

The effects of corruption on the human capital accumulation process: Evidence from Vietnam*

Truong Thi Hoa^{1,2}

¹Graduate School of Asia-Pacific Studies, Waseda University, Tokyo, Japan

²Faculty of Economics, Ho Chi Minh City University of Technology and Education, Ho Chi Minh city, Vietnam

Correspondence

Truong Thi Hoa, Graduate School of Asia-Pacific Studies, Waseda University, Tokyo, Japan.

Email: hoatruong@toki.waseda.jp;
hoatrt@hcmute.edu.vn

Abstract

This study aims to identify the effects of corruption on the human capital accumulation process in Vietnamese provinces/cities. I employ labour quality assessments of firms as a proxy for human capital and divide human capital accumulation into the following two processes: an educational process and a process through which educational outcomes and worker training transform into labour quality. The estimation results have some notable implications for the Vietnamese context. Corruption has both negative and positive effects on human capital. On the one hand, corruption reduces the positive effect of local government spending on educational achievements and worsens labour quality. On the other hand, the prevalence of corruption in provinces/cities increases the advantages of local schools in the competition to obtain funds from the central government; hence, corruption enhances educational achievements in those regions. The results of this study indicate that corruption adversely affects human capital overall.

KEYWORDS

corruption, education, human capital, Vietnam

JEL CLASSIFICATION

D73; H75; J24; P36

*I am deeply thankful to Professor Kato Atsushi for his patience and constructive comments on the previous versions of this manuscript. I also thank Alexandra Roulet, the Editor and a referee for their work and constructive comments that helped me improve my paper.

1 | INTRODUCTION

Since its economic reform in 1986, Vietnam has performed remarkably well according to human development indicators, including educational outcomes. The country stands out because of its significant achievements in education in terms of both quantity and quality. A report by the Vietnam Ministry of Education and Training shows that youth literacy rates have increased rapidly and reached 96.8% in 2012. Vietnam has also succeeded in making significant progress toward a commitment to universal primary education. In 2013, the net enrolment rates for primary education and lower secondary education were 98.31% and 88.04%, respectively.¹ Vietnam has shown improvement in terms of both access to education and the quality of education. When Vietnam joined the PISA² in 2012, Vietnamese students amazed experts around the world with their outstanding results, particularly considering that Vietnam is a lower middle-income nation. In 2012, Vietnam ranked among the top 20 economies with the highest scores, and its score was higher than the mean score of OECD countries/economies.³ In 2015, the country maintained its stunning record and ranked 8th in science at 525 points, which is better than the average score of OECD countries/economies (OECD, 1992, 2016).

Despite all the achievements acknowledged by international organizations, the Vietnamese education system has two major problems that concern the public, the government and scholars. The first is the criticism that educational outcomes do not meet social requirements (Trần, 2011). A report by the World Bank reveals that although the Vietnamese workforce is well educated with good literacy and numeracy, the productivity and quality of labour are inadequate (Bodewig & Badiani-Magnusson, 2014). The second is that the education system is subject to pervasive corruption. According to public officials, enterprises and citizens, corruption is one of the most severe problems in Vietnamese society (World Bank, 2013), and according to Vietnamese citizens, education is the fifth most corrupt sector (Transparency International, 2013). Widespread corruption inside the educational system threatens not only the quality of education but also the mentality and integrity of future generations (Transparency International, 2011).

Although the general view of the public and scholars in Vietnam is that corruption has detrimental influences on the accumulation of human capital, there is a lack of quantitative empirical evidence for that assertion. Furthermore, while corruption is a complex social phenomenon that can negatively affect the entire system, an empirical study has never been conducted to determine how corruption impacts Vietnamese educational achievements and human capital. This study aims to fill these research gaps by focusing on how corruption influences Vietnam human capital, based on provincial-level panel data. This study is unique because rather than using educational variables, such as enrolment rates or literacy rates, this study measures human capital using labour quality assessments of firms. Using educational factors to measure human capital might lead to flaws in research on a country with significant educational achievements but inadequate labour skills such as in Vietnam. Second, I hypothesize that the process of human capital accumulation in Vietnam has two steps; the first is education, and the second is the transformation of educational outcomes and worker training into labour quality. I analyze the effects of corruption on both steps.

¹See the report *Vietnam Education for All 2015 National Review* (Vietnam Ministry of Education and Training, 2014).

²PISA stands for Programme for International Student Assessment, which is used to assess the key knowledge and skills of 15-year-old students, focusing on mathematics, reading, science and problem solving (OECD, 2014).

³In 2012, the scores for Vietnam were 511, 508 and 528 in mathematics, reading and science, respectively, compared to the average scores for OECD countries/economies, which were 494, 496 and 501 (OECD, 2014).

This study provides several noteworthy results. The estimation results reveal that corruption has both positive and negative effects on human capital; however, overall, it adversely affects human capital. On the one hand, during the education process, corruption reduces the favourable impacts of provincial spending on educational outcomes and worsens the quality of labour. On the other hand, surprisingly, it might help improve enrolment rates in certain provinces/cities. To provide a detailed explanation for this counterintuitive result, I construct a simple model based on the public fund procurement game for the Vietnamese context. This model shows that corruption increases the advantages of certain schools in the competition for the central government's funds; therefore, it enhances the inputs of local educational systems. These findings are important because they deepen our understanding of Vietnam and may shed light on the circumstances in other countries with similar phenomena, such as China and Laos.

This paper is structured as follows. Section 2 briefly reviews existing studies on human capital, the effects of corruption on human capital and the phenomenon in Vietnam. Sections 3 and 4 discuss the hypotheses and the empirical methodology employed in this study. Section 5 describes the data sources and the construction of the variables. Section 6 analyzes the estimation results. Section 7 reviews the results of the robustness checks, and the final section concludes the paper.

2 | LITERATURE REVIEW

2.1 | Human capital

Although human capital is considered to be one of the critical determinants of economic development, it is an elusive concept. To proxy human capital, many previous studies use educational outcomes such as adult literacy rates (Barro, 1991), enrolment rates (Caselli, Esquivel, & Lefort, 1996), average years of schooling (Ding & Knight, 2009) and cognitive skills measured by test scores (Hanushek & Woessmann, 2008). Nonetheless, educational outcome may not be a good measure of human capital as a determinant of economic development. First, the accumulation of human capital depends not only on education but also training processes. Second, for many reasons, good learners may not transform into productive workers. Therefore, a significant gap exists between these educational variables and the knowledge and skills of workers. Some economists state that the imprecise measurement of human capital is one of the reasons that studies report inconsistent results on the impacts of human capital on development (de la Fuente & Doménech, 2006). To address this problem, in this study, I use labour quality assessments of firms as a proxy for human capital. This index more precisely reflects the knowledge, skills and competence of workers that accumulate through both education and training. Therefore, labour quality assessments may be a better proxy for human capital.

To better explain the determinants of the human capital accumulation process, economists have attempted to identify the factors that determine educational outcomes. Some scholars employ the education production function, in which educational outcomes are explained by inputs, including school resources, family backgrounds and the initial ability of students (Glewwe & Lambert, 2010; Hanushek, 2010; Harris, 2010). This function is based on the principle that increasing inputs enhances achievement. However, this simple function is based on the unrealistic assumption that inputs are used efficiently (Harris, 2010); therefore, using this equation, numerous studies have found a weak or even negative link between inputs and output. These results imply that educational inputs are ineffectively used by educational systems (Hanushek, 2010).

Instead of using a simple education production function that explains educational outputs only by inputs, Bishop and Wößmann (2004) consider the role of various actors (parents, teachers, students, the government, administration and school managers) in the operation of the education system. These

actors respond to their respective incentives and influence the allocation of inputs and the effectiveness of their use; therefore, they affect the outcome. More details are provided in the following section, in which I discuss the channels through which corruption might affect educational outcomes and review existing studies evaluating these actors' actions and incentives. Some corrupt actors might steal a portion of public funds allocated for education or use it inefficiently for personal gain. In addition, corruption influences educational outcomes by defining 'the rules of the game', altering stakeholders' incentives and behaviours. In this study, I add corruption to a simple education production function to explicate its effects on educational outcome.

2.2 | Effects of corruption on human capital

Corruption is generally considered to adversely influence human capital, as represented by indicators of education. Using cross-sectional and 2SLS estimations for 103 countries from 1980–2002, Dridi (2014) finds that their corruption index has a negative link with secondary school enrolment rates, but no significant connection with dropout rates. Gupta, Davoodi, and Tiongson (2002) show that corruption reduces primary net enrolment rates and increases dropout rates, repeater rates and illiteracy rates. Studies have indicated that corruption has a negative link with human capital as measured by the average years of schooling (Mo, 2001). Many scholars discuss and stress the two key channels through which corruption affects human capital: its effects on the allocation and use of public budgets for education and its effects on the incentives of students and families to invest in human capital.

Previous studies show that corrupt officials tend to have smaller budgets for education, health and social protection and larger budgets for fuel, defence and infrastructure as these officials can embezzle more funds, and it is more difficult to detect embezzlement in projects involving both more money and secrecy (Delavallade, 2006; Mauro, 1998; Shleifer & Vishny, 1998). Bureaucrats also engage in corrupt activities for their personal benefit by stealing money devoted to the education system (Boikos, 2016) or using it ineffectively (Bishop & Wößmann, 2004).

Corruption may also dictate 'the rules of the game' and structure the incentives of all stakeholders in an education system, namely, parents, teachers, students, government officials and school managers. Several scholars view corruption as a type of informal institution or an institutional problem rather than a rare illicit act. Based on the institutions concept proposed by North (1990), Teorell (2016) argues that corruption is an institution because in most countries, corruption is not an exception to the rule but rather defines 'the rules of the game'. Corruption emerges as an informal institution that shapes the incentives of actors only when it is widespread and expectedly practiced among citizens and government officials (Helmke & Levitsky, 2004). It is considered an institutional problem that persists for long periods (Mo, 2001). When we view corruption as an institution or 'the rules of the game' as defined by North (1990), its consequences are viewed from the following different perspective: corruption structures the incentives and interactions of individuals (North, 1990). The prevalence of corruption motivates people to engage in other corrupt acts because it lessens the probability they will be detected, the extent of punishment they will receive, or the moral cost they will pay (Blackburn, Bose, & Emranul Haque, 2010).

Rampant corruption in society also alters the incentives of individuals to invest in productive human capital (Ehrlich & Lui, 1999; Pecorino, 1992). Ehrlich and Lui (1999) develop two models with homogenous and heterogeneous agents who must choose to invest in either political capital or productive human capital and find that corruption reduces the incentive to invest in productive human capital. Corruption distorts individuals' incentives to allocate time and effort to productive activities, such as accumulating knowledge and skills (Mo, 2001; Tanzi, 2007); thus, rent-seeking activities reduce the incentives to invest in productive human capital, which hampers growth (Pecorino, 2016). Corruption also induces a misallocation of talent; corruption lowers the returns of productive

activities, rendering rent-seeking or corrupt activities relatively more attractive, thereby causing resources, including talent, to flow from productive activities to corrupt activities (Murphy, Shleifer, & Vishny, 1993). Corruption affects occupational choices because talented young people might choose to work as bureaucrats with lower salaries since they could potentially earn extra income from corrupt activities (Blackburn et al., 2010). However, despite the importance of new research investigating the effects of corruption on human capital, empirical evidence regarding this issue is relatively limited (Dimant & Tosato, 2018; Dridi, 2014). Dimant and Tosato (2018) conduct a comprehensive survey of the causes and effects of corruption by focusing on empirical studies and find that during the past decade, scholars have overlooked the effects of corruption on human capital.

Moreover, these studies, which are mainly conducted across countries, have two important limitations. The first is the incomparability of some variables between countries. It is inconceivable that one year of schooling is equivalent across countries, irrespective of the difference in the quality of education (Wößmann,). Furthermore, every country has unique characteristics, and cross-country studies are often unable to control for such characteristics. These issues highlight the need for conducting a cross-regional analysis within a single country, where many characteristics are common across regions. In this study, I focus on research at the provincial level; the data are more comparable and it is possible to delve deeply into Vietnam's distinctive phenomenon.

2.3 | Corruption in Vietnam

Corruption is one of the most imminent threats to Vietnam's development. Vietnam is ranked 113 of 176 countries and has a score of 33/100 on the Corruption Perception Index 2016 (Transparency International, 2017). Corruption has grown alongside the rapid growth since the economic reform in 1986 because the process of economic transition creates more opportunities for corrupt behaviour (Tromme, 2016). Previous studies show that corrupt behaviour is pervasive in Vietnamese society (Rama & Võ, 2008), and most firms involved in these activities follow 'the rules of the game' (Nguyen, Ho, Le, & Nguyen, 2016).

Despite notable educational achievements, such as higher enrolment rates and literacy rates and obtaining a high rank in PISA test performance,⁴ education is perceived as the fifth most corrupt sector of the 12 most important public sectors in Vietnam.⁵ However, only a few studies investigate the consequences of corruption on the education process, and these studies can be divided into two lines of research. The first line of research focuses on corrupt behaviour within the education system, and the second line of research, which attempts to provide quantitative evidence, measures corruption as a general term rather than specific acts within the system.

Studies belonging to the first line of research often provide insight into corrupt behaviour within the Vietnamese education sector using a qualitative approach. Transparency International (2013) details the forms, causes and effects of corrupt behaviour within the Vietnamese education system. This study reveals that corrupt behaviour in the education sector exists in many different forms: embezzlement, bribes and kickbacks in public investment and procurement projects, misallocation of funds for students, the reporting of false achievements and awards, wrongdoing during the teacher selection process, bribery intended to benefit parents and students, misconduct during the process of publishing

⁴Vietnamese students impressed many experts with their high scores on the PISA test in 2015, and Vietnam ranks 8th based on the science scores (OECD, 1992, 2016).

⁵In the report *Global Corruption Barometer 2013*, the Vietnam education system received a score of 3.4 on a scale of 1–5; 1 implies that the country is not at all corrupt, and 5 implies that the country is extremely corrupt (Transparency International, 2017).

textbooks, informal charges and fees charged by teachers and administrators and extra class requirements for some students. These practices adversely affect the Vietnamese education sector in three aspects. First, these practices raise the cost and inequality of accessing education because parents are expected to pay unauthorized charges or for extra classes. These practices also worsen the quality and outcomes of education because they cause a reduction in or the inefficient use of the educational budget or create a poor atmosphere that demotivates both teachers and students. Moreover, these activities are more harmful in the long run because they harm the mentality of generations of students who are directly involved in those actions, and they adversely affect social norms⁶ (Chow & Nga, 2013; Transparency International, 2011). Despite such insight into corrupt behaviour in the education sector, due to the unavailability of data at the nationwide level, the results of these studies focusing on corrupt behaviour are limited and only capture several corruption-related cases.

The second line of research attempts to investigate and provide quantitative evidence of the effects of corruption on education and usually regards corruption as a general term rather than some specific practices within the education system. Anh, Minh, and Tran-Nam (2016) focus on Vietnam and study the effects of corruption on economic growth. These authors find a positive link between corruption and secondary education enrolment rates; however, the authors do not explain this link. Nguyen, Bach, Le, and Le (2017) find that a negative relationship exists between corruption and the quality of Vietnamese primary education as assessed by the citizens at the district level. However, more empirical evidence based on different types of data and approaches is needed.

3 | THE EFFECTS OF CORRUPTION ON THE HUMAN CAPITAL ACCUMULATION PROCESS IN THE VIETNAMESE CONTEXT

I hypothesize that corruption affects Vietnamese human capital via its effects on the two processes of human capital accumulation: the education process and the process by which educational outcomes are transformed into labour quality in a productive sector.

In the education process, educational achievements are generated from the use of educational inputs by actors. Corruption could influence this process and alter educational achievements because it potentially distorts the allocation or causes the inefficient use of the budgets intended for the education system. Corruption also acts as an informal institution that shapes the incentives of stakeholders. While corruption is expected to lower the positive effects of public spending on education, how corruption impacts educational outcomes when it is so prevalent as an informal institution remains unclear. On the one hand, corruption might lower the return of productive human capital, which could reduce the incentive for students to study hard in their schooling. On the other hand, since the prevalence of corruption lowers the threat of corrupt agents being detected and punished, corruption encourages the stakeholders of the educational system to practice some forms of corruption, which may actually have some positive impacts. For instance, the prevalence of corruption in a region might stimulate a school manager to engage in bribery to obtain funding from the central government for a school facility project, an action that would increase school resources (Transparency International, 2011).

Corruption also influences the transformation process and worsens the labour quality in the productive sector via two possible methods. First, corruption might distort individuals' incentive to

⁶According to Chow and Dao Thi Nga (2013), the practices of corruption in education 'perpetuate[s] a lifelong cycle of an unhealthy attitude'; 38% of Vietnamese youth claim they are willing to pay a bribe to be accepted by a good school or hired by a company.

accumulate knowledge and skills; therefore, lowering the quality of labour (Mo, 2001; Tanzi, 2007). Second, corruption might motivate talented young people to become government officials despite the low salaries because as officials, they can receive informal income by engaging in corrupt practices (Blackburn et al., 2010). As a result, corruption lowers the quality of labour in private firms.

4 | EMPIRICAL METHODOLOGY

In this study, I analyze the influences of corruption on Vietnamese human capital in two steps.

In the first step, I examine how corruption affects educational achievements by adding corruption to a simple education production function at the provincial level, which is more popular in research investigating the individual level. In this simple function, I include both vital educational inputs, namely, public spending and family background, to explain educational achievements. Corruption might affect educational achievements through the incentives of stakeholders or the use of public spending. Because corruption potentially reduces the positive effects of spending on educational achievements, a nonlinear relationship may exist between corruption and educational achievement (Boikos, 2016). I add an interaction term for public spending and corruption to the function to analyze the nonlinear relationships among corruption, spending and educational achievements. The estimation equation is as follows:

$$y_{it} = \beta_0 + \beta_1 spend_{it} + \beta_2 corrupt_{it} + \beta_3 spend_{it} \times corrupt_{it} + \beta_4 \chi_{it} + \theta_i + v_{it}, \quad (1)$$

where y_{it} , $spend_{it}$ and $corrupt_{it}$ denote educational achievements measured by upper secondary enrolment rates, province/city spending per student and the extent of corruption in province i in year t , respectively. Although public spending on education is distributed through the budgets of both provinces/cities and the central government,⁷ I do not cover spending from the central government due to the unavailability of the data. In addition to public spending, the income and size of families also plays a key role in determining student educational performance (Hanushek, 2010). I employ real GDP capita and fertility rates as proxies for income and family size across regions and add them as control variables (χ_{it}). θ_i represents the unobserved invariant characteristics of provinces/cities, such as culture, and v_{it} is the error term.

TABLE 1 Descriptive statistics

Variable	Unit	Obs	Mean	SD	Min	Max	Source
Labour quality		378	0.86	0.11	0.43	1	PCI
Corruption		378	0.51	0.15	0.18	0.78	PCI
Spending	Million VND ⁽¹⁾ / student	373	7.58	4.96	1.19	19.50	Statistical yearbooks
GDP per capita	Million VND ⁽¹⁾	377	30.16	32.6	7.53	270.06	Statistical yearbooks
Enrolment rates	%	378	59.45	15.33	24	89.30	Population and Housing Survey
Fertility rates		377	2.18	0.37	1.3	3.46	
Training expenditures	%	378	3.17	1.97	0	8.09	PCI

Note: (1) VND is the currency of Vietnam, and the current exchange rate with USD is approximately 1 USD = 22,700 VND.

⁷In addition to the budgets of provinces/cities, education spending might be distributed from the state budget through several programmes, such as the National Target Program on Education and Training (The Government of Vietnam, 2016).

TABLE 2 Correlation coefficients among variables

	Labour quality	Training expenditures	Enrolment rates	Corruption	Spending	GDP per capita	Fertility rates
Labour quality	1						
Training expenditures	0.596	1					
Enrolment rates	0.2029	0.1996	1				
Corruption	0.1783	0.5055	0.2037	1			
Spending	0.1895	0.2312	-0.0554	0.2262	1		
GDP per capita	0.1079	0.0982	0.1773	0.0801	-0.0969	1	
Fertility rates	0.0232	0.1305	0.0097	0.2213	0.3059	-0.2591	1

In the second step, I examine how corruption affects labour quality, as assessed by firm managers in specific provinces/cities, after controlling for educational achievement and the training expenses of firms in the regions. The labour quality depends on both education and training but could be affected by corruption because corruption might motivate talented students to work in the public sector rather than private firms or reduce the incentives to accumulate knowledge and skills among workers:

$$LQ_{it} = \gamma_0 + \gamma_1 y_{it} + \gamma_2 train_{it} + \gamma_3 corrupt_{it} + \varepsilon_{it}, \tag{2}$$

where LQ_{it} represents labour quality assessments of firms in province/city i in year t , and $train_{it}$ represents the worker training expenditures of firms.

Some scholars consider that corruption may be an endogenous variable due to reverse causality because a poor level of education might induce corruption (Gupta et al., 2002). However, in most countries, corruption is an institutional problem that persists over a long period (Mo, 2001; Pellegrini & Gerlagh, 2001); therefore, it is inconceivable that reverse causality occurs over a short period. In the context of this study, corruption is pervasively practiced in Vietnam. Corruption is also considered a type of institution or ‘the rules of the game’; therefore, it is implausible that the educational achievements attained over a period of six years would alter the corruption phenomenon. In addition, to address the problem regarding endogeneity, instrumental variables must be employed. There is no valid instrument for the study of corruption in Vietnam at the provincial level (Dang, 2016). Due to the reasons discussed above, I treat corruption as an exogenous variable.

I employed a fixed effects method for the estimation. In addition to public spending and family background, some invariant characteristics of provinces/cities, such as factors related to culture or ethnicity, might contribute to explaining educational outcomes. A fixed effects estimation rules out these constant variables and avoids omitted variable bias. Furthermore, the result of the Hausman test has a very small p -value, which suggests that the fixed effects model is more appropriate for this study⁸ than random effects models.

5 | DATA SOURCES AND THE CONSTRUCTION OF VARIABLES

I use panel data for all 63 provinces/cities in Vietnam from 2010 to 2015. I focus on data at the provincial level since the same system and policies apply to the whole nation; however, education in Vietnam and the phenomenon of corruption vary remarkably over time and across provinces/cities.

⁸The p -value of the Hausman test is 0.0004 for the first step and 0 for the second step.

TABLE 3 Effects of corruption on upper secondary enrolment rates

Variable	(1)	(2)	(3)	(4)
Spending	1.346*** (0.3807)	1.484*** (0.3976)	0.813** (0.389)	0.9274** (0.4006)
Corruption	20.1907*** (5.156)	21.5543*** (5.1494)	9.04228* (5.3197)	10.4902** (5.2545)
Spending × corruption	-1.9838*** (0.646)	-2.2366*** (0.672)	-1.2161* (0.6423)	-1.4163** (0.6579)
Fertility rates		3.9318*** (1.3984)		2.6257** (1.2755)
GDP per capita			0.4053*** (0.0954)	0.3868*** (0.0939)
Constant	47.0008*** (2.667)	37.6671*** (4.131)	41.3503*** (3.2431)	35.3692*** (4.2719)
F statistics (p-value)	9.87(0)	11.13(0)	10.5(0)	9.41 (0)
Obs	372	372	372	372

Note: Robust standard errors appear in parentheses.

*10% level of significance, **5% level of significance, ***1% level of significance.

Some provinces, such as Lai Chau, have upper secondary enrolment rates of approximately 33%, whereas others have higher rates; Hanoi had enrolment rates of approximately 87% in 2015. We may be able to enhance our understanding of Vietnam's circumstances by focusing on the reasons for the vast disparities among provinces/cities.

Panel data for the 63 provinces/cities of Vietnam is collected from three main sources: the General Statistics Office of Vietnam (GSO), provinces/cities' statistical yearbooks and the provincial competitiveness index (PCI) published by the Vietnam Chamber of Commerce and Industry (VCCI) and the United States Agency for International Development (USAID).⁹

In the first step, upper secondary enrolment rates are used as the dependent variable to capture educational achievements. Because of the universalization of education, there is little difference in the primary and lower secondary enrolment rates among provinces/cities. Upper secondary enrolment rates are a better indicator of educational achievements. I collect data for this variable from Vietnam's Population and Housing Survey, which is published by GSO. In the second step, the dependent variable is labour quality based on firm's assessments, which is obtained from the PCI dataset. This indicator shows the proportion of firms in the regions that agree that labour quality meets their demands. This index is a more precise measurement of human capital since it indicates the satisfaction of firms with the knowledge, skills and competence of workers, which is attained through both education and training.

To measure corruption, I use an indicator from the PCI dataset that is constructed through the cooperation between the VCCI and the USAID. These organizations constructed the dataset in three steps: collecting survey data from a random sample of thousands of firms; calculating sub-indices; calculating PCI, which is the weighted mean of all the sub-indices (Malesky, 2016). Since the first version, which was published in 2005, the PCI has become an important reliable tool for both academicians and the government to assess the ease of conducting business in provinces/cities. The indicator is calculated as the share of firms agreeing or strongly agreeing with the statement 'The

⁹PCI indexes are reported annually based on the survey responses from thousands of firms that are randomly selected to mirror the populations of provinces/cities to accurately reveal the business environment of provinces/cities (Malesky, 2016)

rent-seeking phenomenon is popular for handling the administrative procedures required for businesses'. In this study, I evaluate the consequences of corruption and consider that corruption not only involves illegal acts but also acts as an informal institution. The selected indicator indicates the prevalence of corruption in provinces/cities, reflects corruption as an informal institution, and is relevant for this study. This indicator could also be considered a proxy of corrupt behaviour in the education system for two reasons. First, corruption in Vietnam is highly centralized within a province/city, and provincial leaders have the power to control corrupt activities in their regions by various means (Bai, Jayachandran, Malesky, & Olken, 2017). Therefore, a close correlation is expected to exist between corruption in the business sector and corruption in the educational system because both sectors depend on the incentives and activities of provincial leaders. Second, the prevalence of corruption could motivate more corrupt activities, including those in the educational system. Therefore, a potential positive correlation exists between the selected indicator and extent of corrupt behaviour in the education system. In fact, Dang (2016) uses an indicator based on firm responses to the statement 'Enterprises in my line of business usually have to pay informal charges' to measure the prevalence of corruption. Because this indicator narrows the scale of corruption to specific industries rather than the whole region, I do not use it for my main estimation but add it to the robustness check test.

I calculated provincial government spending per student and real GDP per capita using data from the statistical yearbooks of 63 provinces/cities using 2010 as the base year. Data regarding fertility rates, the number of children per mother, are also obtained from population and housing surveys. Data on training expenditures are obtained from the PCI dataset and are calculated as the share of firms' expenses that are spent on worker training.

Tables 1 and 2 provide the descriptive statistics and correlation coefficients of the main variables, respectively. The descriptive statistics show that there are considerable differences among provinces/cities. Table 1 also reveals some missing values of spending, per capita GDP and fertility rates. Because the missing values are caused by incomplete data in certain statistical reports by the government and are not related to the values of the variables, and the missing rate is very small, these observations with missing data could simply be deleted when performing the regressions.¹⁰ The correlation coefficients are not very high between explanatory variables. Thus, multicollinearity should not be an issue.

6 | ESTIMATION RESULTS

6.1 | First step: Effects of corruption on educational achievements

Table 3 shows the results for the fixed effects estimation results, which is the first step of the process. For model (1), public spending, corruption and the interaction term are the independent variables, and they are the only variables included in the model. Models (2) and (3) include both fertility rates and GDP per capita. All the variables are included in model (4). The findings of all four models show robust results for all the explanatory variables. The estimated coefficients of education spending per student, corruption and the interaction term are all statistically significant. I focus solely on the results of model (4), which has notable implications.

As expected, corruption has a negative effect on secondary school enrolment rates by reducing the positive impact of public education spending. The estimated coefficient of education spending

¹⁰It is appropriate to remove observations with missing data if the missing data are not related to the value of variables and the proportion of missing values is small (Pigott, 2001).

is 0.9274. This means that if the corruption index equals zero, and thus the interaction term is zero, school spending would enhance educational achievements, as predicted by the education production function. Increasing the educational budget by one million VND per student could increase the enrolment rates by 0.9274%. The coefficient estimated for the interaction term is equivalent to -1.4163 , implying that corruption diminishes the positive effects of spending on educational achievement. For the study period, the corruption index for Vietnam ranged from 0.18 to 0.78, with a mean of approximately 0.51. At this mean, corruption reduces the positive impact of local spending, and the coefficient of spending decreases by 0.7223 ($\approx 1.4163 \times 0.51$). This means that, on average, spending has a positive influence on enrolment rates, but increasing the educational budget by one million VND per student increases enrolment rates by roughly 0.21%. For some provinces where corrupt behaviour is rampant (corruption index exceeds: $0.9274/1.4163 \approx 0.65$), the positive effect of spending is reversed.

The coefficient for the main effect of corruption is roughly 10.49, which means that when spending is zero, and thus the interaction term is zero, corruption increases enrolment rates. This result contradicts other cross-country findings but is consistent with Anh et al. (2016), which also focuses on Vietnam. Using corruption data from Transparency International's Corruption Perceptions Index (CPI), the authors concluded that corruption has a favourable impact on secondary enrolment rates.

Because Vietnam has a unique context, in addition to the negative effects of corruption on education quality, which has been shown in several research and reports (Nguyen et al., 2017; Transparency International, 2011), the prevalence of corruption could have positive effects on educational outcomes. This counterintuitive estimation result can be interpreted as follows. Three sources fund Vietnamese schools: the budgets of both local governments and central governments and households.¹¹ The funding from the central government has several distinctive characteristics. First, it is distributed through specific projects, such as those associated with the National Target Program, which prioritizes projects that aim to increase literacy rates, universalize education or improve facilities for schools in poor mountainous areas.¹² These projects play an important role in increasing enrolment rates in poor areas. Second, obtaining approval for these facility projects is competitive due to the scarcity of funds, and the process is slow and labourious for local schools. These conditions foster an environment for bribery, and schools that are more willing to collude with government officials are more likely to be approved for infrastructure projects (Transparency International, 2011). As some previous studies have indicated, the pervasiveness of corruption stimulates additional corrupt behaviour because it reduces the possibility of being caught or punished (Blackburn et al., 2010; Teorell, 2007). Therefore, the pervasiveness of corruption in provinces/cities motivates school managers to bribe central government officials to obtain approval for facility projects, which could have a positive impact on enrolment rates. For a more comprehensive explanation, I provide details about the rules for public fund procurement in Vietnam and build a simple model that explains the link between the level of corruption and the allocation of funds from the central government.

¹¹In 2013, local governments, the central government and households contributed 64%, 12% and 24%, respectively (see *Education Financing in Viet Nam, 2009–2013, following the National Education Accounts methodology* by The Government of Viet Nam and UNESCO Institute for Statistics (2014).

¹²The central government allocated 12,300 billion VND for the 2012–2015 National Target Program in Education and Training; generally, half of the funds are allocated to school facility projects in poor mountainous areas, and one fifth of the funds is used to increase literacy rates or enhance the universalization of education (The Government of Vietnam, 2016).

6.2 | The public fund procurement rules for the Vietnamese education system

In Vietnam, each local school project that is financed by the central government's budget must go through two main phases: fund procurement and fund disbursement. A typical procedure is illustrated below.

In phase one, there are two main players: school managers and officials of the central government. School managers prepare and propose project plans, and central government officials make the final fund allocation decisions. One problem here is that total government funding is limited; therefore, numerous schools compete for a fraction of the funding. This problem creates an environment that promotes bribery since school managers must offer some type of benefit to oblige the central government officials who hold the final decision-making power. Bribes are proposed in secrecy, and usually, the school managers who offer the largest bribe will obtain the approval. Often, the bribe is a specific share of the fund that is approved for the project.

There are three main stakeholders in phase two: the school manager, the central government officials, and the construction company. In this process, the fund disbursements for the construction and embezzlement occur at the same time. According to Vietnam's regulations, the funds for each project are strictly managed by the treasury system and cannot flow directly to the pocket of government officials or school managers. The government transfers money to the local school's account at the local treasury. School managers cannot withdraw this money for purposes other than making payments to the construction companies. Therefore, the embezzlement of funds can only occur when government officials, construction companies and school managers collude. They steal money by setting the unit price of the project higher than its actual value and using the difference for bribes. After receiving the funds, construction companies fulfil their commitments and pay government officials and school managers. In Vietnam, generally, only the companies that agree to collude become successful bidders on construction projects.

Another important regulation is that there is an external monitor for the construction supervising company and auditing company for all projects funded by the central government. These players act on behalf of the government to ensure that the quality of facility meets a certain standard and to prevent embezzlement. Their presence ensures that school managers and government officials do not steal all the money. However, due to their limited capabilities and information, these actors are unable to fully prevent the misappropriation of funds.

6.3 | A simple model

The following describes a simple model that I constructed to illustrate the situation in Vietnam. There are a total of m provinces/cities, and there is one school in each province/city. All these schools compete to receive funds from the central government. Because the central government budget is limited, only n schools will receive funds ($n < m$). The total funds for each project is T . All school managers are aware of the rules of the game and the level of corruption in all provinces/cities.

6.3.1 | The first phase: fund procurement

The school manager of the school in province i secretly offers a share of the project funds as a bribe (b_{i1}) to central government officials. The central government officials have full authority to make decisions; therefore, they will decide to approve funding requests based on the level of the bribe offered by the school managers. I assume that the bribe offered by the school managers is: $b_{11} < b_{21} < \dots < b_{(m-n)1} < \dots < b_{m1}$; n schools propose the highest level of bribe (with $b_{i1} > b_{(m-n)1}$) and

will obtain the approval. Because embezzlement occurs in the second phase, which is no longer under the responsibility of these officials, and thus there is no evidence of their corrupt behaviour, they do not face the risk of being detected.

6.3.2 | Second phase: fund disbursement

All school managers know the percentage of money they can steal without being detected by the auditing company or the company that supervises the construction, which is represented by t (with: $t < 1$). If they steal a percentage higher than t , they will certainly be caught; therefore, all school managers ensure that the percentage of stolen money equals t , and the total amount of money left for improving the local school's facility is $T(1-t) > 0$. By predetermining t , the school managers do not face the risk of external detection but still face the risk of being caught, which could result from internal acts, such as denouncement by their staff or local government officials.

The school managers in province i must determine the percentage of money they will use to bribe central government officials (b_{i1}), the percentage they will keep for themselves (b_{i2}) and the percentage they will pay their subordinates or local government officials for covering up the bribe (b_{i3}); $b_{i1} + b_{i2} + b_{i3} = t$ with $0 < b_{i1}, b_{i2}, b_{i3} < t$.

6.3.3 | From the school managers' perspective

The actions of the school managers can only be detected internally, and the amount of risk depends on the percentage of funds they pay for covering up the bribe (b_{i3}) and the level of corruption in the province/city (c_i). The risk of being detected is: $p_{it} = e^{-\alpha(b_{i3} + c_i)}$, with $\alpha > 0$.

If their corrupt behaviour is discovered, school managers will be penalized. The severity of the punishment depends on the total amount of money that has been stolen and the level of corruption in the respective province/city. The punishment is: $W_i = T \times t \times e^{-\beta c_i}$, with $\beta > 0$.

Objective function of school managers.

If the school managers either offer a lower bribe than n other schools ($b_{i1} \leq b_{(m-n)1}$) or their school does not receive the funds, both the school managers and the schools obtain an amount equal to zero. If school managers obtain the funding ($b_{i1} > b_{(m-n)1}$), then the schools receive $T(1-t) > 0$; they receive both the monetary benefit ($T \times b_{i2} = T(t - b_{i1} - b_{i3})$) and other non-pecuniary benefits, such as promotion opportunities because they contributed to the school facility's improvement or their own satisfaction, which is denoted by a_0 . For simplification, I assume that the other benefits (a_0) are equal among all school managers. The school managers also face the risk of being detected internally (p_{it}) and being punished (W_i).

$$\begin{cases} F = 0 \text{ if } b_{i1} \leq b_{(m-n)1} \\ F = (1 - p_{it}) [T(t - b_{i1} - b_{i3}) + a_0] + p_{it} [T(t - b_{i1} - b_{i3}) + a_0 - W_i] \text{ (1) if } b_{i1} > b_{(m-n)1} \end{cases} \quad (3)$$

6.3.4 | School managers' decision-making process

First, b_{i3} is set to maximize F . The solution is

$$b_{i3} = \frac{\ln(\alpha t) - (\alpha + \beta) c_i}{\alpha} \quad (4).$$

$$\text{By inserting (4) into (1), I obtain: } F = T(t - b_{i1}) + a_0 - \frac{T}{\alpha} [\ln(\alpha t) - (\alpha + \beta) c_i + 1] \quad (5).$$

Then, the school managers estimate their maximum b_{i1} , which is the solution for: $F = 0$. As such, the maximum b_{i1} that the school manager in each province/city could offer to central government officials is:

$$b_{i1}^* = t + \frac{a_0}{T} - \frac{1}{\alpha} [\ln(\alpha t) + 1] + \frac{\alpha + \beta}{\alpha} c_i \quad (6)$$

This solution reveals that schools in provinces/cities with higher levels of corruption (c_i) have higher b_{i1}^* ; therefore, they are more likely to receive funds. Because all school managers acknowledge the rules of the game and are aware of the level of corruption in the provinces/cities, they could calculate the highest bribe that could be offered by other schools. School managers do not necessarily offer the maximum level of bribe (b_{i1}^*) to government officials.

As expected, the estimated coefficients of GDP per capita are positive. These results align with a significant amount of evidence showing that higher income increases the amount of inputs that families have for education; therefore, it enhances educational outcomes (Blanden, 2004). In contrast, the positive results of fertility rates are rather surprising. Many existing studies have been conducted and the results generally indicate that larger family size decreases parents' resources and investment in their children's education; therefore, family size can adversely affect educational achievements (Jæger, 2009). Nonetheless, several scholars argue that this negative link is more consistent in studies on developed countries, whereas in developing countries, the effect of family size on educational outcomes depends on the specific context. In some developing countries, where either child labour is common or children bear the responsibility for housework, an increase in family size could increase the enrolment rates because children would have more siblings to help with household chores and labour (Maralani, 2008). This argument could also be applied to explain the positive correlation between fertility rates and enrolment rates in Vietnam, where more than half of the children engage in housework, and one tenth of the children are child labourers.¹³

6.4 | Second step: Effects of corruption on labour quality

Table 4 shows the estimation results obtained during the second step, during which labour quality is the dependent variable. I focus on discussing the findings of model (3) because this model includes all the variables.

Corruption has a significant negative coefficient, possibly indicating that the prevalence of corruption directly harms the labour quality in private companies in provinces/cities. As discussed by several scholars, this adverse effect of corruption might be explained by its effect on not only the choice of occupation of young labourers (Blackburn et al., 2010; Murphy et al., 1993) but also the incentive to invest in accumulating the knowledge and skills of current workers (Mo, 2001; Tanzi, 2007). At least, in the case of Vietnam, the former effect appears to be a potential reason that has been observed and reported. Despite the low pay in the public sector,¹⁴ 64.2% of young people in Vietnam prefer to work for the government.¹⁵ Vietnamnet conducted a survey and found that most civil servants earn extra income through various means, including receiving informal payments,¹⁶ and approximately one-third of

¹⁴Workers in the Vietnam public sector reportedly earn a low salary that does not meet the standard cost of living (Poon et al, 2009).

¹⁵See Vietnam the School to Work Transition Survey by the International Labor Office (ILO) (International Labour Office, 2017).

¹⁶In total, 34% agree that they would use their working time to perform extra work, 25% agree that they would use their position to perform extra work, 30% agree that they would receive gifts and informal payment from citizens and businesses (Jairo, 2012).

TABLE 4 The effects of corruption on labour quality

Variable	(1)	(2)	(3)
Corruption		-0.1223*** (0.0406)	-0.1087** (0.0416)
Enrolment rates	0.0077*** (0.0012)		0.0076*** (0.0012)
Training expenditures	0.0298*** (0.0025)	0.0424*** (0.0023)	0.034*** (0.0028)
Constant	0.3121*** (0.0666)	0.7923*** (0.0187)	0.3624*** (0.0714)
<i>F</i> statistics (<i>p</i> -value)	170.88(0)	181.16(0)	126.14 (0)
Obs	378	378	378

Note: Robust standard errors appear in parentheses. *10% level of significance, **5% level of significance, ***1% level of significance.

the respondents agree that public servants stay in their jobs even though they receive low salaries because they have opportunities to earn extra income (Jairo, 2012). It appears that corruption causes young people to join the public sector instead of private firms because it increases the expected income of government officials.

As several reports have noted, corruption in Vietnam is more damaging in the long run because it may harm the mentality of future generations, causing them to be more willing to engage in corrupt behaviours and work as corrupt bureaucrats rather than find employment in productive sectors. The Vietnam Youth Integrity Survey 2014 conducted by Transparency International indicates that, although they are aware that corruption is illegal, a high proportion of youths are still willing to break laws and compromise their integrity for personal gain. In addition, the survey reports that 42% of youth are willing to violate their principle of integrity to enrol in a good school; one fourth of these youths are willing to perform corrupt acts to attain a desirable job; and 18% believe that cheating leads to success in life.

Additionally, local education performance and training expenditures have significant and positive coefficients, implying that these factors are important for enhancing the knowledge, skills and competence of workers in firms.

6.5 | Total effects of corruption on labour quality

Based on two estimation results, corruption appears to affect labour quality both directly through talent allocation and indirectly through educational achievements. Table 5 shows the total effect of corruption on labour quality.

Corruption influences the accumulation of human capital at both steps: the education process and the process whereby educational outcomes and training transform into labour quality. Corruption directly harms labour quality; as the corruption index increases from 0 (no corruption) to 1 (prolific corruption), the proportion of enterprises who are satisfied with their labour quality decreases by 10.87%. Indirectly, corruption affects labour quality through its effects on enrolment rates, which have

TABLE 5 Total effects of corruption on labour quality

Direct effect	Indirect effect	Total effect
-0.1087	$(10.4902 - 1.4163 \times \text{Spending}) \times 0.0076$	$-0.029 - 0.0108 \times \text{Spending}$

TABLE 6 Estimation results with different corruption indicators

Variable	(1)		(2)
Dependent variable: Upper secondary enrolment rates		Dependent variable: Labour quality	
Spending	1.8712*** (0.4189)	Corruption 1	-0.1494*** (0.0436)
Corruption 1	17.4083*** (5.7229)	Enrolment rates	0.0075*** (0.0012)
Spending × Corruption 1	-2.6196*** (0.6235)	Training expenditures	0.0327*** (0.0026)
GDP per capita	0.3669*** (0.0857)	Constant	0.3994*** (0.0707)
Fertility rates	2.938** (1.2822)		
Constant	29.5588*** (4.3408)		
<i>F</i> statistics (<i>p</i> -value)	12.92 (0)	<i>F</i> statistics (<i>p</i> -value)	115.38 (0)
Obs	372	Obs	378

Note: Robust standard errors appear in parentheses.

*10% level of significance, **5% level of significance, ***1% level of significance.

a significantly positive impact on labour quality. Corruption affects enrolment rates in the following two ways: corruption decreases the positive effects of local governments' spending on enrolment rates and simultaneously increases the chances that local education systems will receive funding from the central government. Table 5 shows that, overall, corruption adversely affects labour quality, and its damaging effects increase as local spending also increases. However, we do not claim that less spending is better because spending also contributes to improving enrolment rates and labour quality.

7 | ROBUSTNESS CHECK

For the robustness check, I conducted two estimation steps with different data measurements for corruption and educational achievements.

Table 6 presents the results of the estimation with Corruption 1, which is measured by the percentage of firms that agree or strongly agree with the statement 'Enterprises in my line of business usually have to pay informal charges'. Dang (2016) uses this index to measure the prevalence of corruption in provinces/cities. The main estimation results are robust, and the signs of the estimated coefficients for spending, corruption and the interaction term remain unchanged. The total effect of Corruption 1 on labour quality remains negative, which is consistent with the main estimation results.¹⁷

Table 7 provides the results of the regression with lower secondary enrolment rates being used as a proxy for educational achievements.¹⁸ In the first step of regression, the estimated coefficients for

¹⁷Total effects of Corruption 1 on labour quality: -0.0188 - 0.0196 Spending

¹⁸Due to the efforts to fight illiteracy and universalize primary education, literacy rates and primary enrolment rates might not be good candidates reflecting disparity in terms of education achievements across regions. While upper secondary enrolment rates, which are employed in the main estimations, could be a better candidate, I select lower secondary enrolment rates for the robustness check test.

TABLE 7 Estimation results with educational achievement measured by lower secondary enrolment rates

(3)		(4)	
Dependent variable: Lower secondary enrolment rates		Dependent variable: Labour quality	
Spending	0.2191 (0.3834)	Corruption	-0.1881*** (0.0429)
Corruption	12.2662** (5.233)	Enrolment rates	0.0076*** (0.0012)
Spending × Corruption	-0.2039 (0.6173)	Training expenditures	0.0354*** (0.0026)
GDP per capita	0.2978*** (0.1069)	Constant	0.2065** (0.0917)
Fertility rates	0.8663 (1.1939)		
Constant	66.1385*** (4.5106)		
<i>F</i> statistics (<i>p</i> -value)	17.02 (0)	<i>F</i> statistics (<i>p</i> -value)	137.93 (0)
Obs	372	Obs	378

Note: Robust standard errors appear in parentheses. *10% level of significance, **5% level of significance, ***1% level of significance

educational spending and interaction term turns to be insignificant, but the signs remain the same. The results of the second step are robust with the main estimation. Overall, corruption has unfavourable effects on labour quality.¹⁹

8 | CONCLUSION

Using panel data on 63 provinces/cities in Vietnam, I conducted two estimation steps, aiming to identify the impacts of corruption on Vietnam's human capital. The estimation results for the first step show that corruption influences many aspects of human capital accumulation both positively and negatively. Corruption affects the education process and alters the outcomes of provinces/cities through two channels: local education spending and the ability to obtain central government funds. First, corruption weakens the positive impact of local spending on educational achievements because corrupt officials either embezzle funding devoted to the education system or use it inefficiently. In addition, the pervasiveness of corruption reduces the possibility that stakeholders who engage in corruption will be detected and affects the level of punishment that they will receive if their actions are discovered. For this reason, corruption at the provincial level enhances the advantages of school managers who seek to obtain funding from the central government for school projects; thus, it may have a positive effect on enrolment rates. The results obtained during the second step are indicative of decreases in the local labour quality. The misallocation of talent caused by pervasive corruption could

¹⁹Total effects of corruption according to the regression results: - 0.0949 – 0.0199 Spending.

be a reason for this negative effect. Overall, corruption has a detrimental effect on human capital in Vietnam.

REFERENCES

- Anh, N. N., Minh, N. N., & Tran-Nam, B. (2016). Corruption and economic growth, with a focus on Vietnam. *Crime, Law and Social Change*, 65, 307–324. <https://doi.org/10.1007/s10611-016-9603-0>
- Bai, J., Jayachandran, S., Malesky, E. J., & Olken, B. A. (2017). Firm growth and corruption: Empirical evidence from Vietnam. *The Economic Journal*, 129, 651–677. <https://doi.org/10.1111/eoj.12560>
- Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, 106, 407–443. <https://doi.org/10.2307/2937943>
- Bishop, J. H., & Wößmann, L. (2004). Institutional effects in a simple model of educational production. *Education Economics*, 12, 17–38. <https://doi.org/10.1080/0964529042000193934>
- Blackburn, K., Bose, N., & Emranul Haque, M. (2010). Endogenous corruption in economic development. *Journal of Economic Studies*, 37, 4–25. <https://doi.org/10.1108/01443581011012234>
- Blanden, J. (2004). Family income and educational attainment: A review of approaches and evidence for Britain. *Oxford Review of Economic Policy*, 20, 245–263. <https://doi.org/10.1093/oxrep/grh014>
- Bodewig, C., & Badiani-Magnusson, R. (2014). *Skilling up Vietnam: Preparing the Workforce for a Modern Market Economy* (World Bank Publications).
- Boikos, S. (2016). Corruption, public expenditure and human capital accumulation. *Review of Economic Analysis*, 8, 17–45.
- Caselli, F., Esquivel, G., & Lefort, F. (1996). Reopening the convergence debate: A new look at cross-country growth empirics. *Journal of Economic Growth*, 1, pp. 363–389. <https://doi.org/10.1007/BF00141044>
- Chow, S., Nga, D. T. (2013). ‘Bribes for Enrollment in Desired Schools in Vietnam’, in Transparency International, Global Corruption Report: Education (Routledge), pp. 60–67. <https://books.google.co.jp/books?xml:id=BfdEAQAAQBAJ>
- Dang, Q. V. (2016). The impact of corruption on provincial development performance in Vietnam. *Crime, Law and Social Change*, 65, 325–350. <https://doi.org/10.1007/s10611-016-9608-8>
- de la Fuente, A., & Doménech, R. (2006). Human capital in growth regressions: How much difference does data quality make? *Journal of the European Economic Association*, 4, 1–36. <https://doi.org/10.1162/jeea.2006.4.1.1>
- Delavallade, C. (2006). Corruption and distribution of public spending in developing countries. *Journal of Economics and Finance*, 30, 222–239. <https://doi.org/10.1007/BF02761488>
- Dimant, E., & Tosato, G. (2018). Causes and effects of corruption: What has past decade's empirical research taught us? A survey. *Journal of Economic Surveys*, 32, 335–356. <https://doi.org/10.1111/joes.12198>
- Ding, S., & Knight, J. (2009). Can the augmented Solow model explain China's remarkable economic growth? A cross-country panel data analysis. *Journal of Comparative Economics*, 37, 432–452. <https://doi.org/10.1016/j.jce.2009.04.006>
- Dridi, M. (2014). Corruption and education: Empirical evidence. *International Journal of Economics and Financial Issues*, 4, 476.
- Ehrlich, I., & Lui, F. T. (1999). Bureaucratic corruption and endogenous economic growth. *Journal of Political Economy*, 107, S270–S293. <https://doi.org/10.1086/250111>
- Glewwe, P., & Lambert, S. (2010). Education production functions: Evidence from developing countries. In D. J. Brewer and P. J. McEwan (Eds), *Economics of Education* (pp. 137–147). Amsterdam: Elsevier.
- Gupta, S., Davoodi, H. R., & Tiongson, E. (2002). Corruption and the provision of health care and education services. In A. K. Jain (Ed.), *The Political Economy of Corruption* (pp. 111–141). London: Routledge.
- Hanushek, E. A. (2010). Education production functions: Developed country evidence. In D. J. Brewer and P. J. McEwan (Eds), *Economics of Education* (pp. 132–136). Amsterdam: Elsevier.
- Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature*, 46, 607–668. <https://doi.org/10.1257/jel.46.3.607>
- Harris, D. N. (2010). Education production functions: Concepts. In D. J. Brewer and P. J. McEwan (Eds), *Economics of Education* (pp. 127–131). Amsterdam: Elsevier.

- Helmke, G., & Levitsky, S. (2004). Informal institutions and comparative politics: A research agenda. *Perspectives on Politics*, 2, 725–740. <https://doi.org/10.1017/S1537592704040472>
- International Labour Office (2017). Viet Nam School-to-Work Transition Survey Country Summary. (http://www.ilo.org/wcmsp5/groups/public/—asia/—ro-bangkok/—ilo-hanoi/documents/publication/wcms_541516.pdf accessed on 12 September 2017).
- International Labour Organization (ILO), Ministry of Labour, Invalids and Social Affairs (MOLISA) and General Statistics Office (GSO) of Viet Nam (2014). *Vietnam National Child Labour Survey 2012 - Main Findings*. Hanoi: ILO.
- Jäger, M. M. (2009). Sibship size and educational attainment. A joint test of the confluence model and the resource dilution hypothesis. *Research in Social Stratification and Mobility*, 27, 1–12. <https://doi.org/10.1016/j.rssm.2009.01.002>
- Jairo, A.-A. (2012). Incentives and salaries in Vietnam's public. *Vietnam Law & Legal*, Forum, (accessed on 12 September 2017). <http://vietnamlawmagazine.vn/incentives-and-salaries-in-vietnams-public-3479.html>
- Malesky, E. (2016). *The Vietnam Provincial Competitiveness Index: Measuring Economic Governance for Private Sector Development, 2015 Final Report* (Hanoi, Vietnam: Vietnam Chamber of Commerce and Industry and United States Agency for International Development).
- Maralani, V. (2008). The changing relationship between family size and educational attainment over the course of socio-economic development: Evidence from Indonesia. *Demography*, 45, 693–717. <https://doi.org/10.1353/dem.0.0013>
- Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public Economics*, 69, 263–279. [https://doi.org/10.1016/S0047-2727\(98\)00025-5](https://doi.org/10.1016/S0047-2727(98)00025-5)
- Mo, P. H. (2001). Corruption and economic growth. *Journal of Comparative Economics*, 29, 66–79. <https://doi.org/10.1006/jcec.2000.1703>
- Murphy, K. M., Shleifer, A., & Vishny, R. W. (1993). Why is rent-seeking so costly to growth? *The American Economic Review*, 83, 409–414.
- Nguyen, T. V., Bach, T. N., Le, T. Q., & Le, C. Q. (2017). Local governance, corruption, and public service quality: Evidence from a national survey in Vietnam. *International Journal of Public Sector Management*, 30, 137–153. <https://doi.org/10.1108/IJPSM-08-2016-0128>
- Nguyen, T. V., Ho, B. D., Le, C. Q., Nguyen, & H. V. (2016). Strategic and transactional costs of corruption: Perspectives from Vietnamese firms. *Crime, Law and Social Change*, 65, 351–374. <https://doi.org/10.1007/s10611-016-9609-7>
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*, (Cambridge University Press): Cambridge. <https://books.google.co.jp/books?xml:id=BVC6AAAAIAAJ>.
- OECD (2014). What Students Know and Can Do: Student Performance in Mathematics, Reading and Science, Rev. ed., Febr. 2014, PISA 2012 Results Organisation for Economic Co-operation and Development, Programme for International Student Assessment; Vol. I (Paris: OECD).
- OECD (2016). PISA 2015 Results in Focus, PISA in Focus No., 67 (Paris: OECD). <https://doi.org/10.1787/aa9237e6-en>
- Pecorino, P. (1992). Rent seeking and growth: The case of growth through human capital accumulation. *Canadian Journal of Economics*, 25, 944–956. <https://doi.org/10.2307/135773>
- Pellegrini, L., & Gerlagh, R. (2004). Corruption's effect on growth and its transmission channels. *Kyklos*, 57, 429–456. <https://doi.org/10.1111/j.0023-5962.2004.00261.x>
- Pigott, T. D. (2001). A review of methods for missing data. *Educational Research and Evaluation*, 7, 353–383. <https://doi.org/10.1076/edre.7.4.353.8937>
- Poon, Y., Hung, N. K., & Do Xuan, T. (2009). The Reform of the Civil Service System as Viet Nam Moves into the Middle-Income Country Category, *Reforming Public Administration in Viet Nam*, p. 199.
- Rama, M., Vö, V. K. (2008). *Making Difficult Choices, Vietnam in Transition* (International Bank for Reconstruction and Development/The World Bank).
- Shleifer, A., & Vishny, R. W. (1993). Corruption, *The Quarterly Journal of Economics*, 108(3), pp. 599–617. <https://doi.org/10.2307/2118402>
- Tanzi, V. (1998). Corruption around the world: Causes, consequences, scope, and cures. *Staff Papers*, 45, 559–594. <https://doi.org/10.2307/3867585>
- Teorell, J. (2007). Corruption as an institution: Rethinking the nature and origins of the grabbing hand. QoG Working Paper Series, pp. 5.
- The Government of Viet Nam and UNESCO Institute for Statistics (2016). *Education Financing in Viet Nam, 2009–2013, Following the National Education Accounts Methodology* (Hanoi).

- The Government of Vietnam (2012). Decision on the approval of national target program for education and training for period 2012–2015, Social Republic of Vietnam Government Portal (Hanoi)., http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_xml:id=2&mode=detail&document_xml:id=163488.
- Trân, T. (2014). Education financing in Vietnam. *Revue Internationale D'éducation De Sèvres*, <http://journals.openedition.org/ries/3895>
- Transparency International (2011). Forms and Effects of Corruption on the Education Sector in Vietnam.
- Transparency International (2013). Global Corruption Barometer 2013.
- Transparency International (2017). 'Corruption Perception Index 2016', Transparency International. https://www.transparency.org/news/feature/corruption_perceptions_index_2016 accessed on 5 September 2017
- Tromme, M. (2016). Corruption and corruption research in Vietnam - an overview. *Crime, Law and Social Change*, 65, 287–306. <https://doi.org/10.1007/s10611-016-9605-y>
- Vietnam Ministry of Education and Training (2014). *Vietnam Education for All 2015 National Review* (Hanoi).
- World Bank (2013). *Corruption from the Perspective of Citizens, Firms, and Public Officials: Results of Sociological Surveys* (Washington D.C: The World Bank).
- Wößmann, L. (2003). Specifying human capital. *Journal of Economic Surveys*, 17, 239–270. <https://doi.org/10.1111/1467-6419.00195>

How to cite this article: Thi Hoa, T. The effects of corruption on the human capital accumulation process: Evidence from Vietnam. *Econ Transit Institut Change*. 2019;00:1–20. <https://doi.org/10.1111/ecot.12229>