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Globalization, wages and skill premia in a transition economy: new evidence from Vietnam

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Abstract

We ask what has happened to wages and skill premia during Vietnam's globalization and transition from command to mixed economy. Over two decades of reform, wages rose in real terms and the skill premium also increased. We find, however, that neither trend has been linear, nor even monotonic, over the entire transition period. In particular, while average real wages increased between 1993 and 2008, most of this increase took place during the 1990s. Skill premia likewise rose during the 1990s but leveled off in the 2000s. There also exists a substantial gap between wages and skill premia in state and private sectors. This gap widened in the 1990s but seemed to level off in the 2000s.

In a small transitional economy like Vietnam, non-farm wages have been subject to significant influences both from increased exposure to global markets and from domestic policies—notably policies on the capital market and skilled labor market. To identify the contribution of each policy shift to changes in wages and skill premia in different phases of the economic reform process, we examine and compare skill premium trends in state and non-state sectors, and in traded and non-traded industries.

We fit the wage data to a very general model allowing for differential rates of return by institution and trade orientation. The results provide a richer understanding of overall wage trends, and provide a starting point for distinguishing between increases in returns to skills due to economic dynamics versus those arising from one-time transitional adjustment. They also indicate that overall rates of return to skills in Vietnam are much lower than those obtained by previous studies using more aggregative models and less recent data.

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1. Introduction

Employment, wages and returns to skills are key pieces of information in all assessments of economic growth and human welfare. The collapse of the Soviet Union and Eastern Bloc economies around 1990 sparked a large literature assessing the impacts of the transition from socialism on wages and returns to skills (Kreuger and Pischke 1995; Flanagan 1995; Orazem and Vodopivec 1997; Brainerd 1998; Adamchik and Bedi 2000; Munich et al 2005). The global swing toward more open economic policies (what Estevadeordal and Taylor call the “Great Liberalization”) dates from around the same time. It too has given rise to a large body of research evaluating the effects of trade policy reforms and global market integration on wages and wage premia (Wood 1997; Feenstra and Hanson 1997; Arbache et al. 2004; Zhu and Trefler 2005; Hausman, Huang and Rodrik 2007). These two literatures examine similar outcomes of economic and political change but from very different perspectives and in the main with different tools, and do not cross-reference each other despite obvious links between globalization and internal market liberalization. There is a subset of countries for which the central preoccupations of both literatures are of first-order importance: economies whose recent experience has been dominated by concurrent processes of globalization and the move from command to market economy. Among these, Vietnam, the subject of our study, is a prominent example.

In Eastern Europe and the former Soviet Union (EE/FSU), the collapse of communism caused deep and sustained recessions and dramatic reductions in state sector activity and employment. The recovery of employment during this J-curve transition was led by private (and privatized) firms. Workers with skills specific to state-owned firms suffered relative wage declines (Brainerd 1998); there was positive selection of skilled and ambitious workers into private sector enterprises unconstrained by the communist “wage grid” (Adamchik and Bedi 2000), and overall, there was a rise in returns to skills led by private sector employment growth (Flanagan 1995; Orazem and Vodopivec 1997; Adamchik and Bedi 2000; Munich et al. 2005). The analogous transitions in East Asia – specifically, in China and Vietnam – were qualitatively similar but less extreme in every respect.¹ Economic growth remained positive throughout, and state enterprises, while contracting in relative terms, by no means became irrelevant or marginalized. At the same time – and also in contrast to EE/FSU – exposure to global markets through international trade and factor movements grew at a very rapid rate. Skill premia, on average, also rose during these transitions, but the acceleration of globalization and the persistence of large state sectors make the reasons for these rises less obvious.

Studies of the “Great Liberalization” in the developing world have also frequently found evidence of rising skill premia. This is more surprising, since low-income economies are in general rich in unskilled labor, and the Heckscher-Ohlin/Stolper-Samuelson model predicts that exploiting comparative advantage will lead to a relative rise in returns to the more abundant factor. In Latin America and Asia, skill premia and wage inequality have increased along with integration into the global market (Wood 1997; Arbache et al. 2004; Knight and Song 2003).

These trends may still be consistent with Heckscher-Ohlin in that the global re-integration of large, labor-rich economies like China and India has seen a sharp rise in the global endowment of unskilled labor. Other analyses, however, have identified Ricardian technology-based comparative advantage as playing a leading role, especially in the more dynamically growing economies (Feenstra and Hanson 1997; Zhu and Trefler 2005), and most especially in economies where industrial policy has been actively deployed to assist industries in their progress up the quality ladder (Hausman, Huang and Rodrik 2007).

Thus, in economies simultaneously undergoing both globalization and internal economic liberalization, we have a problem to identify the causes of any observed rise in returns to skills. Is it the result of a beneficial interaction of trade opening and productivity growth, or could it be merely the one-time consequence of the transition from command to market economy?

In this paper, we study the experience of one transitional economy, taking advantage of a data set extending over two decades of the transition. Vietnam's extended move to "market socialism" since about 1990 has been marked both by extensive domestic policy reforms and by a huge increase in exposure to global markets. *A priori*, each process has momentous impacts on the labor market. Our data show that wages rose in real terms and that the skill premium also increased. In addition, wage differentials in other dimensions, notably state vs. non-state sectors and traded vs. non-traded industries—also saw significant changes. We find that the most important wage trends have not been linear – nor even monotonic – over the entire transition period. In particular, while average real wages rose from 1993 to 2008, most of this increase took place during the 1990s; in the 2000s there was a clear slowdown in wage growth. Likewise, overall wage inequality and skill premia rose during the 1990s but leveled off in the 2000s. Most importantly, we learn that in order to understand trends in skill premia in the economy, we must unpack the separate effects of domestic reforms — especially those affecting state sector employment and conditions—and external reforms--those affecting relative profitability of production traded vs. non-traded sectors.

We explore these issues in this paper. We begin by characterizing the data, and then move into a more analytical examination of possible reasons for observed trends and puzzles. Using wage data from national household living standards surveys, we explore the effects of globalization and domestic labor and capital market policies on the Vietnamese labor market. We focus on explaining differential skill premium trends between state and non-state sectors, and between traded and non-traded industries. We also consider their implications for longer-term growth and development.

The rest of the paper is organized as follows. In the next section, we examine and summarize the data and conduct some preliminary and descriptive statistical analysis. In section 3 we sketch a simple model of wage and skill premium determination in the context of policy intervention in both capital and labor markets. Section 4 provides an econometric exploration of trends in the skill premium, taking account of the key features of the two transitions by discriminating

between state and non-state sectors, and traded and non-traded industries. Section 5 draws some conclusions, compares and contrasts findings from other studies, and identifies issues to be pursued in greater depth in the future.

2. Wage growth and skill premia during Vietnam's twin transitions

2.1. Prior studies

The literature on wage growth, wage inequality, and returns to education in Vietnam is increasingly rich. Most of existing studies estimate variants of the Mincerian earnings equation: Gallup (2002) and Liu (2005) employ simple OLS, Doan and Gibson (2010) the Heckman method, Liu (2006) Hay's two-stage method (a generalization of Heckman's approach), Pham and Reilly (2007a and 2007b) mean and quantile regression approaches, and Nguyen et al. (2006) and Oostendorp and Doan (2010) a difference-in-differences estimator. Some papers also apply various decomposition methods to explore characteristics that explain wage gaps, and study factors contributing to changes in wage gaps. For example, Sakellariou and Fang (2010) carry out an Oaxaca-Blinder decomposition based on unconditional quantile regression rather than on mean regression.

Perhaps because of differences in methodologies, point estimates of the rate of returns to education vary considerably among these studies, even though they all use data from the Vietnam Household Living Standard Surveys (see section 2.2 below). Nevertheless, these studies yield consistent findings regarding *trends* in the Vietnamese labor market. First, wage levels increased rapidly in Vietnam during its transition, just as has happened in China. From 1998 to 2008, real earnings doubled for men and more than doubled for women (Sakellariou and Fang 2010).

Second, returns to education in Vietnam are low but have increased over time, similar to the experiences of both China and the former Soviet Union or Eastern European transitional economies. Doan and Gibson (2010), using OLS and Heckman estimators, find that the rate of return to one additional year of schooling in Vietnam rose from about 3% in 1993 to about 10% in 2008, a level comparable to returns to schooling in other developing countries.

Third, there is strong evidence of persistent wage differentials in several dimensions. These include gender, ethnicity, and region (Pham and Barry 2007b; Liu 2006; Nguyen et al. 2006), but also (and somewhat more surprisingly) institutions—specifically, state vs. non-state sector employment. Imbert (2010) studied the state/non-state sector wage gap, documenting the considerable increase in average earnings of state sector workers from 1993 to 2006, following labor market reform. Taking into account the effect of unobserved worker characteristics, Imbert found that the rise in state sector wage premium cannot be explained by a change in worker selection into the sector. Rather, it is due to differences in returns to characteristics, or sectoral

differences in wage-setting, indicating dualism in the labor market. As will be shown later, our findings in this paper accord with and complement these results.

Another dimension over which we find variation is that of traded and non-traded industries. Vietnam's move from quasi-autarky (prior to 1986, its trade was mainly in the form of soft-currency exchanges with other Soviet bloc economies) to more or less complete integration with the global economy has been promoted and accompanied by measures, notably exchange rate unification and depreciation, trade policy relaxation, and domestic commercial policy reform, which increase the domestic terms of trade between traded and non-traded industries. Nguyen et al. (2006) analyzed the impact of trade liberalization on wage structure in Vietnam, in particular the rate of returns to education and gender wage gap, but found only limited evidence of an impact. Oostendorp and Doan (2010) on the other hand, found that trade liberalization reduced returns to education by 1.2-3.6%, though in their study most of this decline was due to changes in the industry distribution of employment rather than lower Mincerian returns. Since liberalization of the exchange rate regime, external trade and capital flows have played a major role in the economic transition, we explore the traded/nontraded dimension further in this paper.

Our contribution to the literature on wages and skill premia in transition economies is twofold. First, we use all available rounds of the VHLSS, from 1993 through 2008. This enables us to study changes in the Vietnamese labor market over a longer period than previous studies. The combined data span almost two decades of extensive domestic reforms and rapid economic integration. Second, we examine skill premium trends along two dimensions of particular importance to the transition: state vs. non-state firms, and traded vs. non-traded industries. This allows us to study the contribution of both types of policy changes (internal and external reforms) on the Vietnamese labor market. Most studies in the literature examine only one type of policy change at a time. Also, whereas existing studies (e.g., Nguyen et al. 2006, Oostendorp and Doan 2010) yield mixed evidence on the impact of trade liberalization on wage structure in Vietnam, our method allows us to identify the contribution of external liberalization to wage growth and rising skill premia separately from that of domestic labor market reforms—and to examine potential interactions between the two types of reform.

2.2. Data

Our primary data sources are the VHLSS conducted in 1993, 1998, 2002, 2004, 2006, and 2008).² These are standard World-Bank-type income and expenditure household surveys, designed to measure living conditions and poverty and inequality (Grosch and Glewwe 2000). They include employment modules that generate the employment and wage data used in this paper. Early rounds of VHLSS were smaller in size (4,800 households in 1993 and 6,000 in 1998) and were representative at the national, rural/urban, and regional levels. The survey year 2002 had the largest number of households (29,533). In the most recent three rounds, the number of households has remained constant at 9,189.

In our empirical work, we include all individuals of working age (15-60 years) with reported wages. The hourly wage (thousand VND per hour worked) is calculated by dividing annual total wages (main salary plus other bonuses and cash benefits) by the estimated number of work hours during the year. Only the primary job is counted. Within each survey year, wages are regionally deflated to January of that year using deflators provided by the surveys.³ For year 2002, there are no data on experience, so we replace it with $\min(\text{age}-17, \text{age}-\text{schooling years}-17)$.

Most other studies using VHLSS data use the survey's original schooling year variable, which ranges from 0 through 12 years only. We adjust schooling years for highest educational level (a junior college degree means 14 years of education, a college degree 16 years of education, master's degree 18 years, and Ph.D. 21 years). As a result, the average years of schooling that we present are higher than that found in most other studies also using the VHLSS. This might also lead to lower estimates of returns to schooling years.

In the analysis below, we allocate workers into traded and non-traded industries. Appendix A lists industries in each category and describes our methods for making this division.

2.3. Descriptive statistics

We begin by characterizing the data and analyzing wage trends. The first lines in Tables 1 and 2 show that real wages for all groups have risen consistently over the years. The trend in overall wage inequality, measured by the Gini coefficient of average hourly wages, has been uneven. The coefficient rose from 0.38 in 1993 to 0.42 in 2002, but declined to 0.36 in 2004 and 0.35 in 2006, then finally increased again to 0.39.

[Table 1]

[Table 2]

While there was wage growth for all groups, its pace has been unequal across groups, and the trends have not been linear (Table 2). Wage growth has been higher for those with higher levels of education, leading to a rise in skill premia. As seen in Figure 1, in 1993 the skill premium, as measured by the ratio of the average wage for workers with different educational levels to those for workers with no schooling, hardly existed. This was the outcome of central planning, in which wages were institutionally set rather than determined by labor productivity or market forces—as had also been the case in EE/FSU prior to the collapse of communism in those countries. From 1993 through 2002, as the economy went through a series of domestic reforms, there was a dramatic increase in the skill premium, most especially for college-educated workers. Interestingly, however, this rise did not persist in the second reform decade. In fact, Figure 1 shows that for some levels of education, the skill premium actually declined slightly from 2002-2008.

[Figure 1]

Another interesting revelation in Table 1 is the evolution of the wage differential between state and non-state sectors. In 1993, average wages of state workers were only 90% of those in non-state (this ratio varied somewhat by education level: see Appendix B, Table B-1). But from 1993-2002 wages grew much faster in the state sector, with growth rates of 18% in 1993-1998 and 17% in 1998-2002, as against only 9% and 4% in the non-state sector (Table 2). As a result, state sector wages quickly caught up with then exceeded those in non-state sectors. By 2002, state sector workers' average wage was 175% that of non-state sector workers. In 2002-2008 however, the non-state sector started to catch up. Consequently, the state to non-state wage ratio declined from 1.75 in 2002 to 1.57 in 2004, then remained stable until 2008.

The rise of state sector wages and their persistent premium over non-state sector stands in strong contrast to trends seen in the transitions of the EE/FSU countries. Interestingly, however, these data are similar to those from a comparable period in China, where the ratio of average state to non-state sector wages rose from 0.4 in 1988 to approximate parity (0.9) in 2001, while the coefficient of variation of wages across institutions fell from 0.46 to 0.16 (Cai, Park and Zhou 2008, Table 6.4).

In sum, the data suggest that far from exhibiting a smooth transition from the command-economy era, Vietnam's wage labor market behaved very differently in the 1990s as compared with the 2000s. There might exist one or more structural breaks in the trend of wage growth and skill premia between these two periods. There also exist a substantial and widening gap between the state and private sectors' wages.

2.4. Wage determinants: basic Mincerian analysis

While the descriptive analysis yields interesting results, when examining factors associated with wage differentials we need to control for covariates. We do this initially with Mincerian wage regressions.^{4 5} The findings generally confirm those of the descriptive analysis. Over the years, there were consistent increases in returns to education, especially college education. In Table 3a we report the regression of log wage on a set of covariates including educational achievement measured by reported years of schooling.⁶ The estimates show that in 1993, returns to education were very low: the coefficient on years of schooling, after controlling for experience, gender, and other characteristics, was 0.19. This means that one additional year of schooling increases the log hourly wage by just 1.9%. By 1998, this had jumped to 0.041, and thereafter it increased until by 2008 it reached 0.058.⁷ The contrasts between periods are notable. In 1993-2002, returns to education rose 147% (about 16% per year). In 2002-08 they rose by just 23%, or about 4% per year. Even after these increases, however, in 2008 returns to education in Vietnam remained low by international standards. This raises concerns regarding incentives to invest in human capital.

[Table 3a]

[Table 3b]

In Table 3b we fit the same model, but this time using dummies for different educational levels. In 1993, there were hardly any differences in wages among those with varying educational levels. Only college graduates had positive returns to education. Even then, the return was very small: a college degree would result in a log wage only 27% higher than for those with no education. Returns to different levels of education increased steadily from 1993 through 2008. Returns to college degrees increased the most, as already discussed in Table 3a and in the descriptive analysis. Once again, our estimates show that returns to schooling grew much faster in the 1990s compared with the 2000s.

Results for other dimensions of wage differentials also mirror those in the descriptive analysis. It seems reasonable to posit a structural break in Vietnam's labor market around the early 2000s. In particular, the state sector dummy was negative in 1993 and 1998, but positive in 2002 and 2008. The traded industry dummy was not statistically significant in the 1990s, but became negative and significant in the 2000s. In 2002, as Vietnam adjusted to the aftermath of the Asian financial crisis and its own set of policy reforms (see below), the wage discount for tradable sector employment was a remarkable 10-11%. But even six years later, this discount remained a significant 4-5%.

2.5. Vietnam's transition

What can explain the patterns and trends in these data? Structurally, the process of growth, reform and globalization that Vietnam has undergone could have conflicting effects on wages, returns to skill, and intersectoral wage premia. Growth increases aggregate labor demand and should, other things equal, increase the demand for skills more rapidly than that for 'raw' labor. Not only does the expanding economy demand more specialized services in banking, finance, insurance, management and related tasks, but the supply of skills is surely less elastic than that of raw labor. Reforms have also had a large impact on the relative position of state and private sector activity, and on the degree of engagement of foreign capital and joint-venture operations in production. These changes could have an influence on the growth of relative demand for skills. Finally, globalization requires a reorientation of large parts of the economy to the norms of the international market. Price convergence (in activities with comparative advantage, from below; in those with comparative disadvantage, from above) influences changes in returns to all factors, including labor. In the case of a labor-abundant, low-skill economy, the Stolper-Samuelson theorem predicts that global market integration will raise returns to unskilled labor relative to those for skills, but this naïve result is highly contingent, especially on the institutional and policy setting.

In addition to globalization, the influence of economic and institutional reforms affecting domestic resource allocation is also of particular importance. Vietnam's experience as a transitional economy is almost unique in East Asia; only China has undergone such a sweeping change in economic organization, from quasi-closed and almost entirely state-controlled to mainly open, with state and private institutions coexisting throughout. One characteristic of the old system was a clear distinction between wages, returns to skills, and other conditions of state

and private sector labor markets, as seen in the Vietnamese data for the survey year 1993 (Table B-1). As we have seen, however, the segmentation of state and private sectors in terms of wages and skill premia has tended to widen and persist rather than diminish.

The contribution to employment growth by institution has been dramatically different. Table 4 summarizes changes in the structure of employment. As expected, the share of wage employment has been increasing while that of self-employment has been decreasing. Within wage employment, the state sector's share is much smaller than that of the non-state sector. This should be judged against the former's continuing high GDP share, despite a slow decline from 40.2% in 1995 to 35.5% in 2008.⁸ The state sector has generated relatively few new jobs (Jenkins 2004), despite the overall labor-abundance of the economy, and specializes in skill-intensive technologies. At the same time the non-state sectors have adopted highly labor-intensive techniques, and in the 2000s, industries such as garments, footwear and furniture have flourished. Therefore, it seems that state and private sector employers are responding to different signals, or applying different rules in deciding on how much labor and what types of labor to employ, and what wages to pay. These observations presumably reflect differential access to capital and other intangible advantages enjoyed by state sector industries, and further underline the importance of institutional factors in explaining trends in Vietnam's labor market.

[Table 4]

In contrast with the 'shock therapy' transitions of most EE/FSU economies, Vietnam's transition has been gradual, constrained by policy and legislative actions, and reform has followed an identifiable sequence. Some of the most significant reform measures are listed in Table 5. In early reforms, opportunities for international integration were greatly enhanced, and the pace of external liberalization has been maintained throughout, notably through trade pacts with Japan, the EU and the US, membership in regional groupings such as ASEAN and APEC, and culminating with WTO accession (January 2007). In the early transition years, however, the benefits of international integration were substantively restricted to state-sector industries. Although Vietnam liberalized trade and implemented policies to attract foreign direct investment, there remained a strong bias toward joint ventures with state firms in tradable industries, mainly operating at the higher end of the capital-intensity range (World Bank 1995).⁹ These external reforms were accompanied by the relaxation (after 1994) of the most obvious restrictions on state sector wages, allowing for a sharp rise in returns to skills. Capital markets, however, remained essentially closed to private borrowers, while state firms could access funds at below-market prices through the state-owned banking system. Accordingly, early growth in tradable industries was dominated by state enterprises (some with foreign buy-in, in the form of joint ventures), largely producing import-substitutes using capital-intensive technologies. Export revenue growth in this period was dominated by agriculture (especially rice and coffee) and natural resources.

[Table 5]

Only later, at the start of the second reform decade, were reforms adopted that encouraged private sector engagement with the global economy. The passage of Enterprise Laws in 2000 and 2005, in particular, consolidated the legal basis for organized private sector activity, and permitted private sector joint ventures as well as wholly foreign-owned firms. Domestic investment continued to be crowded out by state sector firms. The tradable sector activities that grew fastest, as a consequence, were those employing technologies and factor proportions consistent with comparative advantage as defined by the vector of factor endowments *net* of those employed in the state sector. This is the decade during which Vietnam's export-oriented, assembly-driven manufacturing sector achieved its current prominence. Demand for higher-skilled labor has also grown, but mainly in nontradable service-sector activities such as banking, finance, insurance and administration, all of which have remained the preserve either of the state (including provincial governments) or of state-owned companies.

The Vietnam transition is special due to the unique features of a socialist economy. While product markets have been liberalized over time, relaxation of state controls over factor markets has been much slower and more uneven. This can be seen in capital markets, and in the qualitatively different treatment of private and state sector firms and workers. On one hand, the state sector labor market has always been tightly regulated, and remains so to this day. On the other hand, in the first decade of economic reforms (roughly 1986-1998) the government introduced a number of changes that directly and indirectly affected wages and conditions for state sector workers. Direct influences included a wholesale reform of state sector enterprises (resulting in the loss of an estimated 1.5 million jobs), and the 1994 Labor Law, which relaxed somewhat the regulations governing state sector workers' compensation and benefits (Moock et al., 2003). These labor law reforms were thought by contemporary observers to have had little direct impact on private sector workers, as "in general the private sector was not hampered by the more rigid labor remuneration regulations" to which government agencies and state-owned enterprises were subject (World Bank 1995: 63).

Indirect influences included early initiatives to "equitize" (i.e., partially privatize) some state-owned enterprises, and the relaxation of statutory limitations on joint venture partnerships with foreign capital. These liberalizing reforms were adopted in the 1990s while retaining very high rates of protection and other forms of preferential treatment for state-owned enterprises (Athukorala 2006). As the World Bank (1995) concluded, "These privileges - in particular preferential access to land and foreign trade quotas and licenses - have played a very important role in the concentration of foreign direct investment in joint ventures with state enterprises, which is transferring to them new financial, managerial and technological resources." Undoubtedly, access of SOEs to foreign capital and joint venture partnerships in the 1990s helped raise their productivity, and along with it the returns to their workers—subject, of course, to restrictions on compensation imposed by the Labor Law.

This review of Vietnam's transition uncovers considerable, if circumstantial, evidence for a form of segmentation between the state and non-state labor markets. This was revealed in persistent

intersectoral differences in wage rates, returns to skills, and employment trends relative to output growth rates. These findings raise two interesting questions. To what extent do domestic institutions and reforms govern the evolution of wages and skill premia? What is the contribution of globalization—the very rapid opening to world markets that Vietnam underwent at the same time? In the next section we construct a simple model to examine what happens to the skill premia in state vs. non-state sectors when the government intervenes into both capital and skilled labor markets. The model allows us to form hypotheses about policy causes of intersectoral wage premium trends in the globalizing Vietnamese economy. This sets the stage for empirical hypothesis tests in section 4.

3. Theory

Assume that representative firms in state and non-state sectors produce the same output, face the output price vector p , and share the same production function $f(L,T,K)$, where L is unskilled labor, T is skilled labor, and K is capital. Under the counterfactual of complete and undistorted markets, both types of firm choose factor employment to maximize profit, given by $p^*f(L,T,K) - wL - qT - rK$, where w , q and r are economy-wide wages for unskilled labor, skilled labor, and capital respectively. Under the usual assumptions of concavity and linear homogeneity, this profit maximization yields factor demand functions $L_i^*(w,q,r,p)$, $T_i^*(w,q,r,p)$, and $K_i^*(w,q,r,p)$, where i indexes non-state (N) and state (S) sectors. Let w be unity by choice of unskilled labor units. Then relative labor demand $H_i = T_i/L_i$ is a declining function of the relative factor price q : $H_i^*(q,r,p)$.

An important feature of the model is the assumption of complementarity between capital and skills (Griliches 1969; Krusell et al. 2000; Duffy et al. 2004). Complementarity requires:

$$\frac{\partial H_S}{\partial r_S} < 0 \quad \text{and} \quad \frac{\partial H_N}{\partial r_N} < 0.$$

The interaction of capital-skills complementarity with policy distortions in factor markets rationalizes observed patterns of intersectoral divergence and convergence of skill premia during Vietnam's transition. There are two policy interventions that cause deviation from competitive equilibrium. The first is that government sets the price and/or quantity of capital in the state sector to \bar{r}_S and \bar{K}_S . This yields a new relative labor demand function for state firms: $H_S(q, p, \bar{r}_S, \bar{K}_S)$. The relative labor demand function for non-state firms is still $H_N(q, r_N, p)$. Under this policy firms in each sector no longer face the same rental rate of capital, but they still face the same relative wage. The second policy intervention is in the state sector's hiring of skilled workers, which we capture in stylized form by having government set the number of skilled jobs made available at \bar{Q} .

Figure 2 captures the main idea. We assume a fixed total supply of skilled workers and full employment. The horizontal axis measures the total skills endowment, and the vertical axes measure relative wages in state and non-state sectors. State sector demand for skills is measured from the left by the curve H_S , and non-state demand from the right, by the curve H_N .

[Figure 2]

Without policy distortions, equilibrium is at the point where the value marginal product of skills is equal across sectors, at H^* , with a common unit price q^* . If there is only a capital market distortion, then in the skilled labor market both state and non-state firms still face the same relative wage q^* . In the absence of a hiring quota, cheaper (or more readily available) capital to the state sector leads to more hiring of skilled workers, and this crowds out skills in the non-state sector. However, the quota causes segmentation in the skilled labor market. It raises the equilibrium relative wage in the state sector to q_S while lowering that in the non-state sector to q_N .

Rationing of skilled jobs in the state sector has created an intersectoral divergence in skill premia. A change in Q directly affects the gap in skill premia. Moreover, other changes that affect the relative labor demands in the two sectors—such as changes in output prices due to trade liberalization, or capital injections due to policy changes or foreign direct investment—also alter the gap, by displacing the relevant skilled labor demand curves. For example, an increase in the government's allocation of capital to the state sector will shift that sector's skills demand curve to the right, raising wages paid to state sector skilled workers and widening the intersectoral gap. On the other hand, an increase in foreign direct investment into the non-state sector will increase that sector's relative labor demand, raising wages paid to skilled workers in non-state firms, and so narrowing the gap.

This analysis accounts for equilibrium skilled wage differences across sectors, but leaves one remaining puzzle. If the state hiring quota lowers the cost of skilled workers to non-state firms, why are these firms not more skill-intensive? The answer, we surmise, lies in a macroeconomic link between the otherwise disjoint sectoral capital markets. As in China, Vietnam's state-owned industries have preferential access to domestic capital at low administrative prices. Their borrowings are limited only by administrative quotas, and the capital they borrow is frequently cycled back into the economy in a variety of forms of spending and speculative activity. Seeking to maintain monetary stability, and lacking adequate sanctions over state sector activity, the monetary authorities rely heavily on limitations on credit made available to the non-state sector. This externality imposed by state sector activities on non-state borrowing, pushes private firms toward less capital-intensive processes; capital-skills complementarity then ensures that non-state demand for skills is also low.

This stylized model is useful in explaining what happened to skill premia in many transition economies. In the former communist countries of Eastern Europe, transition and globalization

involved a sharp reduction in the capital stocks of state firms but a dramatic increase in those of private firms. This directly reduced the relative demand for skilled labor in state firms while raising it in private firms. The net result was a relative increase in skill premia in the private sector as this sector expanded. In Vietnam, as explained earlier, transition has not been accompanied by contraction of the state sector. We hypothesize that the process of transition and globalization in Vietnam be divided into two stages, with major policy changes in between.

During the 1990s, the state sector expanded because of preferential treatment in the capital market. Firms either received capital directly from the government, or had easy access to subsidized loans from state banks or foreign investment. This capital market distortion, coupled with rationing of skilled sector jobs in state firms, led to widening of the gap in skill premia between the two sectors. As will be shown below, this widening of the skill premium gap was the most pronounced among state firms in the traded sectors, because trade liberalization during this period also favored state firms more.

In the 2000s, there was a gradual leveling of the playing field between the state and private sectors. Private firms started to receive more capital investments, especially from FDI. This increased the private sector's relative labor demand, reducing the gap in skill premia.

In the next section, we examine the empirical evidence for this theoretical discussion.

4. Explaining rising skill premia – the role of institutions and globalization

4.1. Empirical strategy

The foregoing discussion suggests that wage trend and inter-sectoral wage gap in Vietnam are a result of both domestic policies on labor and capital markets and external liberalization of trade and FDI. To measure the impacts of these simultaneous internal and external policies, simply including state sector dummy and traded industry dummy, as done in the basic Mincerian analysis in section 2.4, is likely to be inadequate. These policies are likely to influence wages not only through intercept shifts, but also through changes in returns to education and in returns to other workers' characteristics. Furthermore, there could be interactions between the two sets of policies.

To account for the impacts of these two coterminous sets of policies and potential interaction between the two, we sort wage earners in our data into four groups: ST = state & traded, NST = non-state & traded, SNT = state & non-traded, and NSNT = non-state & non-traded. Hypothesis-testing then implies an estimation strategy which allows for statistical tests of differences in estimated coefficients across groups and years. We achieve this with "stacked regressions"; that is, we interact the four group dummies ST, NST, SNT, and NSNT with year dummies and with all explanatory variables including the constant term. We pool data for pairs of years (1993-1998, 1998-2002, 2002-2008) and calculate the change in returns to education for each group in

each period. Comparing changes in returns to education across groups allows us to identify the distinct effects of internal and external reforms and their interactions. The stacked regression results are shown in Appendix C. Nearly all the estimates are statistically different from zero. Significant differences in treatment effects across groups are consistent with persistent segmentation in the market for skills, and the regressions show that these persist through the entire transition era.

4.2. Empirical results – the roles of policies and globalization

To focus on our main story, we discuss only those results that relate to returns to education in each of the groups and time periods. Table 6a, drawn from the estimates in Appendix C, reports returns to education by year. It shows that in 1993, only workers in state firms and non-traded industries had a positive return to education; those in state firms but traded industries actually had a negative return to education. In fact, in 1993, workers in state firms and non-traded industries were the only ones with any measurable skill premium. The gap in returns to education between this group and other workers persists and even widens through time; by 2008, the return to an additional year of schooling for workers in state non-traded industries (9.1%) is almost twice the next highest figure (4.7%, for workers in state traded industries). Returns to education in non-state traded industries are the slowest to rise, and by 2008 reach only 1.9%, half the rate for state workers in equivalent industries.

Interestingly, however, the skill premia in state and non-state traded industries begin to converge in the 2000s. This is consistent with the continued opening of the economy accompanied by new measures to remove impediments to private sector engagement in international trade and FDI.

[Tables 6a and 6b]

Trends through time can be seen in Table 6b. During the early reform period, 1993-98, there were significant rises in returns to education for all groups, but especially so for workers in state firms and traded industries. These workers began with a significantly negative skill premium, so the rising premium reflects the relaxation of the command economy wage grid. But it also suggests a positive interaction between institutions and globalization. The average worker in a state firm experienced a rapid increase in returns to his or her education in the 1990s, but this increase was even higher if this worker was also in a traded industry. Thanks to the ability of state firms to attract large quantities of new investment both from the domestic economy and from abroad, state workers in traded and joint-venture industries captured a dividend from the decade of state-led globalization.

The middle period, 1998-2002, was one of slower growth as the Vietnamese economy experienced aftershocks from the Asian economic crisis. These took the form of a slowing of export demand and FDI inflows. For private sector workers, growth in the skill premium stalled during these years. State sector workers, however, suffered no such penalty, again indicating the advantages enjoyed by these industries even well into the economic transition. The tables only

begin to turn during the second phase of transition, from 2002-08. In these years, non-state traded sector skill premia begin to catch up—and indeed during this later period, no other group experienced a significant rise in returns to education. These data signal a convergence in skill premia. Despite this catch-up, however, non-state traded sector workers still had substantially lower returns to education compared with workers in other groups in 2008, as seen in Table 6a.

This changing trend is consistent with the nature of policy shifts, as discussed earlier. By the 2000s, the country had deepened its external reforms, signing a bilateral trade agreement with the USA (2001) and preparing for WTO accession (2007). Moreover, domestic reforms now began to level the playing field between state and private firms. The former began to face more competition in domestic markets from private firms and private-sector joint ventures, and of course from foreign firms both in world markets and (increasingly) in the Vietnam home market itself. In contrast with earlier reforms, passage of the Enterprise Laws of 2000 and 2005 encouraged FDI not only in state sector enterprises but also in the private sector, and thus not only in capital-intensive industries but also, increasingly, in labor-intensive industries. All these measures stimulated the expansion of labor-intensive traded industries in the private sector, which over the past decade have become the engines of export and employment growth in Vietnam. At the same time, we see that the state trade sectors also began to converge on factor proportions more consistent with the comparative advantage of the Vietnamese economy. Between 2002 and 2008, returns to education in state traded industries ceased to increase – and in fact, even fell slightly. Deepening of both external and domestic policy reforms in the 2000s explains the beginning of skill premium convergence, with catch-up by workers in traded industries and private firms.¹⁰

The model estimated in this section, by interacting both institution and trade dummies with all explanatory variables, has enabled us to trace the impacts on wages of increased economic openness and domestic policies, and to unpack interactions between the two in different eras of Vietnam's economic transition. There is evidence that in the early reform period, domestic policies, including labor and capital market policies, had a stronger impact on wages and skill premia, while in the later period, it was continued opening to the global economy that had a stronger impact. In the early period, the state played the dominant role in Vietnam's opening to the global market; in the later period, we see evidence of private-sector catch-up, albeit late and relatively little.

Our findings extend and to some extent unify those of prior contributions to this literature. As in Imbert (2010), we find evidence that the gap in skill premium between workers in state and private sectors increased over time. We show further that this gap ceased to increase in the 2000s as a result of deepening reform and liberalization. This is revealed only by examining the interaction between institutional and trade factors.

Our analysis has also shown the net impact of trade liberalization on wage premia might be masked by interactions between institutions and trade. It thus complements studies by Nguyen et

al. (2006) and Oostendorp and Doan (2010); the former find limited evidence of the impact of trade liberalization, while the latter finds that trade liberalization reduces returns to education.

Despite increases over time, and with the exception of the state non-traded workforce, after two decades of globalization and liberalization returns to skills in Vietnam remain low by international standards. Our estimates, based on a generalized Mincerian model, yield rates of return to education considerably lower than those in prior studies using earlier rounds of the same data and/or more restrictive estimation strategies.

5. Conclusions

This paper integrates two literatures concerned with explaining changing skill premia: that on economies in transition, and that on the effects of globalization in developing economies. This helps us to unpack and understand the Vietnamese case. With the aid of a data set spanning two decades—much longer than most existing studies of transition economies—we can identify the separate wage premium effects of globalization and domestic labor and capital market policies, and of their interactions.

An earlier literature on the labor market effects of economic transitions examined wage premia in the post-communist transition economies of Eastern Europe and the former Soviet Union. The transition to a market economy was found to raise skill premia due to the abolition of the state sector “wage grid,” and because of positive selection into private sector jobs. In Vietnam, the transition from command to mixed economy and the concurrent opening to international trade and investment occurred in a very different setting: one of continued economic growth rather than recession, and one in which the state, far from relinquishing its role in the real economy, remained privileged both in international trade and investment and in domestic factor markets. Vietnam’s transition saw real wages and returns to schooling both rise, consistent with findings in earlier studies but for very different reasons.

In the first reform decade, globalization (the liberalization of external trade and FDI) created opportunities for expansion in traded sector industries, but due to a slower pace of internal market reform, these were captured in large part by state sector industries. Because of this and the relaxation of the wage grid, this period of ‘state-led globalization’ saw a dramatic increase in skill premia in state sector traded industries relative to other wage labor groups. Only by the second reform decade, after more substantive liberalization of the domestic market, do we see evidence that non-state sector wages and skill premia begin to converge toward those in state sectors. Even then, the state-non-state wage gap remains large, indicating persistent segmentation, and returns to skills remain very low. This is strikingly true of the non-state traded sector, which is the fastest-growing segment of the Vietnamese wage labor force.

Another interesting result arise from our empirical analysis. When we examine the impacts of either domestic policies or globalization separately, the conclusion seems to be that the impact

of globalization (or external reform) is limited compared to the impact of domestic policies. But when we examine the impacts of both together, the results reveal a much more complete and nuanced picture of trends in the Vietnamese labor market, and also of the nature of Vietnam's economic growth during its transition and globalization. The net impact of trade might be masked when examined alone, because this impact might vary for state and private sector workers. Similarly, the impact of privatization is partially masked by the effects of globalization. These results depend on a degree of labor market segmentation between state and private sectors; this is a consequence of the privileged position occupied by the state sector, especially in relation to capital markets and regulatory treatment. The persistent state-private sector wage gap is evidence that, despite policy reforms, state firms continue *not* to behave according to market forces.

As a result it is clear that in a country where human capital is scarce, there is a potentially large growth dividend associated with the further relaxation of special treatment for state-owned enterprises. As a group, these industries absorb a large share of Vietnam's investment capital and its skilled labor, yet they are highly inefficient and their activities contribute relatively little to overall income growth.¹¹ In the presence of persistent segmentation the state sector has depressed returns to skills and crowded out more skill-intensive forms of non-state sector growth. Vietnam's transition "from plan to market" has been less disruptive than in Eastern Europe, but in the absence of further liberalization of the domestic market it is not yet clear that observed increases in skill premia are due to growth dynamics or merely a one-time gain from relaxation of certain domestic distortions. Our results suggest that resource misallocation associated with the persistence of state sectors has likely been a drag on overall growth. What effect this has had on incentives for young people to acquire skills rather than simply to enter the low-skill labor market is an important subject for research. In the long run of a low-income economy, where adjustment is concerned, it is not clear that gradual is better.

Table 1: Mean hourly wages (thousand VND)

	1993	1998	2002	2004	2006	2008
All	1.83	2.90	3.83	4.54	4.56	7.34
Gini coefficient	0.38	0.35	0.42	0.36	0.35	0.39
State	1.71	3.23	5.49	5.64	5.61	9.34
Non-state	1.89	2.73	3.14	3.60	3.65	5.84
State/non-state ratio	0.90	1.18	1.75	1.57	1.54	1.60
T-stat for diff. in mean b/t public & private	2.08	5.95	25.24	21.70	21.75	20.28
No degree	1.76	2.53	2.54	3.07	3.13	4.80
Primary school degree	1.99	2.68	3.03	3.50	3.53	5.39
Middle school degree	1.74	2.68	3.72	3.92	3.89	5.60
High school degree	1.75	3.20	4.70	5.42	4.99	7.82
College degree and higher	2.03	5.36	7.37	8.08	8.42	14.74
T-stat for diff. in mean b/t primary degree & others	2.32	4.57	10.59	12.37	12.16	10.64
T-stat for diff. in mean b/t middle school degree & others	1.34	3.48	3.24	7.24	8.02	9.89
T-stat for diff. in mean b/t high school degree & others	0.88	2.54	8.82	9.32	5.97	3.74
T-stat for diff. in mean b/t college degree & others	1.25	17.7	28.00	27.74	32.60	32.18

NOTE: all wages have been deflated to January 1998 prices

Table 2: Average annual growth in wages

	1993-1998	1998-2002	2002-2008	1993-2008
All	12%	8%	15%	20%
State	18%	17%	12%	30%
Nonstate	9%	4%	14%	14%
No degree	9%	0%	15%	12%
Primary school degree	7%	3%	13%	11%
Middle school degree	11%	10%	8%	15%
High school degree	17%	12%	11%	23%
College degree and higher	33%	9%	17%	42%

-

Table 3b: Determinants of wages (OLS), using educational attainment

Dependent variable: log(hourly wage)	1993	1998	2002	2008
Middle school degree	0.004	0.074	0.127	0.101
High school degree	0.066	0.216	0.287	0.304
College degree and above	0.272	0.575	0.635	0.792
Years of experience	0.017	0.021	0.023	0.034
Years of experience squared	0.000	0.000	-0.001	-0.001
Ethnic minority dummy	-0.083	-0.060	-0.190	-0.131
Male dummy	0.313	0.190	0.197	0.222
Red River Delta	-0.266	-0.412	-0.342	-0.237
North East	-0.287	-0.308	-0.406	-0.106
North West	0.217	-0.187	-0.604	-0.206
North Central Coast	-0.232	-0.406	-0.321	-0.316
South Central Coast	-0.185	-0.121	-0.134	-0.080
Central Highland	-0.037	-0.167	-0.930	0.151
South East	0.168	0.034	-0.043	0.076
Mekong River Delta	0.099	-0.131	-0.076	-0.080
Tradable industry dummy	0.017	-0.014	-0.109	-0.043
State sector dummy	-0.143	-0.124	0.201	0.109
Constant	0.122	0.673	0.833	1.549
N	2608	3590	21451	7010
Adjusted R-squared	0.10	0.18	0.31	0.34

Notes: Bold means statistically significant at 5% or 1%

Italic means statistically significant at 10%

OLS regressions with robust and clustering adjusted standard errors

Table 4: Structure of employment

	1993	1998	2002	2004	2006	2008
Self employed	73.9%	59.1%	63.9%	60.7%	58.7%	58.3%
Wage employed	26.1%	40.9%	36.1%	39.3%	41.3%	41.7%
State	5.8%	7.1%	9.3%	13.3%	14.2%	13.6%
Private	20.3%	33.7%	26.8%	26.0%	27.1%	28.1%

Table 5: Major reform measures

Domestic market liberalization	Trade and international integration
1986 Doi moi – “renovation” of the command economy: introduction of markets	1988/89 Introduction of import tariffs, unified exch rate 1991 Law on Import & Export Duties (preferential tariffs)
1990-1 Recognition of private enterprises (constitutional amendment); Law on Private Enterprises, Law on Companies	1992 Vietnam-EU trade agreement 1994 US diplomatic recognition
1994 Law on Promotion of Domestic Investment – rules on approval process	1995 join ASEAN, apply to join WTO
1994 Labor Code – relaxes wage grid	1999 MFN trade agreement with Japan
1995 Law on State Enterprises – regulation and reform	2000 US bilateral trade agreement (“WTO lite” – implemented 2002)
2000 Enterprise Law – significant domestic market liberalization	mid-2000s – various bilateral/multilateral PTAs/FTS; 29 new Trade Laws
2006 Unified Investment Law – further domestic liberalization and more relaxation of foreign investment controls	2006 WTO accession agreed (accession 2007)

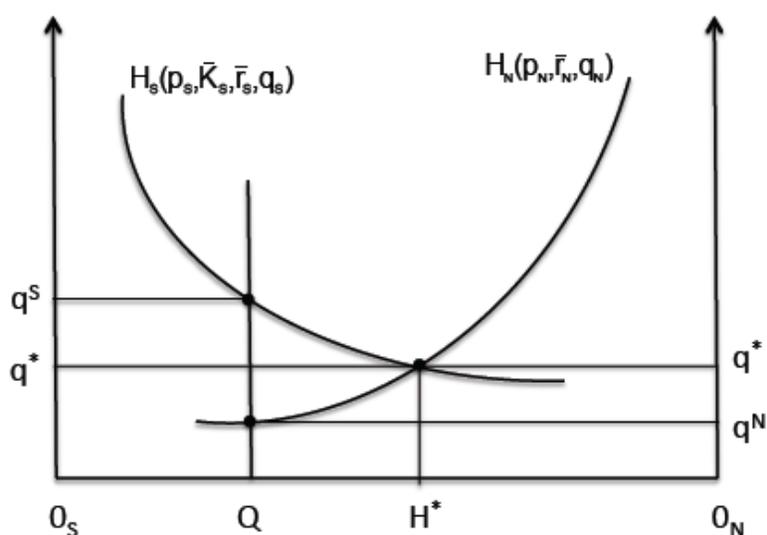


Figure 2: The intersectoral market for skilled labor

Table 6a: Returns to one additional year of schooling by institution, traded industry, and year

	1993	1998	2002	2008
State*Traded	-0.029	0.021	0.051	0.047
Non-state*Traded	-0.008	0.013	0.005	0.019
State*Non-traded	0.044	0.073	0.082	0.091
Non-state*Non-traded	0.002	0.038	0.035	0.040

i) OLS "stacked regressions" (all variables are interacted with the four group dummies: ST = state*traded, NST = non-state*traded, SNT = state*non-traded, and NSNT = non-state & non-traded)

ii) Dependent variable = log(hourly wage)

iii) Other explanatory variables (experience ethnicity, gender, experience, urban dummy, industry dummies) included but not reported

iv) In bold means statistical significant at at least 5% level

Table 6b: Changes in returns to one additional year of schooling by institution, traded industry, and time period

	93-98	98-02	02-08
State*Traded	0.050	0.036	-0.004
Non-state*Traded	0.029	-0.004	0.013
State*Non-traded	0.020	0.015	0.009
Non-state*Non-traded	0.036	0.002	0.006

i) OLS "stacked regressions" (all variables are interacted with the four group dummies: ST = state*traded, NST = non-state*traded, SNT = state*non-traded, and NSNT = non-state & non-traded)

ii) Dependent variable = log(hourly wage)

iii) Other explanatory variables (experience ethnicity, gender, experience, urban dummy, industry dummies) included but not reported

iv) In bold means statistical significant at at least 5% level

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Appendix A: Classification of tradable and non-tradable industries

This definition is based on an examination of the UN COMTRADE data set. If an industry does not show up in COMTRADE, it's considered non-tradable. All agricultural, mining, and manufacturing (except recycling) industries are in COMTRADE. Most utility and service industries are not, except 40 (electricity, gas, and water), 74 (other business activities), 92 (disposable collection and public sanitation), and 99 (foreign organization activities). In the following list, non-tradable industries include industries numbered 37 –73, 75 – 91, and 93 – 98. The rest are tradable.

- 01 Agriculture and relating services (including livestock raising)
- 02 Sylviculture and relating services
- 05 Catching and raising seaproducts, and relating services
- 10 Coal mining
- 11 Oil and gas drilling and related services
- 12 Uranium and Thorium mining
- 13 Metal mining
- 14 Mining for rocks, stone, sand, salt, fertilizer...
- 15 Food and beverage production
- 16 Tobacco production
- 17 Textile
- 18 Fur processing and fur products (excluding garments)
- 19 Leather tanning and leather products including wallets, seats, suitcases
- 20 Wood, bamboo, rattan processing and production of wood, bamboo and rattan products
- 21 Paper and paper products
- 22 Printing and publishing (books, magazines, newspapers, and
- 23 Coke, crude oil, uranium processing
- 24 Chemicals and chemical products
- 25 Plastic and Rubber production and products
- 26 Other non-metal mineral products production
- 27 Metal production and processing
- 28 Metal products (except machines and equipment)
- 29 Other equipment and machinery not specified elsewhere
- 30 Office and computer equipment production
- 31 Other electronic, electric equipment not specified elsewhere
- 32 Radio, TV, broadcasting and other communication equipment
- 33 Medical and laboratory equipment, precision instruments, and meters (clocks)
- 34 Motor vehicles and spare parts
- 35 Other means of transportation (boats, railroad, airplane)
- 36 Furniture production and other productions not specified elsewhere
- 37 Recycling, reprocessing
- 40 Electricity, gas, water steam, hot water production and distribution
- 41 Water exploitation, purification, and distribution
- 45 Construction
- 50 Vehicle sales, maintenance and repair; retail sale of gas
- 51 Wholesale and agent sales (excluding motor vehicles and motorbikes)
- 52 Retail sales (excluding motor vehicles and motorbikes);repairs of family appliances
- 55 Hotel and restaurant (including big and small restaurants, cafe, beverage and drink stands,...)

- 60 Road, railroad and pipeline transport
- 61 Water transport
- 62 Airline transport
- 63 Services in transport; tourist services
- 64 Post and telecommunications
- 65 Financial intermediary (excluding insurance and social welfare)
- 66 Insurance and pensions (excluding social insurance)
- 67 Assistance in finance (including social insurance)
- 70 Science and technology activities
- 71 Activities relating real-estate
 - Rental of machines and equipment (excluding operators); rental of furnitures and household
- 72 goods
- 73 Computer-related activities
- 74 Other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging, etc.
- 75 Government administration and national defense; promulgated social insurance
- 80 Education and training
- 85 Health and social relief (hospitals, health centers, veterinary care, social relief,...)
 - Cultural and sport activities (broadcasting, television, cinema, recreation and entertainment,
- 90 press, library, museum, sport,...)
- 91 Communist party, mass organizations, professional associations
- 92 Disposal collection, public sanitation improvement, and similar activities
- 93 Other service activities (laundry, hairdressing, funerals,...)
- 95 Housework services provided at client's home
- 99 Activities of foreign organizations

Appendix B: Supplementary data and estimation

In 1993, average wages for state sector workers were lower than those of their private sector counterparts for all education levels except college degrees (Table B-1). Within the state sector in 1993, average returns to college education were somewhat higher than returns to lower education levels. Surprisingly, this was not true for the non-state sector.

Table B-1: Average hourly wage by educational level and institution, 1993

	State	Nonstate	State/nonstate Wage Ratio
Primary school	1.85	2.02	0.92
Middle school	1.54	1.88	0.82
High school	1.63	2.01	0.81
College & above	2.04	1.90	1.07
Wage ratio (base = no degree)			
Primary school	0.98	1.16	
Middle school	0.82	1.07	
High school	0.86	1.15	
College & above	1.08	1.09	

Wages are in thousand VND, January 1993 price, deflated regionally and monthly

Table B-2: Determinants of Wages - Heckman Estimation Results

	1993	1998	2002	2004	2006	2008
Wage equation (dependent variable = log wage)						
Years of education	0.011	0.039	0.037	0.043	0.052	0.057
Years of experience	0.016	0.023	0.023	0.039	0.035	0.037
Years of experience squared	0.000	0.000	-0.001	-0.001	0.000	-0.001
Male dummy	0.390	0.314	0.219	0.210	0.220	0.244
Ethnicity minority dummy	-0.114	-0.137	-0.387	-0.159	-0.121	-0.146
Urban dummy	0.226	0.403	0.292	0.192	0.081	0.194
State sector dummy	-0.121	-0.100	0.243	0.136	0.148	0.138
Traded industry dummy	0.027	-0.007	-0.106	-0.008	0.002	-0.033
Constant	-0.606	-0.608	0.254	0.378	0.555	0.815
Selection equation						
Years of education	0.027	0.025	0.028	0.044	0.045	0.050
Male dummy	0.327	0.345	0.384	0.396	0.360	0.372
Ethnic minority dummy	-0.278	-0.302	-0.364	-0.529	-0.482	-0.574
Urban dummy	0.539	0.578	0.457	0.420	0.415	0.369
Dependency ratio	-0.033	0.049	0.091	0.068	0.079	0.139
Log (non-wage income)	-	-	-0.173	-0.205	-0.203	-0.126
Dummy for head of household	0.042	0.067	0.053	0.022	0.040	0.038
Age	-0.004	-0.003	-0.001	-0.001	-0.001	0.000
Constant	-1.176	-1.268	-0.974	-1.111	-1.121	-1.249
N	12985	16689	81462	25656	25703	25530
Rho	0.508	0.729	0.206	0.242	0.298	0.327
Sigma	0.747	0.744	0.679	0.552	0.529	0.597
Lambda	0.379	0.542	0.140	0.133	0.158	0.195
Chi2 for Wald test that rho=0	2.25	95.62	29.18	6.95	5.00	3.03

Notes: Bold means statistically significant at 5% or less

Italic means statistically significant at 10%

All regressions have robust and clustering adjusted standard errors

Table B-3: Determinants of Wages - Treatment Estimation Results

	1993	1998	2002	2008
Wage equation (dependent variable = log wage)				
Years of education	0.002	0.027	0.031	0.048
Years of experience	0.017	0.023	0.022	0.036
Years of experience squared	0.000	0.000	-0.001	-0.001
Male dummy	0.298	0.175	0.186	0.194
Ethnicity minority dummy	-0.032	-0.013	-0.363	-0.072
Urban dummy	0.069	0.182	0.242	0.142
Traded industry dummy	0.026	-0.012	-0.107	-0.031
State sector dummy	-0.091	-0.022	0.325	0.191
Constant	0.053	0.335	0.373	0.657
Selection equation (dependent variable = state sector dummy)				
Years of education	0.1413	0.135	0.138	0.130
Male dummy	-0.2437	-0.061	-0.116	0.043
Ethnic minority dummy	0.3987	0.328	0.514	0.616
Urban dummy	-0.1218	-0.405	-0.216	-0.143
Network dummy	1.5373	1.756	1.854	1.762
Constant	-0.9963	-0.856	-1.105	-1.153
N	2608	3590	21451	7019
Rho	-0.051	-0.189	-0.165	-0.112
Sigma	0.670	0.580	0.670	0.575
Lambda	-0.034	-0.109	-0.110	-0.064

Notes: Bold means statistically significant at 5% or less

Italic means statistically significant at 10%

Network dummy: value = 1 if the household has at least one other member working for the state

Appendix C: Determinants of log wage: generalized model

Table C-1: OLS regression with full interaction, 1993 and 1998

	Coeff.	SE	T-statistic	P-value
State*trade*1998	0.357	0.084	4.26	0.000
State*trade*1993	0.284	0.141	2.01	0.044
Nonstate*trade*1998	0.435	0.041	10.61	0.000
Nonstate*trade*1993	0.096	0.054	1.79	0.073
State*nontrade*1998	-0.066	0.138	-0.48	0.630
State*nontrade*1993	-0.191	0.157	-1.22	0.224
Nonstate*nontrade*1998	0.233	0.117	1.99	0.047
Nonstate*nontrade*1993	-0.129	0.150	-0.86	0.389
State*trade*1998*educ_yrs	0.021	0.009	2.23	0.026
State*trade*1993*educ_yrs	-0.029	0.014	-2.16	0.030
Nonstate*trade*1998*educ_yrs	0.013	0.005	2.39	0.017
Nonstate*trade*1993*educ_yrs	-0.008	0.006	-1.33	0.185
State*nontrade*1998*educ_yrs	0.073	0.007	10.85	0.000
State*nontrade*1993*educ_yrs	0.044	0.009	5.07	0.000
Nonstate*nontrade*1998*educ_yrs	0.038	0.008	4.89	0.000
Nonstate*nontrade*1993*educ_yrs	0.002	0.010	0.19	0.852
N	6198			
Adjusted R²	0.60			

i) Dependent variable = $\log(\text{hourly wage})$

ii) Other explanatory variables (gender, ethnicity, urban dummy, industry dummies, and experience) included but not reported; constant term suppressed

Table C-2: OLS regression with full interaction, 1998 and 2002

	Coeff.	SE	T-statistics	P-value
State*trade*2002	0.304	0.059	5.12	0.000
State*trade*1998	0.430	0.092	4.66	0.000
Nonstate*trade*2002	0.445	0.028	15.68	0.000
Nonstate*trade*1998	0.461	0.048	9.59	0.000
State*nontrade*2002	-0.097	0.058	-1.65	0.098
State*nontrade*1998	-0.197	0.099	-1.99	0.047
Nonstate*nontrade*2002	0.316	0.033	9.49	0.000
Nonstate*nontrade*1998	0.261	0.078	3.33	0.001
State*trade*2002*educ_yrs	0.056	0.005	11.34	0.000
State*trade*1998*educ_yrs	0.017	0.010	1.71	0.088
Nonstate*trade*2002*educ_yrs	0.013	0.003	4.59	0.000
Nonstate*trade*1998*educ_yrs	0.014	0.006	2.36	0.018
State*nontrade*2002*educ_yrs	0.079	0.004	19.67	0.000
State*nontrade*1998*educ_yrs	0.065	0.007	9.49	0.000
Nonstate*nontrade*2002*educ_yrs	0.036	0.003	10.47	0.000
Nonstate*nontrade*1998*educ_yrs	0.035	0.008	4.22	0.000
N	25041			
Adjusted R²	0.73			

i) Dependent variable = log(hourly wage)

ii) Other explanatory variables (gender, ethnicity, urban dummy, industry dummies, and experience) included but not reported; constant term suppressed

Table C-3: OLS regression with full interaction, 2002 and 2008

	Coeff.	SE	T-statistics	P-value
State*trade*2008	0.550	0.078	7.07	0.000
State*trade*2002	0.215	0.061	3.5	0.000
Nonstate*trade*2008	0.776	0.048	16.28	0.000
Nonstate*trade*2002	0.417	0.029	14.35	0.000
State*nontrade*2008	0.151	0.077	1.96	0.050
-				
State*nontrade*2002	0.233	0.070	-3.33	0.001
Nonstate*nontrade*2008	0.600	0.065	9.18	0.000
Nonstate*nontrade*2002	0.156	0.053	2.96	0.003
State*trade*2008*educ_yrs	0.047	0.007	7.21	0.000
State*trade*2002*educ_yrs	0.051	0.005	10.24	0.000
Nonstate*trade*2008*educ_yrs	0.019	0.004	4.24	0.000
Nonstate*trade*2002*educ_yrs	0.005	0.003	1.75	0.081
State*nontrade*2008*educ_yrs	0.091	0.005	19.5	0.000
State*nontrade*2002*educ_yrs	0.082	0.004	20.58	0.000
Nonstate*nontrade*2008*educ_yrs	0.040	0.005	7.93	0.000
Nonstate*nontrade*2002*educ_yrs	0.035	0.003	10.19	0.000
N	28470			
Adjusted R²	0.79			

i) Dependent variable = log(hourly wage)

ii) Other explanatory variables (gender, ethnicity, urban dummy, industry dummies, and experience) included but not reported; constant term suppressed

Notes

¹ In EE/FSU, the simple average contraction of per capita GDP after 1989 was 46%, and it took anything from 3-10 years to recover pre-transition levels. Neither China nor Vietnam experienced a recession following their adoption of market economy policies (source of basic data: World Development Indicators Online).

² In its first two rounds this was known as the Vietnam Living Standards Survey (VLSS).

³ These are the VHLSS variables *rcpi* and *mcpi*.

⁴ We also ran Heckman regressions to control for sample selection bias. Identification variables include dependency ratio, dummy for household head, and non-wage income (non-wage income variables are not available for survey years 1993 and 1998). The results (Table B-2) suggest that there are no major differences between OLS and Heckman estimates, even though in all regressions, the null hypothesis that $\rho=0$ can be rejected. Hence we discuss only the OLS results in detail.

⁵ We also run regressions controlling for endogenous selection into state sector jobs. The identification variable is a network dummy equal to 1 if the household has at least one member in a state sector job. Comparing the treatment regression results in Table B-3 to the OLS results in Table 3a, we can see that without controlling for selection into state sector jobs, estimates of returns to education tend to be biased upward. However, there are no qualitative changes in the story being told, so we continue to present OLS regression results for in the main paper.

⁶ In this and all subsequent regressions, we examine robustness with respect to industry. The results are not substantively altered by inclusion of industry fixed effects among the covariates.

⁷ For example, Cai et al. (2008) estimate returns at about 10%/yr in China. Our estimate is also substantially lower than those obtained in other studies using the same Vietnamese data: Doan and Gibson (2010) estimate that annual returns to schooling rose to over 9% per year by 2008.

⁹ In its report, the World Bank (1995:35) noted that “the vast majority of FDI has financed joint ventures with [State-owned enterprises], whose capital contribution to the joint venture has usually consisted of land use rights. Several reasons have contributed to this trend: the relatively small size of most private enterprises, their concentration on few industrial subsectors, their more limited connections with decision makers, and-most important-their limited access to land.”

¹⁰ While the current analysis indicates that the rise in returns to education for workers in traded non-state sector was due to globalization and further domestic reforms, it cannot tell us the underlying mechanism for this change. More specifically, we cannot test the impact of globalization under the Heckscher-Ohlin model vs. models of trade in intermediate goods (Feenstra and Hanson 1997); the former would predict a decrease in skill premia while the latter would predict a rise. To carry out this test, we would need to disaggregate the industrial classification further into import-competing vs. export-oriented and more, which our current data would not allow. This is clearly an interesting area for future research if data become available.

¹¹ Vietnam’s Central Institute for Economic Management has estimated a state-sector ICOR of 17.5 as opposed to a private sector ICOR of 4.6 (cited in Asia Times: “Vietnam changes course”, April 12 2011, http://www.atimes.com/atimes/Southeast_Asia/MD12Ae01.html).