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# Education as Protection? The Effect of Schooling on Non-Wage Compensation in a Developing Country

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## Abstract

This is the first paper identifying the causal effect of schooling on non-wage compensation using data from Vietnam. The paper takes an advantage of the establishment of the compulsory primary schooling reform that was introduced in Vietnam in 1991 to instrument for exogenous variations in years of schooling to surmount the endogeneity problem as a primary threat to identification facing the causal effect estimation. The paper finds that education is positively associated with non-wage benefits. In particular, the baseline 2SLS estimates indicates that one additional year of schooling is causally linked to a 6 percentage point increase in the likelihood of receiving monetary payments for public holidays, a 4.6 percentage point increase in the likelihood of receiving monetary employee benefits, a 7.3 percentage point increase in the likelihood of having annual paid leave and a 6.8 percentage point increase in the likelihood of having firm-provided social insurance. The baseline estimates are strongly robust to the estimates from some robustness checks. The paper also inspects that the causal associations between schooling and formal employment, skilled occupation and employee-friendly firm are three potential mechanisms through which schooling causally affects non-wage compensation.

**Keywords:** Returns to schooling; Non-wage compensation; Developing countries

**JEL Classifications:** I26, J24, J32, J33

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# 1 Introduction

Quantifying the private returns to schooling in labor markets has become a canonical topic in economics over many decades especially since the application of the Mincerian equation (Heckman et al. 2003; Mincer 1974). Importantly, while there has been an enormous number of studies devoted towards estimating the causal effect of education on wage as a primary labor market outcome, extremely less attention has been provided to identifying non-wage compensation benefits of schooling (Oreopoulos and Salvanes 2011). Apparently, there is a research gap of the causal effect of schooling on non-wage compensation from the existing literature.<sup>1</sup>

Non-wage forms of compensation enormously contribute to workers' well-being in the workplace (Budd 2004; Dale-Olsen 2006). To a certain extent, non-wage benefits play a very vital role as workers' social protections in the workplace from the vulnerability stemming from both internal and external shocks. Therefore, understanding non-wage benefits is especially salient to acquire a more comprehensive insight into the private returns to schooling in the labor market (Oreopoulos and Salvanes 2011). The current study significantly fulfills the research gap by providing empirical evidence on the effect of schooling on non-wage compensation using data from Vietnam.

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<sup>1</sup> Non-wage benefits are very indispensable forms of compensation that includes both monetary non-wage and non-monetary non-wage elements of compensation a firm provides to its employees further away than typical wage and salary payments (Budd 2004). Monetary non-wage benefits consist of profit-sharing remuneration, lump-sum bonuses, stock options and other contingent payments. Meanwhile, non-monetary non-wage or fringe benefits are made up of employee benefits such as employer-provided health insurance, sick pay, paid holidays, annual paid leave, dental insurance, training aids, unemployment benefits and retirement benefits.

Furthermore, it is interesting to implement such studies using the context of developing countries because in these countries non-wage compensation benefits are heterogeneously provided by firms. A stylized fact of the distribution of firms in developing countries is the ubiquitous presence of informal, small-sized and family firms which constitute the informal sector (Gollin 2008; Rauch 1991). Although informal firms play a very important role in job creations for workers especially low-skilled laborers (Banerjee and Duflo 2007), they function differently relative to formal firms in particular the provision of compensation for informal employments (La Porta and Shleifer 2014).

Specifically, informal firms do typically not attach non-wage benefits to a paid job's compensation package (McCaig and Pavcnik 2015). There are some reasons for this stylized fact. Importantly, under the presence of the inadequate legal enforcement firms simply choose to elude the compliance of labor market regulations about the assurance of standard working conditions as well as the provision of social protections via non-wage benefits for their employees in order to minimize costs related to labor uses (Goldberg and Pavcnik 2003; Mao et al. 2013; Paz 2014; Schneider and Enste 2000). As well, because of being informal and small-sized firms, they are not sufficiently affordable to pay for costs associated with non-wage benefits rather than comparatively low salaries. It is suggestive of being that almost fundamental causes for this fact are most likely rooted in the existence of weakly institutionalized labor markets without strongly insitutional arrangements from the context of developing countries (Pagés et al. 2014). Consequently, informal workers are extremely vulnerable to the shocks during their working careers due to the lack of essential employment securities, social and health protections provided by firms (Mannila 2015). The reality of heterogeneously paid non-wage compensation provides a profound background for

examining the importance of schooling for the explanation of non-wage differentials in low-income countries like Vietnam.

Vietnam has a very striking background for the current study in terms of its context of development. The economic reforms that Vietnam has implemented since 1986 under the name of renovation (*Đổi Mới* in Vietnamese) has crucial effects on the functioning of labor markets in this transition economy. General speaking, before 1986 Vietnam had no labor markets because its economy worked as a centrally planned system. Under such an economy, all allocations related to employment such as the volume of jobs, the amount of workers or wage were dominantly decided by the central state. In contrast, in the era of economic renovation Vietnam has initiated and developed its labor markets where there are the interactive functionings of the demand for and the supply of labor in some extent to allocate human resources in the economy.

However, it is reasonably admitted that Vietnam has so far a weakly institutionalized labor market in the sense that labor market institutions and policies are inefficiently functioned and insufficiently implemented as well (Schmillen and Packard 2016) and thus there is the co-existence of both formal and informal labor markets in this low-income economy (Rand and Torm 2012). Under a weakly institutionalized labor market, non-wage benefits that firms provided for Vietnamese workers are arguably heterogeneous, especially between formal and informal employment sectors (Argente and García 2015). Hence, the study of the effect of schooling on non-wage benefits is tremendously important because in that context the role of education in determining non-wage benefits received by workers with various educational outcomes is hypothetically revealed more apparently (Schmillen and Packard 2016).

Also, during the same period of economic reforms Vietnam has experienced the remarkable expansion of its educational system due to an increasing demand for schooling that is originated from a higher demand for quintessential workers. In this context, education plays a very important role in the Vietnamese labor market in terms of both increasing the quality of workers and improving living standards for Vietnamese citizens. Investments in education is costly and how large the returns to schooling is in the labor market economically incentivizes workers for doing such investments. However, numerous studies on the private returns to schooling from the literature in Vietnam and other developing economies alike has well-concentrated on wage as a key labor market outcome. There is no research estimating the non-wage returns to schooling. However, workers' payoffs for investments in schooling are reflected not only by wage returns but also non-wage benefits. The estimates of merely wage returns to schooling that ignore non-wage benefits seemingly under-evaluates the whole effect of education on labor market outcomes. The current study fills this gap by giving the first evidence on the causal link between schooling and non-wage compensation in the related literature using data from Vietnam.

A central hitch with the empirical identification of the causal effect of schooling on labor market outcomes is that schooling is likely connected with many latent personal characteristics that are also probably related to labor market outcomes. This problem indicates that estimated associations between education and labor market outcomes merely demonstrate the omitted variations rather than a reliable causal relationship. To conquer this problem, the current study utilizes the policy of compulsory primary schooling in Vietnam in 1991 that mandated a compulsory primary education for all Vietnamese children aged under

15 at the time of policy.<sup>2</sup> The alteration in educational attainment induced by this educational reform is therefore unrelated to other unobserved individual characteristics that also determine labor market outcomes.

Using household survey data from Vietnam between 2010 and 2014, this study finds that education does cause a favorable effect on non-wage compensation. The positive effect of education on non-wage benefits are discovered by using OLS, 2SLS and reduced-form estimators. In particular, the baseline OLS estimates show that workers going to schools for one more year are more likely to gain non-wage benefits, specifically monetary payments for public holidays by 4.4 percentage points, monetary employee benefits by 2.6 percentage points, annual paid leave by 6.6 percentage points and firm-provided social insurance by 6.5 percentage points compared to the counterparts. The baseline 2SLS estimates indicate that an additional year of schooling is causally linked to a 6 percentage point increase in the likelihood of receiving monetary payments for public holidays, a 4.6 percentage point increase in the likelihood of receiving monetary employee benefits, a 7.3 percentage point increase in the likelihood of having annual paid leave and a 6.8 percentage point increase in the likelihood of having firm-provided social insurance. Furthermore, reduced-form estimates illustrate that workers exposed to the reform are more likely to achieve non-wage benefits than those who were out of the reform, in particular for monetary payments for public holidays by 11.4 percentage points, monetary employee benefits by 8.8 percentage points, annual paid leave by 13.8 percentage points and firm-provided social insurance by 13 percentage points. Interestingly, it is obvious that the impact of schooling is larger for fringe

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<sup>2</sup> The 1991 compulsory schooling reform in Vietnam was used as an instrument for exogenous changes in schooling from some recent studies related to the causal effects of schooling in health care utilization or political outcomes for examples Dang (2017a, 2017b).

(non-monetary non-wage) benefits than monetary non-wage benefits by using all three estimation models.

This paper furthermore inspects several essential channels through which schooling might effects the probability to gain non-wage benefits in the workplace. One likelihood is more education increases the chance for working in the formal sector rather than the informal sector. Workers working with a formal employment tend to earn improved non-wage compensation. Another possible factor is that acquiring more schooling give more likelihoods for workers to achive a skilled occupation that in turn enables them more likely to obtain non-wage compensation. Finally, the possibility to working for an employee-friendly firm might be higher for the more educated workers. Workers working for an employee-friendly firm probably are more likely to gain non-wage compensation.

The remainder of the paper is organized as follows. Section 2 describes the Vietnamese compulsory schooling reform and previous literature related to returns to schooling in Vietnam. Data and the sample are discussed in section 3 while estimation methods are presented in section 4. Sections 5, 6 and 7 respectively report baseline empirical results, the results of robustness checks and the inspection of potential mechanisms to explain the causal effect of schooling on non-wage compensation. Finally, discussion and conclusion are made in section 8.

## **2 The Vietnamese Compulsory Schooling Reform and Returns to Schooling in Vietnam**

### **2.1 The Vietnamese Compulsory Schooling Reform**



After the 1975 unification of the whole country, Vietnam had a very insufficiently-developed educational system due to a very difficult situation of a post-war period (London 2011). The educational attainment rates were very low compare to other same context countries in Asia. Moreover, nearly ten years for a centrally planned economy, Vietnam seemingly lossed its educational development. The extreme lack of resources and the closeness of the economy as well made the educational system in this low-income country had become worse.

In 1986, the government of Vietnam launched an economic reform that is called renovation under the name of *Đổi Mới* in Vietnamese. In line with the policies for reforming its economy, Vietnam has attempted to transform its educational system with many policies as efforts to enhance the nation's human capital stock for economic growth and the transformation of the whole economy (Kinh and Chi 2008). One of the most important educational policies is the compulsory primary schooling reform for all Vietnamese children that was introduced in 1991 (Kamibeppu 2009). This reform formally worked under a legislative framework of the *Law on Universal Primary Education* (LUPE).

Under the reform, all Vietnamese children has been forced to go to primary schools at the age of 6 years old for the first grade and completed the primary level at 15 years old for the fifth grade. In other words, 15 years old became the maximum age for freely leaving schools in Vietnam as the regulation of LUPE. With this legislative approval, Vietnamese citizens who were born in 1977 and later were fully exposed to the schooling reform while those whose years of birth lower than 1977 were out of the reform. It is expected that this intervention makes average year of schooling is higher for the group of Vietnamese children exposed to the reform than that for those who were out of the reform.

Before this reform, Vietnam had no any year of compulsory schooling. Children's schooling vastly depended on households' individual decisions based on their resources. Generally speaking, there had been no formal interventions from the government to change years of schooling for Vietnamese children (Viet 2009). With this policy, there profoundly was an increase in the number of compulsory schooling years from zero to five, equivalently the completion of primary education. To do this, the government of Vietnam aimed to increase average years of schooling, especially for people in rural and remote areas in this transition economy. In reality, the 1991 reform is really a crucial policy with remarkable results it has created to increase educational attainment among Vietnamese citizens. Illustratively, the statistics from World Bank (2017) demonstrates that the fractions of gross primary educational attainment had apparently increased over the period of post-reform compared to the pre-reform period. In particular, while the figures were highly stable with around 104 percent between 1983–1990, the fractions of gross primary enrollment had risen over the period of 1992–1997 for examples approximately 107 percent in 1992, 112 percent in 1994 and 115 percent in 1997.

## **2.2 Returns to Schooling in Vietnam**

Education has been regarded as a significant driver of the changes in economic, political and social aspects during the era of economic reforms in Vietnam (Huong and Fry 2004). The role of education in explaining the labor market outcomes in Vietnam is well-documented over few decades. Almost studies focus on the link between schooling and wage or income during the age of economic reform in this transition economy. The results show positive impacts of schooling on labor market outcomes in Vietnam during its economic reform period (Phan and

Coxhead 2013). However, it is more vital to discuss estimation methods has been used from available studies to identify if achieved estimates are reliable to inform the causal effect.

Initial studies on this topic in Vietnam all used the conventional Mincerian equation (Mincer 1974) with a OLS estimator to estimate labor market benefits of schooling. As the first study providing the estimate of private returns to schooling in Vietnam, Gallup (2002) employs a very essential OLS Mincerian model to estimate wage returns to schooling. In a same manner, Moock et al. (2003) finds that schooling measured by various educational levels has considerable positive impacts on labor market earnings in Vietnam with modified Mincerian equations and a OLS estimator. However, such studies that merely used a conventional Mincerian equation and its augmented equations with a naive OLS estimator for the estimation could not produce unbiased estimates because of the existence of the endogeneity problem. Ignoring the endogeneity problem of the relationship between education and schooling is a very extreme disadvantage in providing precise estimates of private benefits of schooling. It is vastly challenge to use such estimates to inform the causal impact of education on labor market outcomes.

Subsequently, the literature has witnessed researchers' attempts to produces more precise estimates of the impact of interest by using other estimation approaches to account for the problems of endogeneity (Arcand et al. 2004) or selection bias (Doan and John 2010). For instance, Liu (2006) applies a basic demand-and-supply framework initiated by Katz and Murphy (1992) to interestingly discover that education make changes the demand towards educated workers and thus imposes wage differentials. Kinh and Westbrook (2012) provide evidence on the impact of schooling on household welfare in Vietnam using an IV estimator. In particular, Kinh and Westbrook arguably used a mean value of educational outcome from

the same group with similar characteristics such as age, gender, cohort and location to instrument for exogenous changes in a respondent's educational outcome. They find that education plays a substantial role in improving consumption expenditure for Vietnamese families.

Oostendorp and Doan (2013) strive to examine not only wage but also employment effects of schooling and find the positive impacts of schooling on labor market outcomes in Vietnam. Moreover, Oostendorp and Doan attempt to control for a potential problem of selection bias by using a modified functional form with an additional part of sample selection terms. Recently, Doan et al. (2017) also use Heckman's two-step model to address selection bias and find that returns to schooling in Vietnam increased during the economic reform up to the 2008 global financial crisis but after that the returns evidently decreased.

Generally speaking, previous studies on the labor market benefits of schooling in Vietnam mostly focus on wage or earnings. More importantly, the relationship between schooling and labor market outcomes found from the existing literature in Vietnam undeniably tends to be correlation rather than true causality that leaves open a research gap on the causal effect of schooling on labor market outcomes in Vietnam. This study significantly fulfills the research gap by estimating the causal effect of schooling on non-wage benefits in Vietnam.

### **3 Data and the Sample**

This study uses three waves of Vietnam Household Living Standards Survey (VHLSS) (2010, 2012 and 2014 surveys) to estimate the causal effect of education on non-wage compensation from the labor markets in Vietnam. The VHLSS is a nationally representative

household survey that has been conducted biannually. The first VHLSS wave was carried out in 2002. Generally, in each survey roughly 40,000 individuals from about 9,000 households across Vietnam were asked to elicit fundamental information on demographics, education, health, employment, household expenditure, household assets, housing and agricultural production. This study exploits data from sections of demographics, education and employment from the VHLSS surveys of 2010, 2012 and 2014 to create essential variables for the sample.

To form the sample for the analysis, this study limits all respondents who were formally working with a paid job from the labor markets at the time of surveys. These respondents played a role as active workers from the current labor force from 2010, 2012 and 2014 VHLSSs. In terms of the sample for the main empirical analysis, the paper uses those who were born between 1968 and 1985. This is equivalent to the the choice of  $\pm 9$  bandwidths in which the 1977 cohort plays a role as the birth-year cutoff to divided the whole sample into the treatment and the control groups. The treatment group only includes workers were born between 1977 and 1985 who were fully exposed to the 1991 schooling reform. Whereas, the control group consists of those whose birth years between 1968 and 1976 were out of the same reform.

It is crucial to define non-wage compensation variables used in this study. Despite the existence of a wide range of non-wage compensation forms from the literature, due to the availability of related information from VHLSS data this study only employs four proxies for non-wage compensation including *monetary payments for public holidays*, *monetary employee benefits*, *annual paid leave*, and *firm-provided social insurance*. These dependent variables are all measured in percentage terms. For the first dependent variable, *monetary*

*payments for public holidays* is a binary variable equals 1 if a worker receives any payment for public holidays in Vietnam according to the Labor Code and zero otherwise.<sup>3</sup> Second, the variable of *monetary employee benefits* is also a dummy that take a value of 1 if a worker receives any employee benefits such as boneses, uniform costs, lunch costs, allowances for business travels, illness costs, costs of pregnancy check-ups or costs of acciendents during working time and zero otherwise. Third, *annual paid leave* is also a binary variable that takes 1 if a worker has annual paid leave and zero otherwise. Finally, the fourth dependent variable takes a value of 1 if a worker has *firm-provided social insurance* from an offered compensation package and zero otherwise. Notably, among these variables *monetary payments for public holidays* and *monetary employee benefits* are monetary non-wage benefits while *annual paid leave* and *firm-provided social insurance* are non-monetary non-wage (fringe) benefits.

Table 1 reports the statistical summary of the sample. The whole sample for the baseline analysis has 7,865 observation in the size with a treatment group of 4,694 workers and a control group of 3,171 workers. In terms of basic socio-demographic characteristics, the average age of the whole sample is nearly 34 years old while corresponding figures for the treatment and the control groups are respectively roughly 31 and 40 years old. Among available observations, there are about 57 percent male workers, 54 percent respondents from urban areas, 95 percent belonging to the majority group, and 77 percent being married at the time of survey.

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<sup>3</sup> Under the Vietnamese Labor Code, general public holidays consist of New Year's Day (January 1), Lunar New Year Festival (the Tet holiday), Hung King's Anniversary Day (March 10 of the Lunar Year), Reunification Day (April 30), International Labor Day (May 1) and National Day (September 2).

Regarding the variables related to education, the rate of respondents who were fully exposed to the 1991 schooling reform is approximately 60 percent for the whole sample. The average schooling year for the whole sample is 10.6 years and the corresponding educational outcomes for the treatment and the control groups are respectively about 11.3 and 9.6 years. Apparently, the treatment group's average schooling year is higher than that for the control group.

Referring non-wage compensation outcomes, around 71 percent workers receives monetary payments for public holidays for the whole sample. The corresponding figures for the treatment and the control groups are respectively 75 percent and 65 percent. For monetary employee benefits, there are approximately 54 percent workers from the whole sample while there are nearly 57 percent and 50 percent workers from the treatment and the control groups. While nearly 57 percent respondents from the whole sample indicated that they receive annual paid leave for the current job, the corresponding figures from the treatment and the control groups are respectively 61 percent and 49 percent. Roughly 55 percent of respondents from the whole sample benefit from a firm-provided social insurance while nearly 59 percent and 48 percent of respondents respectively from the treatment and the control groups receive this form of non-wage compensation. The statistical summary of other variables are specifically presented in Table 1.

## **4 Estimation Methods**

To estimate the link between schooling year and non-wage benefits, this study employs three approaches including (i) ordinary least squares (OLS), (ii) a two-equation system with a

procedure of two-stage least-squares (2SLS), and (iii) a reduced-form regression. Let's start with the OLS estimation, the paper estimates the following equation:

$$Benefit_i = \alpha_1 + \alpha_2 SchoolingYear_i + \alpha_3 \mathbf{X}'_i + \tau_t + \varepsilon_i \quad (1)$$

where  $Benefit_i$  is a non-wage benefit measured by four distinct variables (the probability of monetary payments for public holidays, the probability of having monetary employee benefits, the probability of receiving an annual paid leave, and the probability of having firm-provided social insurance) for the worker  $i$ ;  $SchoolingYear_i$  is years of schooling;  $\mathbf{X}'_i$  is a vector of control variables including age, squared age, a dummy for male gender, a dummy for living in an urban area, a dummy for belonging to an ethnic group of majority (*Kinh* or *Hoa* peoples) and a dummy for being married;  $\tau_t$  indicates survey year fixed effects; and  $\varepsilon_i$  is an idiosyncratic error term. Importantly,  $\alpha_2$  is the coefficient of interest that indicates the effect of schooling years on non-wage compensation outcomes.

However, the estimation of the effect of education on non-wage benefits using OLS likely produces biased estimates due to the endogeneity problem of the relationship between education and outcomes of interest. How to overcome the endogeneity problem in order to achieve precise estimates of the causal links between education and labor market outcomes has canonically become the most solicitous issue in applied econometrics of the study of labor markets over several decades (Card 2001). Recent studies has employed compulsory schooling reforms as a contemporarily fashionable approach to instrument for exogenous shifts in educational outcome to estimate the causal effect of schooling on labor market outcomes (Devereux and Hart 2010; Grenet 2013; Oreopoulos 2006; Pischke and von Wächter 2008; Stephens and Yang 2014).



This study uses the 1991 compulsory primary schooling reform that mandated all Vietnamese children aged under 15 at the time of exposure reform to go and complete the primary school. Equivalently, children who were born since 1977 were fully exposed to the reform whereas those whose birth years prior to 1977 were out of the reform. This paper uses this criterion to create the treatment and the control groups for doing an evaluation of the impact of schooling on non-wage benefits for Vietnamese workers. Let denote  $ReformExposure_i$  as the probability of being exposed to the reform for a worker  $i$ , mathematically

$$ReformExposure_i = \begin{cases} = 1 & \text{if } BirthYear_i \geq 1977 \\ = 0 & \text{otherwise} \end{cases} \quad (1)$$

where  $BirthYear_i$  is the year of birth of the worker  $i$ .

The variable of  $ReformExposure_i$  is used to predict schooling years in the following two-equation system with a two-stage least-squares (2SLS) estimation procedure. The first and second stages estimate the corresponding following regression functions:

$$SchoolingYear_i = \beta_1 + \beta_2 ReformExposure_i + \beta_3 \mathbf{X}'_i + \tau_t + \epsilon_i \quad (2)$$

and

$$Benefit_i = \gamma_1 + \gamma_2 \widehat{SchoolingYear}_i + \gamma_3 \mathbf{X}'_i + \tau_t + \zeta_i \quad (3)$$

where  $\widehat{SchoolingYear}_i$  in equation (3) is the predicted value of  $SchoolingYear_i$  from the first stage regression in equation (2). The coefficient of  $\gamma_2$  meaningfully reports the local average treatment effect (LATE) of years of education on non-wage compensation outcomes.

Finally, the paper uses a reduced-form regression to directly estimate the effect of the 1991 schooling reform on non-wage compensation outcomes. In particular, the paper estimates the following equation:

$$Benefit_i = \varphi_1 + \varphi_2 ReformExposure_i + \varphi_3 \mathbf{X}'_i + \tau_t + \xi_i \quad (3)$$

The coefficient of  $\varphi_2$  shows the effect of the reform on non-wage compensation outcomes.

## 5 Baseline Results

Next, the paper reports the baseline results for the impact of education on non-wage compensation. This paper first explores the impact of the schooling reform on years of schooling (first-stage regression) and non-wage compensation outcomes (reduced-form regressions) using key graphs. In particular, the first-stage and the effect of the schooling reform on outcomes are geographically demonstrated in Figures 1 and 2. According to Figure 1, the schooling reform in 1991 had a substantial effect on years of education for Vietnamese workers. Furthermore, the reduced-form graphs in Figure 2 show considerable increases in non-wage compensation for workers who were full exposed to the reform relative to the counterparts for four proxies respectively monetary payments for public holidays in part (a), monetary employee benefits in part (b), annual paid leave in part (c) and firm-provided social insurance in part (c) of Figure 2.

Furthermore, the baseline estimated coefficients are reported in Table 2 for four dependent variables, in particular the probability of receiving monetary payments for public holidays (column 1), the probability of receiving monetary employee benefits (column 2), the

probability of having annual paid leave (column 3), and the probability of having a firm-provided social insurance (column 4). For each non-wage compensation outcome, the paper estimates three econometric specifications: OLS (Panel A), 2SLS including first-stage coefficient and *F*-statistics as well (Panel B), and reduced-form regressions (Panel C). Using these various models allow the current paper to expedite the comparison of estimates of the impact. Importantly, the baseline sample includes individuals born in 1968–1985 with 7,865 observations. For each baseline specification, the set of control variables consists of age, squared age, male, urban, majority, and married; and survey year fixed effects is also included. Generally, the estimated coefficients indicate that education has a significant positive relationship with non-wage benefits for all four outcomes using three estimation models. All estimated coefficients are statistically significant at 1%.

The OLS estimates in Panel A of Table 2 point out that there is a significant favorable connection between education and all four non-wage compensation measures in the Vietnamese workplace. Each extra year of schooling on average is associated with a 4.4 percentage point increase in the probability of receiving monetary payments for public holidays (column 1), a 2.6 percentage point increase in the probability of receiving monetary employee benefits (column 2), a 6.6 percentage point increase in the likelihood of having annual paid leave (column 3) and a 6.5 percentage point increase in the likelihood of having firm-provided social insurance (column 4). It is obvious that the impacts are larger for non-wage non-monetary (fringe) benefits than for non-wage monetary benefits.

It is essential to question that are the OLS estimates precisely inferred as a causal impact of education on non-wage compensation or do they merely reflect latent characteristics that are correlated with both education and non-wage compensation outcome? Despite the

unobservable factors related to various survey years are controlled in the estimation model, there may still be correlated hidden determinants for example macroeconomic indicators that demonstrate economic growth and firm's growth as well. More importantly, there are likely latent characteristics associated with personal workers for instance individual ability or family backgrounds that are related to both schooling and non-wage benefits. Admittedly, the available set of control variables using in OLS model can not satisfactorily provide an acceptable approach to the endogeneity problems. Therefore, these OLS estimates are not reliably suggestive of the causal effect of schooling on non-wage compensation.

Thus, to quantify the reliable causal effect the current paper employs the 1991 compulsory schooling reform to instrument for exogeneous changes in schooling years for addressing the endogeneity issues. The paper estimates the impact of the reform on non-wage compensation by its impact on years of education. In doing so, it is assumed that the mediational pathway through which the reform has an impact on non-wage compensation is only years of schooling and not by way of other features of the reform such as curriculum changes, well-trained teachers or financial assistance. The results of 2SLS estimates are presented in Panel B of Table 2.

The first-stage estimates indicate that the reform has a significant positive impact on years of schooling. In particular, exposure to the reform more likely increases a worker's education by about 1.9 years of schooling. Equally importantly, the *F*-statistics of the excluded instrument in the first-stage is approximately 76.06, suggesting that the reform is satisfactorily associated with schooling years the endogenous variable in this study (Staiger and Stock 1997). The significant positive link between the reform and educational outcome in this study is completely consistent with the findings from previous studies for Vietnam

implemented by Dang (2017a, 2017b) that also use the same reform as an instrument for exogenous variations on years of schooling.

The second-stage estimates also indicate that education has a significant positive effect on non-wage benefits. The estimated coefficient in the second-stage is inferred as the local average treatment effect. In particular, an additional year of schooling significantly rises the likelihood of receiving monetary payments for public holidays by about 6 percentage points (column 1), the likelihood of receiving monetary employee benefits by about 4.6 percentage points (column 2), the possibility of having annual paid leave by roughly 7.3 percentage points (column 3) and the probability of having firm-provided social insurance by approximately 6.8 percentage points (column 4). The findings suggest that the causal effect of years of schooling on non-wage compensation exists thoroughly in Vietnam. Specifically, additional education significantly rises non-wage compensation, in particular monetary payments for public holidays, monetary employee benefits, annual paid leave and firm-provided social insurance.

It is also absorbing to mention that the 2SLS estimates are larger than the corresponding OLS estimates. This implies that OLS estimator to some extent likely produces the biased estimates compared to the estimates using 2SLS estimator. Yet, the differences of the impact for each dependent variable are comparably not sizable. Specifically, these differences are about 1.6 percentage points for monetary payments for public holidays, 2 percentage points for monetary employee benefits, 0.7 percentage points for annual paid leave and 0.3 percentage points for firm-provided social insurance.

In addition to presenting the OLS and 2SLS estimates, this paper also discusses the reduced-form estimates of the impact of exposure to the reform on non-wage compensation. This allows us to verify if exposure to the reform validly affects non-wage benefits. The

estimates from Panel C of Table 2 show that exposure to the reform is significantly and positively related to all four non-wage benefits. Specifically, workers who were exposed to the reform are 11.4 percentage points more likely to receive monetary payments for public holidays (column 1), 8.8 percentage points more likely to receive monetary employee benefits (column 2), 13.8 percentage points more likely to have annual leave paid (column 3) and 13 percentage points more likely to have firm-provided social insurance (column 4). Apparently, the reform has a considerable favorable impact on non-wage compensation in Vietnam.

## **6 Robustness Checks**

Next, this section discusses some key robustness checks of the baseline estimates. The paper implements three checks for the sensitivity of baseline estimates by (i) estimating other various specifications that are different from the baseline specification by changing the set of control variables, (ii) estimating the baseline specification using various sub-samples created by using different bandwidths, and (iii) estimating the baseline specification with a sub-sample that excludes observations from Ha Noi and Ho Chi Minh City, two largest provinces in Vietnam. The estimated results of robustness checks are presented in Tables 3–5.

### **6.1 Using Various Specifications**

Firstly, Table 3 reports the estimated coefficients using two various specifications, including (i) a parsimony specification that excludes all available control variables from the baseline specification as shown in column 1, and (ii) a full specification that adds more control variables in particular dummies for six geographical regions in Vietnam to control for the regional

variation into the baseline specification as shown in column 2 of each dependent variable. In general, the estimated coefficients indicate that when the paper uses different specifications the estimated results of the impact of education on non-wage benefits are highly identical to the baseline results in terms of the signs and the magnitudes of the impact. The coefficients maintain their statistical significances at 1% level and also suggest the positive links between years of schooling and non-wage benefits.

Specifically, the OLS estimates in Panel A of Table 3 show that an additional year of schooling is more likely to link to a 4.8 (column 1) or 4.4 percentage points (column 2) increase in the probability of receiving monetary payments for public holidays, a 3 (column 1) or 2.7 percentage points (column 2) increase in the probability of receiving monetary employee benefits, a 6.9 (column 1) or 6.7 percentage points (column 2) rise in the possibility of having annual paid leave and a 6.8 (column 1) or 6.7 (column 2) rise in the possibility of having firm-provided social insurance. It is obvious that there is increase in the magnitude of the point estimates of the OLS estimates in Table 3 compared to the baseline OLS estimates in Table 2 although this change is very comparably small.

The 2SLS estimates in Panel B of Table 3 are highly robust to the baseline estimates in Table 2 for both first- and second-stage estimates. The first-stage estimates apparently show a significant and positive impact of the reform on schooling years with  $F$ -statistics of 60.71 (parsimony specification) or 91.24 (full specification). The magnitude of the first-stage impact is roughly 1.68 years of schooling for parsimony specification (column 1) or 1.71 years of schooling for full specification (column 2). For the second-stage results, one more year of schooling causally rises the probability of non-wage benefits, in particular monetary payments for public holidays by about 6 or 6.1 percentage points, monetary employee

benefits by roughly 4.7 or 4.8 percentage points, annual paid leave by approximately 7.2 or 7.3 percentage points and firm-provided social insurance by nearly 6.6 or 6.8 percentage points.

Again, the reduced-form estimates using parsimony and full specifications in Panel C of Table 3 also confirm a significant and positive impact the reform on non-wage benefits. The magnitudes of the impacts are around the baseline estimates although they are slightly lower than the baseline ones. Specifically, workers exposed to the reform are more likely to reach non-wage benefits by approximately 10.1 or 10.4 percentage points for monetary payments for public holidays, 7.9 or 8.2 percentage points for monetary employee benefits, 12 or 12.5 percentage points for annual paid leave and 11.1 or 11.7 percentage points for firm-provided social insurance.

## **6.2 Using Different Bandwidth Choices**

Secondly, Table 4 reports the estimated coefficients using different bandwidth choices to create corresponding sub-samples, including (i) 1969–1984 birth years (6,974 observations), (ii) 1970–1983 birth years (6,038 observations), (iii) 1971–1982 birth years (5,032 observations), and (iv) 1972–1981 birth years (4,071 observations). The paper also finds a significant and positive relationship between schooling years and non-wage benefits using all specifications for all sub-samples. These estimates still keep their statistical significances at 1% level as the baseline estimates. Crucially, the point estimates tend to be around the baseline ones in terms of their magnitudes.



The OLS estimates from Panel A of Table 4 indicates that education is positively correlated with non-wage compensation. In particular, the increasing probability of non-wage benefits stemming from having an extra year of schooling is 4.3–4.4 percentage points for monetary payments for public holidays (column 1), 2.6–2.7 percentage points for monetary employee benefits (column 2), 0.67 percentage points for annual paid leave (column 3) and 6.6–6.7 percentage points (column 4).

The 2SLS estimates from Panel B of Table 4 also show the strong robust impact of schooling on non-wage compensation comparable to the baseline 2SLS estimates. For the first-stage, exposure to the reform increases education by 1.42–1.8 years of schooling with the *F*-statistics on excluded instrument of between 59.79–71.47. When we narrow the sample with a smaller bandwidth, the magnitude of the first-stage estimate is relatively lower although the decrease is relatively insignificant. This is probably due to a fact that the individuals whose birth years are closer to the birth year cutoff (1977) tends to have a more similar educational pattern. Therefore, the impact of the reform for workers born around the cutoff are more likely lower than that for a group included both workers born far from the cutoff. The second-stage estimates indicate that one more year of schooling causally increases monetary payments for public holidays by 5.4–6.2 percentage points (column 1), monetary employee benefits by 2.9–4.6 percentage points (column 2), annual paid leave by 6.4–7.6 percentage points (column 3) and firm-provided social insurance by 6.1–7.1 percentage points (column 4).

In terms of the reduced-form estimation results, the estimates in Panel C of Table 4 indicate that individuals exposed to the reform tend to have a higher likelihood of receiving monetary payments for public holidays by 7.6–11.2 percentage points (column 1), a higher

likelihood of receiving monetary employee benefits by 4.1–8.2 percentage points (column 2), a larger possibility of having annual paid leave by 9.1–13.7 percentage points (column 3) and a larger possibility of having firm-provided social insurance by 8.7–12.8 percentage points (column 4) compared to the counterpart individuals.

### **6.3 Other Robustness Checks**

Finally, the paper estimates the effect with a sub-sample that removes observations from Ha Noi and Ho Chi Minh City, two largest provinces in Vietnam. Ha Noi and Ho Chi Minh City have the most active labor markets in Vietnam. Economic activities and employments in these two cities contribute the largest proportions to the economy's whole economic activities. Therefore, it is necessary to check the sensitivity of the baseline results to the estimates from a sub-sample without workers in Ha Noi and Ho Chi Minh City. There are 1,370 observations from Ha Noi and Ho Chi Minh City that amount to about 17% of the whole sample that all observations from 63 Vietnamese provinces. The estimated coefficients are presented in Table 5 with a sub-sample of 6,495 observations.

The results show that there is no differences between the estimated coefficients in Table 5 and the baseline estimates in Table 2 in terms of both the signs and the magnitudes of the impacts. The positive impacts for all outcomes of non-wage benefits using available estimation models are established with a 1% statistical significance level. The OLS estimates in Panel A of Table 5 illustrate that workers who have an additional year of schooling are on average 4.6 percentage points more likely to gain monetary payments for public holidays (column 1), 2.5 percentage points more likely to acquire monetary employee benefits (column 2), 6.7 percentage points more likely to have annual paid leave (column 3) and 6.6

percentage points more likely to hold firm-provided social insurance (column 4) than their counterparts.

Meanwhile, the 2SLS coefficients in Panel B of Table 5 also show very strongly consistent estimates of the impact for both the first- and second-stage estimates. In the first-stage, the reform on average increases workers' educational outcome by roughly 1.9 years of schooling that is similar to the baseline first-stage estimate. Also the *F*-statistics on excluded instrument is 71.77 that is very close to the baseline corresponding figure. For the second-stage results, one more year of schooling results in a 6.3 percentage point increase in the probability of receiving monetary payments for public holidays (column 1), a 4.2 percentage point increase in the possibility of gaining monetary employee benefits (column 2), a 7.5 percentage point increase in the probability of having annual paid leave (column 3) and a 7.1 percentage point increase in the likelihood of having firm-provided social insurance (column 4).

The reduced-form estimates as indicated in Panel C of Table 5 show that the reform is also significantly and positively linked to non-wage compensation. Specifically, exposure to the reform causes for a worker a higher probability to receive monetary payments for public holidays by about 11.9 percentage points (column 1), a higher probability to gain monetary employee benefits by nearly 8.1 percentage points (column 2), a higher probability to have annual paid leave by approximately 14.2 percentage points (column 3) and a higher probability to have firm-provided social insurance by roughly 13.3 percentage points (column 4).

It is conclusive that the results of robustness checks as presented above extremely confirm the strongly robust baseline estimates of the causal impact of schooling on non-wage in terms of both the sign and the magnitude of the impacts.

## **7 Potential Mechanisms**

This section inspects crucial mechanisms through which schooling has a positive impact on non-wage benefits in Vietnam as indicated in the section of empirical results. We propose three key mediators behind the causal link between education and non-wage compensation that consist of (i) formal employment, (ii) skilled occupation and (iii) employee-friendly firm. It is expected that education is significantly related to these mediators which in turn affects non-wage benefits. Table 6 demonstrates the estimated coefficients of the impacts of schooling on three mediating factors. Overall, the estimates from Table 6 show that education has statistically significant and positive impacts on mediating factors measured in percentage points, in particular formal employment (column 1), skilled occupation (column 2) and employee-friendly firm (column 3). The results and discussions are presented in details as follows.

### **7.1 Formal Employment**

Although the Vietnamese labor market has been developed over last decades, it so far owns a weakly institutionalized system with imperfect functionings especially in terms of the defective implementation and compliance of labor market institutions and policies (Schmillen and Packard 2016).<sup>4</sup> Under this context, there is the co-existence of formal and informal

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<sup>4</sup> For example, under the regulation of the Vietnamese Labor Code that was first introduced in 1994, for all jobs with a duration of at least three months a written employment contract must be signed between employers and employees. However, the implementation is poorly carried out in reality as consequences of the existence of labor market imperfections such insufficient legal supervision, lack of information and modest labor mobility

employment sectors within the Vietnamese labor market. As a result, there exists a considerable fraction of unregistered or informal workers relative to the amount of formal workers in this emerging economy (Huong et al. 2013; Schmillen and Packard 2016).

Furthermore, the labor market dualism likely has a significant impact on inequality in labor market outcomes.<sup>5</sup> In reality, formal and informal workers receive discriminated compensation packages in terms of both wage and non-wage benefits in Vietnam (Rand and Tarp 2011). Some previous studies for examples McCaig and Pavcnik (2015) and Nguyen et al. (2013) emphasize that working with an informal job is significantly and negatively related to wage compensation in Vietnam. Regarding non-wage compensation, while formal workers who work under the legal protection of the employment law receive better benefits, informal workers who work for informal firms within the underground economy tend to receive relatively low wage and loss basic non-wage benefits (Huong et al. 2013; Rand and Tarp 2011). As a result, informal workers are extremely vulnerable to the shocks for examples unemployment, health problems, aging or even natural disasters in the existence of the lack of social protection (Huong et al. 2013).

Because differences in non-wage benefits provided to workers between informal and formal firms, workers individually have strong motivations to find to reach the formal employment (McCaig and Pavcnik 2015). The role of education is more apparent to improve

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(Brassard 2004). Numerous firms especially small-sized ones have strong motivations to disobey the legislative regulation to in order to minimize costs related to labor uses in Vietnam (Schmillen and Packard 2016).

<sup>5</sup> The context of labor market dualism has been used for the study of labor market outcome differentials in many developing countries for examples Argentina (Pratap and Quintin 2006), Brazil (Botelho and Ponczek 2011), China (Maurer-Fazio and Dinh 2004), Columbia (Magnac 1991), South Africa (Badaoui et al. 2008), and Mexico (Maloney 1999).

the receipt of non-wage benefits for any worker through achieving a formal job. In this study, formal employment is used as a primary mediator to explain the causal effect of schooling on non-wage compensation. Importantly, in this study formal employment is measured by the probability a worker to achieve a formal written employment contract with her or his current paid job.

Actually, we find that expanded education leads to a statistically significant increase in the probability to find a job in the formal sector as shown in column 1 of Table 6. In particular, the OLS estimate in Panel A indicates that an additional year of schooling is significantly and positively linked to a 6 percentage point increase in the likelihood of formal employment. Meanwhile, the 2SLS estimate in Panel B shows that one extra year of education results in an increase in the probability of formal employment by about 8.4 percentage points. Moreover, using a reduced-form regression the paper finds that workers exposed to the reform are 16 percentage points more likely to achieve a formal employment than those were out of the reform as indicated in Panel C. The positive impact of exposure to the reform on the probability to have a formal job is graphically demonstrated in part (a) of Figure 3. The finding in this section is that Vietnamese educated workers tend to work in the formal sector with a written employment contract is entirely consistent with the results from previous studies (McCaig and Pavcnik 2013, 2015). This finding implicates that education plays a very important role for workers to reach the formality in their career paths. More importantly, it is likely conclusive of the confirmative role of the formal employment status to account for the causal association between schooling and non-wage compensation.

## **7.2 Skilled Occupation**

During the era of economic reforms, Vietnam has increasingly emphasized the importance of skilled human resources as a primary driver of economic growth and development (Bodewig et al. 2014). Therefore, the demand for educated laborers has risen as a consequence of the transformation of the Vietnamese economy from a traditional agriculture-based system towards a modern market-based economy with the considerable expansion of skilled occupations. While skilled occupations include managers, professionals, technicians, clerks and services and sales workers, unskilled occupations consist of craftsmen, machine operators, manual workers, farming workers and farmers. Learning process equips individuals with not only fundamental skills for examples sufficient reading, writing, calculating or problem solving, but also cognitive, social and behavioral, and technical skills that in turns boost educated workers' capacities to acquire qualified occupational vacancies (Bodewig et al. 2014).

Furthermore, the qualification preference has traditionally become a cultural setting within the Vietnamese society. This perspective has been persistent over the years. Therefore, it is a rationale that Vietnamese people in general enormously respect those who has a relatively high education. In a analogous manner, firms strongly desire to recruit skilled workers to fulfill vacancies from skilled occupations. The extremely high demand for skilled laborers is more obvious when there is a lack of proficient human resources in Vietnam (Montague 2013).

Skilled occupations provide workers with improved working conditions and better compensation packages including both wage and non-wage benefits relative to unskilled occupations. Therefore, obtaining a skilled occupation by making investments in schooling is a useful bridge to connect education and non-wage benefits in the Vietnamese labor market.

In this study, based on the available VHLSS data, a skilled occupation is defined as one of the following occupations: leaders or managers, professionals or technicians, and clerks or service workers. Meanwhile, agriculture, forestry, fishery workers, skilled workers or machine operators and unskilled workers are classified as unskilled occupations.

Actually, this study finds that education is significantly and positively related to skilled occupation as indicated in column 2 of Table 6. Specifically, an extra year of schooling rises the probability of achieving a skill occupation by about 7.6 percentage points using OLS estimator (Panel A) or 5.7 percentage points using 2SLS estimator (Panel B). Furthermore, being exposed to the reform increases a worker's likelihood to work with a skilled occupation by nearly 10.8 percentage points (Panel C). Moreover, the positive impact of exposure to the reform on the probability to work with a skilled occupation is graphically represented in part (b) of Figure 3.

### **7.3 Employee-Friendly Firm**

Ownership might affect the possibility that a firm provides non-wage benefits for its employees. For example, Nguyen and Ramstetter (2017) find that ownership structure contributes to wage differentials among workers who work for manufacturing firms in Vietnam. Nguyen and Ramstetter show that foreign companies, and state-owned and large firms tend to pay a higher wage than small-sized domestic enterprises in this emerging economy. Moreover, the literature on wage inequality shows that firms with various ownerships tend to pay heterogeneously due to their different preferences of skilled workers (Afonso 2016).



This study defines employee-friendly firms as firms that are more likely to provide improved working conditions for workers and more importantly are to provide non-wage benefits to their workers rather than merely wage compensation. Based on available information about firms' ownership structure from VHLSS data, this study defines a firm as one of the following ownership structures: foreign companies, state-owned enterprises and sizable private firms as an employee-friendly firm. In contrast, a firm whose ownership type is collective, independent production or business households, and farming, forestry and agricultural households/individuals is not regarded as an employee-friendly firm.

This paper also finds a significant and positive relationship between education and the possibility of working for an employee-friendly firm as shown in column 3 of Table 6. The OLS estimate in Panel A indicates that one additional year of schooling is positive associated with a 5.7 percentage point rise in the probability of working for an employee-friendly firm. The causal effect of an additional schooling year on the analogous outcome from the 2SLS estimate in Panel B is a higher likelihood of 7.7 percentage points. In addition, the reform estimate in Panel C shows that workers exposed to the reform are more likely to work for an employee-friendly firm by about 14.6 percentage point than those who were out of the reform. The positive impact of exposure to the reform on the probability to work for an employee-friendly firm is graphically demonstrated in part (c) of Figure 3.

## **8 Discussion and Conclusion**

Using the Vietnamese compulsory primary schooling reform as an instrument for exogenous shifts in years of schooling enables this study to estimate the causal effect of schooling on

non-wage compensation in Vietnam. The estimates indicate that more schooling has a significant positive effect on the probability to gain non-wage compensation specifically measured by monetary payments for public holidays, monetary employee benefits, annual paid leave and firm-provided social insurance.

Equally important, this paper also probes three causal pathways linking changes in schooling with the probability to gain non-wage benefits in the labor markets using the context of a developing country. In the first channel, education promotes the likelihood for workers to reach formal jobs that in turn tend to provide better non-wage compensation relative to informal jobs. Another pathway is that the role of skilled occupation through which education affects non-wage compensation. The more educated is likely to working with a skilled occupation and by this link he or she gains better non-wage benefits compared to the less educated. Finally, more schooling provides more changes to work for an employee-friendly firm that generously give its employees preferable non-wage compensation.

This paper significantly contributes to the economics literature in some ways. Firstly, this paper while also provides more evidence on the causal effect of schooling on labor market outcomes this paper switches the focus away from wage a conventional measure of labor market outcome to non-wage outcomes that also play very important roles to determine workers' well-being. The private returns to schooling in labor markets are well-documented from the existing literature. However, there is so far no study devoted to estimate the non-wage returns to schooling. This study therefore significantly fulfills the research gap and also provides a more insightful understanding of the private returns to education in the labor markets.

Second, the nature of this study enables us to emphasize that education can be treated as workers' efficiently protective tool in the workplace to ask for providing non-wage benefits from firms. Importantly, the problem that there is a deficient provision of workplace protections has increasingly been concerned for the public policy implications especially in developing countries where there exists weakly institutionalized labor markets (Seshanna and Decornez 2003). When public interventions and legal legislations related social protections in labor markets are seemingly failure to protect workers from disadvantaged working conditions including the sufficient provision of fundamental non-wage facilities because of a fact that labor market institutions as well as policies are poorly functioned (Afonso 2016; Checchi and García-Peñalosa 2008; Fortin and Lemieux 1997), education has been regarded as the primary determinant of the employment protection (Perugini and Pompei 2016). This study evidently indicates that education can improve workers' well-being in the workplace through acquiring non-wage compensation.

Furthermore, some researchers recently attempt to examine the differences in the provision of non-wage forms of compensation in the workplace from developing countries. There are some factors for explaining this fact including managers' gender (Rand and Tarp 2011) or the probability of a firm being registered especially for small- and medium-sized enterprises (Rand and Torm 2012). This study shows that education is potentially an additional important determinant of non-wage differentials in the labor markets.

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**Table 1** Summary statistics of the sample

Variable	Full sample		Treatment		Control	
	Mean	SD	Mean	SD	Mean	SD
<b>Non-wage compensation variables</b>						
Monetary payments for public holidays (=1 if yes, =0 otherwise)	0.707	0.455	0.747	0.435	0.646	0.478
Monetary employee benefits (=1 if yes, =0 otherwise)	0.542	0.498	0.574	0.494	0.495	0.500
Annual paid leave (=1 if yes, =0 otherwise)	0.565	0.496	0.613	0.487	0.493	0.500
Firm-provided social insurance (=1 if yes, =0 otherwise)	0.547	0.498	0.592	0.492	0.480	0.500
<b>Control variables</b>						
Age (years)	34.243	5.446	30.525	2.996	39.746	3.087
Male (=1 if yes, =0 otherwise)	0.567	0.495	0.553	0.497	0.589	0.492
Urban (=1 if yes, =0 otherwise)	0.536	0.499	0.513	0.500	0.570	0.495
Majority (=1 if yes, =0 otherwise)	0.949	0.219	0.951	0.215	0.946	0.225
Married (=1 if yes, =0 otherwise)	0.796	0.403	0.738	0.440	0.883	0.321
Red river delta (=1 if yes, =0 otherwise)	0.216	0.412	0.232	0.422	0.192	0.394
Midlands and northern mountainous areas (=1 if yes, =0 otherwise)	0.092	0.289	0.097	0.296	0.085	0.279
Northern and coastal central region (=1 if yes, =0 otherwise)	0.201	0.401	0.195	0.396	0.211	0.408
Central highlands (=1 if yes, =0 otherwise)	0.044	0.206	0.041	0.198	0.050	0.217
Southeastern area (=1 if yes, =0 otherwise)	0.232	0.422	0.231	0.422	0.233	0.423
Mekong river delta (=1 if yes, =0 otherwise)	0.214	0.410	0.204	0.403	0.230	0.421
Survey 2010 (=1 if yes, =0 otherwise)	0.338	0.473	0.342	0.474	0.331	0.471
Survey 2012 (=1 if yes, =0 otherwise)	0.340	0.474	0.332	0.471	0.350	0.477
Survey 2014 (=1 if yes, =0 otherwise)	0.323	0.468	0.326	0.469	0.319	0.466
<b>Mechanims</b>						
Formal employment (=1 if having a written employment contract, =0 otherwise)	0.631	0.482	0.689	0.463	0.545	0.498



Highly skilled occupation (=1 if clerks, service workers, professionals, technicians, leaders and managers, =0 if unskilled workers, manual workers/machine operators, agricultural, forestry and fishery workers)	0.445	0.497	0.483	0.500	0.389	0.488
Employee-friendly firm (=1 if firm's ownership is private domestic, state-owned, or foreign, =0 firm's ownership is farming, household business, or individual production)	0.676	0.468	0.728	0.445	0.599	0.490
Schooling variables						
Schooling reform exposure (=1 if yes, =0 otherwise)	0.597	0.491	1	0	0	0
Schooling years (years)	10.575	4.264	11.252	3.849	9.572	4.637
Observations		7,865		4,694		3,171

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**Table 2** The impact of schooling on non-wage compensation: Baseline estimates

	Monetary payments for public holidays	Monetary employee benefits	Annual paid leave	Firm-provided social insurance
	(1)	(2)	(3)	(4)
<i>Panel A. OLS regressions</i>				
Schooling years	0.044*** (0.003)	0.026*** (0.003)	0.066*** (0.003)	0.065*** (0.003)
<i>Panel B. 2SLS regressions</i>				
Second stage: Schooling years	0.060*** (0.006)	0.046*** (0.008)	0.073*** (0.007)	0.068*** (0.008)
First-stage (Outcome is schooling years): Schooling reform exposure	1.902*** (0.121)	1.902*** (0.121)	1.902*** (0.121)	1.902*** (0.121)
<i>F</i> -stat on excluded instrument	76.06	76.06	76.06	76.06
<i>Panel C. Reduced-form regressions</i>				
Schooling reform exposure	0.114*** (0.013)	0.088*** (0.015)	0.138*** (0.015)	0.130*** (0.016)
Controls	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes
Observations	7,865	7,865	7,865	7,865

*Notes:* \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of age, squared age, male, urban, majority, and married. Bandwidth: 1968–1985.

Source: author' calculations based on Vietnam Household Living Standards Survey 2010, 2012 and 2014.

**Table 3** The impact of schooling on non-wage compensation: Robustness, various specifications

	Monetary payments for public holidays		Monetary employee benefits		Annual paid leave		Firm-provided social insurance	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
<i>Panel A. OLS regressions</i>								
Schooling years	0.048*** (0.003)	0.044*** (0.003)	0.030*** (0.003)	0.027*** (0.003)	0.069*** (0.003)	0.067*** (0.003)	0.068*** (0.003)	0.067*** (0.002)
<i>Panel B. 2SLS regressions</i>								
Second stage: Schooling years	0.060*** (0.007)	0.061*** (0.006)	0.047*** (0.009)	0.048*** (0.009)	0.072*** (0.008)	0.073*** (0.007)	0.066*** (0.009)	0.068*** (0.008)
First-stage (Outcome is schooling years): Schooling reform exposure	1.676*** (0.132)	1.712*** (0.116)	1.676*** (0.132)	1.712*** (0.116)	1.676*** (0.132)	1.712*** (0.116)	1.676*** (0.132)	1.712*** (0.116)
F-stat on excluded instrument	60.71	91.24	60.71	91.24	60.71	91.24	60.71	91.24
<i>Panel C. Reduced-form regressions</i>								
Schooling reform exposure	0.101*** (0.014)	0.104*** (0.013)	0.079*** (0.017)	0.082*** (0.016)	0.120*** (0.017)	0.125*** (0.017)	0.111*** (0.018)	0.117*** (0.018)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,865	7,865	7,865	7,865	7,865	7,865	7,865	7,865

*Notes:* \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of age, squared age, male, urban, majority, married and dummies for six geographical regions. Bandwidth: 1968–1985.

Source: author' calculations based on Vietnam Household Living Standards Survey 2010, 2012 and 2014.

**Table 4** The impact of schooling on non-wage compensation: Robustness, various bandwidths

	Monetary payments for public holidays	Monetary employee benefits	Annual paid leave	Firm-provided social insurance
	(1)	(2)	(3)	(4)
<i>Panel A. OLS regressions</i>				
Bandwidth: 1969–1984 (Observations: 6,974): Schooling years	0.044*** (0.003)	0.027*** (0.003)	0.067*** (0.003)	0.067*** (0.003)
Bandwidth: 1970–1983 (Observations: 6,038): Schooling years	0.044*** (0.003)	0.026*** (0.003)	0.067*** (0.003)	0.067*** (0.003)
Bandwidth: 1971–1982 (Observations: 5,032): Schooling years	0.044*** (0.004)	0.026*** (0.003)	0.067*** (0.003)	0.067*** (0.003)
Bandwidth: 1972–1981 (Observations: 4,071): Schooling years	0.043*** (0.004)	0.026*** (0.003)	0.067*** (0.003)	0.066*** (0.003)
<i>Panel B. 2SLS regressions</i>				
Bandwidth: 1969–1984 (Observations: 6,974)				
Second stage: Schooling years	0.062*** (0.006)	0.046*** (0.009)	0.076*** (0.008)	0.071*** (0.008)
First-stage (Outcome is schooling years): Schooling reform exposure	1.798*** (0.122)	1.798*** (0.122)	1.798*** (0.122)	1.798*** (0.122)
<i>F</i> -stat on excluded instrument	71.47	71.47	71.47	71.47
Bandwidth: 1970–1983 (Observations: 6,038)				
Second stage: Schooling years	0.058*** (0.006)	0.042*** (0.010)	0.074*** (0.009)	0.070*** (0.009)
First-stage (Outcome is schooling years): Schooling reform exposure	1.745*** (0.130)	1.745*** (0.130)	1.745*** (0.130)	1.745*** (0.130)
<i>F</i> -stat on excluded instrument	65.88	65.88	65.88	65.88
Bandwidth: 1971–1982 (Observations: 5,032)				
Second stage: Schooling years	0.054*** (0.008)	0.034*** (0.011)	0.069*** (0.010)	0.065*** (0.011)
First-stage (Outcome is schooling years): Schooling reform exposure	1.513*** (0.135)	1.513*** (0.135)	1.513*** (0.135)	1.513*** (0.135)
<i>F</i> -stat on excluded instrument	59.79	59.79	59.79	59.79

Bandwidth: 1972–1981

(Observations: 4,071)

Second stage: Schooling years	0.054*** (0.009)	0.029** (0.012)	0.064*** (0.011)	0.061*** (0.012)
First-stage (Outcome is schooling years): Schooling reform exposure	1.415*** (0.140)	1.415*** (0.140)	1.415*** (0.140)	1.415*** (0.140)
F-stat on excluded instrument	64.41	64.41	64.41	64.41

*Panel C. Reduced-form regressions*

Bandwidth: 1969–1984: Schooling reform exposure (Observations: 6,974)	0.112*** (0.014)	0.082*** (0.016)	0.137*** (0.016)	0.128*** (0.017)
Bandwidth: 1970–1983: Schooling reform exposure (Observations: 6,038)	0.101*** (0.014)	0.073*** (0.016)	0.129*** (0.018)	0.121*** (0.019)
Bandwidth: 1971–1982: Schooling reform exposure (Observations: 5,032)	0.082*** (0.015)	0.051*** (0.017)	0.104*** (0.017)	0.098*** (0.018)
Bandwidth: 1972–1981: Schooling reform exposure (Observations: 4,071)	0.076*** (0.016)	0.041** (0.018)	0.091*** (0.019)	0.087*** (0.020)
Controls	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes

Notes: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of age, squared age, male, urban, majority, and married.

Source: author' calculations based on Vietnam Household Living Standards Survey 2010, 2012 and 2014.

**Table 5** The impact of schooling on non-wage compensation: Robustness, excluding Ha Noi and Ho Chi Minh City

	Monetary payments for public holidays	Monetary employee benefits	Annual paid leave	Firm-provided social insurance
	(1)	(2)	(3)	(4)
<i>Panel A. OLS regressions</i>				
Schooling years	0.046*** (0.004)	0.025*** (0.004)	0.067*** (0.003)	0.066*** (0.003)
<i>Panel B. 2SLS regressions</i>				
Second stage: Schooling years	0.063*** (0.006)	0.042*** (0.009)	0.075*** (0.006)	0.071*** (0.007)
First-stage (Outcome is schooling years): Schooling reform exposure	1.903*** (0.134)	1.903*** (0.134)	1.903*** (0.134)	1.903*** (0.134)
F-stat on excluded instrument	71.77	71.77	71.77	71.77
<i>Panel C. Reduced-form regressions</i>				
Schooling reform exposure	0.119*** (0.015)	0.081*** (0.018)	0.142*** (0.016)	0.133*** (0.017)
Controls	Yes	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes	Yes
Observations	6,495	6,495	6,495	6,495

Notes: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of age, squared age, male, urban, majority, and married. The sample excludes observations from Ha Noi and Ho Chi Minh City (two largest provinces in Vietnam). Bandwidth: 1968–1985.

Source: author' calculations based on Vietnam Household Living Standards Survey 2010, 2012 and 2014.

**Table 6** Potential mechanisms: The impact of schooling on formal employment, skilled occupation and employee-friendly firm

	Fomal employment	Skilled occupation	Employee- friendly firm
	(1)	(2)	(3)
<i>Panel A. OLS regressions</i>			
Schooling years	0.060*** (0.003)	0.076*** (0.002)	0.057*** (0.003)
<i>Panel B. 2SLS regressions</i>			
Second stage: Schooling years	0.084*** (0.007)	0.057*** (0.006)	0.077*** (0.007)
First-stage (Outcome is schooling years): Schooling reform exposure	1.902*** (0.121)	1.902*** (0.121)	1.902*** (0.121)
F-stat on excluded instrument	76.06	76.06	76.06
<i>Panel C. Reduced-form regressions</i>			
Schooling reform exposure	0.160*** (0.013)	0.108*** (0.013)	0.146*** (0.014)
Controls	Yes	Yes	Yes
Survey year fixed effects	Yes	Yes	Yes
Observations	7,865	7,865	7,865

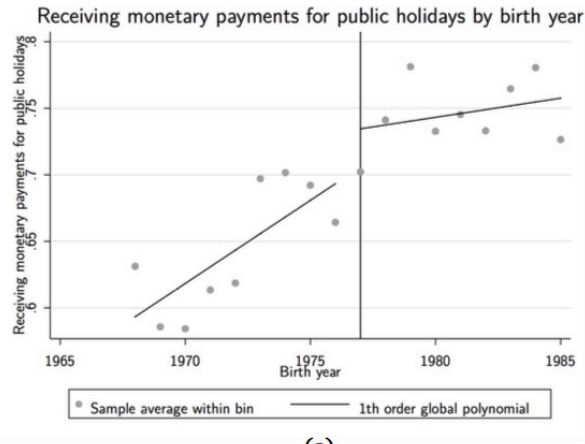
*Notes:* \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors are clustered at the provincial level and reported in parenthesis. Control variables consist of age, squared age, male, urban, majority, and married. Bandwidth: 1968–1985.

Source: author' calculations based on Vietnam Household Living Standards Survey 2010, 2012 and 2014.



**Fig. 1** First-stage: Schooling reform exposure – Schooling years

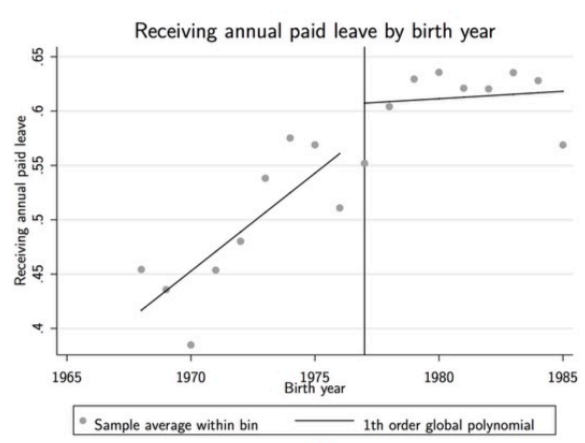




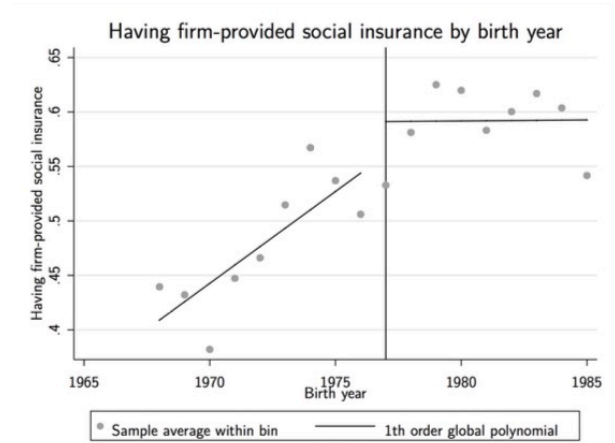
(a)



(b)



(c)



(d)

**Fig. 2** Reduced-form: Schooling reform exposure – Non-wage compensation



**Fig. 3** Reduced-form: Schooling reform exposure – Formal employment, skilled occupation and employee-friendly firm