Impacts of firm's performance on wage determination in Vietnam

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Abstract

This paper examines the relationship between firm's performance and employees' earning in Vietnam. More specially, we attempt to investigate whether the paying higher wage translates to higher productivity and whether firm's ability-to-pay affects employees' earning by using two datasets: a firm-level panel data and a unique matched employer-employee data. The evidence shows that firms paying higher relative wages have higher productivity. Similarly, wages are also determined by the firm's ability to pay: more profitable firms pay higher wages. However, the evidence indicates that the degree of rent-sharing is higher among sole proprietorship firms. We also find that the firms tend to share larger proportion of rents with more disadvantaged groups of workers, i.e. female employees and production workers. However, receiving higher degree of rent-sharing also makes earnings more volatile due to high volatility of profits. We do not find concrete evidence on the job-sorting effect on wages.

Key words: labor market, wage determination, wage differentials, efficiency wage, rent-sharing, matched firm-employee data, Vietnam

I. Introduction

While the standard theory of wage determination predicts that workers' wage does not depend on the firm's performance, a number of theories, including shirking models (Shaprio and Stiglitz, 1984), rent-sharing theory (Akerlof, 1982 and 1984) or turnover theory (Campell, 1993), predict a positive relation between firm's performance and wages. Empirically, literature generally finds that the efficiency wage theories work in developed economies (Krueger and Summers, 1988; Konings and Walsh, 1994; Blanchflower et al, 1996; Hildreth and Oswald 1997). For developing countries, there are comparatively fewer studies, both on the relationship between employees' wages and firm's productivity and on the relationship between firms' ability to pay and wages. While all studies find that, similar to evidence from developed economies, firms with higher wages will have higher productivity, the results relating to the relationship between firm's performance and wage are mixed. While some find a positive correlation of firms' ability to pay and their workers' wage (e.g. Teal, 1996 for Ghana; Velenchik, 1997 for Zimbabwe, Soderbom and Teal, 2001 for Ghana, Aigbokhan, 2011 for Nigeria; Azam and Ris, 2001 for Cote d'Ivoire), other find no relationship such as Martins (2006) for Brazil and Soderbom and Teal (2002) for Nigeria. Moreover, the evidence from both developed and developing economies is not clear about which groups of employee may benefit more from firm's ability-to-pay and whether different ownership types of firms could have different strategy on wage determination.

This paper explores the relationship between firms' performance and workers' wages in Vietnam and investigate whether such relationship varies across types of firm ownerships and/or employees' gender and occupations. Taking advantage of two datasets, the firm-level data and matched employer-employees data, we will assess whether paying high relative wages could help firm to increase its productivity and whether firm's ability to pay will increase the employees' earning. The firm-level unbalanced panel data, consisting of 4060

small and medium firms, allows us to test the efficiency wage theory as well the rent-sharing theory at the firm average level while controlling for firm's fixed effects. Meanwhile, the matched employer-employee data, including 1009 employees in 434 firms, allows us to control not only firm characteristics but also workers' characteristics. Using the endogenous switching regression model, we are also able to control for the endogeneity of workers' choice of firm type to work for. In order to account for the endogeneity of profits per employee in our estimation, we use several instruments, such as lagged value of profits per employee, value added per employee and volatility of revenue per employee.

The empirical results show that firms' productivity is higher for those firms pay higher relative wages. We also find evidence that firms share parts of their profits with their employees. It is noted that sole proprietorship firms share a larger proportion of their profits with their workers, although their profits, in absolute terms, are much lower than the corporate firms' profits. The similar results are also found when we control for both firms' characteristics and employees' characteristics. We find that female employees get a higher share of the firms' profits. This partly may reduce the wage differentials among male and female employees but it could also make the female workers' wage more volatile due to the volatility of the firms' profits. We find that firms share the profits with only production workers and manager and professional, but not with the service officers (i.e. sales persons or office workers). We also find little evidence that job sorting does not have a statistically significant effect on wages.

This paper contributes to several strands in literature. First, we take the endogeneity of worker's choice of firm into account. In Vietnam as well in other developing countries, informal firms (i.e. sole proprietorship firms) and formal firms (corporate firms) are coexisted. A worker's wage may largely depend their choice of ownership type of firms to work for. However, most of the studies using micro data in Vietnam and other developing

countries do not take into this into account. Without controlling for this self-selection, the results may be biased.

Second, the paper contributes to the limited literature on the relationship between firms' performance and workers' wage in developing countries. More specifically, rather than focusing on testing whether different braches of efficiency wage theories works for formal and relatively large firms in developing countries, we take advantage of out data and test our hypotheses for both micro firms (most of them are the sole proprietorship/household businesses in our sample) and larger firms.

Third, this paper also advances the current studies on wage differentials in developing countries in general and in Vietnam, in particular. In the last decades, Vietnam's social and economic reforms prompt social transformation. This transformation has caused the sharp decline in poverty, but also widened the social gaps, including gaps in the labor market, among different groups in the society. An emerging literature has tried to investigate the determinants of earnings and the earnings gaps in Vietnam (e.g. Liu, 2004; Nguyen et al, 2013; Phan and Coxhead, 2013; Pham and Bailley, 2007; Imbert 2012; Nguyen, 2009; Fukase, 2013). Most of the current studies on wage differentials in Vietnam (and other developing countries) relied on household-level data, which could not provide us the information on firms' performance and wages and thus it is not clear how much of the observed earning differentials is due to differences in firms' performance.

The paper is organized as follows. Section 2 reviews some recent literature, both theoretical foundation and empirical on the relationship between firms' performance and workers' wage. Section 3 presents our empirical strategy. Data and basic statistics are presented in section 4. In section 5, we report empirical results. The paper is concluded in section 6.

II. Theoretical background and related literature

II.1. Theoretical background

In a competitive labor market, firms are wage takers and face a horizontal labor supply. In this market, for each skill set, wage should be only determined by labor market conditions. Job characteristics should not have any impacts on wages unless such characteristics affect workers' utility (for example, workers may demand a premium to compensate for working in a hazardous conditions). In such a market, one expect that a firm has no incentive to pay their workers higher wages as it becomes more profitable. And thus, differences in profitability among firms could not lead to differences in wage rates among similar workers. However, empirical evidence finds that there are large wage differentials among workers who possess the same level of skills. These studies find a positive relation between the firm performance and wages (e.g. Krueger and Summers, 1988; Konings and Walsh, 1994; Blanchflower et al, 1996; Hildreth and Oswald 1997; Teal, 1996; Velenchik, 1997, Arai and Heyman, 2009; Aigbokhan, 2011). Blanchflower et al (1996) argues that, under a competitive labor market condition, this relation could be explained by the upward sloping short-run labor supply curve. For example, firms in growing industries will hire more workers and cause the labor demand curve to move up. This will ultimately put an upward pressure on earnings. This relationship only works in the short run and when the wage elasticity of labor demand is larger than unity, however. In the long run, the labor market returns to its equilibrium level and the observed short-run relationship between wage and profits disappears.

There are a number of alternative theories of wage determination that attempt to explain the observed positive relationship between firm's performance and wage. This class of theories is usually referred to as efficiency wage theories, although not all the branches of efficiency wage theories, such as nutrition-based theory, could be used to explain the relationship between wage paid and the firms' performance. The shirking model, developed

by Shapiro and Stiglitz (1984), argues that higher wages are a mechanism firms used to discourage shirking among their employees by increasing the costs to shirking to workers who would be fired if they are caught shirking. Meanwhile, according to the turnover theory of wage determination, if the cost of hiring, and training a worker is high, firms could increase wages to reduce voluntary turnover. According to the rent-sharing theory, higher wages induces loyalty from workers, who in turn want to reciprocate such as a gesture with higher productivity (Akerlof, 1982 and 1984). Such loyalty would increase with the extent to which the firm shares its profits with the workers. An extension of this theory postulates that the bargaining power of workers would impose a credible threat to reduce the firm's profit to zero. This extension enables us to assess the relevance of the market imperfection argument associated with trade union power in wage determination.

II.2. Empirical literature

There are two major strands in the empirical literature. The first strand uses either firm/industry level data or control for firm/industry fixed effects. In their cross-section regression analysis of wages, Krueger and Summers (1988) find evidence suggesting that workers' industry exerts a substantial impact on their wages even after controlling for human capital variables and variety of job characteristics. The study also finds that industries with high wage differentials have lower turnover and higher effort. This finding is consistent with efficiency wage theory. Leonard (1989) finds a positive relationship between wages and productivity in a sample of high tech firms in California. Groshen and Krueger (1990) find that wages of registered nurses are negatively correlated with supervisory intensity, as predicted by the efficiency wage theory. Similarly, Krueger (1991) finds that wages in corporate fast food restaurants are higher than wages in similar franchised restaurants. This wage differential is viewed as a substitute for monitoring. Wadhwani and Wall (1991) find a positive relationship between productivity and uncertainty for UK firms. A similar results are

reported by other studies (Levine, 1992; Huang et al, 1998; Krueger and Summers 1998; Reilly, 1995; and Groshen 1991; Blanchflower et al,1996 and Hildreth and Oswald, 1997).

The second and most recent strand literature exploits the employer-employee data to control for unobserved characteristics of both workers and firms. Margolis and Salvanes (2001) examine the degree of rent-sharing in France and Norway, using large matched employer-employee panel data sets while progressively adding further controls to the wage equations. They find the rent-sharing effects in Norway, but not in France. Lack of rent-sharing could be attributed to using a weak instrument problem as Margolis and Salvanes (2001) have identified, since the rent-sharing in France is found in other papers such as one by Kramarz (2003). The rent-sharing effect is also found in Sweden, where the rent-sharing coefficient is between 12% and 24% (Arai, 2003; Arai and Heyman, 2001). Other studies also find evidence of substantial degree of rent-sharing in Portugal (Martins, 2004 and 2009), Belgium (Rycx and Torejo, 2004) and Italia (Card, Devicienti and Maida, 2014).

While there are many studies that examine the relationship between firm's performance and wages in developed economies, there are comparatively fewer studies in developing countries. Teal (1995) uses a combination of production function and earnings functions approaches to test both efficiency wage and rent-sharing theories in Ghana. He finds evidence that strongly supports the rent-sharing theory. In a related study that uses the same dataset, Teal (1996) only estimates the earning functions to test the rent-sharing theory while controlling for the influence of trade union on wages and earnings. The empirical results show that the union effect coefficient is much larger in earning equations, suggesting that allowances (i.e. rent-sharing) are the channels through which unions influence workers' earnings. However, Soderbom and Teal (2001) test efficiency wage and rent-sharing using Ghanaian data for the period 1991-1997 and find no evidence in support of efficiency wages. Similarly, using Nigerian manufacturing sector data in 2000/01, Soderbom and Teal (2002)

also find that the real profits-per-employee variable is insignificant in wage determination. By contrasts, Aigbokhan (2011), who uses Nigeria matched employer-employee data collected from 1998 to 2000, find evidence support both efficiency wage and rent-sharing theories. He finds evidence to support both efficiency wage and rent-sharing theories. While Soderbom and Teal (2002) argue that the lack of significant effect of profits on wage may be due to the possibility that efficiency wage works through firm size channel, Velenchik (1997), using data from 201 manufacturing and 1,609 workers collected in Zimbabwe in 1993, finds that rent-sharing is a component of the wage setting process and that the firm size is not explained by rent-sharing as the firm size coefficient are actually larger when rent proxies are included in the specification. Using firm-level data from Cote d'Ivoire, Azam and Ris (2001) do not find supportive evidence for the efficiency wage theory, but for rent-sharing theory. Their findings also suggest that a purely competitive model is not capable of explaining wage determination in Cote d'Ivoire.

The relationship between firm's performance and wages is also found in transitional economies. Using a unique Bulgarian firm level data in 1997 and 1998, Dobbelaere (2004) finds that ownership structure is an important determinant of both wage level (for a given productivity) and the degree of rent-sharing. Even, rent-sharing is found to be larger in stated owned firms than private firms. In China, firm's profitability has a substantial effect on wages (Knight and Li, 2005).

In Vietnam, a number of studies find the gender-related, ownership-related and industrial wage gaps in recent years. However, most of the above studies use the individual level data thus cannot account for the firm's performance (Liu, 2004; Pham and Bailey, 2007; Imbert 2013; Nguyen et al, 2013). A smaller number of firms try to look at the impact of trade liberalization (either at industry-location level or ownership-type) on individual wages (Phan and Coxhead, 2013, Fukase, 2013). Meanwhile, some other uses on firm level data, so they

cannot control for workers' characteristics (Nguyen, 2009; Rand and Torm, 2012). However, some recent studies attempt to test some aspects of the efficiency wage theory in general and rent-sharing in particular. Vu et al (2013) find some evidence, albeit weak, on the firm sharing the rent they obtained from exporting to its workers. Meanwhile, Torm (2012) provides evidence that union members earn higher wages than non-members, and more likely to receive social benefits. In a related paper, Larsen et al (2011) find that there is a significant positive wage premium associated with obtaining a job through an informal contact. The evidence implies that rent-sharing, in different forms, has affected the employees' wage. Yet, we still do not have evidence how the quasi-rent, i.e. profits calculated from the accounting book; influence the wage and the heterogeneous effects of rents on different groups of employees.

III. Empirical approaches

In this paper, we test efficiency wage and rent-sharing hypotheses using production function, earnings function and human capital approaches. The production function and earnings function approaches use unbalanced firm-level data while the human capital function approach uses a matched employer-employee data.

III.1. Production function approach

This approach allows us to directly estimate the efficiency wage hypothesis that higher wages will increase firm's productivity. Following Levine (1992), we consider following production function:

$$Y = (e^{\gamma} L)^{\alpha} K^{\beta} f \epsilon$$

where Y denotes output; $e^{\gamma}L$, effective labor; *K,* capital; f, firm's invariant characteristics and ϵ, the i.i.d shock to the production function and assumed to be uncorrelated with changes in γ, L and K. Taking the log of the production and first differencing yields:

$$\Delta \ln Y = \alpha\gamma\Delta \ln e + \alpha\Delta \ln L + \beta\Delta \ln K + \Delta \ln \epsilon$$

where $\gamma \ln e$ is the relative wage. This framework allows us to estimate the impact of increasing wage on productivity growth (Levine, 1992). A firm could have two options to achieve the same level of productivity growth: either to increase the number of workers or increase wages. So in the above framework, a firm is said to pay efficiency wage if the elasticity of output with respect to wages ($\alpha\gamma$) is equal or higher than elasticity of output with respect to labor (β). However, according to Wadhwani and Wall (1991), firms tend to pay efficiency wage if the elasticity of output with respect to relative is positive.

The equation to be estimated will take the form:

$$\Delta \ln Y_{it} = \alpha_0 + \alpha_1\Delta \ln L_{it} + \alpha_2\Delta \ln K_{it} + \alpha_3\Delta \ln RelWage_{it} + \alpha_4\Delta X_{it} + \epsilon$$

The above production function is estimated by using the Wooldridge (2009)'s 2-step approach, a refined Levinshon-Petrin (2003) approach. This approach controls for the endogeneity of production factors. It also deals with the Ackerberg et al (2006)'s critiques of collinearity problem arising in the Levinshon-Petrin (2003) (Petrin and Levinshon, 2011).

Empirically, there are several ways of calculating the relative wages. Levine (1992) uses the ratio of average hourly compensation paid by a firm to its three largest competitors in the product market, controlling for occupation. Meanwhile, Wadhwani and Wall (1991) use the firm wage relative to industry wage (taking into account the occupation structure of the firms) and Teal (1995) calculate the relative wage by taking the actual firm wage relative to the wage predicted by the human capital characteristics of the workers in the firms. In this paper, we follow Wadhwani and Wall (1991) approach and calculate the relative wage as

firm wage to ownership-industry wage. Due to limited data, we cannot take into account the wage distribution of firm, so we cannot adjust our relative wage based on the occupation structure.

III.2. Earning function approach

We use the standard earnings equation used in literature (e.g. Blanchflower et al, 1996; Abowd and Lemieux, 1993; Christofides and Oswald, 1992) as follows:

$$\ln wage_{it} = \beta_0 + \beta_1 \ln Profits / employee_{it} + \beta_2 X_{it} + c_i + \eta_{it}$$

where $wage_{it}$ is the log of the average wage per employee of firm i; $Profits / employees_{it}$ is the ratio of the gross profits, that is value added minus the total wage bills and other bonus, to total employees; X_{it} is the firm's characteristics, c_i is firm's fixed effect and η_{it} is iid error terms. Firm characteristics X_{it} includes total employment (as proxy for firm size), business practice index,[1] capital intensity, percentage of regular employment in total employment, percentage of female employment in total employment, percentage of production workers in total employment and percentage of unskilled workers in total employment, dummy variables for changes in firm's industry, in firm's type of ownership, and in firms' owner, firm's owners with at least vocational training degree.

In this specification, the profits-per-employee is clearly endogenous.[2] To account for this endogeneity, various instrument variables are introduced such as value added per employee (Estavao and Tevlin, 2003), prices of exports and imports (Abowd and Lemieux, 1993),

[1] Business practice index is unweighted average of 8 business practice indicators, including using email, having an accounting book, carrying out advertisement, owners'/managers' regulation knowledge, having training activity, being a member of business association, percentage of sales to other provinces and exports in total sales and percentage of input purchased from other provinces and imports in total input purchase.

[2] According to Navon and Tojerow (2013), using the profits per employee will create two types of bias. On the one hand, the close and negative relationship between (accounting) profits and wages will make the estimates of rent-sharing downward biased. On the other hands, if the efficiency wage theory is correct, higher wages will make firms more profitable and this would lead to an an upward biased estimation of rent-sharing.

number of major innovations made by a firm in previous periods (Van Reenen, 1996), the employer' overdraft and the amount borrowed from banks (Teal, 1996), export ratio (Arai and Heyman, 2009). In this paper, we follow Blanchflower et al (1996), Margolis and Salvanes (2001) and Rynx and Torejo (2003) and use lagged profits-per-employee and value added per employee as instrument variables. While using lagged variable as instrument variable is rather natural because firm's financial data usually being persistent over a period time, and the lagged profits-per-employee may influence the current profits per employee but do not have a direct effect on current wages. Meanwhile the value added per employee is directly correlated with profits per employee, but could only affect the wages through profits (Margolis and Salvanes, 2001). Furthermore, value added is less subjected to measurement error and therefore a better measure for profits (Rynx and Torejo, 2003).

III.3. Human capital approach

We use a matched employer-employee data to estimate the earning function, which controls for firms' and workers' characteristics, group effect and endogeneity. The earnings equation can be specified as:

$$wage_{ij} = \theta_0 + \theta_1 H_{ij} + \theta_2 \ln profit/employee_j + \theta_3 F_j + \upsilon_{ij}$$

where $wage_{ij}$ is the worker *i*'s monthly wage; H_{ij} is human capital of worker's *i* of firm *j*; $\ln profit/employee_j$ is the log of profits per employee of firm *j*; F_j is firm *j*'s characteristics; υ_{ij} is the iid error terms. H_{ij} includes years of education (we calculate years of education based on the degree the worker completed), worker age, tenure, total experience (i.e. total time working in firm *j* and other firms before if any); gender; relations to firm owner and occupation (we categorize three types of occupation: managers and professional with university degrees; service workers such as sales or accountant; and production workers), whether worker *i* is a union member or not and total hours worker *i* worked per week. F_j

includes total employment (as proxy for firm size), percentage of regular employment, total asset, owner's gender and education level and owner's perception that wage negotiation with workers as the most important criteria for wage setting (or alternatively, the profitability of the firms as the most important criteria). To account for endogeneity of profits per employee variables, we either follow Blanchflower et al (1996) and use the lagged level of profits per employee instead profit per employee or use the value added per employee and 3-year rolling standard deviations of revenue per employee as instruments. While the argument for value added per employee is as in the previous section, 3-year rolling standard deviations of revenue per employee could represent the shocks to profits without direct effects on wages.

To take into account the job-sorting effects, we will use the endogenous switching regression model. The switching equation is as follows:

$$Prob(\text{Work for corporate firms} = 1) = \exp(\delta_0 + \delta_1 H_i + \delta_2 X_i + \sigma)$$

where H_i are workers' characteristics including year of education, gender, marriage status, potential experience; X_i is wealth index (constructed from the reported assets where he/she lives).

IV. Data and basic statistics

The data is jointly collected by University of Copenhagen, CIEM and ILSSA in 2005, 2007, 2009 and 2011. The surveys were conducted in 10 provinces, 4 from the North, 3 from the Central and 3 from the South. Due to implementation issue, only some specific areas in each province and city are selected. In each province, both urban districts and rural districts are chosen. In each province, the sample was stratified by ownership form to ensure that all types of non-state enterprises, including formal and informal firms were represented.

Subsequently, stratified random samples were drawn from a consolidated list of formal enterprises and an on- site random selection of informal firms.

After each survey round, to replace exit firms or a small number of firms, which declined to continue the survey, additional firms would be randomly selected from the list of formal firms combined by the GSO in the previous years (For example, for 2007 survey, replaced firms are selected from Enterprise census in 2006) and on-site selection of informal firms (see Demenet et al.,2010 and Rand and Torm, 2012). The sample size for each survey is 2,821 firms for 2005 survey, 2,635 firms for 2007 survey, 2,655 firms for 2009 survey and 2,552 firms for 2011 survey.

Although the sample is slightly adjusted overtime, the questionnaires are nearly the same. Information collected includes firm's general characteristics; firm history; household characteristics of the owner/manager; production characteristics; sales structure and export; indirect costs, raw materials and services; investments, assets, liabilities and credit; fees, taxes and informal payments; employment; environment; network and economic constraints and potentials.

For the estimation of production function and earnings equation, we have unbalanced panel of 4998 firms in three years 2007, 2009, and 2011 (our estimation strategy requires firms participating in at least two consecutive surveys to be included in the sample). Moreover, using fixed effects panel model with instrument make 937 singleton samples, i.e. those firms participating in two surveys, not be able to use. This leaves our samples to have only 4061 samples with adequate information for estimation. Of these samples, 2801 firms are sole proprietorship and 1139 are corporate.

[TABLE 1 ABOUT HERE]

Table 1 reports the basic statistics for our sample. The average annual wage is about 5,719 millions (at 1994 price). The average wage and its growth at the sole proprietorship

firms are much lower than that in the corporate firms. But there is a large variation in the annual wage growth among the corporate firms (with the standard deviation is high at 284%). This also reflected by the large relative wage among corporate firms in compared to that of sole proprietorship firms. Annually, the profits-per-employee is around 9,116,000 VND for sole proprietorship and 15,824,000 VND for corporate firms. Meanwhile, the growth rate of profits per employee also is much lower in sole proprietorship firms than in the corporate firms.

On average, each sole proprietorship firm employs about 11 employees, one fifth of the corporate firms. But the standard deviation is large, reflecting that there is a large variation in the number of employees among firms. The employment growth rate of corporate firms is higher than that of sole proprietorship firms (7.3% versus 4.0%). The employment structure is similar between these two types of firm, except for the share of female workers (31% in sole proprietorship firms versus 21.8% in corporate firms).

The employer-employee data was collected in 2009 covering 1,444 workers and 577 firms. Since we will use the volatility of revenue per employment, which is 3-year rolling standard deviation of revenue per employee as one of two instruments (together with value added per employee), so the sample reduced to about 1,150 observations (since the firms should be in the 2007 survey in order to calculate the volatility of revenue per employee). Among included observations, 124 employees did not report their salary (of which 117 employees were household members and3 relatives). We also do not have data on profits per employee for 10 observations and data on total hours works in a week for 9 observations. Thus, our final sample includes 1009 observations, of which, 417 from 105 corporate firms and 592 from 329 sole proprietorship firms.

[TABLE 2 ABOUT HERE]

Table 2 presents basic statistics for matched employer-employee data. The proportion of male employees is 62.7%, which is almost equal to the share of male employees in the firm-level data (see Table 1). Most of these male workers worked in sole proprietorship firms (41%) while the remaining (21.7%) works for corporate firms. By constrast, nearly half of female employees (17.6%) works for sole proprietorship firms and the remaining (19.6%) for corporate firms. On average, worker's age is 33 years old with 11 years of education, 11.2 years of experience. The average tenure is about 6 years. There are no large difference between male employees and female counterparts in such human capital variables, except the year of education and tenure. In our sample, female employees seem to have higher level employment position than male employees. While 24.2% of female employees are managers or professionals (including those in production with university degree), this figure is only 11.7% for male employees. Similarly, a larger proportion of female employees work as service workers (such as office workers or sales workers, without university degree). More than half of female employees are production workers, much lower than 80.4% male employees as production workers. However, the proportion of female and male employees in each occupational category is different across sub-group of firms.

On average, employees in sole proprietorship firms have much lower salary than employees' salary in corporate firms (1,590,900 VND per month versus 2,202,528 VND). The earnings gap of employees in each occupation category is also large between sole proprietorship and corporate firms. Although overall gender wage gap is not noticeable with difference of about 38,000 VND or USD 2 in 2009, the gap is much larger among the corporate firms than among the sole proprietorship firms and larger for manager and university-graduate professional than for production workers.

With regards to firms performance, profits per employee in sole proprietorship is about 30-40% lower than that of corporate firms. Similarly, the corporate firms are also much

larger (in terms of employment). On average corporate firms have about 51 employees while sole proprietorship has only 12.5 employees.

V. Estimation results

V.1 Testing the efficiency wage hypothesis

Table 3 presents the estimation results using the full sample and subsamples of sole proprietorship and corporate firms. The dependent variable is the growth rate of productivity (as measured by the growth rate of value added). The results show that, change in relative wages have a positive effect on productivity growth. The coefficient is 0.54, implying that a 1% increase in relative wage will cause the productivity growth increase by 0.54 percentage point. The coefficients for sole proprietorship firms and corporate firms are 0.52, and 0.64 percentage point, respectively. Therefore, the results support the efficiency wage theory, according to Wadhwani and Wall (1991)'s argument but not supported Levine (1992)'s argument.

[TABLE 3 ABOUT HERE]

Table 4 also presents the result of the production function estimation. Different from Table 3, in this Table, we use the level of productivity (i.e. the level of value added) as the dependent variable. Column [1] is the results for the whole sample and columns [2] and [3] the results for sole proprietorship firms and for corporate firms, respectively. The estimation results show that a 1% increases in relative wage will lead to 0.53% increases in productivity level. This figure is 0.51% and 0.66% and for sole proprietorship for corporate firms, respectively. However, the test show that the instrument used, i.e. the lagged employment, is weak in the case of corporate firms. Thus, according to Wadhwani and Wall (1991)'s argument, the data support the efficiency wage theory. But according to Levine (1992)'s argument, the efficiency wage seems to work among sole proprietorship firms.

[TABLE 4 ABOUT HERE]

V.2. Testing rent-sharing hypothesis using firm-level data

Table 5 reports the regression results for earnings equation. The instrument for the profits per employee in the first three columns is the lagged profits per employee and in the last three columns is value added per employee in this period. The results using the lagged profits per employee as instrument shows that, for the whole sample, profits per employee has strong and positive effects on earnings. As profits per employee increases by 1%, the wage increases by 0.14 percentage point. This result, however, seems to be driven by the sole proprietorship subsample since we find a positive and statistically significant effect among these firms, but not among corporate firms. However, when we use value added per employee as instrument, the coefficient estimate increases significantly from 0.139 to 0.417. Furthermore, corporate firms also share their profits with their employees, although the degree of rent-sharing is still smaller than the one for the sole proprietorship firms. A 1%-increase in profits per employee causes the average earning of employees in sole proprietorship firms to increase 0.49% increase in the average earning of workers in sole proprietorship firms and 0.31% for sole proprietorship firms. The results are not consistent with those reported by Krueger (1991). There are some potential explanations for the differences in findings. First, sole proprietorship firms are small, and the owner do all the managerial tasks, which often are done by hired managers/supervisors in the large corporate firms. With the human capital cost being small for sole proprietorship firms, the owners may pass part of the saving to their employees in the form of profit sharing to induce greater productivity. Second, since the production process is often less complex for sole proprietorship firms than it is for corporate firms, the former may not require highly skill manpower. However, it may take time for owner to train a worker and a slightly higher salary than the average salary may be sufficient

to make them more loyal. In this case, higher salary acts like a gift and the workers will either put more efforts in their work or become more loyal to their firms.

[TABLE 5 ABOUT HERE]

The results also show that the effect of other variables on earnings varies across the sole proprietorship and corporate firms. The total employment (as a proxy for firm size) has a positive and statistically significant effect on employees' earnings in sole proprietorship firms while it has no effect on earning of employees in corporate firms. Even, for the estimation using lagged profit per employee as the instrument (column [2], Table 5), the total employment variable even has a negative effect on average wage of workers in corporate firms. Regarding the employment structure, there is slightly different between sole proprietorship and corporate firms on the role of percentage of regular employment on wages: the more regular employees, the higher wage do the firms pay to their employees. This suggests that regular employees have higher wages than the irregular counterpart. While the share of women in total employment has no effects on employees' earnings in corporate firms, it has a negative effect on in sole proprietorship firms, indicating that there is an insignificant gender wage gap in corporate firms while the gender gap is large in sole proprietorship firms. For the share of production workers, the results show that for all types of firms, the larger share of production workers in total employment, the average salary is higher. This results is contrast with the fact that the production workers (in our definition, including apprentice) seem to have lower salary than manager or professional employees, thus higher proportion of production workers, the average wage should be lower or the coefficients on either the percentage of unskilled employees or the percentage of women employees should be negative. Because we do not have enough information on the wage distribution within the firms, we could not have a reasonable explanation for this case.

We also controlled for trade union membership by adding a dummy variable that takes value of 1 if a firm's employees are unionized. Trade union membership was found to have no effect on earnings for both sole proprietorship and corporate firms (results not shown). But, these results are not consistent with those reported by Torm (2012), who found trade union membership has a positive effect on wages. These differences in findings could be attributed to the different data set used (Torm (2012) uses matched employer-employee data for formal firms with at least 10 workers.)

V.3. Testing rent-sharing theory using the matched employer-employee data

In the previous sections, we use firm-level data to test the efficiency wage and rent-sharing theories. However, such data does not allow us to control for workers' human capital characteristics, which, according to Becker (1971), are of very importance in wage determination. In this section, we will use a unique matched employer-employee data to test the rent-sharing theory. Using this data, we can both control for workers' and firms' characteristics.

[TABLE 6 ABOUT HERE]

Table 6 presents our benchmark estimation of earnings function. In the benchmark estimations, we ignore the endogeneity of profits per employee. Column [1] is the results for the whole samples, columns [2] and [3] present the results for sole proprietorship firms and corporate firms, respectively. Columns [4] and [5] are the results of endogenous switching regression estimations, in which we control for the effects of job sorting among employees regarding the types of firm to work for. The results show that employees' earning positively correlates with firm's profits. We also find that this relationship is stronger for sole proprietorship firms. This is consistent with the results obtained by using the firm-level data (Table 5).

As mentioned above, profits-per-employee is clearly endogenous. To partially deal with this endogeneity problem, we replace profits per employee with its first lagged as a regressor. The estimation results show that the (lagged) profit per employee has positive effects on employees' earning for whole sample. However, this effect is only statistically significant for the sample of employees in sole proprietorship firms, but not for the employees in corporate firms. We also find the same pattern even after controlling for the switching problem (see Appendix 1 for the result).

Although lagged variables are used in a number of studies, Oswald (1996) argues that "a lagged variable is at best an ad hoc instrument". We have instead using the lagged profits per employee as instrument variable for current profits per employee (see Appendix 2 for the results). However, this instrument seems to be weak.

[TABLE 7 ABOUT HERE]

Table 7 presents our results using the value added per employee and 3-year rolling standard deviation of revenue per employee as the instrument variables. The profits-per-employee coefficient slightly increases to 0.089 from 0.077 in the benchmark model. This is consistent with other studies when instrument is introduced. The coefficients for subsamples of sole proprietorship firms and of corporate firms also increase, although the degree of rent-sharing is lower in corporate firms.

We do not see the difference in the rent-sharing coefficients when the job sorting is controlled. In fact, the inversed Mills ratio for both subsamples is not statistically significant. The only significant change is the coefficients on gender and year of education for employees. Without controlling for job sorting, male employees in the sole proprietorship firms have a higher salary than female counterparts while this difference disappears when the switching is controlled. The coefficient on gender for the corporate firm subsample also declines from 0.194 to 0.156. But female employees in corporate firms still have lower wages

than their male counterparts. Similarly, returns to education for workers in corporate firms did not have statistically significant effects as we control for switching probability.

The results also show that when we control for occupations, workers' education level does not have large effects on their wage. Our estimated rate of returns to education is lower than other studies[3], at about 1.9% (rate of returns to education increases to 3.3% if we do not control for occupation. However, without controlling the occupation, estimating earnings equation using cross-sectional data may suffer from attenuation bias). Furthermore, education does not play any effects in the sole proprietorship firms (but still have a positive effect in corporate firms). Experience does not have statistically significant effects on salary for workers in sole proprietorship firms, but have positive and statistically significant on wages for those working in corporate firms. The negative sign of total experience square indicates that the relationship between experience and earnings are not linear. The evidence also shows that tenure does not play a role in corporate firm employees' earning but do matter for employees in sole proprietorship firms.

We also find a large wage gap among occupations. And the occupational wage gap is also different for sole proprietorship and corporate firms. In sole proprietorship firms, the earnings of manager and professionals (i.e. those with university degree) and of service employees (including salesperson, accounting without university degree) are 41% and 15% higher than that of production workers, respectively (but the gap between service workers and production workers is not statistically significant). Meanwhile, the production workers in corporate firms has earnings 16% and 31% lower than that of managers and professionals and of service workers in the same type of firms.

[3] Other studies such as Phan and Coxhead (2013) have estimated the rate of return to education in Vietnam at about 5% for one more year of education.

Consistent with the results using the firm-level data, those employees who are members of trade union does not have higher salary than those who are not a member. This result is logical in Vietnam where the trade unions are still in the process of transforming to become a more independent organization and true representatives for workers.

Better quality workers tend to choose to works in bigger firms, thus firm size, even after controlling for rent-sharing, still have positive effects on workers' salary (Velenchik, 1997). However, our empirical results show an opposite result. Firm size has statistically significant effects on wage of workers in sole proprietorship, but not in corporate firms, which are on average larger than sole proprietorship firms.

[TABLE 8 ABOUT HERE]

Table 8 reports the effects of rent-sharing on earnings of different groups of employees. Column [1] and [2] are for male and female employees and columns [3], [4] and [5] for managers/professionals, service workers and production workers, respectively. The results show that the rent-sharing coefficients are higher for those who usually have lower bargaining powers such as women or production workers. This partly reflects that the male employees, manager/professional and service workers usually have higher salary than their male employees and production employees. As long as firms yield higher profits, the owners tend to act fair by increasing the salary of female employees and production worker since these groups are usually have lower salary. Meanwhile, the firms have to pay higher wages for professionals as profits increase, implying that the bargaining power of this group is stronger than other groups, especially service workers. Although this may help to reduce the wage gaps between male and female and among occupations, it also causes the disadvantage workers in more volatile condition since the profits per employee tend to be volatile.

VI. Conclusion

While numerous studies find evidence on the working of efficiency wage and rent-sharing theory in developed countries, the literature for developing is rather limited. Yet, such studies do not provide clear evidence on who benefits more from the better firms' performance and how much this relationship could attribute to the wage differentials between groups of workers. This paper attempts to test the efficiency wage and rent-sharing theories in Vietnam and to examine the degree of rent-sharing for male and female employees and for different types of occupations. Two datasets are used in this paper. While the firm-level panel data allows us to test the theories at the firm-level, the unique matched employer-employee data allows us to test the rent-sharing theory, controlling for both firm's characteristics and employees' characteristics. We also are able to take the job-sorting effect into account.

The evidence from the firm level data shows that the both efficiency wage theory and rent-sharing theory works in our context. We find that firms with higher relative wages will have higher productivity. This is consistent with other studies both in developed and developing countries (Wadhwani and Wall, 1991, Capelli and Chauvin, 1991, Moll, 1993, Teal, 1995, Aigbokhan, 2011). However, if we adopt the Levine (1992)'s argument, then in our context, only sole proprietorship firms, to some extent, pays efficiency wage. For corporate firms, their productivity increases as firms pay wage higher relative wage, but the coefficient is not as large as the coefficient on labor. This means higher wages did not cause the productivity to increases as much as expected.

Meanwhile, we also find a high degree of rent-sharing among the firms in our sample, after controlling for firm's fixed effects and for endogeneity of firms' profits per employee. On average, as profits per employee increase by 1%, the average wage rise by 0.42%. We find that sole proprietorship share a larger proportion of its profits to workers than their corporate firms. This partly due to the fact that in general, sole proprietorship pays lower wage than corporate firms and they need to share the profits to workers in order to keep them

staying in the firms. We also find that the coefficients of rent-sharing are dependent on the choice of instruments (Oswald, 1995).

The results from the matched employer-employee data confirm our results using firm-level data. We also find that firm's profits-per-employee have positive and statistically significant effects on workers' wage. The empirical evidence also shows that the workers in sole proprietorship firms receive higher degree of rent-sharing than their corporate counterparts. However, in absolute terms, the profits per employee in corporate firms are much higher. So, the higher degree of rent-sharing in sole proprietorship firms could only mitigate the wage differentials between corporate firms and sole proprietorship firms. The empirical results for different groups of employees also shows that the more disadvantage workers such as female employees or production workers may receive the higher degree of rent-sharing, but it could not offset the wage gaps between male and female workers, or between production workers and other types of workers.

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Essay 3: Tables

Table 1: Basic statistics for firm panel data

		All firms	Sole proprietorship	Corporate firms
Annual wage (average)	Mean	5,719	4,810	7,796
	SD	[3,877]	[3,198]	[4,450]
Annual growth rate	Mean	16.7%	13.9%	23.2%
	SD	[162.8%]	[45.5%]	[283.8%]
Relative wage	Mean	-0.139	-0.083	-0.269
	SD	[0.642]	[0.687]	[0.501]
Profits per employee	Mean	11,148	9,116	15,824
	SD	[23,632]	[12,013]	[38,486]
Growth of profit per employees	Mean	24.8%	21.1%	33.4%
	SD	[86.5%]	[65.6%]	[121.5%]
Value added	Mean	453,639	157,604	1,129,735
	SD	[2,191,477]	[529,626]	[3,805,198]
Value added growth	Mean	26.6%	21.7%	37.5%
	SD	[178.6%]	[57.9%]	[311.4%]
Employment	Mean	23	11	50
	SD	[60]	[22]	[99]
Employment growth	Mean	5.0%	4.0%	7.3%
	SD	[39.7%]	[32.9%]	[52.1%]
Regular employee share	Mean	91.9%	92.2%	17.8%
	SD	[17.8%]	[91.2%]	[17.7%]
Women share	Mean	33.8%	31.0%	40.2%
	SD	[25.7%]	[26.3%]	[23.0%]
Production worker share	Mean	69.1%	69.8%	67.4%
	SD	[16.9%]	[16.7%]	[17.4%]
Unskilled share	Mean	28.3%	27.9%	29.2%
	SD	[26.3%]	[27.0%]	[24.6%]
BPI	Mean	0.20	0.11	0.41
	SD	[0.20]	[0.13]	[0.18]
Capital intensity	Mean	30.1	23.6	44.7
	SD	[69.6]	[58.3]	[88.6]

Table 2: Basic statistics for matched employer-employee data

		All firms		Sole proprietorship		Corporate firm	
		Women	Men	Women	Men	Women	Men
Number of employees		376	633	178	414	198	219
Percent of employees		37.3%	62.7%	17.6%	41.0%	19.6%	21.7%
Worker's age	Mean	33.8	32.7	33.4	32.1	34.1	33.9
	Sd	[10.3]	[9.0]	[10.5]	[8.8]	[10.2]	[9.3]
Year of education	Mean	11.8	10.9	10.1	10.2	13.3	12.3
	Sd	[3.6]	[3.1]	[3.4]	[2.8]	[3.1]	[3.2]
Experience	Mean	11.2	11.2	11.4	11.2	11.1	11.1
	Sd	[9.8]	[8.2]	[9.4]	[7.9]	[10.2]	[8.8]
Tenure	Mean	5.8	5.5	5.4	5.4	6.2	5.6
	sd	[6.0]	[4.5]	[4.8]	[4.2]	[7.0]	[4.9]
% with university degree		24.2%	11.7%	10.7%	5.1%	36.4%	24.2%
% service workers		22.3%	7.9%	14.0%	3.6%	29.8%	16.0%
% production workers		53.5%	80.4%	75.3%	91.3%	33.8%	59.8%
Monthly salary (nominal)	Mean	1,820	1,858	1,523	1,620	2,088	2,306
	Sd	[1,055]	[1,050]	[767]	[919]	[1,199]	[1,134]
Manager/Professional wage	Mean	2,537	3,057	2,242	2,616	2,615	3,231
	Sd	[1,493]	[1,339]	[829]	[1,126]	[1,619]	[1,386]
Service workers' wage	Mean	1,956	2,374	1,972	2,101	1,949	2,491
	Sd	[706]	[1,201]	[655]	[1,416]	[732]	[1098]
Production workers'w age	Mean	1,439	1,633	1,337	1,546	1,643	1,883
	Sd	[699]	[829]	[682]	[844]	[692]	[731]
Profit per employees	Mean	2,992	2,626	1,672	1,799	4,179	4,187
	Sd	[4,535]	[3,591]	[1,923]	[1,935]	[5,730]	[5,151]
Employment	Mean	35.9	24.2	15.3	11.2	54.3	48.9
	Sd	[38.9]	[35.6]	[17.9]	[16.1]	[43.2]	[47.5]

Table 3: Impact of relative wage increase on value added growth

	[1] All firms	[2] Sole proprietorship	[3] Corporate firms
Employment growth	0.595***	0.560***	0.714***
	[0.077]	[0.087]	[0.154]
Capital growth	0.106***	0.093***	0.106***
	[0.013]	[0.014]	[0.030]
Change in relative wage	0.538***	0.518***	0.644***
	[0.019]	[0.020]	[0.052]
Change in BPI	0.429***	0.16	0.589***
	[0.106]	[0.131]	[0.178]
Change in regular worker share	-0.021	-0.14	0.197
	[0.098]	[0.114]	[0.178]
Change in female worker share	0.056	0.023	0.085
	[0.063]	[0.070]	[0.129]
Change in production worker share	-0.034	0.086	-0.201
	[0.111]	[0.132]	[0.193]
Change in unskilled worker share	0.037	-0.004	0.092
	[0.039]	[0.041]	[0.089]
Change in firm age	-1.283*	-1.493*	-1.852
	[0.697]	[0.818]	[1.270]
Change in firm ages squared	0.384	0.442	0.603
	[0.253]	[0.293]	[0.470]
Changes in location	-0.202	-0.279	-0.096
	[0.146]	[0.206]	[0.214]
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Intercept	0.084	0.11	-0.06
	[0.092]	[0.105]	[0.179]
Weak identification test (Cragg-Donald Wald F statistic)	285.291***	243.967***	60.786***
N	2479	1703	776

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable is the value added growth (which is equal to log of value added in the current period minus the log of value added in previous period). The production function is estimated by using the Wooldridge (2009)'s approach with fixed effects. Columns [1], [2] and [3] are the whole sample,

subsample of sole proprietorship firms and corporate firms, respectively. Employment growth, capital growth is equal to log of employment in this period minus log of employment in previous period. BPI is unweighted average of 8 business practice indicators, including using email, having an accounting book, carrying out advertisement, Owners'/Managers' regulation knowledge, having training activity, being a member of business association, percentage of sales to other provinces and exports in total sales and percentage of input purchased from other provinces and imports in total input purchase. Regular workers share is the ratio of fulltime regular workers to total employment. Unskilled worker share is the ratio of the number of unskilled worker (production workers, except the foreman and cleaning workers) to total number of employees. Relative wage is equal to ratio of the firm's wages to the average wages that the same ownership type of firms in the same industry and same province pays in the same year.

Table 4: Impact of relative wage on productivity

	[1]	[2]	[3]
	All firms	Sole proprietorship	Corporate firms
Employment	0.573***	0.477***	0.836**
	[0.149]	[0.158]	[0.337]
Capital	0.110***	0.102***	0.0957**
	[0.0184]	[0.0171]	[0.0481]
Firm relative wage	0.531***	0.511***	0.664***
	[0.0199]	[0.0209]	[0.0630]
BPI	0.424***	0.317**	0.382
	[0.134]	[0.156]	[0.249]
Regular worker share	-0.0996	-0.253	0.222
	[0.163]	[0.181]	[0.341]
Female worker share	0.11	0.0619	0.142
	[0.0697]	[0.0793]	[0.140]
Production worker share	0.116	0.288	-0.1
	[0.184]	[0.209]	[0.349]
Unskilled worker share	0.0378	0.00607	0.0478
	[0.0445]	[0.0452]	[0.130]
Firm age	-1.438**	-1.322*	-1.737
	[0.593]	[0.727]	[1.117]
Firm age squared	0.436**	0.367	0.548
	[0.212]	[0.257]	[0.411]
Locating in urban area	-0.257*	-0.266	-0.169
	[0.149]	[0.230]	[0.237]
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Weak identification test (Cragg-Donald Wald F statistic)	74.672***	76.174***	11.570+
N	4060	2801	1139

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of value added growth. The production function is estimated by using the Wooldridge (2009)'s approach with fixed effects. Columns [1], [2] and [3] are the whole sample, subsample of sole proprietorship firms and corporate firms, respectively. Employment growth, capital growth is in log. BPI is unweighted average of 8 business practice indicators, including using email,

having an accounting book, carrying out advertisement, Owners'/Managers' regulation knowledge, having training activity, being a member of business association, percentage of sales to other provinces and exports in total sales and percentage of input purchased from other provinces and imports in total input purchase. Regular workers share is the ratio of fulltime regular workers to total employment. Unskilled worker share is the ratio of the number of unskilled worker (production workers, except the foreman and cleaning workers) to total number of employees. Relative wage is equal to ratio of the firm's wages to the average wages that the same ownership type of firms in the same industry and same province pays in the same year.

Table 5: Earnings equation

	IV: lagged profit/labor			IV: value added per employee		
	[1]	[2]	[3]	[4]	[5]	[6]
	All firms	Sole proprietorship	Corporate firms	All firms	Sole proprietorship	Corporate firms
Profit/labor (in log)	0.139***	0.221***	0.042	0.417***	0.492***	0.306***
	[0.047]	[0.070]	[0.059]	[0.015]	[0.021]	[0.021]
Total employment	0.032	0.130***	-0.081**	0.117***	0.217***	0.006
	[0.029]	[0.042]	[0.040]	[0.027]	[0.039]	[0.037]
BPI	0.285***	0.456***	0.122	0.092	0.318**	-0.089
	[0.101]	[0.147]	[0.135]	[0.102]	[0.152]	[0.133]
% regular employment	0.810***	0.812***	0.864***	0.625***	0.638***	0.661***
	[0.071]	[0.093]	[0.116]	[0.068]	[0.087]	[0.111]
% women employees	-0.246***	-0.288***	-0.105	-0.250***	-0.262***	-0.135
	[0.064]	[0.079]	[0.115]	[0.067]	[0.083]	[0.118]
% production employees	0.330***	0.317***	0.236*	0.352***	0.298***	0.303**
	[0.079]	[0.101]	[0.130]	[0.082]	[0.107]	[0.134]
% unskilled employees	-0.079**	-0.051	-0.105	-0.069*	-0.028	-0.116
	[0.038]	[0.046]	[0.072]	[0.040]	[0.049]	[0.075]
Owner has technical degree	0.027	0.212	-0.339	0.081	0.227	-0.138
	[0.116]	[0.166]	[0.210]	[0.121]	[0.176]	[0.215]
Firm's ownership change	0.08	0.098	0.049	0.094	0.114	0.064
	[0.055]	[0.077]	[0.080]	[0.058]	[0.082]	[0.082]
Firm's industry change	0.009	-0.005	0.032	0.04	0.007	0.098
	[0.055]	[0.073]	[0.084]	[0.057]	[0.078]	[0.082]
Firm's legal status change	-0.026	-0.001	-0.025	-0.034	-0.022	-0.026
	[0.038]	[0.059]	[0.054]	[0.040]	[0.063]	[0.056]
Firm's owner gender	0.025	0.03	-0.006	0.015	0.011	0.004
	[0.029]	[0.037]	[0.046]	[0.030]	[0.040]	[0.047]
Capital intensity	0.026**	0.016	0.040**	-0.01	-0.013	0.001
	[0.012]	[0.016]	[0.020]	[0.012]	[0.015]	[0.019]
Locating in urban area	0.128	0.511**	-0.121	0.177	0.583**	-0.111
	[0.151]	[0.254]	[0.187]	[0.158]	[0.270]	[0.196]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes	Yes	Yes	Yes

Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Weak identification test (Cragg-Donald Wald F statistic)	198.054***	117.138***	72.700***	1.1e+04***	7756.933***	2772.964***
N	4014	2797	1106	4061	2814	1128

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of average wage (i.e. total wage bills divided by total employee). We use GMM estimation methods. The instrument variable for columns [1], [2] and [3] is the lagged log of profits per employee in last period. The instrument variable for columns [4], [5] and [6] are the log of value added per employee. Columns [1] and [4] use the whole sample. Columns [2] and [5] use the subsample of sole proprietorship firms. Columns [3] and [6] use the subsample of corporate firms. Employment growth, capital growth is in log. BPI is unweighted average of 8 business practice indicators, including using email, having an accounting book, carrying out advertisement, Owners'/Managers' regulation knowledge, having training activity, being a member of business association, percentage of sales to other provinces and exports in total sales and percentage of input purchased from other provinces and imports in total input purchase. Regular workers share is the ratio of fulltime regular workers to total employment. Unskilled worker share is the ratio of the number of unskilled worker (production workers, except the foreman and cleaning workers) to total number of employees. Relative wage is equal to ratio of the firm's wages to the average wages that the same ownership type of firms in the same industry and same province pays in the same year.

Table 6: Earning equations, from matched employer-employee data (benchmark)

	[1] All	[2] Sole proprietorship	[3] Corporate	[4] Sole proprietorship	[5] Corporate
Profits per employee (in log)	0.079***	0.127**	0.079**	0.081**	0.079**
	[0.030]	[0.049]	[0.037]	[0.039]	[0.035]
Year of education	0.019**	0.015	0.018**	0.082***	0.024**
	[0.008]	[0.011]	[0.009]	[0.021]	[0.009]
Total experience	0.014*	0.002	0.028***	-0.027	0.026***
	[0.008]	[0.012]	[0.008]	[0.018]	[0.008]
Total experience squared	-0.000***	0	-0.001***	0	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age	0.004	0.004	0.004	0.016**	0.004
	[0.004]	[0.006]	[0.005]	[0.007]	[0.004]
Tenure	0.008	0.012	-0.004	0.016	-0.004
	[0.006]	[0.008]	[0.008]	[0.012]	[0.008]
Gender (Men=1)	0.148***	0.136*	0.196***	-0.048	0.184***
	[0.043]	[0.077]	[0.044]	[0.100]	[0.040]
Manager/Professional	0.335***	0.402***	0.313***	0.360***	0.312***
	[0.057]	[0.099]	[0.066]	[0.078]	[0.063]
Service workers	0.160***	0.154	0.160***	0.211***	0.160***
	[0.051]	[0.095]	[0.057]	[0.075]	[0.054]
Hours per week	0.013***	0.012***	0.009	0.006	0.009
	[0.004]	[0.004]	[0.006]	[0.006]	[0.006]
Member of union	0.071	0.04	0.121	-0.035	0.121
	[0.075]	[0.141]	[0.091]	[0.124]	[0.086]
Negotiation in wage setting	0.081	0.092	-0.045	0.124	-0.044
	[0.052]	[0.069]	[0.074]	[0.081]	[0.071]
Regular worker share	0.392**	0.748***	-0.096	0.468**	-0.095
	[0.177]	[0.231]	[0.187]	[0.216]	[0.179]
Total employees	0.100***	0.149**	0.072	0.1	0.072
	[0.034]	[0.059]	[0.051]	[0.071]	[0.048]
Total asset	0.022	0.071**	-0.029	0.038**	-0.03
	[0.020]	[0.032]	[0.030]	[0.018]	[0.029]

Being relative to owners	0.043	0.019	0.081	0.053	0.082
	[0.050]	[0.071]	[0.064]	[0.040]	[0.062]
Gender of owner	0.1	0.091	0.151*	-0.004	0.150*
	[0.061]	[0.086]	[0.086]	[0.061]	[0.082]
Owner has technical degree	0.022	0.006	0.03	-0.129	0.03
	[0.059]	[0.088]	[0.073]	[0.095]	[0.070]
Firms in urban area	0.141**	0.102	0.103	-0.038	0.103
	[0.067]	[0.096]	[0.080]	[0.130]	[0.076]
Intercept	2.961***	1.675**	4.331***	2.675***	4.075***
	[0.495]	[0.750]	[0.684]	[0.744]	[0.655]
ls0				-0.223**	-0.223**
				[0.093]	[0.093]
ls1				-0.935***	-0.935***
				[0.075]	[0.075]
r0				2.484**	2.484**
				[1.011]	[1.011]
r1				0.183	0.183
				[0.166]	
N	1009	592	417	592	417

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of monthly wage. Column [1] uses the whole sample. Columns [2] and [4] use the subsample of workers who work in sole proprietorship firms. Columns [3] and [5] uses the subsample of workers who work in corporate firms. Columns [4] and [5] are the second stage of the switching endogenous regression model. Profits-per-employee is the log of average gross profits (value added minus total wage bills and bonus) per employee. In this table, we do not control the endogeneity of the profits per employee.

Table 7: Earning equations, from matched employer-employee data (estimation with IV)

	[1] All	[2] Sole proprietorship	[3] Corporate	[4] Sole proprietorship	[5] Corporate
Profits per employee (in log)	0.135***	0.211***	0.105***	0.214***	0.106***
	[0.034]	[0.066]	[0.037]	[0.066]	[0.037]
Year of education	0.019**	0.014	0.018**	0.027	0.038
	[0.008]	[0.011]	[0.009]	[0.029]	[0.023]
Total experience	0.014*	0.001	0.028***	-0.003	0.022**
	[0.008]	[0.013]	[0.008]	[0.015]	[0.010]
Total experice squared	-0.000***	0	-0.001***	0	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age	0.004	0.004	0.004	0.005	0.005
	[0.004]	[0.006]	[0.005]	[0.006]	[0.005]
Tenure	0.008	0.013	-0.004	0.013	-0.004
	[0.005]	[0.008]	[0.008]	[0.008]	[0.008]
Gender (Men=1)	0.143***	0.131*	0.194***	0.099	0.156***
	[0.043]	[0.077]	[0.044]	[0.110]	[0.052]
Manager/Professional	0.331***	0.406***	0.311***	0.413***	0.309***
	[0.056]	[0.100]	[0.066]	[0.102]	[0.066]
Service workers	0.160***	0.151	0.161***	0.159	0.160***
	[0.051]	[0.096]	[0.056]	[0.097]	[0.056]
Hours per week	0.013***	0.012***	0.009	0.012***	0.010*
	[0.004]	[0.004]	[0.006]	[0.004]	[0.006]
Member of union	0.052	-0.004	0.12	-0.005	0.12
	[0.077]	[0.143]	[0.091]	[0.143]	[0.091]
Negotiation in wage setting	0.084	0.083	-0.037	0.083	-0.033
	[0.052]	[0.070]	[0.074]	[0.070]	[0.073]
Regular worker share	0.352**	0.678***	-0.086	0.671***	-0.082
	[0.176]	[0.238]	[0.190]	[0.240]	[0.188]
Total employees	0.108***	0.174***	0.073	0.173***	0.074
	[0.035]	[0.061]	[0.051]	[0.061]	[0.050]
Total asset	0.013	0.065**	-0.035	0.064*	-0.037
	[0.020]	[0.032]	[0.031]	[0.033]	[0.030]
Being relative to owners	0.041	0.014	0.081	0.016	0.086

	[0.050]	[0.073]	[0.063]	[0.073]	[0.065]
Gender of owner	0.099	0.086	0.152*	0.085	0.150*
	[0.063]	[0.086]	[0.087]	[0.087]	[0.087]
Owner has technical degree	0.016	0.01	0.024	0.012	0.024
	[0.059]	[0.089]	[0.073]	[0.089]	[0.073]
Firms in urban area	0.124*	0.095	0.095	0.094	0.095
	[0.068]	[0.097]	[0.081]	[0.097]	[0.081]
mill0				-0.205	
				[0.409]	
mill1					0.243
					[0.269]
Intercept	2.542***	0.73	4.721***	0.684	4.188***
	[0.513]	[0.810]	[0.638]	[0.808]	[0.798]
Overidentification test (Hansen statistics)	13.496***	6.145**	7.932***	6.201**	8.022***
Weak identification test (Cragg-Donald Wald F statistic)	576.552***	216.101***	522.528***	214.005***	520.881***
N	1009	592	417	592	417

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of monthly wage. Column [1] uses the whole sample. Columns [2] and [4] use the subsample of workers who work in sole proprietorship firms. Columns [3] and [5] uses the subsample of workers who work in corporate firms. Columns [4] and [5] are the second stage of the switching endogenous regression model. Profits-per-employee is the log of average gross profits (value added minus total wage bills and bonus) per employee. In this table, two instrument variables are used: the value added per employee and the 3 year rolling standard deviation of revenue per employee. For estimating columns [4] and [5], we use the inversed Mills ratio from the switching equation since the switching endogenous regression model does not support the estimation with instrument variables.

Table 8: Earning equations for different groups of employees, from matched employer-employee data (use value added per worker as IV)

	[1] Men	[2] Women	[3] Professional	[4] Service workers	[5] Production workers
Profits per employee (in log)	0.107**	0.170***	0.123**	0.086	0.154***
	[0.042]	[0.045]	[0.050]	[0.057]	[0.038]
Year of education	0.013	0.024*	0.01	0.045*	0.017*
	[0.010]	[0.013]	[0.020]	[0.023]	[0.009]
Total experience	0.011	0.019*	0.043***	0.027	0.007
	[0.010]	[0.011]	[0.016]	[0.018]	[0.010]
Total experice squared	-0.000**	-0.001**	-0.001***	-0.001**	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age	0.005	0.001	0.004	0.005	0.002
	[0.006]	[0.007]	[0.008]	[0.012]	[0.005]
Tenure	0.01	0.007	0.001	-0.003	0.012*
	[0.008]	[0.007]	[0.010]	[0.010]	[0.006]
Manager/Professional	0.364***	0.310***			
	[0.077]	[0.079]			
Service workers	0.123	0.223***			
	[0.079]	[0.068]			
Gender (Men=1)			0.190***	0.05	0.138**
			[0.068]	[0.072]	[0.063]
Hours per week	0.013**	0.012**	0.015**	-0.001	0.013***
	[0.005]	[0.005]	[0.006]	[0.010]	[0.004]
Member of union	-0.01	0.086	0.146	-0.057	0.005
	[0.085]	[0.108]	[0.163]	[0.098]	[0.081]
Negotiation in wage setting	0.120*	0.073	0.048	0.122	0.084
	[0.064]	[0.075]	[0.106]	[0.092]	[0.058]
Regular worker share	0.484**	0.188	0.109	0.173	0.413**
	[0.237]	[0.207]	[0.254]	[0.279]	[0.202]
Total employees	0.115***	0.103*	0.122	0.187***	0.108***
	[0.042]	[0.053]	[0.083]	[0.068]	[0.038]
Total asset	0.031	0.004	-0.044	0.018	0.024
	[0.026]	[0.027]	[0.037]	[0.035]	[0.023]

Being relative to owners	0.06	-0.016	0.08	-0.108	0.044
	[0.063]	[0.079]	[0.093]	[0.118]	[0.066]
Gender of owner	0.103	0.077	0.2	0.094	0.077
	[0.074]	[0.088]	[0.128]	[0.089]	[0.066]
Owner has technical degree	0.005	0.05	0.05	-0.098	0.019
	[0.078]	[0.068]	[0.098]	[0.124]	[0.067]
Firms in urban area	0.166**	0.03	0.175	0.122	0.12
	[0.078]	[0.100]	[0.125]	[0.091]	[0.078]
Intercept	2.401***	3.314***	4.126***	3.880***	2.376***
	[0.652]	[0.695]	[0.931]	[0.890]	[0.571]
Overidentification test (Hansen statistics)	11.530***	5.991**	4.764**	5.107**	12.364***
Weak identification test (Cragg-Donald Wald F statistic)	441.101***	401.326***	317.101***	185.558***	526.564***
N	633	376	165	134	710

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of monthly wage. Column [1] and [2] use the subsample of male employees and female employees, respectively. Columns [2], [3] and [4] use the subsample of managers/professionals, service officers and production workers, respectively. Profits-per-employee is the log of average gross profits (value added minus total wage bills and bonus) per employee. In this table, two instrument variables are used: the value added per employee and the 3 year rolling standard deviation of revenue per employee.

Appendix 1: Use lagged as independent variables or IV variables

	[1]	[2]	[3]	[4]	[5]	[6]
	All	Sole proprietorship	Corporate	All	Sole proprietorship	Corporate
	Lagged profits/employee as independent variables			Lagged profits/employee as IV		
Profits per employee (in log)	0.070**	0.163***	0.028	0.269***	0.583***	0.173
	[0.027]	[0.050]	[0.033]	[0.103]	[0.213]	[0.177]
Year of education	0.019**	0.012	0.021**	0.019**	0.009	0.022***
	[0.008]	[0.011]	[0.008]	[0.008]	[0.012]	[0.008]
Total experience	0.013*	0.003	0.027***	0.015*	-0.001	0.029***
	[0.008]	[0.012]	[0.008]	[0.008]	[0.014]	[0.009]
Total experience squared	-0.000***	0	-0.001***	-0.000***	0	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age	0.004	0.003	0.004	0.004	0.004	0.004
	[0.004]	[0.006]	[0.005]	[0.004]	[0.006]	[0.005]
Tenure	0.007	0.011	-0.005	0.008	0.015	-0.004
	[0.006]	[0.008]	[0.009]	[0.005]	[0.009]	[0.009]
Gender (Men=1)	0.159***	0.154**	0.202***	0.130***	0.104	0.191***
	[0.043]	[0.077]	[0.044]	[0.045]	[0.083]	[0.045]
Manager/Professional	0.331***	0.402***	0.294***	0.312***	0.419***	0.286***
	[0.057]	[0.099]	[0.064]	[0.057]	[0.114]	[0.065]
Service workers	0.166***	0.182*	0.154***	0.163***	0.157	0.157***
	[0.052]	[0.093]	[0.057]	[0.052]	[0.106]	[0.056]
Hours per week	0.013***	0.012***	0.010*	0.012***	0.010**	0.011*
	[0.004]	[0.004]	[0.006]	[0.004]	[0.004]	[0.006]
Member of union	0.09	0.019	0.122	-0.006	-0.206	0.101
	[0.072]	[0.144]	[0.087]	[0.087]	[0.225]	[0.093]
Negotiation in wage setting	0.081	0.103	-0.052	0.096*	0.042	0.002

	[0.053]	[0.069]	[0.075]	[0.055]	[0.080]	[0.101]
Regular worker share	0.464***	0.921***	-0.116	0.243	0.379	-0.093
	[0.176]	[0.228]	[0.189]	[0.199]	[0.313]	[0.213]
Total employees	0.104***	0.160***	0.079	0.129***	0.286***	0.084*
	[0.035]	[0.058]	[0.053]	[0.037]	[0.088]	[0.051]
Total asset	0.025	0.070**	-0.016	-0.008	0.038	-0.048
	[0.020]	[0.032]	[0.031]	[0.026]	[0.037]	[0.049]
Being relative to owners	0.041	0.013	0.085	0.037	-0.009	0.083
	[0.050]	[0.071]	[0.070]	[0.052]	[0.082]	[0.064]
Gender of owner	0.101*	0.104	0.128	0.088	0.064	0.132
	[0.061]	[0.086]	[0.085]	[0.068]	[0.095]	[0.091]
Owner has technical degree	0.026	-0.023	0.04	-0.006	0.03	-0.008
	[0.062]	[0.090]	[0.080]	[0.062]	[0.108]	[0.090]
Firms in urban area	0.175***	0.143	0.145*	0.1	0.06	0.112
	[0.067]	[0.098]	[0.078]	[0.077]	[0.111]	[0.096]
Intercept	2.766***	1.154*	4.925***	1.551*	-2.315	4.198***
	[0.475]	[0.662]	[0.696]	[0.877]	[1.907]	[1.201]
Weak identification test (Cragg-Donald Wald F statistic)				10.830+	25.045**	2.148
N	1002	591	411	1002	591	411

Standard errors in brackets; + p<0.15, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$,
Dependent variable is the log of monthly wage. Column [1], [2] and [3] use the lagged log profits per employee as a regressor. while it is used as an instrument variable in columns [4], [5] and [6]. Columns [1] and [4] use the whole sample. Columns [2] and [5] use the subsample of workers in sole proprietorship firms. Columns [3] and [6] use the subsample of workers in corporate firms. Profits-per-employee is the log of average gross profits (value added minus total wage bills and bonus) per employee.