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Changing wage structure and education in Vietnam 1993 – 1998: The roles of demand

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Abstract
This paper examines the changes in relative earnings of workers with different education levels during Vietnam's transition. It is found that females enjoy a higher return to education than males do in 1998, reversing the situation observed five years ago. A large fall in the returns to vocational training for males, amid the rapid growth in the representation of better-educated females in the private sector where education is valued higher could be responsible for what have occurred. A direct assessment of the role of demand using a simple demand and supply framework developed by Katz-Murphy (1992) is undertaken. The result suggests an increase in the relative demand for better-educated workers appears to play an important role in explaining the earnings differentials between workers of different education groups. Education reform to better suit the needs of the post-reform emerging market, on-the-job training for workers, as well as equal access to education are some policy options that hold the key to reduce wage inequality between different education groups.

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This paper examines the changes in relative earnings of workers with different education levels during Vietnam's transition. It is found that females enjoy a higher return to education than males do in 1998, reversing the situation observed five years ago. A large fall in the returns to vocational training for males, amid the rapid growth in the representation of better-educated females in the private sector where education is valued higher could be responsible for what have occurred. A direct assessment of the role of demand using a simple demand and supply framework developed by Katz-Murphy (1992) is undertaken. The result suggests an increase in the relative demand for better-educated workers appears to play an important role in explaining the earnings differentials between workers of different education groups. Education reform to better suit the needs of the post-reform emerging market, on-the-job training for workers, as well as equal access to education are some policy options that hold the key to reduce wage inequality between different education groups.

Key words: returns to education, Vietnam, wage structure
JEL Classification: I21, J31, P2

Introduction

Recently, there has been a growing interest on the impact of changes in the wage structure on returns to education during transition. What are the forces that drive the changes in the returns to education? Economic theory suggests three forces that account for the changes – shifts in supply, shifts in demand and/or changes in wage setting institutions. The shift in supply could be due to changes in the distribution of education attainment in the population. The changes in the relative demand for workers with different education levels could reflect shifts in the relative demand for more educated workers compare to less educated ones. Such changes in the desired skill mix of workers could be driven by technology change, changes in international trade and changes in wage-setting institutions (Bound and Johnson 1992; Katz and Murphy 1992; Levy and Murnane 1992). So far, the literature on developed countries has focused on changes in wage setting institutions such as the declining union membership and the eroding value of minimum wage. In the context of transitional economies, however, the removal of centrally-determined wage scale through wage reform, the introduction of contract system and the development of the private sector may play a dominant role in driving the changes in wage setting institutions and subsequently changing in demand and supply conditions.

Increase in return on education, and higher returns particularly to females are some common features found during transition. Most EEC, except Eastern Germany (Bird et al. 1994; Krueger and Pischke 1995)[1] have seen a dramatic increase in return on education. China, like most EEC, has also experienced a rise in returns to education

(Kidd and Meng 2001; Li 2003; Liu et al. 2000). Studies in the U.S. (Dougherty 2003, Card 1999) and in European countries (Trostel et al. 2002) report a higher coefficient on schooling for females than males. Similar findings are also reported in China (Maurer-Fazio 1999) and EEC such as Ukaine, Hungary, Poland, and Slovak (Brainerd 2000).

Yet there are conflicting evidence regarding the relative importance of education versus experience. While the literature consistently finds a rise in returns on education during the transition, it remains inconclusive regarding returns to experience. Declining experience premium is found in the Czech Republic (Chase 1998; Flanagan 1998), but not in China (Liu 1998). According to Večerník (2001), education dominated over experience in the Czech Republic between 1988 and 1996. The opposite is found in China during 1981-1987. Meng and Kidd (1997) report that increase in the returns to experience is more than in the returns to education.

Using two rounds of Vietnam Living Standards Survey, this paper examines changes in returns to education and identifies the forces behind, as well as their effects using a simple demand and supply framework proposed by Katz and Murphy (1992)[2]. Quantitative studies on what drive changes in returns to education during transition are still relatively few. Whether changes in relative demand for workers by education attainment have happened in Vietnam is important to understand earnings inequality. In addition, the demand and supply framework will allow a closer examination of the gender dimension of the changes. Estimation of the Mincerian wage equation could also shed some light on the effect of experience and its relative importance in comparison to

[1] Krueger and Pischke (1995) find that returns to education has declined after the unification in Eastern Germany.

education. Throughout the paper, attempts will be made to compare the experiences of Vietnam to that of the EEC and China wherever is appropriate.

The first section outlines the market reform in Vietnam. Descriptive information of changes in earnings to workers by education levels during the post-market reform period is reviewed in Section 2. Section 3 describes the changes in the wage structure and education. Section 4 estimates the Mincerian earnings equation. The changes in returns to human capital are reported and analysed. The Katz-Murphy method is presented in Section 5. This section also examines the effects of demand shifts and supply shifts on earnings differentials by different education levels. Concluding remarks and policy implications are presented in Section 6.

Market Reform in Vietnam, 1992-1998[3]

In order to examine the changes in the wage structure in Vietnam between 1992 and 1998, it is important to assess the extent the labour market was reformed over the 5-year period. During the period of central planning Vietnam had no labour market. Raw material was provided by the government and production targets for commodities were set. Based on the overall plan laid down by the government, the number of workers were decided for each organisation by respective administrative units. A salary budget was allotted to each organisation and workers were paid by a pre-determined salary scale, based on grade and length of service (Phan 2000). Wages were more attached to individual workers than to the specific jobs they performed. With the wage fund and

[2] For instance, Newell and Socha (1998) and Rutkowski (1996) study changes in wage distributions in Poland. The former uses Katz and Murphy's demand and supply framework, but focuses on the link between changes in international trade patterns and changes in the wage distributions.

number of workers fixed, state-owned enterprise (SOE) managers had no discretion to set wages. Wages were very compressed. Differentials between the lowest and highest grades were very narrow. In-kind payments composed a large part of the salary paid (ILO 1994). With the wage fund attached to work units, workers can not freely transfer between work units.

The collapse of many state-owned enterprises (SOEs) led to the introduction of the market reform, *Doi Moi*, in 1986. Vietnam's transition can be divided into two phases: 1986 to 1991, and 1992 to the present. The first phase saw substantial structural change, with total state employment falling by about 250,000 persons each year. Unemployment increased and real wages fell, by 30 to 50 per cent, because of high inflation (ILO 1994). In the second phase, priority is still being given to the state sector. Therefore, the private sector has remained relatively small.[4] Wage reform and the contract system characterise the labour market reforms in this phase.

The changes in wage structure began when two important resolutions were passed in 1993. They specified the 'basic wage' to be paid to all employees as a multiple of the minimum wage rate. In practice, enterprises have been able to calculate a different 'basic wage' for different skills. The 'basic wage' could be set on the basis of an enterprise-specific minimum wage rate - higher than the economy-wide one - as determined by productivity within the enterprise. In addition, as in China, performance-related bonuses from net profits of SOEs could be distributed to workers. As a result, skills-based wage differentials have widened. A closer link was established between wages and workers' productivity within a firm. The plan was also announced to decompress public sector

[3] This section is drawn heavily from McCarty (1999) and O'Conner (1996).

wages in the mid-1990s.[5] The wages of public servants were partly monetised. Employees in the public sector no longer receive benefits such as having access to rationed goods at artificial prices, subsidised housing, health services and education. Also, piece wages have become an even more important tool to reward productivity.

Like China, Vietnam has introduced a labour contract system. The 1994 Labour Code formalises labour contracts as the basis for the employer–employee relationship. Since its introduction, the number of workers covered by labour contracts in the non-state sector has increased.[6] Data from the late 1990s suggests that 150,000 workers had labour contracts, up from 75,000 in the mid-1990s. In contrast to the relatively short duration of contracts in the non-state sector, the proportion of state workers with indefinite contracts has increased during 1994 and 1996 (CIEM 1995). The significance of labour contract lies in the transition from a system of guaranteed lifetime employment that has been responsible for overstaffing, low productivity and shirking. More has to be done to reduce guaranteed lifetime employment in the state sector. Nonetheless, the introduction of the contract regime does provide more autonomy to firms in hiring and firing decisions.[7]

In summary, the disintegration of the centrally-determined wage system, the development of private productive system would tie wages closer to productivity. As reform taking deeper root, closer association between earnings and productivity is likely. According to the human capital theory, productivity is a function of human capital

[4] Between 1995 and 1998 the state sector accounted for 46 per cent of Vietnam's total industrial growth. The domestic private sector only contributed 22 per cent.
[5] Wages of the public servants hired before 1994 are largely exempted (Moock and Patrinos 1998).
[6] 150,000 workers had labour contracts in the late 1990s, up from 75,000 in the mid-1990s.
[7] Foreign-invested firms have to recruit workers via an employment service system. In principle, they can recruit their workers directly if workers introduced by employment services are not suitable. However, they are required to notify the labour office at the provincial level.

accumulation either through education and/or labour market experience. It takes time for various reform policies to be enforced and to take effect. With the survey data used in this paper collected in 1992-93 and 1997-98, it is expected that wages and education link more closely in the second survey period in comparison to the first survey period.

Changes in the Wage Structure and Education

The data sources are from the Vietnam Living Standards Surveys (VLSS) 1992-93 and 1997–98. The sample that is used in this paper is defined as follows: Wage earners who 1) worked in the 12 months prior to the survey[8]; 2) were aged between 18 and 60 years, inclusive; [9] and 3) supplied earnings data. By restricting the sample to wage earners, the paper excludes the majority of the working population. In Vietnam, the wage sector[10] is still relatively under-developed. The VLSS92-93 survey shows that about 14 percent of the female workers between 18 and 60 years old are wage earners. The share increases to 16 percent in the second survey. With the paper examining a small fraction of the Vietnamese labour force, cautious interpretation of the results and their implications is necessary. In each survey, some individuals did not report the earnings, education, or other relevant variables. These individual records were deleted, resulting in a sample of 1154 in 1993 (males: 657 males; females: 497) and of 2505 in 1998 (males: 1496; females: 1009) for wage estimations.

[Table 1] Participation rate of wage earners, by gender

[8] The questionnaire contains employment information on the 12 months as well as on the previous week prior to the survey. To minimise the possible effect of seasonality, this paper uses the employment information of the 12 months prior to the survey.

[9] Sixty years of age is chosen as the cut off point for the sample. In Vietnam, the legal retirement age is 60 years for males and 55 years for females. Fewer than 23 percent of all women, on average, older than 55 years of age in the two surveys reported non-participation. The legal retirement age may not be effectively implemented especially in the private sector.

To obtain a better picture of participation in wage sector, Table 1 uses the two surveys to portray the wage employees in the 5-year period under study. Starting with the participation rates, we find a two percent increase over time for both genders. Nonetheless, males register a higher increase in participation rate (3 percent) than females (one percent). Note that the youngest age group (18-24) experiences the fastest rise in participation rate. It has doubled over five years. It is contrast to the phenomenon observed in Poland (Newell 2001) where the participation rate of young people has fallen as a result of staying longer in school. In addition, the participation rate of Vietnamese youngest females has risen by more than double, exceeding the increase in that of their male counterparts. On the contrary, the participation rates of females, in particular, between 35 and 44 years of age drops more than that of male. This could reflect a higher exit rate of females from the wage sector into the informal sector. We will return to this point later.

[Table 2] Sample statistics

Table 2 shows that workers, irrespective of their gender, are paid more in 1997-98 than five years ago. It is also apparent that men earn more than women do in both periods, but women enjoy a higher rate of increase than their counterparts over this 5-years period. The mean real wage increases by 68 percent for males but it rises by 84 percent for females. One of the key factor leads to earnings differentials among workers is the difference in endowment, namely, experience and education. In general, women have slightly shorter potential experience than men do. The 1993 data reveals that the average education for females is half a year higher than males. Surprisingly, the average

[10] It refers to the formal wage sector throughout the paper.

education for females has fallen over time. Given the short time span, dramatic changes in the human capital stock in the wage sector is unlikely. However, the human capital stock of wage earners can change if exit from the wage sector into self-employed sector or to be out of the labour force altogether is conditioned on human capital. For instance, the disproportionate withdrawal of low-skilled females from the wage sector is found to be responsible for an increase in average human capital stock in the sector over time in Slovenia and Estonia (Orazem and Vodopivec 2000). Following this line of argument, then the decline in Vietnamese female's average education may suggest more educated females have exited the wage sector, therefore, human capital per female worker in the wage sector has risen over time. Recall that the participation rate of female wage workers belongs to the 35-44 age group has fallen over time. Further investigation of the data reveals that most female public servants exit the wage sector end up either exiting the labour force altogether, or jointing the informal sector.[11] O'Conner (1996) documents that in cases where both spouses are state employees, often the husband retains his state-sector job to maintain family access to state-provided benefits while the wife joins the informal sector. Note that within the wage sector, public sector employees have the highest level of education (Phan 2000). This coupled with these patterns of wage sector exit of female public servants could lower the mean year of schooling in the wage sector. In contrast, male tend to stay in the wage sector (by moving into the private sector) upon their exit from the public sector, keeping the average years of schooling in the wage sector from declining.

[11] This is derived by examining the employment history for respondents in VLSS997-98 who reported a job switch out of the public sector and then by comparing their previous job to their current one. Note that those who were out of the labour force altogether within the past 12 months may have been retrenched earlier are not surveyed for their employment history. Without the data intermittent years has made a more

Table 3 [Average hourly earnings by level of education attainment]

As this paper aims at establishing the relationship between changes in wage structure and returns to education, it will be helpful to present the weighted average hourly earnings of different education groups relative to that of below primary education (Table 3). This weighted average is derived from the data of different age-education subgroups so that a fixed set of weight for age group is applied within each education group in a given year. By doing this, changes in average hourly earnings between education groups over time will not be contaminated by possible changes in the age composition of the labour force.[12,13]

Taking 1992-93 as an example, all education groups except those with vocational education earn more than those with below primary education. In 1997-98, every education group earns more than those who have less than primary qualification do. Notably, workers with tertiary education have gained most – an increase of 70 percentage points over this 5-year period. Increase in the reward to higher educated workers is also reported in other transitory economies such as Poland (Rutkowski 1996), Solvenia (Orazem and Vodopivec 1994) and Russia (Brainerd 1998). Disaggregating the data by gender reveals the same pattern that degree holders have reaped the most over time. However, females do not fare as well as males across all education groups in both survey periods. For instance, female workers with tertiary education, their relative earnings has

vigorous investigation of job change impossible. Compared with female public servants, males tend to switch to private jobs after leaving the public sector.

[12] See Borland (1996) for the method of calculating the weighted average earnings by education.

[13] By calculating the weighted average, wages are then for a fixed demographic distribution and hence do not reflect changes in the level of wages arising from shifts in the education, gender, or experience composition of the labour force – the fixed weight for each cell is the cell's average share of total employment over the entire sample period.

risen by about 58 percentage points – approximately a quarter less than that of their male counterparts.

However, as pointed out by Katz and Murphy (1998) and Borland (1996), changes in relative earnings of different education groups could reflect not only the returns to education skills but also the changes in relative quality of workers with different education. It is particular important for a transition economy like Vietnam as education system has undergone significant changes that there is no guarantee that the relative quality of different education levels would remain constant over time. Because the quality of workers in each education group will be unchanged within-cohort, if within cohort comparison of earnings of workers reveals the same patterns as suggested in Table 3, then we can conclude that changes in relative earnings across different education groups should by and large represent changes in returns to education rather than primarily reflecting changes in relative quality of workers in different education groups.

Table 4 [Ratio of average annual earnings by cohort and by gender]

Table 4 reveals that relative earnings has increased over time for male and female within cohort, displaying the same patterns as in the aggregate data presented in Table 3. It appears that changes in returns to education are indeed responsible for changes in relative earnings for different education groups. Within-cohort comparisons also show that younger cohort (44 years and below for males; 34 years and below for females) with tertiary education earns almost double of those with less than primary education in 1997-98. Li (2003) suggests that younger cohort may benefit more during the transition as it is easier to apply new wage regime to younger cohort than to older cohort.

Table 5 suggests that employment shares for male workers with upper secondary and below have declined but employment shares for vocational qualification and tertiary graduates have risen during the period examined. Male workers with primary and lower secondary (vocational education) in particular register a relatively large drop (gain) in their employment shares. For female workers, employment shares of those with primary, upper secondary qualification and particularly those with tertiary education have risen but those of female workers with vocational and lower secondary qualification have declined. Note that overall changes in employment shares during the 1992-1998 are quite moderate.

Table 5 [Employment share of workers, by education attainment and by gender]

Mincerian Earnings Equations

To establish more vigorously the relationship between education attainment and wages over time, we estimate the conventional Mincerian log earning functions using the two surveys. As discussed earlier, given the small wage sector, potentially there is a sample selection problem from two sources: selection into/exit working and selection into/exit working for wages. It could be dealt with using Hay's (1979) two-stage approach. Hay's approach is a generalisation of Heckman's approach.

In the first stage, a multinominal logit model is used to calculate the correction term, λ_{ij}.[14] This correction term is then included in the earnings equation as an additional regressor in the second stage. The predicted probability P_{ij} from the multinominal logit

[14] $\lambda_{ij} = \frac{6}{\pi^2}(-1)^{J+1}\left[\frac{J-1}{J}\ln P_{ij} + \sum_{\substack{k=1 \\ k\neq j}}^{J}\frac{1}{J}\left(\frac{P_{ik}}{1-P_{ik}}\right)\ln P_{ik}\right]$ *for* $j = 1,\ldots,J$, where P is the probability that the individual i is in sector j.

model is used to compute the correction term λ_{ij}. In the empirical application, a multinominal logit model with three categories is specified. They include the wage sector (government sector, SOEs, private sector), self-employed, and people who are not working. Identification is achieved by including variables, such as number of children, non-labour income[15], and the dependency ratio.[16] These variables affect participation in a particular category but not wages.

In the second stage, the correction term λ_i for the wage earners was computed from the multinominal logit model to augment the earnings functions. The inclusion of the correction term ensures that the OLS gives consistent estimates of the augmented earning functions. The presence of the additional constructed selectivity correction term renders the standard errors incorrect. White's standard errors are used to give asymptotically consistent values in the empirical work

The dependent variable is the log of the hourly wage rate. An extended version of human capital model is reported in Table 6 along with two measures of schooling: years of schooling and education dummies. Explanatory variables include a set of industry, sectoral and controlled dummy variables. Occupation dummies are excluded. Aside from the argument that occupations and wages are jointly determined, a high degree of multicollinearity exists between education and occupation in the post-reform era as well

[15] Non-labour income (in thousand *dong*): The total annual non-labour household income includes sources such as: 1) social fund (pension, disability etc.) from the government; 2) social subsidies from organisation and production units; 3) interest income on saving, stock and loans; 4) claims paid by insurance; 5) gifts including those related to weddings, funerals, and birthdays, both in cash and in kind; 6) dowry or brideprice, inheritance; 7) lottery winnings; 8) income from lease of buildings, equipment, houses, land, draft animals; 9) income from lease of durable goods, every utensil; 10) income from selling buildings, equipment; 11) income from selling vehicles; 12) sale of durable goods; 13) sale of jewellery; 14) remittances received.

[16] Dependency ratio is the number of household members who did not work in the 12 months prior to the interview to the household size.

as between occupation and industry also leads to an exclusion of occupation dummies.[17] As mentioned earlier, in Vietnam, performance-related bonus from the net profit of SOEs could be distributed to workers. It is possible that earnings reflect the profitability of the firms that one works for rather than a return to his/her human capital. Coady and Wang (2000) include bonus-wage ratio to control for differences in profitability of different enterprises where individuals are employed to capture such a possibility. Data on bonus is only available in the second survey. Therefore, this variable is not included. In China, party members are found to earn significantly more than non-party members (Meng 2004, Gustafsson and Li 2000). Unfortunately, information on party membership was not collected in the VLSS, making it impossible to test the proposition that party membership is important in determining jointly education and wage rates.

Table 6 [Earnings equations]

Earnings equations with and without Hay's approach were estimated. For 1992-93, all correction terms are significant except the one for males with years of schooling. For 1997-98, none of the correction terms are significant. Therefore, the discussion presented thereafter will analyse the empirical results with correction for selection for the first survey period, but without selection correction for the second survey period. The following analyses will focus on human capital-related variables.

In general, rates of returns to education in 1998 accord with the previous empirical studies on centrally-planned economy but are still at the lower end of estimates

[17] The inclusion of occupation dummies (professional, trade and clerical work, agricultural, productive workers) as independently variables in the extended version of human capital model prompted the estimated coefficients of industry dummies to change signs and to become insignificant. Broader occupation dummies were experimented (manual and non-manual workers), they turned out to be insignificant.

for non-centrally-planned developing economies. For instance, Psacharopoulos (1994) show that the rates of returns of schooling are 3.7 percent for males and 5.1 percent for females in Czech Republic in 1988; 4.5 percent for males and 5.6 percent for females in 1985 in China; 12.4 percent for males and females in 1988 in the Philippines.

In Vietnam, males are rewarded 6 percentage points for each additional year of education in 1993. Note that the returns have fallen over the 5-year period for males. Bird et al. (1994) and Krueger and Pischkle (1995) also find a decline in returns to an addition year of schooling in Eastern Germany after the unification.

In contrast to the decline of returns to males' education, females register slightly higher returns in 1998 - a one percent increase from the four percent returns registered in 1993. Back then, males have a higher return to schooling for each additional year of education than females. The situation, however, reverses in 1998 – females now enjoy a higher return to their schooling than males. This echoes the findings in the literature (See a detailed review from Dougherty 2003). Further exploration by estimating earnings equations with educational dummies[18] reveals that the reversal could be partly driven by a substantial fall in the return to vocational education for males. The declining returns to vocational training are in accord with the case of the Czech Republic (Flanagan 1998). Flanagan (1998) attributes the decline to inappropriate skills acquired in vocational training under central planning. In the Vietnam Development Report 2001, the World Bank points out the urgency to further reform vocational education to better suit the

[18] In 1993, many education dummies are not significant. Education may yet be an important factor in wage determination in early post reform period. Only focusing on those dummies that are significant in both periods, we find that relative to that of those with lower than primary education, rates of returns to upper secondary and tertiary education for males rise but fall for those with vocational qualification. A significant increase for female workers with tertiary education over time is found. In 1993 male (female) tertiary degree holders earn 67 percent (51 percent) more than those with lower than primary education. In 1998,

needs of the post-reform emerging markets. It is plausible that inappropriate skills may be the culprit behind the decline of the returns to vocational education.

Recall the representation of females with vocational qualification has declined, whereas that of males has increased (Table 5). Unfortunately, with the coefficient of vocational education for females statistically insignificant in 1993, we cannot speculate on the direction of change of the returns for females with vocational qualification and its impact on their wages. Nonetheless, with the decline of the share of females, it is unlikely that females will be penalised more than males during the transition.

Further examination of the data reveals that the higher returns to education for females could also relate to their location of employment.[19] We will focus the analysis on those with tertiary education. Few have tertiary education in both survey periods. Over time, the share of females with tertiary qualification has risen more than the share of male tertiary graduates (Table 5). A closer examination of the age composition of wage earners with tertiary qualification reveals a dramatic increase of wage earners in the age group of 18-24. Such an increase is particularly apparent among female wage earners. Young female tertiary graduates have registered an increase of over 14 percent over the 5-year

male (female) tertiary degree holders are paid about 73 percent (69 percent) more than those with less than primary education.

[19] The literature offers alternative explanations regarding higher returns to females than to males. Analyse these explanations would allow us to understand the forces behind the switch of returns to schooling between two sexes. They include 1) Sample selection bias could differ across gender, and therefore, it might be responsible for part of the differences in returns. We found that the inclusion of lambda to correct for selectivity lowered the coefficient of year of schooling for both sexes. However, it did not change the relationship on returns to education for the sexes over time, casting doubt on the sample selection bias explanation. 2) The better educated is a woman, the less likely is she to be tolerant to discrimination and the more likely is she to be seeking higher paid employment. However, there is little reason to believe that equally educated women are more tolerant to discrimination in 1993 than in 1998. Therefore, the discrimination and tastes story does not seem to offer a good explanation for why the relationship between females and males' return to schooling reversed in 1998. 3) Females may be more motivated in their study than males, leading to systematic differentials in the quality of the schooling investment. While a lack of information on grades earned on courses does not allow direct examination of the quality story. However,

period, doubling that of their male counterparts. In addition, the representation of female wage earners with tertiary qualification in the private sector has changed from virtually non-existence in 1993 to nine percent in 1998.

The above analysis suggests that a rate of younger female tertiary graduates enters the private sector is higher than that of their male counterparts over time. While the wage equation tells us workers in different sectors are paid differently relative to the private sector. It does not show us how private sector rewards education. To examine whether private sector rewards education more, we interact private sector dummy with years of education.[20]

In 1993, the interactive terms are not significant for females and only 10 percent significant for males. In 1998, while the influence of private sector is still not important for males (t-value: 1.26), but it has become very important for females (t-values: 4.06). An additional year of education, a female worker in the private sector are paid 2.8 percent more than their non-private sector counterparts in 1998. The results confirm that skilled labour is more sought after in the private sector in the late reform period. For females, working in the private sector means a higher returns to their education. With increasing better-educated young females entering the sector, they could reap more reward for an additional year of schooling. In addition, recall that better-educated, older female public servants tend to leave the wage sector, slowing down the increase in the supply of educated females in the private sector. As a result, the better-educated females remain in the private sector are likely to attract higher returns relative to that of their male

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there is no strong reason to believe that female students tend to be less motivated in their study in 1993 than in 1998 relative to their male counterparts.

counterparts, reversing the relationship between returns to schooling and gender over time.

Evidence so far seems to suggest that the reversal of returns to education across genders over time may be driven by the decline in the returns to vocational education for males as well as by the demand for female skilled labour in the private sector. As for the latter, it is probable that foreign firms in the private sector have an important role to play. Unfortunately, in 1993, less than 20 workers reported that they were working for 100 percent foreign firms in the full sample, making further exploration of the changing role of foreign firms in relation to returns to education over time difficult.

Li (2002) points out that an increase in the returns to education may not solely result from economic reforms. Vintage effect of education could lead to an overestimation of the increases in return. The vintage effect refers to an increased return may in part reflect the higher quality of education in later years of economic reforms. For instance, Krueger and Pischke (1995) find that education earned under communism decreased in value of East Germany following reunification. One way to examine these two effects further is to re-estimate the models using only the respondents who reported that they quitted school before the market reform, *Doi Moi*, in 1986. They were not subjected to the vintage and the cost effects. Re-estimating the model with year of schooling, the rate of return to an additional year of schooling is found to be 4.5 percent in 1993 – less than one percent difference from 5.2 percent for everyone irrespective to when they stop their education. Unfortunately, small ample size precludes us to split the sample into gender groups after restricting ourselves to those quitted schools before 1986.

[20] The fact that no female tertiary graduates in the 1993 sample has prevented us to interact private sector dummy with education dummies. The results of such a specification could not be comparable between two

In general, the vintage effect does not seem to have an important role to play in Vietnam. As discussed earlier, changes quality of education does not seem to play an important role behind the increase in returns to education in Vietnam.

The potential experience and its squared term, as expected, have a positive sign and a negative sign in all estimations, indicating a usual inverted-U shaped relationship between wage rate and labour market experience. Take 1992-93 as an example, the returns to experience is one percent and 1.6 percent for males and females respectively. This is a fairly low rate of return to experience compared to many market economies (Blau and Kahn 1995) but in accords with EEC transitional economies such as Czech Republic (Munich et al. 1999) and East Germany (Krueger and Pischke 1995). In China, however, Kidd and Meng (2001) report the rate of return to an additional year of labour market experience is about 3 percent for men and women in 1981. Over time, the rate of return to an additional year of experience in Vietnam has declined slightly. The decline in returns to experience is in line with the findings of Chase (1998) and Flanagan (1998). They find that the experience premium fell during the transition in the Czech Republic, supporting the hypothesis that recent labour market experience is more valuable than that acquired under central planning. Studies by Kertesti and Köllö (2001) in Hungary during 1986-1999, Rutkowski (1996) in Poland during 1987-1992 and Krueger and Pischke (1995) in East Germany also report a similar phenomenon. The study of Moock and Patrinos (1998) in Vietnam also finds that younger workers receive higher returns to experience than more experienced ones. However, declining experience premium is not found in China (Liu 1998). In fact, Meng (1998) reports an upward sloping experience-earnings profile for the state sector in China. They attribute such a profile to the returns to

surveys. The results are not shown here but could be requested from the author.

seniority rather than productivity. Further, comparing with the results in 1993, the 1998 results indicate that the inverted-U shaped experience-earnings profile peaks earlier at late 20s for males and females. It contrasts to a peak at mid 30s to 40s for the market economies.

The decline in the experience premium, amid the increase in returns on education for females, suggests that the effect of education could take over that of experience in the late reform period. The estimation result shows that the effect of experience is nearly as strong as that of education for females in 1993. However, like the Czech Republic, but unlike China, education in Vietnam dominates over experience in 1998.

The Role of Shift in Demand and Shift in Supply – Katz-Murphy method

The analysis so far has highlighted the changes in relative earnings between workers with different levels of educational attainment and the possible role of demand in driving the observed gender differences. One approach to understanding the source of these changes during Vietnam's transition is to examine the role of demand and supply shifts more explicitly in explaining the changes of earnings differentials between different education groups. Katz and Murphy (1992) develop a test to examine whether data on relative earnings and employment by educational attainment are consistent with the stable relative demands for labour by checking the sign of the inner product $(w_t - w_\tau)(L_t - L_\tau)$. Given a concave aggregate production function, from which the demand for labour is derived, $(w_t - w_\tau)(L_t - L_\tau) \leq 0$ implies that changes in relative

supply of labour explain the changes in relative earnings and employment.[21] But this conclusion does not exclude the possibility of changes in relative labour demand also have taken place. If $(w_t - w_\tau)(L_t - L_\tau) > 0$, this implies that changes in relative labour demand is necessary to explain changes in relative earnings and employment. Nonetheless, it does not exclude the possibility that changes in relative supply have also occurred.

To quantify the effect of changes in the demand structure on relative earnings and in the educational mix of labour, Katz and Murphy (1992) develop the time series of a relative demand shift index in log quantity unit. Assume the economy is characterised by a CES technology with two types of labour with different education levels (subscript 1 and 2). The relative demand shift satisfies the following relationship:

$$\log\left(\frac{w_1(t)}{w_2(t)}\right) = \frac{1}{\sigma}\left[D(t) - \log\left(\frac{x_1(t)}{x_2(t)}\right)\right]$$

where $w_1(t)/w_2(t)$ is the relative wages in year t and $x_1(t)/x_2(t)$ is the relative supplies in year t. The elasticity of substitution is denoted as σ. Given a specific value of elasticity of substitution between two different types of workers, σ_0, the time series of relative demand shifts could be derived as

$$D(t) = \sigma_0 \log\left(\frac{w_1(t)}{w_2(t)}\right) + \log\left[\frac{x_1(t)}{x_2(t)}\right]$$

[21] Efficiency unit for labour input is calculated as explained in the note below Table 4. The wage measure is a ratio of the earnings of gender group *i* in an education group *j* relative to average earnings of all workers in *i*.

Katz and Murphy (1992) ran a regression over several sample periods to estimate σ. However, it is not feasible here with only two data points over time are collected. Therefore, a range of values between zero to two will be tested.

Table 7 shows the results of Katz-Murphy's inner product of changes in relative earnings and relative number of workers between different education groups. The inner product is calculated to be about 0.05 for males and 0.01 for females. Newell and Socha (1998) report an overall inner product of 0.0806 in Poland during 1989-1994. They conclude that wage and employment changes were not due to supply changes alone. Borland (1996) reports similar findings for Australia during 1986-90. He finds that while changes in earnings differentials between workers with different qualifications in Australia were driven by supply factors in the 60s and the 70s, its importance has been diminishing in the 80s. For Vietnam, the positive sign of the inner products indicates that the demand side of the labour market has played an important role during a period of 1992/93-1997/98. A breakdown by education attainment (not shown here) shows that four inverse relationships out of six are found. The influence of demand factors for vocational and tertiary workers outweighs that of supply factors for workers with other qualifications. Like males, the positive inner product for females indicates that the influence of the demand side of the labour market is important in explaining changes in relative earnings between female workers in different education groups. While three inverse relations are reported out of six, supply factors are outweighed by demand for female workers with primary, upper secondary and tertiary qualification. Demand factors drive the overall changes in earnings and employment growth.

One assumption of the Katz-Murphy's inner product test is that there is a high degree of substitutability between workers in different age groups within an education group. As revealed in Table 5, the relative labour supply of workers with tertiary education to that of those have below primary education has increased for males and females. If the assumption of substitutability holds, then such an increase in labour supply should not have a strong negative effect on the earnings ratio among tertiary graduates relative to those with less than primary education of a particular age group, for instance that of youngest workers. Table 8 shows that within the tertiary education group, the relative earnings ratio of 15-24 workers has not declined compared with the 45-54 age group. Instead it has risen over time. This result holds for both gender groups. However, if we compare the relative earnings ratio of young workers with that of workers age between 35-44, while the same results hold for males, a decline in the relative earnings ratio is evident for females. To conclude, the degree of substitutability between female young and prime age workers within an education category may be not sufficiently high. Readers should keep it in mind when interpreting the test results of females. Nonetheless, the degree of substitutability is not a concern between young workers and older workers fall in the age group of 45-54, irrespectively of their gender.

Next, we turn to the role of demand factors in affecting the relative earnings of workers. Table 9 summaries the Katz-Murphy's measure for over time changes of relative demand shift for workers in different education groups relative to those with lower than primary education. The estimates of changes in demand assume a unity elasticity of substitution.[22] The most notable change over the 5-year period is that the

[22] Various values ranging from zero to 1.5 were used for elasticity of substitution. While the estimates of changes in relative demand differ, the qualitative conclusion stays the same.

demand for workers across almost all education groups has increased relative to those who have less than primary education. Note especially that the relative demand for those with tertiary education has increased sharply for both males and females. Note also that the demand for male workers who have completed primary and lower secondary school has declined relative to the demand for male workers who have less than primary education. The demand for females in all education groups compared to the demand for females with less than primary education has risen across the board. The decomposition results also indicate that this increase in demand for persons, who obtain tertiary qualification, relative to the demand for workers with less than primary education, has been slightly greater for men than women.

The result emerges from Table 9 shows that during Vietnam's transition into a market-oriented economy, shifts in demand in favour of tertiary graduates and away from workers with low qualification has become an important factor behind the increase in returns to schooling in the late 90s. This result is in line with the experience in Poland.

Conclusion

This paper has examined the changes of earnings of males and females with different education qualifications in Vietnam between a period of 1992-93 and 1997-98. Females are rewarded higher for an additional year of education than their male counterparts in 1998, reversing the situation in the early reform period. While the decline in returns to vocational education has a negative bearing for the returns to schooling for males, the demand for skilled labour in the private sector where more young females are hired may account for the observed changes in returns to education for the gender groups

over time. A closer examination of the returns to different education attainment reveals that earnings of workers with tertiary education have significantly increased in comparison with workers with less than primary education. The within-cohort and the econometric analysis indicate that changes in quality of education in the post-reform period may not play a key role in explaining the increase. Rather it is changes in relative earnings of tertiary graduates that are behind what have occurred.

The findings of Katz-Murphy's demand-supply method have highlighted the role of demand factors in explaining the changes in earnings between workers with different education attainment. Relative demand has shifted towards all higher educated workers compared with their reference group (below primary) during 1992-1998. A large relative demand shift towards workers with tertiary education is again found.

This paper has shown that the wage structure has changed in a way to favour the better educated during Vietnam's transition. This is an important factor in explaining changes on earnings differentials that occurred between workers by level of education attainment. Education reform to better suit the needs of the post-reform emerging market, on-the-job training for workers, as well as equal access to education are some policy options that hold the key to reduce wage inequality between different education groups. The lack of a time series of trade data at industry level has prevented the paper to explore further whether the relative demand shift for tertiary educated workers is due to changes in the patterns of international trade. This is an important area for future research.

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Table 1 Participation rate of wage earners, by gender

		1992-93			1997-98	
	All	Males	Females	All	Males	Females
Participation rate						
18-24	12.05	14.68	9.75	24.03	27.13	20.98
25-34	18.18	22.29	14.46	19.75	25.64	14.39
35-44	19.19	23.61	15.41	17.20	21.95	12.99
45-54	12.71	17.50	8.91	13.45	17.54	10.03
55+	2.26	3.22	1.52	2.04	3.46	0.98
Total	13.08	16.47	10.20	15.07	19.35	11.35
Age						
18-24	26.14	25.68	26.76	28.86	27.07	31.52
25-34	34.87	35.10	34.55	29.86	30.95	28.25
35-44	25.77	25.23	26.51	26.11	26.20	25.97
45-54	10.00	10.51	9.30	12.10	12.03	12.19
55+	3.23	3.47	2.89	3.07	3.74	2.08
	100.00	100.00	100.00	100.00	100.00	100.00

Table 2 Sample statistics, 1992-93 and 1997-98, by gender

	1992-93				1997-98			
	Males		Females		Males		Females	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Ln hourly wage rate	-0.13	0.88	-0.44	0.80	0.39	0.74	0.17	0.80
Potential experience	18.34	10.89	17.33	11.08	18.18	10.26	17.21	10.83
Potential experience^2	4.55	5.14	4.23	5.03	4.36	4.58	4.13	4.83
Marital status	0.76	0.43	0.72	0.45	0.62	0.48	0.58	0.49
Migrant	0.67	0.47	0.6	0.49	0.69	0.46	0.62	0.48
Years of schooling	9.09	4.36	9.41	4.55	8.97	4.34	9.00	4.53
Urban	0.43	0.50	0.51	0.50	0.53	0.50	0.59	0.49
Northern upland	0.09	0.29	0.10	0.30	0.06	0.24	0.06	0.23
Red River Delta	0.19	0.39	0.21	0.41	0.18	0.39	0.14	0.35
North Central	0.07	0.25	0.08	0.28	0.08	0.28	0.07	0.25
Central Coast	0.18	0.38	0.14	0.34	0.17	0.37	0.15	0.35
Central Highland	0.02	0.14	0.03	0.16	0.01	0.09	0.02	0.12
South East	0.21	0.41	0.21	0.41	0.30	0.46	0.38	0.49
Mekong Delta	0.24	0.43	0.23	0.42	0.20	0.40	0.19	0.39
Majority	0.90	0.30	0.93	0.26	0.90	0.30	0.89	0.32
Government sector	0.27	0.44	0.36	0.48	0.19	0.39	0.24	0.43
SOEs	0.23	0.42	0.26	0.44	0.18	0.38	0.22	0.41
Private sector	0.50	0.50	0.37	0.48	0.63	0.48	0.54	0.50
Mining	0.02	0.13	0.01	0.09	0.02	0.14	0.01	0.10
Manufacturing	0.28	0.45	0.30	0.46	0.24	0.43	0.39	0.49
Trade	0.03	0.18	0.08	0.27	0.06	0.25	0.10	0.30
Electricity	0.01	0.12	0.00	0.06	0.01	0.11	0.00	0.06
Transport	0.07	0.26	0.02	0.15	0.10	0.30	0.02	0.14
Construction	0.13	0.33	0.01	0.11	0.18	0.38	0.03	0.16
Finance	0.02	0.12	0.01	0.09	0.01	0.08	0.02	0.14
Community	0.25	0.43	0.37	0.48	0.22	0.41	0.28	0.45
Agriculture	0.19	0.39	0.20	0.40	0.16	0.36	0.15	0.36

Note: A price deflator is used to deflate the hourly wage rate collected in the VLSS 97-98 in order to compare the first VLSS.

Table 3 Average earnings by education

	1992/93	1997/98
All		
Below primary	100.00	100.00
Primary education	126.63	112.01
Lower primary	109.33	122.97
Upper primary	127.35	134.58
Vocational	94.92	127.72
Tertiary	142.30	212.14
Males		
Below primary	100.00	100.00
Primary education	129.11	111.98
Lower primary	105.85	117.33
Upper primary	128.71	129.35
Vocational	101.94	132.82
Tertiary	136.15	219.97
Females		
Below primary	100.00	100.00
Primary education	82.64	89.95
Lower primary	81.39	107.89
Upper primary	93.75	117.25
Vocational	71.24	97.69
Tertiary	111.42	169.78

Table 4 Ratio of average earnings -Tertiary versus below primary, by education and cohort

	1992/93	1997/98
Males		
55+ (1993)	3.01	**3.94**
45-54 (1993)	1.33	1.34
35-44 (1993)	1.29	2.42
25-34 (1993)	0.95	1.88
15-24 (1993)	0.83	1.93
15-24 (1998)		2.40
Females		
55+ (1993)		
45-54 (1993)	1.69	2.20
35-44 (1993)	1.23	1.23
25-34 (1993)	1.48	2.63
15-24 (1993)	1.33	2.39
15-24 (1998)		1.76

Note: The number of observations in the 55+ age group is few.

Table 5 Changes in employment shares by education, 1992-98

Males	
Below primary	-0.016
Primary	-0.047
Lower secondary	-0.048
Upper secondary	-0.004
Vocational	0.070
Tertiary	0.046
Females	
Below primary	-0.017
Primary	0.013
Lower secondary	-0.041
Upper secondary	0.017
Vocational	-0.037
Tertiary	0.066

Note: The numbers here are changes of share of total labour input in an education group *j* measured in efficiency units of gender *i* relative to total efficiency units of j. Efficiency units are calculated as the number of workers in *j* multiplied by the average relative earnings earnings of the group *j* relative to the workers with less than primary qualification.

Table 6 Earnings equations (Dependent variable: in log, a thousand *dongs*)
– 1992-93 with selection correction; 1997-98 without

	1992–93				**1997–98**			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
Independent variables	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Potential experience	**0.024**	**0.041**	*0.020	**0.042**	**0.023**	**0.038**	**0.024**	**0.041**
Pot. Experience^2/100	*-0.038	**-0.072**	*-0.039	**-0.082**	**-0.045**	**-0.068**	**-0.047**	**-0.078**
Married	**0.248**	0.006	**0.293**	0.029	**0.121**	0.062	**0.119**	0.065
Migrant	*-0.134*	-0.071	*-0.128	-0.087	**-0.113**	-0.074	**-0.090**	-0.076
Years of schooling	**0.059**	**0.042**			**0.035**	**0.048**		
Primary			0.091	0.022			0.074	0.013
Lower secondary			0.179	0.050			**0.132**	**0.245**
Upper secondary			**0.404**	0.258			**0.418**	**0.416**
Vocational			**0.445**	0.169			**0.300**	**0.300**
Tertiary			**0.668**	**0.514**			**0.725**	**0.690**
Urban	0.079	-0.113	0.083	*-0.135	0.086	0.079	0.065	0.074
Red River Delta	0.090	0.030	0.093	-0.010	-0.005	0.062	-0.023	0.037
North Central	-0.237	*-0.296*	-0.234	*-0.296*	0.048	-0.168	0.025	-0.177
Central Coast	0.208	*0.240	0.188	0.191	**0.345**	*0.239*	**0.321**	*0.213
Central Highland	0.177	0.260	0.135	0.179	-0.260	**0.542**	-0.289	**0.540**
South East	**0.840**	**0.702**	**0.831**	**0.651**	**0.702**	**0.590**	**0.686**	**0.586**
Mekong Delta	**0.493**	**0.539**	**0.461**	**0.484**	**0.333**	0.163	**0.300**	0.126
Majority	-0.062	0.154	-0.009	0.179	0.001	**-0.202**	0.029	**-0.187**
Government employees	**-0.256**	0.054	**-0.252**	0.050	**-0.187**	0.126	**-0.204**	0.127
SOEs employees	-0.138	-0.008	-0.106	0.013	-0.006	**0.121**	-0.016	**0.123**
Mining	0.194	-0.128	0.231	-0.068	0.384	*0.560	*0.426	*0.568
Manufacturing	**0.343**	*0.198	**0.413**	**0.296**	**0.358**	**0.275**	**0.408**	**0.341**
Trade	0.284	-0.112	*0.360*	-0.034	**0.299**	*0.223*	**0.342**	**0.284**
Electricity	0.305	0.401	0.377	0.514	**0.703**	*0.299	**0.693**	**0.434**
Transport	**0.367**	*0.457*	**0.428**	**0.551**	**0.392**	0.636	**0.420**	**0.661**
Construction	0.149	**0.694**	*0.210	**0.767**	**0.247**	*0.287*	**0.279**	**0.364**
Finance	**-0.535**	-0.340	*-0.472	-0.237	0.301	0.189	0.286	0.203
Community	-0.147	0.076	-0.065	0.177	**0.242**	0.211	**0.241**	*0.251*
Lambda	**-0.157**	0.146	**-0.151**	**0.207**				
Constant	**-1.425**	**-1.595**	**-1.195**	**-1.327**	**-0.745**	**-1.067**	**-0.637**	**-0.902**
No. of observations	657	497	657	497	1496	1009	1496	1009
F–statistics	9.240	5.64	7.59	4.78	15.52	10.64	14.41	8.77
Adjusted R–square	0.2317	0.1834	0.2194	0.1758	0.2692	0.2746	0.2853	0.284

Notes: 1) Coefficients in bold, italic and with asterisk are significant at one per cent, five per cent and 10 per cent levels, respectively. 2) The omitted education reference group is below primary education. 3) Private sector, agricultural industry and Northern Uplands are the base for sectoral, industry and region dummies. 4) Majority: Kinh is the major ethnic group. 4) Potential experience: age minus years of schooling minus six (the official school entrance age). 5) Hourly earnings rate of the main job over a 12 months period in logarithm. It includes cash and in-kind payment. It is measured in a thousand *dongs*.

Table 7 Results of Katz-Murphy's inner products

	1992/93-1997/98
All	
Inner product	
Inverse relation	
Males	
Inner product	0.053
Inverse relation	4/6
Females	
Inner product	0.011
Inverse relation	3/6

Notes: The "inverse relation" refers to the numbers of education groups for which an inverse relation between relative earnings and relative labour input exists.

Table 8 Relative hourly earnings of female tertiary graduates relative to those with less than primary education, by age

	1992-93	1997-98
Males		
15-24		
(15-24)/(35-44)	0.64	0.62
(15-24)/(45-54)	1.32	1.55
Females		
15-24		
(15-24)/(35-44)	1.08	0.79
(15-24)/(45-54)	0.85	1.67

Table 9 Relative demand for labour by education - Base group: below primary education

	Change in relative earnings	Change in relative quantities	Change in demand
Males			
Primary	-0.124	-0.093	-0.216
Lower secondary	0.098	-0.122	-0.023
Upper secondary	0.067	0.058	0.125
Vocational	0.333	0.788	1.121
Tertiary	0.686	0.611	1.297
Females			
Primary	-0.036	0.177	0.141
Lower secondary	0.188	-0.120	0.068
Upper secondary	0.273	0.265	0.538
Vocational	0.252	-0.102	0.150
Tertiary	0.328	0.795	1.123