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After the Reforms: Determinants of Wage Growth and Change in Wage Inequality in Vietnam, 1998 -2008

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Abstract: The Vietnam "renovation" reforms were implemented during the 1990s, but their full effect was only felt several years later. We present evidence on the developments in real wage growth and inequality in Vietnam from 1998 to 2008. Wage growth was underpinned by changes in the wage structure (mainly associated with experience group) and residual changes. Growth in productive characteristics (mainly education) contributed to wage growth only at higher points of the wage distribution. Conventional measures of inequality as well as a decomposition of the Gini coefficient show that wage inequality decreased sharply through the 1990s until 2006, but levelled-off subsequently. The main contributors to changing inequality were again education (through the composition effect) and over-time changes in the return to experience. The paper also discusses the possible effects of minimum wage policies on wage inequality in Vietnam.

JEL codes: D33, J31, J42
Keywords: Wage inequality, unconditional quantile regression, Asia, Vietnam.

1. Introduction

During Vietnam's central planning period (prior to 1986), policies were aimed at preserving an egalitarian income distribution. Development during this period was accompanied by misallocation of resources as a result of preserve incentives (see for example, Taylor 2004). The *Doi Moi* ("renovation") reforms were initiated in 1986 and aimed at establishing a market-based economy; however, these reforms actually started taking hold during the 1990s. The consequences of the reforms were dramatic, with output per person increasing significantly during the first decade of the reforms and the labor market particularly impacted.

Before the implementation of the reforms, public sector remuneration policy led to a compression of earnings differentials across groups with different education qualifications. The process of dismantling the old public sector wage system began in 1990[1]. The role of state-owned enterprises was lessened, salaries of public servants were set according to market rates and the salary wage structure would reward public sector workers according to education level, job responsibility and performance. Private firms were free to set wages without government interference; for foreign ventures, however, an effective minimum wage was set which was higher compared to the market wage and the minimum wage set for domestic firms.[2]

The full impact of these reforms probably came only years later, since those hired prior to 1994 were largely exempted (World Bank 1996). The implementation of these reforms led to an increase in the demand for certain types of labor, particularly in trade and services. This resulted in a shortage of high level technical experts, skilled technical workers, administrative and managerial experts and researchers, among others (Nguyen et. al 1991).

[1] Remuneration of public sector workers ceased to be based on length of service and jobs were no longer guaranteed for life (Hiebert 1993; Norlund 1993).
[2] Between 1993 and 1996, the minimum wage for all firms was 120,000 VND (about $12) per month, compared to a minimum wage for firms with foreign ownership of $35 in Hanoi and HCM city and $30 elsewhere.

There are several studies on changing wage distributions and inequality, using various methodologies, mostly for developed, Newly Industrialized and Transition Economies[3]. Studies in this context are lacking for Vietnam (along with most countries in S.E. Asia), especially studies using recent advances in methodology and recent data. Existing studies for Vietnam include those by Nguyen *et. al.* (2006) who decomposed the urban-rural inequality from 1993 to 1998 using a quantile regression approach, Pham and Reilly (2007) who analysed the gender pay gap along the earnings distribution from 1993 to 2002 and found a narrowing gender pay gap, Gallup (2002) who derived conventional measures of inequality in the 1990s and examined the contribution of wage employment to income growth and inequality and Glewwe *et. al.* (2002) who examined changes in poverty in the 1990s and found that poverty declined drastically between 1993 and 1998 (more so in urban areas, more educated households and households headed by women), while household inequality increased slightly. Recently, Le and Booth (2010) used data from 1993 to 2006 to analyse Urban-Rural household expenditure inequality in Vietnam using a simplified version of the same novel methodology as in this paper.

The objective of this paper is to establish the developments in wage growth and inequality in Vietnam during the 1998-2008 period, that is the period from when reforms started taking hold till when the Vietnamese economy and in particular the labor market had been transformed. We use Vietnam Living Standards and Vietnam Household Living Standards data from 1998 to 2008 and recent methodological advances which permit the identification of individual contributors to over-time wage growth at different points of the wage distribution, in other words implementing Oaxaca (1974)-Blinder (1974) decompositions at quantiles.

[3] For example, Lukyanova (2006), Meng, (2004) and Fields and Yoo (2000).

2. Methodology

In the last few years there has been an evolution and refinement of techniques used in examining distributional issues, specifically in evaluating wage differentials between sub-groups (and more generally the impacts of various programs) over the entire range of the earnings distribution. These new techniques were first used to analyse gender earnings gaps (for example, Albrecht *et. al.* 2003) and later to examine changes in wage distributions over time, where the focal point is what contributes to the change in these distributions. This paper implements recent advances in methodology, in particular a two-stage procedure proposed by Firpo et. al. (2009; 2007), which allows the decomposition of changes or differences in wage distributions and assessing the impact of explanatory variables on quantiles of the unconditional wage distribution.

To illustrate the advantages of the two-stage procedure, one can compare it with the traditional Oaxaca-Blinder decomposition and alternative distributional decompositions. The method of Oaxaca-Blinder decomposition, although allowing detailed decompositions of group differences or changes in mean wages, has two drawbacks. First, the contribution of each covariate is sensitive to the choice of the base group (see Oaxaca and Ransom 1999) and second, the consistency of the estimates of the two decomposition components depends on the linearity assumption (see Barsky et. al. 2002). Furthermore, when considering decompositions of changes in distributional statistics other than the mean, most of the available techniques (for example, Juhn et. al. 1993; Donald et. al. 2000; Barsky et. al. 2002 ; Machado and Mata 2005; Melly 2005), have the shortcoming that they don't allow for further dividing the wage structure and composition effect into the contributions of the individual covariates. Recently Firpo et al. (2007; 2009) developed a regression-based approach which allows for such a detailed decomposition at quantiles (and other functionals of the distributions as well).

Consider wage distributions for two groups, 1 and 0, in our case one group at time 1 and the other at time 0. Let Y_{1i} be the wage that would be paid to worker *i* in period 1 and Y_{0i} the wage that would be paid in period 0. Wages depend on a vector of observed characteristics, X_i, as well as unobserved characteristics, ε_i, as depicted in the wage function:

$$Y_{ti} = g_t(X_i, \epsilon_i), \quad t = 1, 0 \qquad (1)$$

Using the sample data, one can identify the distributions: F_1 for $Y_1|T = 1$ and F_0 for $Y_0|T = 0$. One needs to also identify the counterfactual distribution, F_C for $Y_0|T = 1$, that is the distribution that would have prevailed if we have combined the wage structure of group 0 with the distribution of characteristics of group 1. Comparing the wage distributions of the 2 groups by focusing on a particular functional, v (for example, the median), of the distributions, the difference: $D^v = v(F_1) - v(F_0)$, can be decomposed as

$$D^v = [v(F_1) - v(F_c)] + [v(F_c) - v(F_0)] = D_S^v + D_X^v \qquad (2)$$

that is, as a sum of the wage structure and the composition effect. In order to construct $v(F_c)$, one needs to identify F_c. For this, besides constructing the desired composition effect component (D_X^v), assumptions of conditional independence ("ignorability") and "overlapping support" are required.[4]

The two-step decomposition procedure is as follows: in the first step, a reweighting approach is employed to estimate the 2 components of the over-time changes in wage distributions. Using three relevant weighting functions, one can transform features of the marginal distribution of Y into features of the conditional distribution of Y_1 given $T = 1$ and Y_0 given $T = 0$, as well as the features of the counterfactual distribution of Y_0 given $T = 1$. In

[4] Since D_X^v reflects changes in the joint distribution of (X, ϵ), while we require this component to reflect only changes in the distribution of X, the conditional independence assumption (ϵ independent of T given X) is required. In addition, the "overlapping support" assumption requires that there is an overlap in observable characteristics across groups; this is expected to be satisfied in our case, where we look at over-time changes in wage distributions.

deriving the re-weighting functions, the probability that a person belongs in group 1 conditional on X ("propensity score") is derived from a logit regression.

In the second step, we use the *recentered influence function* (RIF) regression[5], recently proposed by Firpo et. al. (2009), which involves estimating a regression of the recentered influence function of the dependent variable $RIF(Y_t; v, F_t)$ on the explanatory variables X. As the expectation of $RIF(Y_t; v, F_t)$ equals to v, using the law of iterated expectation, the decomposition components in equation (2) can now be re-written as:

$$D_S^v = E[m_1^v(X)|T = 1] - E[m_c^v(X)|T = 1] \qquad (3a)$$

$$D_X^v = E[m_c^v(X)|T = 1] - E[m_0^v(X)|T = 0] \qquad (3b)$$

where the RIF regressions are $m_t^v(X) = E[RIF(Y_t; v, F_t)|X, T = t], (t = 0, 1)$ and $m_c^v(X) = E[RIF(Y_0; v, F_0)|X, T = 1]$. A special case of the RIF regression is the unconditional quantile regression when the functional is quantiles of the distribution.

Adding the assumption of linearity on the RIF regression $m_t^v(X) = X^T\gamma_t^v$, the decomposition can be rewritten as:

$$D_S^v = E[X|T = 1]^T(\gamma_1^v - \gamma_0^v) \qquad (4a)$$

$$D_X^v = \{E[X|T = 1] - E[X|T = 0]\}^T\gamma_0^v - R^v \qquad (4b)$$

where R^v is an approximation error. The approximation error also provides a way to test the linear assumption of the model.[6] The estimate of the vector $\gamma_t^v(t = 0,1)$ is obtained from OLS regression of $RIF(Y_t; v, F_t)$ on X_t. Alternative estimators for non-linear model specifications are also discussed in Firpo et al. (2009).

This is a generalization of the Oaxaca-Blinder decomposition which allows the decomposition of changes in any functional of two distributions (for example, mean, median,

[5] For a background on the Influence Function and its use in robust statistics, see Hampel (1974).

[6] In practice, the error in the wage structure (or composition) effect can be estimated as the difference between the estimate of the wage structure (or composition) effect through re-weighting and the estimate obtained from the RIF-regression procedure; the two errors can be different in absolute value.

quantile, Gini coefficient etc). In this paper, we explore the earnings decompositions at different quantiles of the distributions.

3. Data and Estimation Samples

3.1 Summary Statistics

The data used draw on the household questionnaires from the 1997/8 Vietnam Living Standard Surveys (VLSS) and the 2008 Vietnam Household Living Standard Survey (VHLSS 2008)[7]. The VLSS 1997/98 comprised of a sample of nearly 6,000 households, while the VHLSS 2008 comprised of just over 9000 households From the wide range of questions included in the household questionnaire, we utilize information on household member's characteristics such as age, gender, place of residence, education qualifications, as well as employment information of workers employed for wages such as earnings, occupation and major industry of employment.

Since this study focuses on the wage and salary sector and excludes the self-employed (for who there is no earnings information), the results are not representative of changes in household income or consumption inequality. The reason for focusing on wage inequality is its direct link with labor market reforms in Vietnam and related policies such as maintaining a minimum wage policy which is reviewed every few years.

One should look at changes in the proportion of wage employment over the period examined. From the 1992 and 1998 VLSS and 2008 VHLSS, the proportion of wage and salary employees in total employment (including farm employment) was 20% in 1992/93 and 21 % in 1998; this proportion increased to 27% in 2002, 31% in 2006 and 31.8 % in 2008. The category within wage employment which accounts for this increase is workers employed

[7] The surveys were conducted by the General Statistics Office, assisted by the World Bank and funded by United Nations Development Program (UNDP) and the Swedish International Development Cooperation Agency. These surveys are similar in design to the World Bank's Living Standard Measurement Surveys and are nationally representative.

for other households (small household enterprises), which increased sharply from 1998 to 2008.

The dependent variable is the logarithm of the hourly wage, deflated to 1998 prices using the CPI for Vietnam. The estimation samples include all those aged 15-65 who were employed for wages in the public sector (including cooperatives, foreign enterprises and joint ventures) and the private sector (including those employed for small household enterprises). Table A1 in the Appendix presents the mean characteristics of workers by year. Mean earnings grew strongly, with the real wage increasing by 66% over the decade. Education endowments increased substantially; the proportion of workers with tertiary qualifications nearly doubling and the proportion of workers with vocational/technical qualifications more than doubling. Private sector employment increased compared to public sector employment, mainly as a result of a substantial increase in the proportion of those working for other households/household enterprises (from 29% to 47.5% of wage employment). Despite the overall increase in urbanisation, wage employment in urban areas declined compared to rural areas, again because of the increase in the proportion of workers employed for other households; in 2008 this category of workers comprised 57% of wage employment in rural areas compared to 33% in urban areas.

3.2 Conventional Measures of Inequality

One way to characterize inequality is to compute various summary measures of inequality. Each measure of inequality has distinct properties[8]. Tables 1, 1a and 1b present such measures over time and by sector; they reveal a significant decline in wage inequality in Vietnam from 1992 to 2006 and a levelling-off or a small rebound in the following years.

[Table 1 about here]

[8] For example, the Gini coefficient, in comparison to the Theil index, is more sensitive to transfers between people near the middle of the distribution. Transfers from the top to the bottom of the distribution, on the other hand, tends to produce larger changes in the Gini coefficient in comparison to the Theil index.

In the early 1990s Vietnam introduced a minimum wage. The monthly minimum wage was set on the basis of the cost of living of an employee who is employed in the most basic job. The government determines and promulgates from time to time a general minimum wage as well as a minimum wage within and outside large cities. From 1993 to 1996, the general minimum wage was 120,000 VND (about $12) per month, compared to a minimum wage for firms with foreign ownership of $35 in Hanoi and HCM city and $30 elsewhere. Since 1997, the general minimum monthly wage for unskilled labor applicable to both the public and private sector was set at 144,000 VND per month; however, one important difference is that in the public sector, the minimum wage is used as a base to calculate actual salaries, which were set as a multiple of the minimum earnings. Thus, an increase in the minimum wage led automatically to an increase in public sector wages (see for example, Belser, 2000).

While minimum wages in the domestic sector were modest for international standards (less than 30 % of mean earnings), they have been revised consistently over the years to 180,000 VND in year 2000, 210,000 VND in year 2002, 290,000 VND in year 2004, 450,000 VND in year 2006 and 540,000 VND in year 2008, all in nominal terms. At constant (1998) prices, the minimum wage increased by 127 % between 1998 and 2006; however, the corresponding increase between 1998 and 2008 was only by about 100 %, as real minimum wage declined over the 2006-2008 period because of high inflation in recent years.

It would be reasonable to assume that, once the reforms were fully implemented, their independent effect in the labor market would be towards increasing wage inequality. There is convincing evidence that the gradual economic reforms[9] in Vietnam had barely any effect in the labor market prior to 1998. Perhaps the best indicator is developments in the returns to human capital. Doan and Gibson (2010) estimated returns to schooling from 1992 to 2008 in

[9] As opposed to the "cold turkey" reforms in the Easter European transition economies.

Vietnam and found that during the 1992-1998 period, the return to schooling remained low at between 3 and 5%, as opposed to an average of 10% for developing countries. Other evidence on Vietnam (for example, Liu 2006) also suggests that during this period there is no discernable increasing trend for returns to schooling. However, during the later stages of economic reform (1998-2008), the return to schooling increased rapidly and stabilized at about 10% - the global average for developing countries. Similarly, the return to experience increased from 1.5% in 1998 and 2.5% in 2002, to 4% in 2004 and 5.6% in 2008. Doan and Gibson (2010) attribute the rapid increase in the return to schooling to a deepening of reforms, opening of markets and integration to the global economy, which resulted in an increase in the labor market requirements for technical skills.

Chart 1 illustrates the changes in the real minimum wage as well as the Gini coefficient by sector from 1992 to 2008. One would expect that the minimum wage would affect inequality mostly in the private sector, as in the public sector the minimum wage is used as a base to calculate actual salaries which were set as a multiple of the minimum earnings. Looking Chart 1, in the private sector, the sharp increases in the real minimum wage from 1998 to 2006 are associated with declining inequality; from 2006 to 2008, a declining real minimum wage (dues to high inflation) is associated with a levelling off or a slight increase in inequality in the private sector. On the other hand, during the earlier period (1992-1998), when the reforms were not fully implemented, inequality in the private sector – at least based of changes in the Gini – remained unchanged. In the public sector, as expected, there is no discernable association between changes in the real minimum wage and inequality.

[Charts 1 about here]

4. Estimation and Detailed Decomposition

4.1 RIF-Regressions

The unconditional quantile regression estimation consists of two steps. The first step is to derive the Recentered Influence Function (RIF) of the dependent variable and the second step involves estimating an OLS regression of the generated RIF variable on covariates. The estimated coefficients are in fact unconditional partial effects of small location shifts of the covariates.

Specifically, the RIF at quantiles is:

$$RIF(Y, q_\tau) = q_\tau + [\tau - I(Y \leq q_\tau)/f_Y(q_\tau)],$$

where q_τ can be estimated by the sample quantile and $f_Y(.)$ can be estimated using Kernel density. If the specification of the unconditional quantile regression is linear, the OLS estimates of the coefficients are consistent estimators of the unconditional partial effects: $d(q_\tau)/d(X)$.

A well-known drawback of Oaxaca-Blinder decomposition techniques is that the contribution of each covariate is sensitive to the choice of the base group (see for example, Oaxaca and Ransom 1999). In this paper we apply the *deviation contrast transform* procedure developed for use with such decompositions. Applying the deviation contrast transformation to the estimates before conducting the decomposition is one solution to this problem (see Yun 2005). The transformation procedure can be used to transform the coefficients of 0/1 dummy variables so that they reflect deviations from the "grand mean" rather than deviations from the reference category. Consequently, the modified coefficients will sum up to zero over all categories.

Table A2 in the Appendix presents the results of the estimated RIF-regressions. Some notable over-time changes incluide: the significant and heterogeneous changes in the return to experience by experience group. We observe that for the median worker and even more so for

workers at higher points in the distribution, there a sharp increase in the return to experience for younger workers (0-5 experience group) and a corresponding decrease in the return to experience for older workers; this is not the case, however, for workers at the bottom of the wage distribution. We also observe a significant increase in the return to tertiary education for workers at higher points in the distribution and corresponding decreases in the return to lower education qualifications (incomplete primary, primary and lower secondary). Other changes include, the increase in wage premiums for professional occupations compared to manual labor, a decline in the male wage premium for workers at the top of the distribution accompanied with an increase in the male wage premium at the bottom of the distribution; an elimination of the ethnic majority premium; and a reversal of the public sector premium from negative to positive over the same period.

4.2 Decomposition of the change in log-wage

The outcome of the two-step procedure is estimates of the components of the total change in log-wage, namely the composition and the coefficients (wage structure) component, as well as the contribution of individual characteristics to these components and the total change (see Table 2 and Charts 2-5). The composition effect can be further divided into a part explained by the vector of covariates (explained part of the composition effect) in the model and a specification error; the error accounts for the fact that a potentially incorrect linear specification was used in estimating the RIF-regressions[10]. One can observe the size of the specification error and judge whether the method used results in an accurate enough approximation of the problem at hand. The wage structure effect can also be similarly divided into the part explained by the RIF-regression model and the residual change associated with change in intercepts.

[10] Note that this does not affect the estimates of the two components (composition and wage structure), which were derived using the re-weighting approach.

Real earnings of employees exhibited strong growth over the 10-year period examined, with an increase in the real wage (total effect) by about 60% for the median worker. The corresponding increase for a worker at the 10th percentile was larger at about 80%, while for a worker at the 90th percentile the real wage increased by about 70%. The contribution of the composition effect in wage growth is relatively small at the bottom of the wage distribution; however, at higher points it constitutes a substantial proportion of the total effect (about one quarter at the 90th percentile). That is, growth in productive characteristics (such as education) benefited more workers near the top of the wage distribution.

Turning to the contribution of individual covariates, the main contributors to *total* wage growth (column 3 in Table 2), besides the component associated with changes in intercepts[11] are: changes in education attainment, which essentially dominate the composition effect and benefit more workers at higher points in the distribution; from the wage structure effect, the most important effect is through the large but highly heterogeneous changes in the reward of experience for different experience groups (see Table A2). For those at the bottom of the wage distribution, changes associated with the return to experience exert a negative effect on wage growth; above the 20th percentile the effect of changes in the return to experience is towards increasing wages and this effect increases sharply at higher points in the distribution. Changes in the reward of "other" contributors (marital status, ethnicity, urbanity, sector of employment and region) had a negative effect on earnings growth.

[Table 2 about here]

It is worth pointing out the different mix of contributors to wage growth between the bottom and the top of the wage distribution. For the top two deciles, the component explained by the model (with experience as the main contributor) constitutes an important part of the total wage growth, along with the residual component (intercepts). On the other hand, at the

[11] When the RIF-regression method results in a good approximation of the effect of large over-time changes in the distribution of characteristics (X) on quantiles, the residual change captured by the difference in intercepts, reflects the actual wage changes in the base (reference) group.

bottom (10^{th}) percentile, the explained component contributed negatively to wage growth, while residual changes contributed towards increasing earnings by 0.764 log-points; as a result, wages grew by 0.61 log-points. Minimum wages and their changes are expected to influence wages at the bottom of the distribution. Such effects will be captured by the residual component in the decomposition. Hence, these results strengthen the case, whereby developments in the minimum wage maintained in Vietnam have been a major factor behind the inclusive and largely equalizing earnings growth in the wage sector in Vietnam over the last decade.

4.2 Decomposition of the change in the Gini

The model used to decompose real wage growth over time is used here to decompose changes in wage inequality using the Gini as a summary measure of inequality[12]. The estimates given in Table 3 are from the second step of the two-step decomposition method outlined in the methodology section, that is approximation errors are ignored; this is because these errors are generally small and don't influence the main findings.

The estimate of the total change in the Gini is a decline of 0.146 points, which is moderate in its extent but strongly significant. Most of the decline is attributable to the wage structure effect (0.134 points), with the composition effect accounting for 0.012 points, which is still statistically significant. Looking at the contributors to the total change in inequality, changes in the composition of education as well as changes in the return to education contribute moderately to a decline in inequality. On the other hand, changes in the return to experience by experience group (which was earlier found to be the most important contributor to wage growth), contribute to an increase in inequality. The same is the case for the changes in the return to "other" characteristics (mostly due to changes in the return to private vs. public sector employment). Overall, the explained part of the total change in the Gini is

[12] Results from decomposing the variance were also derived and were qualitatively similar.

towards increasing inequality by 0.064 points. However, the residual change component is very large and accounts for a decline in the Gini by as much as 0.21 points. These results are consistent with the earlier finding that residual changes account for almost all of the wage growth at the bottom of the wage distribution.

From the perspective of policy, policy makers in Vietnam are aware that the reforms have the potential of increasing wage inequality, especially through changes in the return to human capital. Developments in wage inequality over the entire period examined suggest that wage growth has been inclusive and equalizing; the maintenance of a minimum wage and its frequent revisions is probably a major factor in shaping these developments. High inflation in recent years has eroded the real minimum wage and this erosion may have contributed to the levelling-off of the declining trend in wage inequality. Vietnam seems to be committed to inclusive growth and to continue to intervene with further revisions in the minimum wage. Indeed, in 2009 the minimum wage was revised to 690,000 VND (650,000 for the state sector), from May 2010 the minimum monthly wage in non-state local firms was again revised to 810,000 VND (730,000 for state-owned enterprises and 1.04 million VND in foreign invested firms), and from 2011 it was further revised to 1.05 million VND[13].

But are such aggressive revisions of the minimum wage sustainable in the long term? In the case of Vietnam, minimum wage revisions have in recent years been contributing significantly to rising inflation. Prices of many consumer goods have been increasing, sometimes even in anticipation of wage increases. For example, in late April 2010 and after the decree issued on March 25th revising the minimum wage for state-owned enterprises to 730,000 (an increase of 12.3%), prices rose by 5% and in the case of some vegetables, prices increased by 50-100% (Vietnam Business News, May 4th 2010). It is, therefore, likely that

[13] A different minimum wage applies for different Zones in Vietnam; the revisions outlined here refer to Zone 3.

policy makers in Vietnam will, over-time, accept a trade-off with more sustainable minimum wage growth which is accompanied with a moderate increase in wage inequality.

5. Conclusion

The Vietnam "renovation" reforms, initiated in 1986 and implemented during the 1990s aimed at establishing a market-based economy. The full impact of the reforms, especially in the labor market, was felt only in recent years. In this paper we use recent advances in methodology and present evidence on the developments in wage growth and inequality in Vietnam from 1998 to 2008, and identify the contribution of individual covariates. Wage growth was strong over the 10-year period examined, with median real earnings increasing by 60% and even more for workers at the bottom of the wage distribution. For the median worker a combination of residual changes and changes in the return to experience by experience group account for the observed increase in wages. However, there is a large degree of heterogeneity in the contributors to wage growth at the bottom vs. the top of the wage distribution. At the top, changes in the return to experience account for most of the wage growth. At the bottom, residual change (which includes the effect of policies) accounts almost exclusively for a wage growth in excess of 80%.

Summary measures of inequality, as well as the results from decompositions indicate that wage inequality in Vietnam has been declining from the early 1990s to about 2006, levelling off after that. We provide circumstantial evidence that upward revisions of the minimum wage played a significant part for this development. A decomposition of the change in the Gini provides finding which are consistent with those from decomposing over-time wage growth, that is residual changes account for the decline in inequality over the period examined. In the light of further sharp upward revisions of the minimum wage beyond 2008 (2009, 2010 and 2011) and emerging evidence that they fuel inflation, it is likely that policy

makers will eventually settle for less aggressive minimum wage increases, at the cost of increasing wage inequality.

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Table 1: Change in Various Inequality Measures over Time: Wages Employees

Inequality measure	1992	1998	2002	2004	2006	2008
Relative Mean Dev.	0.265	0.252	0.249	0.234	0.234	0.246
Coeff. of Variation	0.744	0.735	0.715	0.637	0.649	0.690
Standard Dev. of logs	0.685	0.626	0.638	0.572	0.571	0.596
Gini Coefficient	0.368	0.352	0.346	0.322	0.324	0.338
Theil Entropy Measure	0.227	0.212	0.205	0.172	0.175	0.193
Percentile Ratios						
p90/p10	5.88	5.09	4.81	4.33	4.47	4.51
p90/p50	2.37	2.38	2.32	2.28	2.32	2.39
p75/p25	2.58	2.19	2.23	2.14	2.07	2.11
p50/p10	2.47	2.14	2.08	1.90	1.93	1.89

Table 1a: Change in Various Inequality Measures over Time: Private Sector

Inequality measure	1992	1998	2002	2004	2006	2008
Relative Mean Dev.	0.255	0.253	0.226	0.198	0.195	0.197
Coeff. of Variation	0.715	0.727	0.694	0.581	0.583	0.613
Standard Dev. of logs	0.676	0.632	0.570	0.492	0.485	0.498
Gini Coefficient	0.357	0.353	0.319	0.280	0.277	0.282
Theil Entropy Measure	0.213	0.212	0.182	0.137	0.135	0.145
Percentile Ratios						
p90/p10	5.69	4.95	3.98	3.40	3.37	3.27
p90/p50	2.27	2.39	2.09	1.93	1.87	1.86
p75/p25	2.4	2.22	1.93	1.88	1.80	1.79
p50/p10	2.5	2.07	1.90	1.76	1.80	1.75

Table 1b: Change in Various Inequality Measures over Time: Public Sector

Inequality measure	1992	1998	2002	2004	2006	2008
Relative Mean Dev.	0.269	0.243	0.233	0.231	0.232	0.242
Coeff. of Variation	0.764	0.723	0.638	0.591	0.595	0.628
Standard Dev. of logs	0.667	0.602	0.628	0.620	0.631	0.653
Gini Coefficient	0.370	0.340	0.328	0.320	0.323	0.336
Theil Entropy Measure	0.231	0.201	0.178	0.163	0.167	0.182
Percentile Ratios						
p90/p10	5.25	4.63	4.77	4.80	5.36	5.60
p90/p50	2.33	2.22	2.09	2.01	2.04	2.10
p75/p25	2.52	2.18	2.21	2.43	2.36	2.47
p50/p10	2.25	2.08	2.28	2.37	2.62	2.67

Table 2: Detailed decomposition of the log of hourly wage at percentiles, 1998-2008

Percentile/ Characteristic	1998-2008		
	Composition	**Wage Structure**	**Total**
P10	**0.042**	**0.568**	**0.610**
Education	0.059	0.009	0.068
Experience group	-0.017	-0.151	-0.168
Occupation	0.002	-0.007	-0.005
Broad Industry	0.012	0.024	0.036
Other	-0.007	-0.083	-0.090
Specification error	-0.007	0.012	0.005
Residual (intercepts)	-	0.764	0.764
P20	**0.008**	**0.537**	**0.545**
Education	0.052	0.010	0.062
Experience group	-0.011	-0.034	-0.045
Occupation	-0.004	-0.039	-0.043
Broad Industry	0.003	0.036	0.039
Other	-0.011	-0.086	-0.097
Specification error	-0.021	0.036	0.015
Residual (intercepts)	-	0.614	0.614
P30	**0.047**	**0.497**	**0.544**
Education	0.051	0.009	0.060
Experience group	-0.011	0.097	0.086
Occupation	-0.004	-0.022	-0.026
Broad Industry	0.003	0.037	0.040
Other	-0.014	-0.096	-0.110
Specification error	0.022	-0.012	0.010
Residual (intercepts)	-	0.484	0.484
P40	**0.045**	**0.463**	**0.508**
Education	0.060	-0.025	0.035
Experience group	-0.010	0.098	0.088
Occupation	-0.006	-0.004	-0.010
Broad Industry	0.001	0.025	0.026
Other	-0.019	-0.074	-0.093
Specification error	0.019	-0.020	-0.001
Residual (intercepts)	-	0.463	0.463
P50	**0.036**	**0.432**	**0.468**
Education	0.067	-0.035	0.032
Experience group	-0.009	0.153	0.144
Occupation	-0.008	-0.019	-0.027
Broad Industry	0.002	0.027	0.029
Other	-0.020	-0.060	-0.080
Specification error	0.004	0.006	0.010
Residual (intercepts)	-	0.360	0.360
P60	**0.039**	**0.444**	**0.483**
Education	0.086	-0.042	0.044
Experience group	-0.014	0.255	0.241
Occupation	-0.007	-0.028	-0.035
Broad Industry	0.004	0.019	0.023
Other	-0.023	-0.101	-0.124
Specification error	-0.007	0.007	0.000

Residual (intercepts)	-	0.334	0.334
P70	**0.074**	**0.415**	**0.489**
Education	0.115	-0.071	0.044
Experience group	-0.010	0.276	0.266
Occupation	-0.011	-0.024	-0.035
Broad Industry	0.008	0.016	0.024
Other	-0.030	-0.087	-0.117
Specification error	0.002	0.001	0.003
Residual (intercepts)	-	0.304	0.304
P80	**0.097**	**0.422**	**0.519**
Education	0.117	-0.086	0.031
Experience group	-0.006	0.445	0.439
Occupation	-0.013	-0.043	-0.056
Broad Industry	0.009	-0.003	0.006
Other	-0.028	-0.046	-0.074
Specification error	0.018	-0.015	0.003
Residual (intercepts)	-	0.170	0.170
P90	**0.125**	**0.397**	**0.521**
Education	0.123	-0.073	0.050
Experience group	-0.005	0.456	0.451
Occupation	-0.022	-0.098	-0.120
Broad Industry	0.022	-0.002	0.020
Other	-0.028	-0.138	-0.166
Specification error	0.035	-0.039	-0.004
Residual (intercepts)	-	0.291	0.291

Table 3: Detailed decomposition of Change in Gini, 1998-2008

Characteristic	**All Wage Employees**		
	Composition	**Wage Structure**	**Total**
	-0.012 (z=3.4)	**-0.134 (z=10.5)**	**-0.146 (z=11.3)**
Education	-0.011	-0.014	-0.025
Experience group	0.005	0.054	0.059
Occupation	-0.002	0.013	0.011
Broad Industry	-0.006	-0.008	-0.014
Other	0.002	0.031	0.033
Residual (intercepts**)**	-	-0.210	-0.210

Note: approximation errors are ignored here.

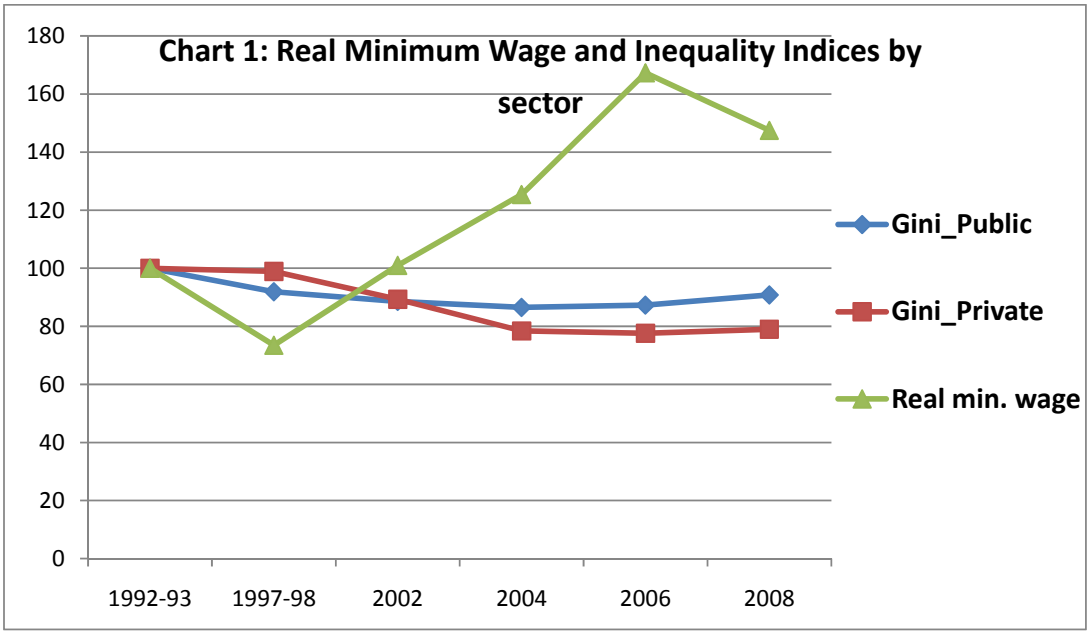
Chart 1: Real Minimum Wage and Inequality Indices by sector
180
160
140
120
100
80
60
40
20
0
1992-93
1997-98
2002
2004
2006
2008
Gini_Public
Gini_Private
Real min. wage

Appendix

Table A1: Summary Statistics by Year: Wage Employees 15-65 Years (%)

Characteristic	**1998**	**2008**
Hourly wage, 1998 prices (Viet Dong)	3,198	5,312
0-5 years of experience	7.07	13.66
6-10 years of experience	19.00	17.90
11-15 years of experience	18.53	11.57
16-20 years of experience	15.34	11.86
21-25 years of experience	15.40	12.38
26-30 years of experience	10.39	12.79
31-35 years of experience	6.73	10.10
36-40 years of experience	4.24	5.61
>40 years of experience	3.28	4.23
Average years of experience	18.70	19.23
Male	61.35	60.86
Female	38.65	39.14
Married	57.75	64.85
Not Married	42.25	35.15
Majority	93.94	94.30
Ethnic Minority	6.06	5.70
Urban	44.18	39.28
Rural	55.82	60.72
Public sector	39.42	32.17
Private Sector	60.58	67.83
< Primary education	22.00	12.92
Completed Primary	25.13	20.13
Lower Secondary	22.77	22.12
Completed Secondary	13.72	11.91
Secondary Vocational/Tech	8.46	17.82
Completed Tertiary	7.92	15.10
Manager/Official	4.96	3.60
Professional/Assoc. Professional	22.09	20.28
Service/Sales	7.02	8,17
Skilled labor	37.76	33.50
Unskilled labor	28.16	34.44
Primary sector	19.21	26.94
Industry	39.80	44.14
Trade/Services	40.99	28,92
Red River Delta	20.49	26.45
North	17.20	16.54
Central	11.83	12/15
South-East	26.86	23.65
Mekong River Delta	23.61	21.21
N	2,984	6,624

Note: Excluded groups in RIF-regressions in bold.

Table A2: Transformed coefficients from RIF-Regressions on the Log of hourly Wage

	1998			2008		
Explanatory Variables	**Q10**	**Q50**	**Q90**	**Q10**	**Q50**	**Q90**
0-5 years of experience	-0.147	-0.245	-0.600	-0.352	-0.103	-0.238
	(0.7)	(2.4)	(2.9)	(3.1)	(1.8)	(2.3)
6-10 years of experience	-0.046	-0.175	-0.478	-0.202	-0.009	-0.119
	(0.2)	(2.0)	(2.5)	(2.0)	(0.2)	(1.3)
11-15 years of experience	-0.036	-0.103	-0.529	-0.053	0.037	-0.009
	(0.2)	(1.3)	(3.3)	(0.6)	(0.8)	(0.1)
16-20 years of experience	0.117	-0.032	-0.327	-0.002	0.056	0.060
	(0.9)	(0.5)	(2.6)	(0.0)	(1.6)	(0.9)
21-25 years of experience	0.112	-0.012	-0.143	0.013	0.070	0.104
	(1.4)	(0.3)	(1.6)	(0.3)	(2.8)	(2.0)
26-30 years of experience	0.012	0.045	0.087	0.113	0.102	0.170
	(0.2)	(1.2)	(1.0)	(3.8)	(5.0)	(3.5)
31-35 years of experience	0.158	0.179	0.408	0.193	0.023	0.155
	(1.3)	(2.9)	(2.8)	(2.8)	(0.7)	(2.4)
36-40 years of experience	0.025	0.250	0.688	0.122	-0.074	0.007
	(0.1)	(2.4)	(3.0)	(1.0)	(1.2)	(0.1)
> 40 years of experience	-0.195	0.093	0.895	0.169	-0.102	-0.128
	(0.4)	(0.5)	(2.0)	(0.8)	(0.9)	(0.7)
Experience squared	-0.0000	-0.0001	-0.0004	-0.0002	0.0001	0.0001
	(0.1)	(0.9)	(1.6)	(1.5)	(0.9)	(0.9
Male	0.060	0.105	0.126	0.122	0.092	0.082
[**Female**]	(2.6)	(8.2)	(4.9)	(8.9)	(11.8)	(4.8)
Married	0.034	0.009	0.023	0.038	0.037	-0.017
[**Not married**]	(1.4)	(0.6)	(0.7)	(2.6)	(3.7)	(0.8)
Majority	0.083	0.031	0.052	-0.005	0.006	-0.010
[**Minority**]	(1.6)	(1.1)	(1.0)	(0.2)	(0.4)	(0.4)
Urban	0.038	0.045	0.079	0.022	0.045	0.068
[**Rural**]	(1.5)	(3.1)	(2.7)	(1.8)	(5.3)	(3.7)
Public	-0.104	-0.091	-0.213	-0.012	0.058	0.051
[**Private]**	(3.4)	(5.5)	(6.2)	(0.7)	(4.8)	(1.7)
< Primary	-0.203	-0.090	-0.139	-0.199	-0.216	-0.429
	(3.0)	(2.5)	(1.7)	(4.7)	(8.3)	(12.5)
Completed Primary	-0.232	-0.121	-0.270	-0.144	-0.169	-0.336
	(4.5)	(4.4)	(4.7)	(4.8)	(8.8)	(11.3)
Lower Secondary	-0.101	-0.062	-0.067	-0.113	-0.122	-0.203
	(2.1)	(2.3)	(1.3)	(4.2)	(7.0)	(7.4)
Completed Secondary	0.123	0.042	0.031	0.030	0.017	0.034
	(2.3)	(1.3)	(0.5)	(0.9)	(0.8)	(0.8)
Compl. Vocational/Tech	0.096	-0.041	0.070	0.127	0.126	-0.017
	(1.3)	(1.2)	(0.9)	(4.8)	(6.9)	(0.5)
Completed Tertiary	0.316	0.274	0.374	0.299	0.365	0.951
	(4.0)	(6.2)	(3.6)	(8.4)	(14.6)	(11.6)
Manager/Official	-0.204	-0.113	-0.156	-0.156	-0.134	0.048

	(1.8)	(2.2)	(1.9)	(2.7)	(3.9)	(0.5)
Professional	0.083	0.102	0.215	0.144	0.192	0.414
	(1.3)	(3.2)	(3.3)	(4.7)	(8.6)	(6.0)
Service/Sales	-0.093	-0.105	-0.234	-0.126	-0.020	-0.111
	(1.0)	(2.8)	(3.4)	(2.9)	(0.8)	(2.0)
Skilled labor	0.066	0.076	0.098	0.081	0.062	-0.165
	(1.1)	(2.4)	(1.4)	(2.8)	(3.2)	(3.4)
Unskilled labor	0.148	0.040	0.077	0.057	-0.100	-0.186
	(2.2)	(1.3)	(1.3)	(1.6)	(4.6)	(4.4)
Primary sector	0.066	0.096	0.081	-0.044	-0.028	0.085
	(1.3)	(3.5)	(1.4)	(1.8)	(2.1)	(3.5)
Industry	0.102	-0.001	-0.048	0.125	0.047	0.032
	(2.8)	(0.0)	(0.9)	(6.4)	(3.9)	(1.2)
Trade/Services	-0.168	-0.095	-0.033	-0.081	-0.019	-0.117
	(3.7)	(4.2)	(0.7)	(3.0)	(1.2)	(2.8)
Red River Delta	-0.267	-0.174	-0.178	-0.104	-0.091	-0.042
	(4.8)	(6.5)	(3.8)	(4.4)	(6.1)	(1.3)
North	-0.122	-0.181	-0.183	-0.082	-0.138	-0.226
	(2.3)	(6.4)	(3.8)	(3.1)	(8.8)	(7.4)
Central	0.077	-0.006	-0.136	0.029	0.012	-0.054
	(1.7)	(0.2)	(2.9)	(1.2)	(0.7)	(1.7)
South-East	0.182	0.219	0.345	0.197	0.226	0.276
	(5.7)	(10.2)	(6.4)	(10.2)	(14.5)	(7.2)
Mekong River Delta	0.130	0.142	0.153	-0.041	-0.009	0.047
	(2.9)	(5.4)	(2.7)	(1.5)	(0.6)	(1.8)
Constant	0.076	0.992	2.032	0.841	1.352	2.323
	(0.3)	(10.1)	(9.8)	(7.3)	(23.7)	(23.6)
Adj. R^2	0.063	0.140	0.071	0.084	0.287	0.248
N	**2,984**			**6,624**		

Note: Excluded group in RIF-regressions in bold; t-values in parentheses.

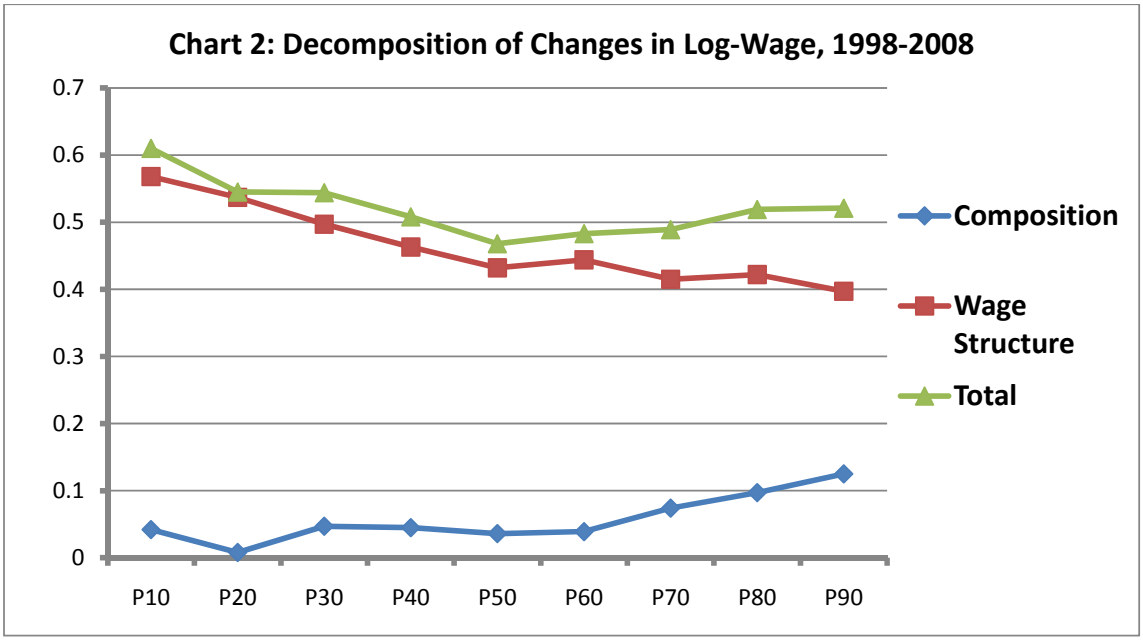
Chart 2: Decomposition of Changes in Log-Wage, 1998-2008
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
P10
P20
P30
P40
P50
P60
P70
P80
P90
Composition
Wage Structure
Total

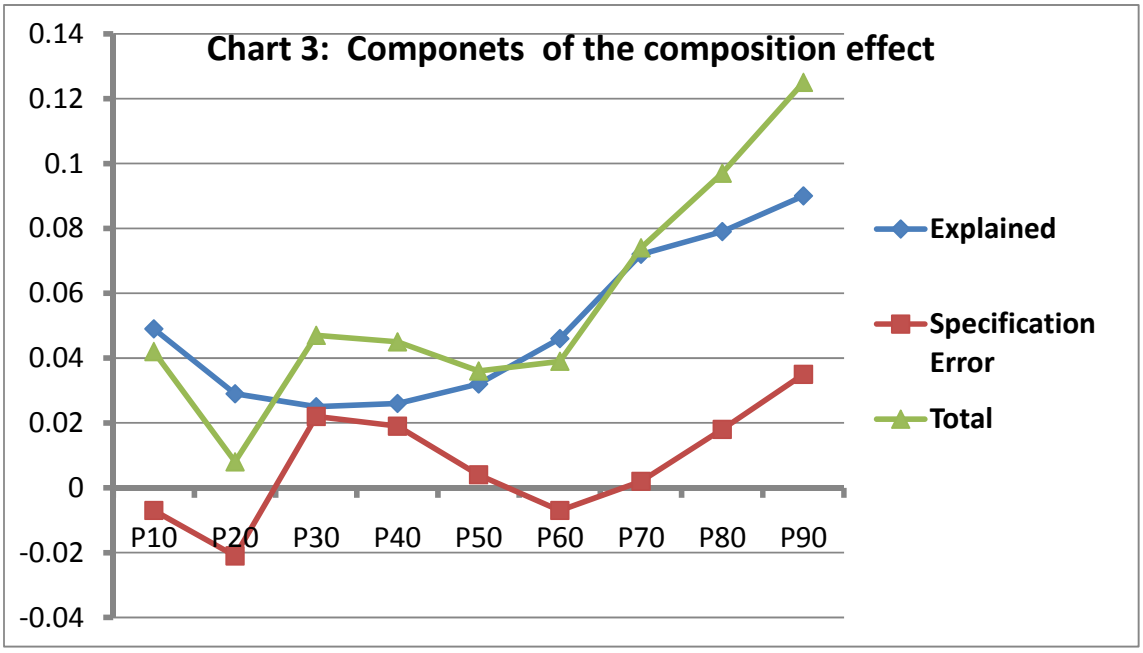
Chart 3: Componets of the composition effect
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
P10
P20
P30
P40
P50
P60
P70
P80
P90
Explained
Specification Error
Total

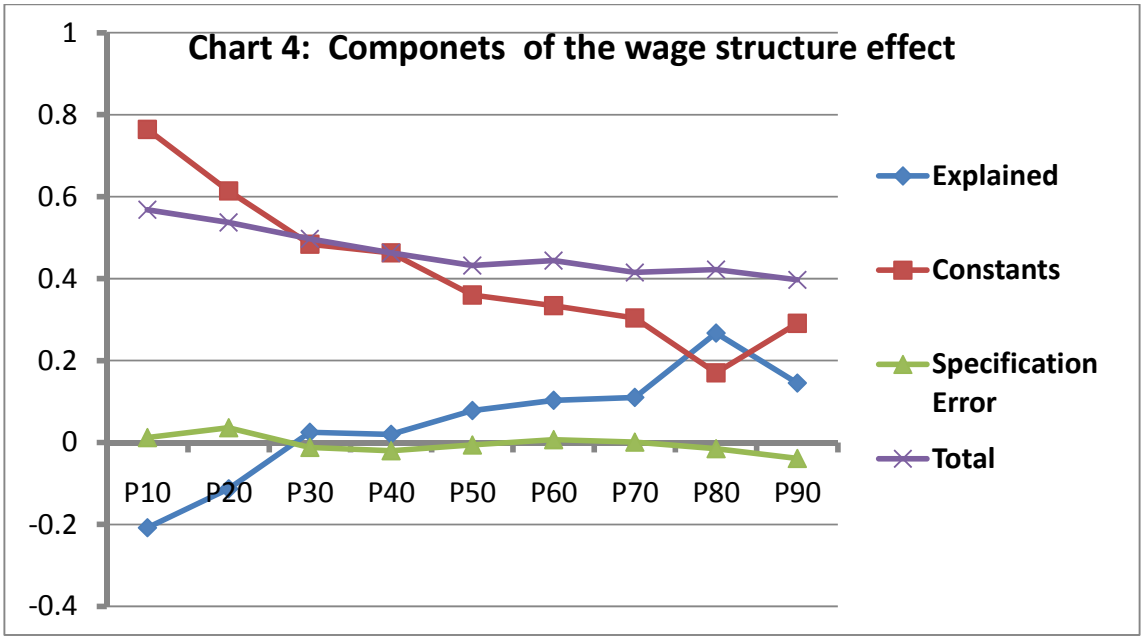
Chart 4: Componets of the wage structure effect
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
P10
P20
P30
P40
P50
P60
P70
P80
P90
Explained
Constants
Specification Error
Total

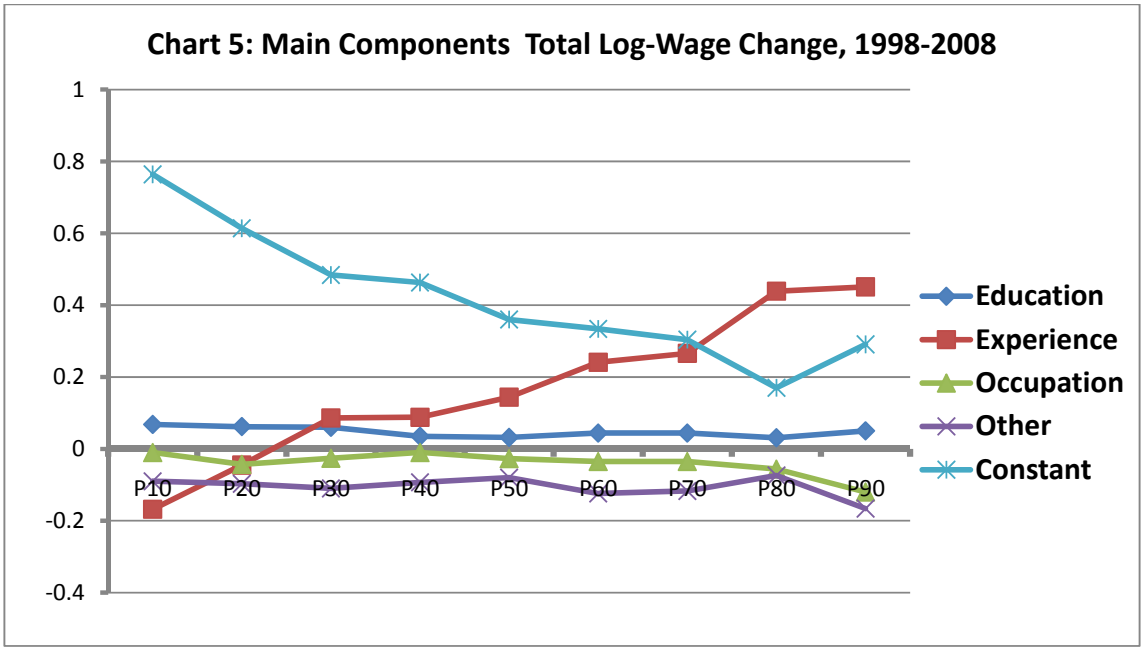
Chart 5: Main Components Total Log-Wage Change, 1998-2008
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
P10
P20
P30
P40
P50
P60
P70
P80
P90
Education
Experience
Occupation
Other
Constant