

The Effect of Taxation and Corruption on Firm Growth: An Empirical Investigation for Vietnam

Le Thi Ngoc Bich

Post and Telecommunication Institute of Technology, Vietnam

Email: bichltn@ptit.edu.vn

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Abstract

The aim of this study is to analyze empirically the impact of taxation and corruption on the growth of manufacturing firms in Vietnam. The study employed pooled OLS estimation and then instrument variables with fixed effect for the panel data of 1377 firms in Vietnam from 2005 to 2011. These data were obtained from the survey of the Central Institute for Economic Management and the Danish International Development Agency. The results show that both taxation and corruption are negatively associated with firm growth measured by firm sales adjusted according to the GDP deflator. A one-percentage point increase in the bribery rate is linked with a reduction of 16,883 percentage points in firm revenue, over four and a half times bigger than the effect of a one-percentage point increase in the tax rate. From the findings of this research, the author recommends the Vietnam government to lessen taxation on firms and that there should be an urgent revolution in anti-corruption policies as well as bureaucratic improvement in Vietnam.

Keywords: Bribery rate; corruption; instrument variable; fixed-effect method; panel data; small and medium enterprises; taxation; Vietnamese firms.

1. Introduction

Corruption has been a serious matter in Vietnam which can be seen and felt in daily activities, in hospitals, in schools or businesses. According to Corruption Perceptions Index provided by Transparency International (2005-2014), Vietnam has been making progress in reducing corruption, with the upgrade of the corruption perception index (CPI) from 2.6 in 2005 to 3.1 in 2014 (Appendix B). Nevertheless, these improvements seem to be insufficient when Vietnam is still amongst countries facing the most serious bribery problems. Vietnam lags behind other Asian countries, and the impact of corruption on the Vietnamese economy is still ambiguous with a lack of scientific studies for proper analysis and evaluation.

Similarly, taxation, precisely corporate income tax (CIT), has been recently an economic concern for firms in Vietnam. Following the decreasing trend of the tax rate in neighbor countries, the Vietnam government has reduced corporate income tax in an attempt to improve the competitiveness of domestic companies. Vietnam has implemented three important phases of tax reforms, which have been assessed to have substantial impacts on socio-economic development (IMF, 2012). Accordingly, the tax reform of 2006-2010 with numerous amendments and supplements in legislation contributed significantly to the process of economic reform. The CIT rate was reduced from 28% to 25% from January, 1st 2009 and to 20% from January, 1st 2014. Furthermore, it is suggested that the CIT will reduce more in following years (Appendix C). A number of supporters of this policy believe that the tax cut will encourage firms to invest more, attract FDI, and

in turn, will create growth and employment. Moreover, Vietnam has had to face fierce global competition after joining the World Trade Organization (WTO) in 2007, so this change in taxation can promote competitiveness and exports of Vietnamese firms by lessening their financial burden. Especially, this financial relief is necessary for small and medium enterprises (SMEs) that account for over 90% of the number of operating enterprises in Vietnam (General Statistics Office of Vietnam, 2010) since financial deficiency is their big obstacle. However, many experts suspect the efficiency of this policy arguing that tax cuts are not always accompanied with firm growth and investment expansion because the tax burden is only one of the obstacles faced by Vietnamese firms (World Bank, 2015). These experts posit that this matter should be analyzed with the provision of more empirical evidence rather than by assumption.

Given the controversy on the effects of taxation and bribery, the major objective of this study is to measure simultaneously the effects of tax and bureaucratic problems on the Vietnamese economy, with corruption being the variable for illustrating bureaucratic matters. One reason to put taxation together with bribery in this study is that both are considered by authorities as costs or financial barriers for firm growth. The findings in this study will make clear the matters on which the burden of official or unofficial payments should be focused when dealing with policies to improve the business environment in Vietnam. By using micro-level evidence, the findings of this study are likely to highlight more accurate and practical messages on these issues as firms are fundamental ele-

ments in the economy as well as being affected directly by changes in taxation and bribery.

In terms of methodology, this paper will employ the analysis framework suggested in Fisman and Svensson (2007) for Uganda firms. Their paper was outstanding for its methodology and persuasive findings. One advantage of our paper compared with previous studies, including the one of Fisman and Svensson (2007), is that the informative panel data from 2005 to 2011 on SMEs in Vietnam will be employed with a bigger sample size and longer duration of observation. It means characteristics of a larger number of firms are observed not only in one year, but also in four years, allowing specific techniques of panel data to be applied in estimation to eliminate econometric problems for more robust and unbiased results.

The rest of the paper is structured as follows. Section 2 reviews the literature on corruption and taxation. Section 3 describes the methodology for the study. Section 4 presents the findings and discussion of the results, and Section 5 gives policy implications and a conclusion.

2. Literature review

The effects of corruption and taxation on economic growth have been controversial issues in both theoretical and empirical perspectives, with different hypotheses and empirical researches revealing various findings. This section is an overview of important theories and empirical outcomes which have been mentioned in the literature.

2.1. Review of theoretical arguments/models

Concerning the impact of corruption on economic growth, there are two prominent com-

peting hypotheses, namely “sand the wheels” and “grease the wheels” (Méon and Sekkat, 2005). The core of the debate between these two points of view is based on the combination of corruption and a low quality of governance. Numerous support arguments for the “grease the wheels” hypothesis suggest that corruption can have a positive impact on economic growth. These arguments circulate the idea that the ill-functioning of the bureaucracy is considered the most popular inefficiency for which corruption can compensate in various aspects. One concern of inefficient bureaucracy is the slowness in process. Lui (1985) suggests that bribes can be the motivation for government officials to speed up the process and efficiently lessen unnecessary waiting time. Another problem of ill-functioning bureaucracy is the poor quality of civil servants. Leys (1964) and Bailey (1966) argue that this problem can be solved by the existence of corruption. With insufficient wages, the government service sector can hardly attract competent bureaucrats. However, when perks play a role as a complement to their income, they may be willing to work for state units, and the quality of civil servants is improved. Finally, Beck and Maher (1986) and Lien (1986) show that bribery may be a tool for government officials to make proper decisions, especially when they do not have enough information or competency to make right judgments about a firm’s capacity. For example, in systems where firms have to pay bribes to get licenses, permits or government contracts, bribery can play a role as an efficient process for civil servants to distribute limited resources to more generous bribers who can be more efficient at the same time.

The “sand the wheels” hypothesis, meanwhile, is the formal statement of the common sense that corruption is detrimental to economic activities. Many theoretical arguments have been revealed to support this conventional viewpoint. Against the argument that an official can speed up the slow bureaucratic process due to bribery, Myrdal (1968) argues that it is not true in many cases because corrupt officials may also cause unnecessary delays to get more chances for extracting a bribe, which adversely impacts economic activities. The study of Murphy et al. (1991) speculates that bribery is harmful at an aggregate level because it distorts economic incentives, hinders investment and allocates talented people to rent-seeking activities. Furthermore, Kurer (1993) argues that the idea on the improvement in quality of bureaucrats due to corruption is a debatable subject. To preserve their illegal income source, corrupt bureaucrats can cause some distortions in the economy and also have the incentive to prevent new officials’ access (especially talented ones) to important positions in government service. Similarly, the notion that corruption can enhance the possibility of bureaucrats making right decisions is questionable. The association between the ability to pay a high bribe and the high efficiency of bribers is not always true. Mankiw and Whinston (1986) show that permission can be beneficial for firms but disadvantageous for social welfare. These firms pay high bribes to get authorization or permission to enter the market because they find it profitable, while for social welfare their entrance is damaging. In these cases, bribery may not play as an efficient tool for officials’ decisions.

Taking both points of view, Osterfeld (1992)

proposes the classification of corrupt behaviors according to their effects on economic growth. Broadly speaking, corrupt actions can be divided into two types with opposite impacts on economic growth: economically restrictive corruption and economically expansionary corruption. The existence of these types may be subject to the impact of corruption on the possibility of free exchange in an economy. Specifically, he argued that regulation in countries is usually a restrictive force on free exchange, which is crucial for economic growth. If corruption is used as a tool for enterprises to avoid those legal barriers and enhance competitive exchange, then corruption will be an expansionary element in the economy. By contrast, corruption is restrictive if it limits chances for beneficial free exchange and impedes wealth creation.

Concerning theories on taxation, Wanniski (1978) proposes that tax instruments can be used to stimulate economic growth. Accordingly, tax cuts probably improve the incentives of people to work and save more to increase their income, and this, in turn, will become capital resources to boost investment and economic growth (Gale and Samwick, 2016). This opinion seems to coincide with the tax policy of many countries recently, especially in corporate income tax (CIT). The IMF (2012) shows that CIT rates have been fallen gradually in both low-income and high-income countries in order to attract investment, improve competitiveness of domestic firms and the internationally competitive CIT rate currently stands at around 25%. Not only the tax rate, but the range of CIT incentives also continues to be more generous and less complex. For the Asian region,

the average CIT rate in 2011 was 22.78% and it is predicted to reduce more in future years (KPMG International, 2011). However, many argue that the impact of tax cuts on growth is uncertain and complicated, depending on other factors such as the structure of tax, the timing and the state budget. Tax cut competition is likely to be a good condition for multinational firms to transfer price by shifting their profit from high-tax countries to low-tax countries, which is definitely unwanted by governments. Additionally, countries may have to face a federal budget deficit if tax cuts are not accompanied with spending cuts and the expansion of production, which subsequently reduces national savings and raises interest rates in the long term. Moreover, the income effect should be taken into account if income is increased by tax cuts and is probably the reason households lose their motivation to work and for firms to invest in new technology (Gale and Samwick, 2014). Overall, tax policy is still a controversial issue in many countries, with various arguments about its effects.

About the simultaneous effects of bribery and taxation on growth, it is commonly said that bribes are quite similar to tax from a firms' perspective because both can be counted as costs. The main difference is that tax is going to become public revenue while bribes will not. However, Schleifer and Vishny (1993) insist that due to uncertainty, high transaction costs and the secrecy of bribery are likely to be more devastating to firm growth than taxation.

2.2. Review of empirical studies

To give practical evidence on the role of corruption, many empirical studies have been implemented, using both microeconomic-level

and macroeconomic-level data. The study of Mauro (1995), that made use of country-level data consisting of subjective indices of bureaucratic honesty and efficiency, gives empirical evidence on the association between corruption and the economy. His study supports the hypothesis that corruption limits economic growth, impedes investment and negatively changes the government spending structure. The negative relationship between corruption and investment, as well as corruption and growth, found in the paper are robust and significant in both economic and statistic senses. Mo (2001) investigated the role of corruption in economic growth and its transmission channels using the quantitative method. The study finds that a one percentage point increase in the bribery level reduces the growth rate by about 0.72 percentage points. Likewise, the study of Gyimah-Brempong (2001) on the panel data from African countries indicates that corruption decreases economic growth directly through an indirect negative impact on investment in physical capital. Quantitatively, a unit increase in corruption is supposed to be associated with a from 0.75 to 0.9 percentage point reduction in the growth rate of GDP and between 0.39 and 0.41 percentage point reduction in per capita income. The study also implies that corruption affects adversely income equality or put differently, the poor in African countries are affected more negatively than the rich.

On the other hand, the research in Latin America, Sub-Saharan Africa and Transition Countries written by Asiedu and Freeman (2007) provided more complicated empirical evidence about the relationship between investment and corruption at a firm and country level.

The study shows that the role of corruption in investment is negative in most cases, but varies across regions in degree of significance. In more detail, corruption is the most important determinant of investment growth for firms in transition countries, while there is no significant impact found for firms in Latin America and Sub-Saharan Africa. Along those lines, Houston (2007) found the uncertain role of bribery in economic growth in his empirical study using country-level data. This study supports the theory of Osterfeld (1992) about the distinction between restrictive and expansionary economic effects of corruption. He proposed that the relative magnitude of the two forces depends on how property laws are enforced in nations. In countries where property protection is weak, corruption becomes an expansionary economic factor while in stable nations corruption is likely to become a restrictive force. To sum up, these findings are empirical evidence for both the view on the rent-seeking model and the proposition that many corrupt activities can be substituted for weak rule of law.

In Vietnam's case, a study of Nguyen and Van Dijk (2012) compared the difference in the corruption-growth relationship of private and state-owned firms. This paper employs cross-sectional data of 741 private firms and 133 state owned enterprises surveyed in 2005 and finds that corruption is harmful to private firms, but not in the case of state ones. Another study of Bai et al. (2013) investigates whether firm growth leads to lower corruption. The data set of over 13000 observations of Vietnamese firms from 2006 to 2010 was used and they discover that firm growth causes a reduction in bribe extraction, especially for firms with

strong land rights and firms operating in multiple locations. More recently, Nguyen et al. (2016) provoked another dimension of corruption, namely the relationship between corruption and innovation. Using the informative data set on Vietnamese Small and Medium Scale Manufacturing Enterprises from 2005 to 2011, this paper ascertains a strong, robust and significant correlation between these two factors, implying that corruption affects negatively the incentives of Vietnamese firms in many aspects of innovation such as product improvement, new product and new process invention.

Regarding taxation, the empirical research of Engen and Skinner (1996) measured the impact of a major tax reform - a 5 percentage point cut in marginal tax rates - on the long-term growth rate. This study found a moderate effect of tax reform on growth rate, approximately 0.2 to 0.3 percentage points. Yet Engen and Skinner argue that even such small effects, in the long term, can have a big impact on living standards because of their accumulation afterwards. Similarly, Furceri and Karras (2008) used panel data of 19 OECD economies from 1965 to 2003 and estimated a negative persistent association between tax and real GDP per capita. They suggest that a one percentage point increase in total tax rate (calculated by total tax payment ratio to GDP) will reduce the real GDP per capita in the long term by between 0.5 and 1 percentage points. Empirical evidence on the role of taxation in the Vietnamese economy has been concerned but seems to be finite. The recent study of Liu et al. (2012) combined both qualitative and quantitative analyses to clarify the relationship between tax burden and economic growth in Vietnam. Both outcomes from quantitative

and qualitative methods indicated the presence of an excessive tax burden in Vietnam. Following these outcomes, the authors suggested that the Vietnamese government should cut down the tax burden rates by adjusting some tax categories, resize state-owned companies and reduce government spending. In line with the role of tax in economic growth, a survey by Nguyen et al. (2013) was conducted to evaluate the role of corporate income tax (CIT) incentives regime in investment decisions of domestic companies in Vietnam. The results of the survey revealed that CIT incentives ranked only 7th in the check-list of fourteen factors affecting investment decisions, following other elements indicating the business environment such as regulations or capacities of government agencies and infrastructure.

Regarding the simultaneous impact of bribery and taxation, the argument of Schleifer and Vishny (1993) on the more destructive role of corruption compared with taxation in the economy was proven persuasively by the paper of Fisman and Svensson (2007) which is one of the main references for this paper in methodology. Microeconomic data on 243 firms in 5 locations and 14 industries of Uganda were employed to evaluate the impact of both taxation and corruption on firm growth. To solve the econometric problems of endogeneity and measurement errors, the authors used location-industry averages of tax rate and bribe rate as instrument variables for taxation and corruption. Finding the negative relationship of firm growth with bribery, as well as with taxation, and in line with the proposition of Schleifer and Vishny (1993), the study proves that corruption is more harmful to firm growth than taxation.

This implies that when the bribery rate increases by one percentage point, firm growth will reduce by three percentage points, three times higher than the impact of taxation on growth.

In general, the issues of bribery and taxation have been studied at different levels and aspects. For the case of Vietnam, although there are a number of papers taking corruption and taxation at firm-level into consideration, to the best of my knowledge, there is no empirical evidence for the impact of both element on firm growth. By measuring corruption and taxation with intensity which has proved more accurate than a dummy variable (Van Vu et al., 2016), this paper will more precisely reveal these matters, contributing to proper policies on taxation and anti-corruption.

3. Methodology and Data

3.1. Empirical Strategy

In the growth model of firms, human capital and physical capital are necessarily taken into consideration as basic elements according to the Solow growth model (Solow, 1956). In addition, firm growth is potentially impacted by firm size and firm age (Evans, 1987), which are also considered empirically for the case of Vietnam. Moreover, in countries like Vietnam, there can be a difference in growth as well as the effect of corruption on firm growth between state and private companies (Nguyen and Van Dijk, 2012). This element therefore, should be captured in the model to see the discrepancy between two groups.

The empirical linear equation to depict growth of firm *i* in sector *j* in year *t* is shown as follows:

$$\text{Growth}_{ijt} = \beta_0 + \beta_c \text{Bribe}_{ijt} + \beta_t \text{Tax}_{ijt} + \beta_x X'_{ijt}$$

$$+ \lambda_t + u_{ijt} \quad (1)$$

In which:

$Growth_{ijt}$: Dependent variable measuring growth of firm i in sector j in year t

$Bribe_{ijt}$: Bribery burden on firms

Tax_{ijt} : Tax burden on firms. In this study, corporate income taxes considered because this type of tax is the main direct burden which firms actually have to pay from their income.

λ_t : Time-fixed effect is a common factor affecting all firms in year t , presented by dummy variables in the model.

X'_{ijt} : Vector of other explanatory variables for firm growth such as physical capital, human capital, type of ownership, firm size, firm age etc.

β_0 : constant element

$\beta_c, \beta_t, \beta_x$ represent respectively the effect of corruption, taxation and other factors on firm growth.

Disturbance u_{ijt} is decomposed into three parts:

$$u_{ijt} = \beta_0 \theta_{ijt} + \alpha_{ij} + \varepsilon_{ijt}$$

θ_{ijt} : The unobserved time-variant variables which are specific for firms

α_{ij} : The unobserved time-invariant factors which are specific for firms

ε_{ijt} : Zero-mean error term

Data on firm sales is used to calculate tax rate, bribe rate and growth of firms because it represents the growth of firms and is less likely to be manipulated, or misreported. Moreover, its value is always positive, which is easier for using mathematic equations compared with profit or added value. Tax burden to firm i of

industry j in year t is measured by the ratio of tax payment to firm revenue.

$$Tax_{ijt} = \frac{Taxpayment_{ijt}}{Revenue_{ijt}} \quad (2)$$

Similarly, bribery is measured by the ratio of bribery payment to firm revenue:

$$Bribe_{ijt} = \frac{Bribe\ payment_{ijt}}{Revenue_{ijt}} \quad (3)$$

To measure firm growth, firm sales adjusted according to the GDP deflator is used as proxy and the formula is used as follows:

$$Growth_{ijt} = \log(sales_{ijt}/GDPDeflator_t) \quad (4)$$

The omitted variables, θ_{ijt} and α_{ij} , are potentially the causes for biased estimation. The problem of α_{ij} can be solved by employing fixed effect estimation (FE) to eliminate them from disturbance. However, there can be still a richer type of endogeneity when $Bribe_{ijt}$, Tax_{ijt} are correlated with the unobserved time-variant part, θ_{ijt} , in disturbance which cannot be eliminated by the FE method. Fisman and Svensson (2007) solved this problem by using location-industry means of tax rate and bribe rate as instrument variables. The authors supposed that the amount of bribe rate firms have to pay can be decomposed into two parts: one part depending on the common characteristics in year t of location-industry where firms belong to; another part decided by specific features of firms. To be more precise, $Bribe_{ijt}$ can be decomposed into:

$$zBribe_{ijt} = Bribe_{jt} + Bribe_{it} \quad (5)$$

In (5), $Bribe_{jt}$ indicates the location-industry average of bribe rate that is common to firms

in the same location and the same industry and depends on the underlying characteristics of the particular location-industry. $Bribe_{it}$, on the other hand, denotes the remaining part of bribe that is specific for each firm and affected by unique features of them. Fisman and Svensson (2007) used common part of location-industry where firms belong to, $Bribe_{jt}$, as an instrument variable for $Bribe_{ijt}$ to solve the endogeneity problem.

To exploit the instrument variable method (IV), such variable has to satisfy two conditions which are relevance and validity. For the relevance requirement, the instrument variable has to be correlated with the endogenous regressor, $corr(Bribe_{ijt}, Bribe_{jt}) \neq 0$, which can be tested by running regression between them in the first stage. However, the validity condition of IV, which requires $corr(Bribe_{jt}, u_{ijt}) = 0$, cannot be tested because u_{ijt} is unobserved and is usually considered without standard procedures. To argue for the validity of IV, Fisman and Svensson (2007) explained that bureaucrats in each location-industry will base on these common features of location-industry to extract bribery from firms in that area and sector. At the same time, this common part of bribery also depends on the ability or skills of location-industry civil servants in applying pressure to extract bribery from firms. This means the factors deciding the amount of $Bribe_{jt}$ are all exogenous to firms or not relevant to u_{ijt} of the model. So with these explanations, the assumption on the validity of the instrument variable can be met, $corr(Bribe_{jt}, u_{ijt}) = 0$ or $Bribe_{jt}$ is valid to be used as an instrument variable for $Bribe_{ijt}$ to solve the problem of endogeneity from remaining unobserved variables.

In this study, for the panel data from 2005 to 2011 of Vietnam SMEs, the average of firms in the same province, same industry for each year, namely location-industry-year bribe rate average, will be used as an instrument variable for the bribe rate of firms. According to Fisman and Svensson (2007) and previous authors (Wald, 1940; Krueger and Angrist, 2001), using grouped averages as IVs is also a solution to reduce bias from measurement errors which is a common problem for empirical analyses.

Similarly, Fisman and Svensson (2007) argued that in corrupt countries where bureaucrats have the power of the harassment offices, it can be expected that the association between taxation and firm growth works in the same mechanism as between corruption and firm growth. Precisely, the relationship between taxation and firm growth can be biasedly estimated due to the omitted variables which can be time-variant or time-invariant. To solve this problem, identically, the FE approach is used to eliminate the bias caused by the correlation between unobserved time-invariant factor α_{ij} and tax rate. For the richer type of endogeneity, correlation between unobserved time-variant variable θ_{ijt} and firm growth, IV for tax rate is also a solution. Correspondingly, the tax rate of firms (the ratio of tax payment to sales) can be divided into two parts:

$$Tax_{ijt} = Tax_{jt} + Tax_{it} \quad (6)$$

Tax_{jt} indicates location-industry-year average value of the tax rate and Tax_{it} is a specific endogenous part for firms. Similar to the bribe rate, the location-industry-year average of tax rate can be used as IV for tax rate to solve the problem of endogeneity with two criteria on the relevance and validity of IV. The relevance re-

quirement, $\text{corr}(\text{Tax}_{ijt}, \text{Tax}_{jt}) \neq 0$, must be tested by regression in the first stage. The criterion on the validity of IV for taxation, $\text{Corr}(\text{Tax}_{jt}, \theta_{ijt}) = 0$, can be argued in the same way as that of bribery. Specifically, this common part in the tax rate depends on conditions of that location-industry, including legal frameworks on taxation and the talent and intention of tax officials in applying tax regulations. These factors are expected to be exogenous to firms or $\text{Corr}(\text{Tax}_{jt}, \theta_{ijt}) = 0$.

In short, after pooled OLS estimation is used as the initial step; FE and IVs for tax rate and bribe rate will be employed as the main method of this study.

3.2. Data

The data employed in the paper is mainly withdrawn from the Survey of Small and Medium Scale Manufacturing Enterprises (SMEs) in Vietnam from 2005 to 2011. The Central Institute for Economic Management (CIEM) and the Danish International Development Agency (DANIDA) initiated this survey in 10 provin-

es of Vietnam every two years and gathered information of 4161 firms with 10667 observations in 12 manufacturing industries. (The list of provinces and industries can be found in Appendix A). Two types of questionnaires covering many aspects of firms were used in the survey, one concerning main features and performance of enterprises and another collecting information at the individual level such as wages, working environment and job satisfaction of workers.

Out of 4161 firms surveyed, 1164 firms were observed in only one year, 950 firms in two years, 585 firms in three years and the data of 1462 firms was available in all four years (2005, 2007, 2009 and 2011). In the panel data of this study, we consider only firms observed over four years to analyze operation of enterprises over a long period of time.

The number of observations of some variables used in this study may be less than the total sample due to the lack of data of some firms (Table 1). There are 88 missing observations of

Table 1: Summary statistics

Variables	N	Mean	Sd	Min	Max
Enterprise_id	5,508	3,349	1,204	4	5,242
FirmAge	5,488	14.64	10.54	2	77
Growth	5,508	13.56	1.632	8.796	22.84
Tax rate	5,508	0.00802	0.0181	0	0.270
Bribe rate	5,508	0.00148	0.0100	0	0.426
Firmsize	5,496	1.800	1.121	0	6.215
Human	5,506	0.0249	0.0593	0	0.800
Ownership	5,508	0.262	0.440	0	1
Physical capital (K)	5,508	13.61	1.829	6.345	19.56
Sector	5508	0.46	0.499	0	1

Note: Monetary values are adjusted according to GDP deflator 2010 of World Bank

bribe payment, 2 for sales and 1 for tax payment. Totally, we have 90 missing observations for main variables in total which are all excluded from the data set.

Physical capital (k) with no missing observation in the main data set is represented by logarithm of physical capital volume adjusted by the GDP deflator and also expected to be positive, implying the higher firm growth for higher capital capacity.

Firm size is measured by the logarithm of employee numbers, with values ranging from 0 to 7.56. A positive value for firm size implies that firms with a larger workforce are likely to perform better and vice versa. There are 12 missing observations for firm size in the data set.

Human capital is measured by the rate between number of professionals and total number of the workforce. Two missing values are found in the data set. Human capital is expected to be positive, indicating that when the proportion of professionals in workforce of firms is high, firms will grow better.

Another explanatory variable is the type of ownership which possibly influences firm growth because it can decide the structure of firms or each type can be under the control of different regulations. This variable is represented by a dummy variable which is equal to 0 if the firm is family-owned and 1 if the firm is joint-stock. State-owned companies do not exist in the data set. The estimation result for this variable in the main data will show us whether there is a difference in performance between family-owned and joint-stock firms.

In addition, firm age is used as an explanatory variable for firm growth because the number

of operating years can affect market position, management degree, networks or ability of adapting new technology...of firms. It is calculated by the operating year from the established year to the surveyed years and has values from 2 years to 77 years.

In pooled OLS estimation, a dummy variable for the sector is added into the model to see the difference in growth of different sectors. According to the classification of manufacturing industries based on R&D intensities of OECD (2011), 12 industries in this study are categorized into two groups: low-technology and medium & high-technology. Value for the sector is equal to 1 if firms belong to medium and high-technology industries and equal to 0 if they are low-technology.

A Provincial Competitiveness Index (PCI) is also included in the model. PCI is a reliable index, administrated and published annually from 2005 by the Vietnam Chamber of Commerce and Industry (VCCI). PCI is evaluated based on many criteria about the quality of economic governance across 63 provinces in Vietnam such as land access, entry cost, transparency and business support services etc. By adding this variable in the model, the effect of the business environment on firm revenue will be captured. It is expected to have a positive impact, implying that firms located in provinces with better governance (high PCI) will grow more prosperously.

4. Results

This part will present the estimation results using pooled OLS and then the FE-IV method for the data set.

4.1. OLS estimation

Table 2: Pooled OLS regression

Variables	Growth	Growth	Growth	Growth	Growth	Growth	Growth
Tax	9.440 (7.74)***	-4.250 (6.62)***	-4.724 (7.44)***	-4.959 (7.84)***	-5.023 (8.01)***	-5.841 (9.12)***	
Bribe	4.303 (1.97)**	-4.637 (4.10)***	-4.650 (4.17)***	-4.883 (4.40)***	-5.065 (4.61)***	-5.333 (4.86)***	
D2007	0.199 (3.20)***	0.086 (2.65)***	0.088 (2.77)***	0.082 (2.58)***	0.107 (3.36)***	0.105 (3.30)***	
D2009	0.267 (4.30)***	0.213 (6.59)***	0.211 (6.64)***	0.204 (6.45)***	0.249 (7.80)***	0.202 (6.15)***	
D2011	0.306 (4.91)***	0.225 (6.79)***	0.218 (6.64)***	0.203 (6.20)***	0.231 (7.07)***	0.183 (5.46)***	
K		0.260 (29.99)***	0.246 (28.52)***	0.244 (28.36)***	0.246 (28.85)***	0.242 (28.47)***	
Firmsize		0.933 (66.87)***	0.892 (62.87)***	0.841 (53.63)***	0.830 (53.17)***	0.832 (53.46)***	
Human			2.536 (12.06)***	1.833 (7.98)***	1.735 (7.63)***	1.697 (7.48)***	
Ownership				0.274 (7.44)***	0.240 (6.57)***	0.234 (6.42)***	
FirmAge					-0.010 (9.64)***	-0.010 (9.09)***	
Sector					0.062 (2.76)***	0.056 (2.47)**	
Pci						0.013 (5.86)***	
_cons	13.281 (286.66)***	8.254 (81.59)***	8.457 (83.51)***	8.536 (84.24)***	8.640 (85.06)***	8.010 (54.24)***	
R ²	0.02	0.74	0.74	0.75	0.75	0.75	
N	5,508	5,496	5,496	5,496	5,476	5,476	

Note: *** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

In pooled OLS regression, dummy variables are used to capture common changes of all firms in each year. The result for pooled OLS estimation is shown in Table 2.

The coefficients for taxation and bribery change dramatically before and after other explanatory variables are added. In the first regressions when only tax rate, bribe rate and fixed year dummy variables are taken into account, the coefficients for both tax and bribe rates are substantially large, positive and strongly significant. However, these positive relationships become smaller when more explanatory variables are considered and turn negative afterwards. This indicates that the effect of omitted variables in the initial stages is captured by taxation and bribery, which makes the estimation biased. In the final regression when all explanatory variables are added, the impact of bribery and taxation on growth is quite similar and both turn negative and statistically significant. For taxation, the result implies that with a one-percentage point increase in tax rate, the firm revenue will reduce by 5.841 percentage points. Similarly, the coefficient of bribery indicates that when the bribe rate increases by one percentage point, the sales of firms will reduce by 5.333 percentage points. Both coefficients are strongly significant at 1%.

The coefficients for human capital, physical capital, firm size and PCI all indicate positive and significant influence on firm growth as expected. The positive value of ownership implies that joint-stock firms tend to grow better than family-owned ones. The impact of firm age reveals that new firms significantly grow better than older firms by around 1 percentage point.

The results show that being a medium/high-technology manufacturer, a firm is approximately 6% more likely to have better growth than that of low-technology sectors. Dummy variables for year effect (year_2007, year_2009, year_2011) show that in general, firm revenues follow an upward trend in comparison with the base year 2005; and in 2011, revenue of firms decreases slightly compared with 2009.

4.2. Fixed effect estimation with instrument variables (FE-IV)

The first stage estimation for relevance of Ivs (Table 3) indicates a strong association of the tax rate with the location-industry-year average of tax ratio. Similarly, in Table 4, the association of bribe rate and location-industry-year average of bribe rate is also found.

The findings in Table 5 show that the coefficients of taxation follow a quite stable pattern and they are statistically significant in all regressions. The size of effect explained by absolute values does not change considerably before and after adding more control variables, fluctuating between the smallest value of 2.805 and the biggest of 3.570. The final regression with the biggest absolute value implies that when the tax rate increases by one percentage point, the revenue of firms will reduce by 3.570 percentage points and this relationship is strongly statistically significant at 5%. By contrast, the association of bribery with firm sales changes substantially among regressions in both absolute values and the degree of significance, but always stays negative in all cases. In the regression with only bribe rate, tax rate and dummy variables for year effects, the result implies that when the bribe rate increases by

Table 3: First-stage regression for tax

(FE-IV method)						
Number of obs = 5384						
F(11, 3) = 123.58						
Prob > F = 0.0011						
Tax	Coef	Std.Err	T	P>t	[95% Conf]	Interval
K	-.0006387	.0004105	-1.56	0.218	-.001945	.0006676
Firmsize	-.0009129	.0005723	-1.60	0.209	-.0027343	.0009085
Human	.0030961	.0080122	0.39	0.725	-.0224024	.0285945
Ownership	.0031307	.0020636	1.52	0.227	-.0034365	.0096979
Firmage	.000057	.0000453	1.26	0.298	-.0000873	.0002012
Pci	.0000211	.0000461	0.46	0.679	-.0001256	.0001677
Year_2007	-.000392	.0003709	-1.06	0.368	-.0015723	.0007884
Year_2009	-.0004711	.0003654	-1.29	0.288	-.0016338	.0006917
Year_2011	-.0003777	.0006051	-0.62	0.577	-.0023034	.0015479
mean_tax	.9445554	.060013	15.74	0.001	.7535673	1.135543
mean_bribe	.019177	.0634562	0.30	0.782	-.1827691	.221123

Included instruments: k firmsize human ownership firmAge pci year_2007
year_2009 year_2011 mean_tax mean_bribe

F test of excluded instruments:
F(2, 3) = 125.57
Prob > F = 0.0013

Angrist-Pischke multivariate F test of excluded instruments:
F(1, 3) = 249.03
Prob > F = 0.0006

one percentage point, the firm sales decrease by 9.979 percentage points, but this association is not statistically significant until firm size and physical capital are added in the model. In the last regression, the bribery coefficient indicates that a one percentage point increase in the bribe rate is associated significantly at 5% with a 16.883 percentage point reduction in firm sales.

Regarding other variables, no considerable discrepancy can be found compared with the results of the OLS method, except firm age that turns from a negative to a positive role in firm growth. The coefficients of human capital, physical capital, type of ownership, firm age

and firm size remain positively and statistically significant. Meanwhile, the PCI coefficient is also positive, but not statistically different from zero. Dummy variables for common year effects also show an upward trend in firm revenue during this time.

These findings are consistent with several previous studies in showing the negative linkage between taxation and growth such as in the case of OECD countries in the study of Furceri and Karras (2008), as well as corruption with growth in the study on African economies of Gyimah-Brempong (2001), although the magnitude of coefficients in this paper is much big-

Table 4: First- stage regression for bribe rate

(FE-IV method)						
Number of obs = 5384						
F(11, 3) = 8.72						
Prob > F = 0.0403						
Bribe	Coef	Std.Err	T	P>t	[95% Conf]	Interval
K	.0001214	.000081	1.50	0.231	-.0001362	.0003791
Firmsize	.0001778	.000569	0.31	0.775	-.0016331	.0019888
Human	-.0016944	.0029332	-0.58	0.604	-.0110293	.0076406
Ownership	-.0000321	.000191	-0.17	0.877	-.0006399	.0005757
Firmage	5.22e-06	.0000164	0.32	0.771	-.0000469	.0000574
Pci	9.70e-06	.0000283	0.34	0.754	-.0000804	.0000998
Year_2007	-.0002067	.0004063	-0.51	0.646	-.0014996	.0010862
Year_2009	-.000251	.0003212	-0.78	0.492	-.0012732	.0007713
Year_2011	-.0002858	.0002549	-1.12	0.344	-.0010971	.0005254
mean_tax	-.0222056	.026143	-0.85	0.458	-.1054042	.060993
mean_bribe	.9345886	.2431472	3.84	0.031	.1607855	1.708392

Included instruments: k firmsize human ownership firmAge pci year_2007
year_2009 year_2011 mean_tax mean_bribe
F test of excluded instruments:
F(2, 3) = 7.39
Prob > F = 0.0493
Angrist-Pischke multivariate F test of excluded instruments:
F(1, 3) = 14.77
Prob > F = 0.0311

ger.

Similarly, compared with the study of the case of Uganda by Fisman and Svenson (2007) using quite similar economic techniques, the coefficients of taxation and corruption in this study are much larger in absolute value. Both studies employ micro-level data sets with IVs for two main variables and show the detrimental impact of them on growth, but the estimators on growth for the case of Vietnam show a more serious influence than that of Uganda. More precisely, the latter found that a one-percentage point increase in the bribery rate will lead to

a 3 percentage point reduction in firm growth and this effect is about three times greater than that of the tax rate. For the former, the result indicates that when the tax rate increases by one percentage point, the firm revenue will reduce by 3.57 percentage points and that impact is about 4.7 times smaller than that of the bribery rate. Generally, the devastating impact of both taxation and bribery on firms are proven in both studies and both show evidence on the suggestion of Schleifer and Vishny (1993) that bribery is more harmful than taxation in such countries. However, there is a big difference in

the size of the absolute values for these impacts between the results of two papers. One possible explanation for the bigger values in Vietnam's case is that bribery and taxation are actually more serious barriers in the studied period for Vietnamese SMEs. According to Transparency International, in 2007 Uganda ranked 111/175 among countries in the world with a corruption problem while Vietnam ranked 123/175 (Appendix B). Furthermore, Appendix E showing Worldwide Governance Indicators of World Bank by country can be an overall description for the business environment in Uganda and Vietnam. Precisely, Vietnam is worse than Uganda for many years in regulatory quality, rule of law and voice & accountability, which are crucial for economic growth. When it comes to the purposes of bribery payment in the data, around 25% of firms revealed that they paid bribery to access public services, 25% said they paid to solve tax matters and 12% of firms used it to get government contracts. Based on these facts, it can be explained that the difference in estimation results is because of the differences in governance degree of countries, which is not captured in the model. The burden of regulation, rule of law and lack of accountability accompanying each percentage rate of bribes and the tax firms have to charge can be the reason the estimation results are overestimated in Vietnam's case. This explanation is quite similar to the notion of Fisman and Svensson (2007). They posited that: "Admittedly, if government officials systematically increase both the regulatory burden and demands for bribes for some industry-locations, then our instrument procedure would over-estimate the negative effect of bribery payment" (Fisman and

Svensson, 2007, 67). For the situation of Vietnam in fact, this phenomenon is very serious in many industry-locations because of a complicated and frustrating regulation system as well as authority structure. Civil servants create many delays not only to have more chances to extract bribery from firms, but in many cases they intend to show their power over people. Unqualified and irresponsible bureaucrats combined with an inefficient obsolete system can take firms a whole day or many days to get a simple document from them, even when they have paid a bribe for that. Secondly, an unclear and complicated structure in the public service is a big barrier for firms operating in Vietnam. In many cases, firms have to use their personal relationship, waste a lot of time, effort and money to meet the right person in charge of their matters or in many cases for useless things from the wrong people. Furthermore, the lack of efficiency and consistency in regulation publication, including in taxation, may be one reason for overestimation of the bribery and taxation effect. Laws and regulations in many cases are incomplete and ambiguous and can have different and contradictory interpretations from different government agencies. Many newly-published rules have been revised after being applied in a very short time, which is likely to be a big difficulty for firms to follow and also a chance for officials to extract bribery. To sum up, the existence of two bureaucratic burden types, namely regulatory burden and financial burden, can be a reason for the large estimated results of bribery and taxation effect on firm performance in Vietnam.

Another explanation for this result is because of the difference in methodology be-

Table 5: Fixed effect estimation using IVs

	Growth	Growth'	Growth	Growth	Growth	Growth	Growth
Tax	-2.805 (1.95)*	-3.176 (1.70)*	-3.483 (1.92)*	-3.504 (1.92)*	-3.413 (2.04)**	-3.570 (2.04)**	
Bribe	-9.979 (1.43)	-14.828 (1.83)*	-15.258 (1.87)*	-15.484 (1.87)*	-15.919 (1.95)*	-16.883 (1.97)**	
year_2007	0.112 (7.48)***	0.111 (5.98)***	0.111 (6.10)***	0.110 (5.94)***	0.102 (5.53)***	0.102 (5.59)***	
year_2009	0.196 (10.52)***	0.217 (10.28)***	0.216 (10.42)***	0.215 (10.22)***	0.196 (9.01)***	0.185 (5.86)***	
year_2011	0.220 (11.00)***	0.260 (10.40)***	0.257 (10.68)***	0.254 (10.24)***	0.243 (9.59)***	0.232 (6.62)***	
K		0.117 (16.18)***	0.116 (16.54)***	0.115 (16.63)***	0.115 (16.80)***	0.113 (17.46)***	
Firmsize		0.631 (17.36)***	0.634 (18.26)***	0.632 (18.19)***	0.628 (18.31)***	0.629 (18.45)***	
Human		0.902 (7.52)***	0.854 (6.60)***	0.854 (6.60)***	0.863 (6.81)***	0.862 (6.78)***	
Ownership				0.101 (2.60)***	0.099 (2.59)***	0.099 (2.57)**	
firmAge					0.002 (1.97)**	0.002 (1.98)**	
Pei						0.003 (0.67)	
R²	0.03	0.22	0.23	0.23	0.22	0.21	
N	5,508	5,460	5,460	5,460	5,384	5,384	

Note: *** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

tween the two studies. The FE method with IVs using panel data is likely to have many advantages over OLS with IVs used in the previous paper. As discussed above, if only the OLS method with IVs is used, there still exists an endogeneity problem in which assumption on the validity of IVs can be invalid because of their correlation between instruments omitting time-invariant variables. Combining IVs with FE, the validity of the assumptions for IVs can be improved by eliminating this correlation.

Although two main econometric problems have been considered and solved by using the FE method with IVs, there can still be some remaining issues which can make the result biased to some extent. One of the most important matters is the validity of the assumption on IVs for taxation and corruption. By using FE with IVs, the endogeneity problem caused by unobserved time-invariant and many time-variant variables can be dealt with. However, it does not mean that the averages of bribe and tax rates as IVs are not correlated with remaining omitted time-variant variables which have not been discovered in this paper. More studies with better econometric techniques can be helpful to supplement this model for less biased estimation. About the measurement error problem, this survey was designed not particularly for a taxation and corruption study; therefore firms can easily give incorrect answers because of the big volume of information, lack of well-designed questions and many other factors... Put differently, measurement errors can also be one of the reasons for making results biased although the averages of location-industry-year are used as IVs to diminish this problem. For example, when most firms tend to underreport their brib-

ery payment, an actual large amount will be replaced by a smaller value. Therefore, the effect of each percentage increase in the bribe rate will be exaggerated or the coefficient of bribery in regressions will be bigger in absolute value while their negative links are unaffected.

5. Policy implication and conclusion

Employing the rich panel data of Vietnamese Small and Medium Scale Manufacturing Enterprises (SME) using the fixed effect method and instrument variables to deal with main econometric problems, this paper provides more empirical evidence about the role of taxation and corruption on firm growth. The magnitude of coefficients is different from previous studies due to various reasons; however, the finding supports the prominent concept of the “sand on the wheels” hypothesis, as well as the negative impact of taxation on firm growth. Moreover, being consistent with the argument of Schleifen and Vishny (1993) and empirical results in the study of Fisman and Svensson (2007), the higher degree of detrimental effect of corruption on the economy compared with taxation is indicated in this study.

The outcome of this analysis, coupled with previous findings, implies some recommendations for policy in Vietnam. Firstly, the negative link of taxation with firm growth, which is consistent with the conclusion from Liu et al. (2012), suggests that the Vietnamese government should lessen the tax burden on firms, especially corporate income tax. For this task, the government can implement a tax system with a larger proportion of tax revenue from other tax types such as indirect tax, personal income tax or property tax which still accounts for a modest part in the total tax revenue of Vietnam.

This policy will probably not only eliminate the price transfer problem of multinational companies, but also help domestic companies, mostly being small and medium enterprises, to enlarge their financial constraint, and government revenue deficit will be replaced by other tax categories at the same time. Secondly, similar to the indication of previous studies, the negative effects of bribery on Vietnamese firms in particular and the Vietnamese economy in general are clear, requiring urgently further anti-corruption solutions from government to create a better business environment for enterprises.

The destructive impact of each percentage increase in the bribe rate in comparison with that of the tax rate estimated in the study shows that regulation to fight against corruption is even much more demanding than priorities from the tax rate. The notion is quite similar to the implication from the previous survey of Nguyen et al. (2013) on the rank of factors influencing investment decisions of firms. The findings in their survey also showed that CIT incentives are less important than regulations, business environment or capacities of government agencies in determining investment decisions of firms.

To improve the business environment, the Vietnamese government should pay special attention to explore effective solutions in curbing corruption. Firstly, corrupt behaviors should be taken seriously in the legal framework with heavy punishments. This measure, which has been implemented strictly in China, can be a barrier for both bribers and corrupt officials to engage in bribery. A complicated and less transparent bureaucratic system is likely to be a main cause for bribery and a factor to exagger-

ate the negative impact of each percentage tax rate and bribery rate in Vietnam. Therefore, a solution for this issue is to simplify bureaucratic procedures, especially in public services and the tax system. Recently, the Prime Minister has approved the proposal 896 on simplifying administrative procedures, citizenship papers and databases related to managing residents for the period from 2013 to 2020. Following this scheme, many regulations and public services have been replaced, dropped or encouraged to be done on an online platform. For instance, the number of enterprises using the online tax declaration system increased from 65% to 95% and many unnecessary documents relating to taxation have been abolished. The total time for paying tax by firms has been reduced approximately by 290 hours per year and may reduce further when the revised tax law is validated from January, 1st 2015 (Ministry of Justice, 2015). However, administrative procedures and control of government in administrative procedures still have many shortcomings, requiring stricter management. Administrative procedures in many areas remain complex and continue to be barriers for enterprises and people's lives. Procedures in many ministries have been slow and have not seriously implemented the assessment and consultation for drafts of legal documents. Consequently, the publication of legal documents has not been timely and complete.

Another matter that should be taken into account in the bureaucracy of Vietnam is the quality of civil servants in government service. The existence of "ascribed status" in which people informally inherit positions in government sectors from their relatives, no matter

what their qualifications, has been a dominant issue in Vietnam. Additionally, bribery to buy seats in the government sector is also a common and obvious problem. This mechanism is attributed to the poor quality of bureaucrats and governance of the country. To cope with this issue, recruitment for official positions should be declared transparently and inspected strictly during examinations. A proper wage system for officials should be implemented at the same time to attract talented people to the public service as well as eradicate corruption (Rijckeghem and Weder, 2001).

This research still reveals some shortcomings due to the limited time for the conducting of the research and problems in the data set and methods used. Therefore, estimation on more well-designed data sets can give more reliable results. Additionally, more effective estimation techniques to solve econometric problems, especially endogeneity and measurement errors, can also help to improve the correctness of findings.

In conclusion, matters on taxation and corruption in Vietnam and other countries still require further understanding from various aspects. This study considers only a small problem relating to these issues, giving an overall picture on their effect on firms. From a firm perspective, the issues such as through which transmission channels taxation and bribery affect firm growth still need to be studied in more detail. Besides firm performance, employment or wages of employees can also be relevant to taxation and corruption, which should be made clear in other researches. In addition, corruption is likely to have an impact not only on firms, but also on people from other walks of life in society. Bribery in hospitals to access health services or in the education system exists as a dominant issue in Vietnam, leaving very serious social consequences, especially disadvantage to the poor. These social issues should be taken into consideration in other scientific studies to give insightful understanding and proper policy recommendations to the government of Vietnam.

APPENDIX

Appendix A: Name of industries and provinces surveyed

No.	Industries	No.	Provinces
1	Manufacture of food product	1	Hanoi
2	Manufacture of beverages	2	Phu Tho
3	Manufacture of textiles	3	Ha Tay
4	Manufacture of wearing apparel and leather products	4	Hai Phong
5	Manufacture of wood products	5	Nghe An
6	Manufacture of paper products	6	Quang Nam
7	Manufacture of printing and reproduction of recorded media	7	Khanh Hoa
8	Manufacture of petroleum products, chemical, pharmaceutical, plastics	8	Lam Dong
9	Manufacture of non- metallic mineral products	9	Ho Chi Minh city
10	Manufacture of basic metal products	10	Long An
11	Electronic products, equipment, machinery, transport equipment		
12	Manufacture of furniture and others		

Appendix B: Facts on corruption and bureaucracy in Vietnam

CPI of Vietnam and Uganda

Year	Vietnam (CPI/Rank)	Uganda (CPI/Rank)
2005	2.6/ 107	2.5/117
2006	2.6/111	2.7/105
2007	2.6/123	2.8/111
2008	2.7/121	2.6/126
2009	2.7/120	2.5/130
2010	2.7/116	2.5/127
2011	2.9/112	2.4/143
2012	3.1/123	2.9/130
2013	3.1/116	2.6/140
2014	3.1/119	2.6/142

Source: Collected from Transparency International (2005-2014)

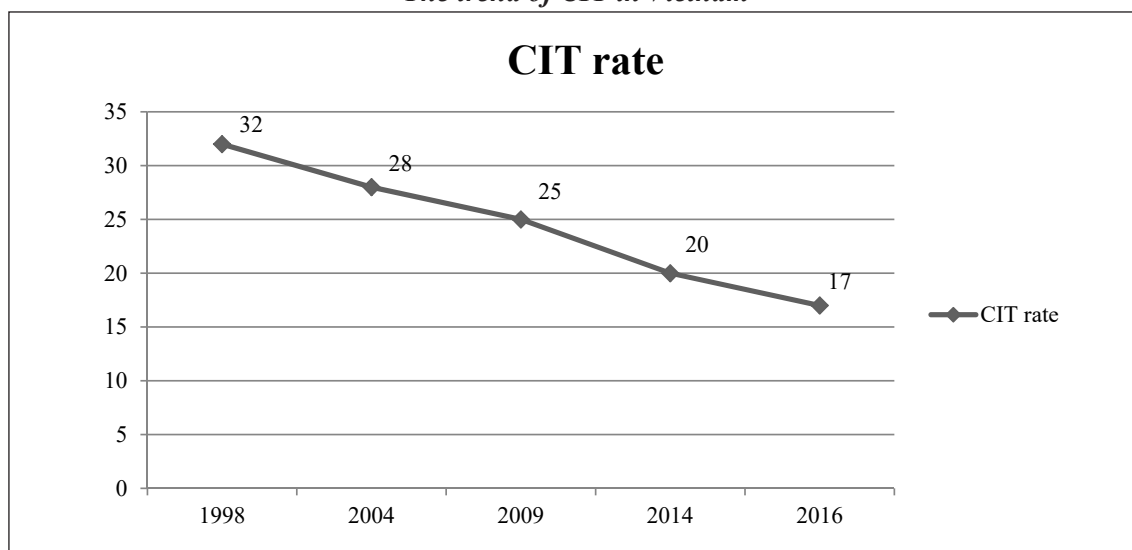
Bureaucratic and legal facts in Vietnam

Indicator Name	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Business extent of disclosure index (0=less disclosure to 10=more disclosure)	3	3	6	6	6	6	6	6	7	7
Strength of legal rights index (0=weak to 12=strong)	5	5	7	7	7	7	7	7	7	7
Time required to enforce a contract (days)	400	400	400	400	400	400	400	400	400	400
Procedures to enforce a contract (number)	36	36	36	36	36	36	36	36	36	36
Time required to register property (days)	67	67	67	57	57	57	57	57	57	57
Procedures to register property (number)	4	4	4	4	4	4	4	4	4	4
Cost of business start-up procedures (% of GNI per capita)	27,6	24,3	20	16,8	13,3	12,1	10,7	8,8	7,7	5,3
Time required to start a business (days)	42	47	37	37	37	36	36	32	34	34
Start-up procedures to register a business (number)	11	11	11	11	11	10	10	10	10	10
Time to prepare and pay taxes (hours)	1050	1050	1050	1050	1050	941	941	872	872	872

Source: The World Bank (2015)

Appendix C: The trend of corporate tax rate in Vietnam

The trend of CIT in Vietnam



Source: Vietnam Tax Law (1997, 2003, 2008, 2013)

Appendix D: Test on fixed effects and time-fixed effects

Hausman Test on Random and Fixed Effects

	(b) fixed	(B) random	(b-B) Difference	Sqrt(diag(V _b - V _B))
Tax	-7.372953	-6.503377	-8.695758	.1610691
Bribe	-3.274693	-4.117454	.8427612	.1434205
Human	.9112061	1.475404	-.5641976	.0721722
Physical capital	.126152	.2041306	-.0779785	.0052727
Ownership	.1296973	.3425145	-.2128172	.0348967
Firm size	.5934516	.7894399	-.1959884	.0138239
Firm age	.0045232	-.0027664	.0072896	.0007335
PCI	.013202	.0163591	-.0031571	.0013576

b= consistent under Ho and Ha; obtained from xtreg

B= inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\text{Chi2}(8) = (b-B)'[(V_b - V_B)^{-1}](b-B)$$

$$= 465.48$$

$$\text{Prob} > \text{chi2} = 0.0000$$

Prob>chi2 = 0.0000 < 0.05, so fixed effect option should be used

Test for Year-Fixed Effects

.testparm _Iyear*

(1) _Iyear_2007 = 0

(2) _Iyear_2009 = 0

(3) _Iyear_2011 = 0

F(3, 4027) = 28.65

Prob > F = 0.0000

The Prob>F is <0.05, so the null hypothesis that the coefficients for all years are jointly equal to zero can be rejected, therefore time fixed effects are needed in this case.

Appendix E: Governance indicators of Uganda and Vietnam

Country	Series Name	2004	2005	2006	2007	2008	2009	2010	2011
Uganda	Control of Corruption	-0.747059	-0.8463023	-0.7539449	-0.7976808	-0.8305356	-0.8871339	-0.9043889	-0.8553036
Uganda	Government Effectiveness	-0.3445083	-0.538458	-0.4811039	-0.4090806	-0.5744343	-0.616434	-0.5203159	-0.5142586
Uganda	Political Stability and Absence of Violence/Terrorism	-1.296	-1.4332918	-1.1594043	-0.9619036	-0.9086396	-0.9895654	-1.0057549	-0.9867951
Uganda	Regulatory Quality	0.0041279	-0.1789024	-0.2042091	-0.1957967	-0.2155984	-0.1493776	-0.1547709	-0.1405176
Uganda	Rule of Law	-0.634746	-0.5626411	-0.3359891	-0.3794556	-0.3779111	-0.4183059	-0.3913537	-0.3464702
Uganda	Voice and Accountability	-0.652038	-0.5283067	-0.4191726	-0.4707309	-0.5031459	-0.4973373	-0.5014085	-0.5309896
Vietnam	Control of Corruption	-0.7515596	-0.7625951	-0.7439528	-0.635259	-0.7265516	-0.5347947	-0.6279594	-0.6146982
Vietnam	Government Effectiveness	-0.4433549	-0.2008869	-0.20117	-0.2175584	-0.2029867	-0.2486035	-0.2625495	-0.231798
Vietnam	Political Stability and Absence of Violence/Terrorism	0.13662074	0.46182263	0.36870687	0.21376859	0.13631895	0.23893752	0.10658007	0.16842645
Vietnam	Regulatory Quality	-0.5394883	-0.5703288	-0.593082	-0.5320479	-0.6054119	-0.6179878	-0.612002	-0.5946119
Vietnam	Rule of Law	-0.476159	-0.2365295	-0.434436	-0.4106814	-0.3997038	-0.4740646	-0.5268919	-0.4831923
Vietnam	Voice and Accountability	-1.3746303	-1.4156142	-1.509865	-1.4974618	-1.4742114	-1.4626456	-1.4764487	-1.4197319

Source: Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010)

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