ERIA Discussion Paper Series

No. 359

Getting to Grade 10 in Viet Nam: Challenges from Deprivation, Discrimination, and a Booming Job Market*

Ian COXHEAD† and Nguyen VUONG
University of Wisconsin-Madison

Phong NGUYEN
Former Director, Social and Environmental Statistics Division, General Statistics Office, Hanoi

February 2021

Abstract: *Viet Nam has enjoyed more than a generation of rapid economic growth, led by labour-intensive exports. This form and pace of growth has increased schooling opportunities, but has also reduced incentives for some students to advance to higher education. We hypothesise that these conflicting influences help explain another puzzle – the relatively slow growth of educational progression to upper secondary school. Slow and unevenly distributed increases in schooling attainment are warning signs for the sustainability of future aggregate growth and for the distribution of growth gains. We use a new data set on participation rates and scores in an exam to enter Grade 10, the first year of upper secondary school, to analyse the variation in test participation rates due to demand- and supply-side factors. The data are drawn from less advanced provinces within Viet Nam. As such, they shed light on the challenges of expanding educational development at the extensive margins of lower socio-economic status and higher grades, especially in areas with large ethnic minority populations.*

Keywords: Education, test scores, school–work transition, ethnic minority, Viet Nam

JEL classification*:* I24, I25, J24, O15, P36

* The authors thank the staff of the Secondary Education Division of Viet Nam's Ministry of Education and Training for making data available, the United Nations Children's Fund (UNICEF) Hanoi for facilitating collaboration, and Nguyen Thanh Hai for outstanding support in data management. We also thank Valerie Kozel; Tien Vu; and seminar and workshop participants at the University of Economics Ho Chi Minh City, the Economic Research Institute for ASEAN and East Asia (ERIA) in Jakarta, the Institute of Developing Economies of the Japan External Trade Organization (IDE-JETRO) in Tokyo, and the University of Wisconsin-Madison for helpful comments on earlier versions. Remaining errors are ours alone.
† Address for correspondence: ian.coxhead@wisc.edu

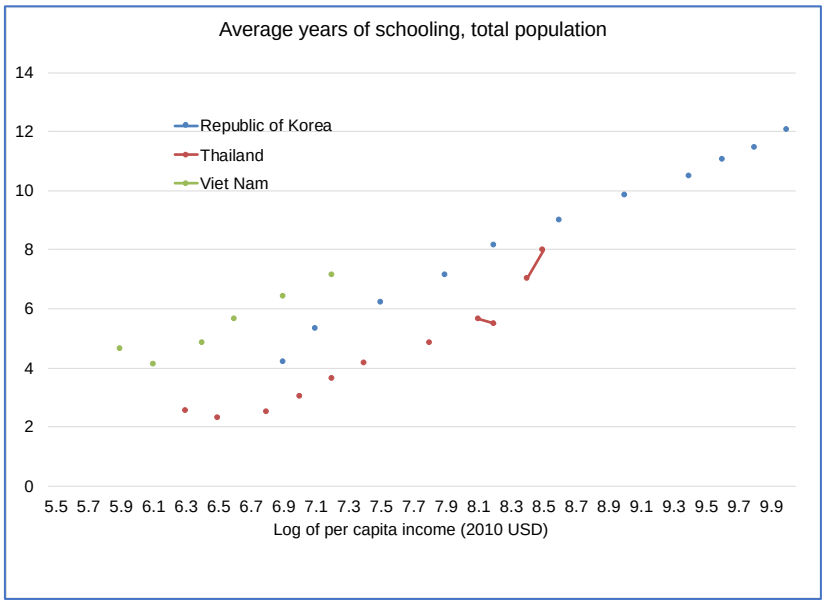
1. Introduction

Viet Nam has made tremendous progress in increasing school enrolment and achievement. In about one generation, it has achieved near-universal rates of primary and lower secondary school enrolment, up from about 86% and 72% respectively in the early 1990s; upper secondary enrolment has increased from 27% to more than 75% during the same interval (Rolleston et al., 2013; Dang and Glewwe, 2018). The average years of schooling in the adult population are higher than in countries such as the Republic of Korea and Thailand at comparable income levels (Figure 1). Despite these aggregate gains, however, significant educational achievement and access gaps remain, especially between wealthy and poor populations – a distinction that is increasingly strongly correlated with ethnic majority and ethnic minority populations. Over these categories, we see that educational flows (i.e. the production of new graduates at each grade level) are quite unequal. Disparities widen rapidly after Grade 9 (ages 14–15). From age 15 to 18, the overall net enrolment rate declines from over 90% to a little more than 50%, but the fall is much faster for children from poor and ethnic minority households. Moreover, the available data suggest that schooling achievement gaps are closing very slowly, if at all.

Viet Nam, like many low- and middle-income countries, offers few opportunities for adult education, so for most teenagers their last year of schooling is the highest credential they will earn and exerts a strong influence over their lifetime earnings. This provides strong motivation for our study. The decision to finish schooling has implications both for individual earning power and for human capital accumulation in the economy as a whole.[1]

[1] Rankings from the recent World Economic Forum's *Readiness for the Future of Production* report (WEF, 2018) highlighted the challenges that Viet Nam faces in transitioning to globalisation. On an indicator called 'drivers of production', Viet Nam is ranked 13th on global trade and investment amongst 100 countries, between Australia and France. On human capital, however, it is ranked 70th, between Sri Lanka and Georgia, and on technology and innovation it is ranked 90th, between Paraguay and Cameroon. The human capital index notably includes low rankings for Viet Nam on key components such as the mean years of schooling (rank: 74), quality of universities (75), quality of vocational training (80), and on-the-job training (74).

Figure 1: Average Years of Schooling in Viet Nam, the Republic of Korea, and Thailand



USD = United States dollar.
Note: Data points at 5-year intervals from 1960 to 2010 (Viet Nam from 1985 to 2010).
Sources: Authors' calculations based on data from World Bank (2020) (accessed 1 January 2020); and Barro-Lee Educational Attainment Dataset. http://barrolee.com/ (accessed 1 January 2020).

Demand for schooling in Viet Nam is subject to income and substitution effects. Average household incomes have risen, and this typically corresponds to increased demand for education as household financial constraints diminish. However, gross domestic product (GDP) growth has been led by labour-intensive industries whose expansion raises the opportunity cost of schooling for children reaching working age. These two effects may apply with different force for different groups in the population, leading to heterogeneous patterns in educational decision-making.

Our goal is to understand the reasons for the variation in educational attainment across the population and to consider welfare and policy implications. Our central question is: how much variation in student school achievement and progress is due to income growth, how much to exogenous household or community factors such as ethnicity, and how much to 'pull' from the labour market? Our purpose in asking these questions is to understand and inform educational policy, especially the goal of educational deepening.

To answer this question, we use a unique data set of individual test-takers and scores from the Viet Nam 10th grade entrance examination (henceforth, G10 exam), a

national exam to determine access to upper secondary school (Grades 10–12). We merge these with data from other sources to obtain district-level controls for economic and social conditions and labour market activity. The data come from a subset of provinces that are poorer and more remote than the national average. As such – and because the variable cost of schooling rises with grade – they present an opportunity to study challenges to educational development at the extensive margin of economic development.

We find considerable variation in the propensity to attempt the G10 exam. Higher household income or socio-economic status (SES) is associated with higher exam participation. However, the labour market plays a significant and negative role. As long as Viet Nam continues to attract investments that take advantage of abundant blue-collar labour, the tension between income effects and opportunity cost will remain for poorer families. Ethnic minority households are especially susceptible since they are initially poor and their income gains from the Vietnamese economic miracle have been relatively small.

In the remainder of this chapter, we first consider the ex-ante forces at work in the labour market of a globalising economy. Subsequently, we review related studies, introduce our data and methods, and report econometric findings. The chapter concludes with a brief policy discussion.

2. Globalisation, Growth, and the Labour Market

Viet Nam's experience with globalisation has been the defining feature of its recent economic history. Exports of goods and services grew from 7% of GDP in 1986 to more than 100% in 2018; their real value expanded at an average annual rate of more than 15%, three times faster than the low middle-income country average. Annual foreign direct investment (FDI) inflows during that period averaged 6% of GDP – more than double the average for low middle-income countries (World Bank, 2020). FDI inflows have expanded by more than 9% annually since 2000.

It follows that globalisation – that is, increasing integration with world markets for products, services, and factors – has been a major driver of change in the domestic labour market. Joining the global market alters relative prices and raises returns on

investments in export-oriented industries. New capital (and other productive attributes bundled with it) raises labour productivity. Those changes in turn help to determine the industries and occupations in which job growth is most active. Aggregate income increases, but the distribution of gains within the domestic economy is conditional on many factors, notably household assets (including labour and skills) and their mobility in response to changing sectoral structure.

Trade theory provides a useful lens through which to view these trends. Viet Nam has specialised in industries making intensive use of relatively low-skilled labour, often with complementary inputs of foreign investment. Its import-substituting industries are far more capital- and technology-intensive than its exporters. This pattern of specialisation has fuelled a generation-long boom in non-farm job creation and GDP growth.

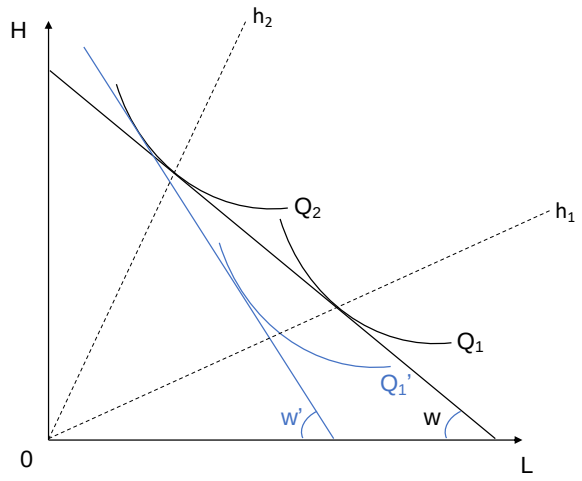
One implication of this pattern of investment and trade is that demand for blue-collar labour has risen rapidly relative to demand for skills.[2] The link from globalisation to this structural change can be appreciated in stylised form with the help of a Lerner diagram (Deardorff, 2002). Assume that the economy is endowed with skills (H) and blue-collar labour (L), and uses these as inputs to produce two goods of differing skill intensity. In Figure 2, production technologies for the two goods are represented by unit isoquants $Q_i = 1/p_i$, each showing combinations of H and L compatible with production of output worth \$1. In equilibrium, since factors are mobile between sectors, there is a single relative price of skills at which factor markets clear; this is shown as a unit isocost line with slope $w = w_H/w_L$ (its intercepts are $1/w_H$ and $1/w_L$). When factor markets clear, then the point on each unit isoquant with slope equal to w is the cost-minimising input ratio $h_i = H_i/L_i$ in that industry. At the tangency, employment in each industry is found by measuring the corresponding distance along each axis.

Choose units such that the price of the skill-intensive good (p_2) is equal to one. The autarky relative price of the less skill-intensive good (p_1) is lower than its world

[2] Demand for skills has also grown, but skilled jobs are concentrated in government and state-owned enterprises whose activity levels have grown far slower than private-sector industries. The latter are subject to crowding-out in domestic capital markets and have much lower capital and skill intensity (Phan and Coxhead, 2013).

price, therefore globalisation increases this price. As a result, Q_1 moves closer to the origin. The original factor price ratio w is now no longer compatible with market clearing. To re-establish factor market equilibrium, the relative price of L, the factor used intensively in industry 1, must rise. The new factor price w' reflects this shift. In other words, a rise in the relative price of the labour-intensive good has caused the skill premium to decline, since $w' < w$.

Figure 2: Effect of a Rise in P_1/P_2 on the Skill Premium

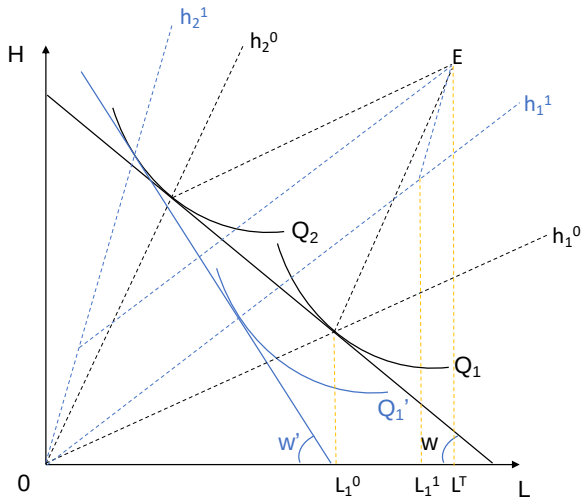


Source: Authors' calculations.

Under full employment, both output and the quantity of each factor employed in 1 increase, while in 2 they must decline. In Figure 3, point E shows the total endowments of H and L available to the two sectors, and the allocation of each factor to each sector is found by vector addition using the cost-minimising factor proportions measured by h_i^j, where i =1,2 denotes sectors, j = 0 denotes the initial equilibrium, and j = 1 the equilibrium after the price change. The relative price change that raises demand for low-skilled labour increases the skill intensity of production in both sectors (another stylised fact in globalising economies), but if the total endowment shown at E remains unchanged, then the shares of sector 1 in employment of both factors must also increase in proportion to its output as measured by the distance from the origin along the relevant ray. Conversely, employment shares in sector 2 must fall. As drawn, for example, the share of L employed in sector 1 increases as a result of the price

change, from $0L_1^0/0L^T$ to $0L_1^1/0L^T$. The reader can verify that an analogous change occurs in the allocation of *H*.

Figure 3: Output and Employment Effects of the Price Rise



Source: Authors' calculations.

Of course, real-world adjustment may involve more conditions – notably, differential elasticities of factor supply, non-traded goods, adjustment times and costs, and transitions between informal and formal employment (Winters, McCulloch, and McKay, 2004). In addition, we know that along with the structural change shown, globalisation also increases aggregate income due to gains from specialisation and trade. Together, these results bring the schooling decision problem into focus. On one hand, income growth induces greater schooling by helping to relax credit constraints and other economic factors limiting educational spending by households. On the other hand, the lower skill premium and faster job growth in blue-collar occupations (i.e. in *L* rather than *H*) raises the opportunity cost of schooling. Predictably, these two forces will be felt with different intensity by different groups within the economy, depending on the distribution of gains from trade and on how each household calculates the expected *net* benefits of additional schooling.

The dynamics of the globalisation–human capital nexus were first explored by Findlay and Kierzkowski (1983) in a model that integrated Heckscher-Ohlin specialisation with models of human capital accumulation due to Mincer (1962), Schultz (1960), and Becker (1954). Their model used exogenous changes in relative

product prices to drive educational decisions by individuals, taking account not only of skill-specific expected lifetime earnings but also of the direct and implicit (opportunity) costs of schooling. An insight from the Findlay-Kierzkowski model is that in a two-good economy the process is self-reinforcing over time. A rise in the relative price of the less skill-intensive good (which contributes to a lower skill premium) induces a change in the composition of the labour force, and this in turn further increases the relative size of the less skill-intensive industry through Rybczinksi effects (Findlay and Kierzkowski, 1983: 968–69).[3] In Figure 3, a more elastic supply of *L* than *H* would see the endowment point *E* moving east–northeast over time. Changes in endowments and in relative factor prices are correlated.

An important qualification not shown in this model is that the economy also produces and consumes non-tradable services. Demand for services is typically income-elastic, and as such grows at least as rapidly as the aggregate economy. Therefore, growth may drive up their prices. Whether this second-round change raises the skill premium or lowers it depends on the relative skill intensity of non-tradable production. In lower-income countries, services are dominated by activities such as construction, sales, food and hospitality, and personal services, and these are largely supplied by small, often family-run firms with low levels of capitalisation. In this case, a rise in demand for services will raise relative demand for blue-collar labour by even more than shown.[4]

Finally, it may be realistic to suppose that the supply of low-skilled labour is elastic due to underemployment in a 'backstop' sector such as agriculture. World Bank data show employment in Vietnamese industry expanding from 12% of the labour force in 1991 to 26% in 2019, and that of services rising from 19% to 35% over the same interval. Agriculture's labour share fell from 69% to 39%, and its share in GDP

[3] Findlay and Kierzkowski (1983) noted that when all individuals are identical, the equilibrium difference in lifetime earnings between skilled and unskilled workers is zero: higher earnings of skilled workers are exactly offset by additional schooling costs that they incur. It follows that other things being equal, a relative price change that favours unskilled labour will, over time, induce more children to quit school earlier.

[4] If non-tradable production is of intermediate factor intensity relative to sectors 1 and 2, then an expansion in demand must reduce the skill premium. Suppose that the endowment point *E* represents factors available for tradable production after demand for non-tradable services (*N*) has been satisfied, so $E(H,L) = E(H^T–H_N, L^T–L_N)$. Then, increased output of *N* will reduce *E*, moving it south and west of its original location. The new skill premium must be lower than its original value.

decreased from 40% to 15%, suggesting a substantial reallocation of low-skilled workers. Suppose for simplicity that the production of services uses only labour (or a combination of labour plus the innate entrepreneurial flair of owner-operators). Then, an elastic supply of low-skilled labour means that the services output can increase in response to growing demand without significant price rises. In this case, the total net increase in low-skilled labour demand is the sum of that in the expanding tradable sector 1, minus that in the contracting sector 2, plus that in the expanding non-traded services sectors.

3. Related Literature

Viet Nam's experience with globalisation may be typical of that amongst lower middle-income countries. Rapid employment growth concentrated in low-skilled occupations poses a particular challenge when adolescents complete basic education and must choose between continuing in school or joining the labour market. These choices have lifetime implications for the current generation – lower skilled workers earn much less over their working careers – but also for overall economic growth and for the distribution of gains from growth in future generations.

It is by now well known that variation in cognitive and non-cognitive abilities in adolescence or even later in life originates very early, even in utero (Almond and Currie, 2011a). Maternal, household, and environmental conditions all play a potentially long-lasting role in young children's intellectual development and this in turn affects a child's performance upon entry to the formal education system (Almond and Currie, 2011b). Thereafter, there is potential for a persistent widening of educational achievement gaps (in the absence of targeted interventions) as more advanced and better-motivated children, and those whose home conditions are more conducive to learning, both learn better and capture more educational resources, such as the attention and encouragement of teachers. Thus, variation in SES, an indicator for a range of health and nutritional variables that contribute to early life and childhood development, is an important predictor of later-life outcomes.

In adolescence and beyond, standardised tests provide a transparently comparable metric of educational attainment. Test scores are complementary with other frequently used but indirect measures such as total schooling years and schooling for age[5] (Ray and Lancaster, 2005), with lower measurement errors. Additionally, test scores provide a direct measure of knowledge acquisition or cognitive capacity, something that can only be very broadly inferred from data on schooling duration or grade progression since these depend more closely on school availability and quality (Hanushek and Woessmann, 2012). Studies elsewhere find that high-school test scores are robust predictors of labour market outcomes (Neal and Johnson, 1996). Finally, selection into test-taking is an important indicator of variation in its own right.

Why do scores and participation rates vary? In literature from the United States (US), there is much attention to differences based on race and ethnicity (Card and Rothstein, 2007; Thomas, 2004). Some of these are correlates of structural inequality: race is a strong predictor of differences in household income, parental schooling, and other indicators of children's school performance. Others are attributable to discrimination. In any heterogeneous population, the mix of causes is both intrinsically important (we want to understand the reason for differences) but also of value to policy. Finding the least-cost path to a socially acceptable level of variation across sub-populations begins with a good diagnosis of the causes of that variation.

Empirically, our study is closely related to those in other countries where progression within the education system is conditional on the results of a screening exam, such as Norway (Solli, 2017; Strøm, 2004). However, our study, unlike many from wealthier countries with relatively homogeneous populations, must first (and arguably, foremost) control for non-random selection by eligible children into test participation.

Other contributions to the comparative international literature on educational attainment tend to rely heavily on measures of the *quantity* of education such as years in school (e.g. Blanchard and Olney, 2017), but these provide little information about

---

[5] Ray and Lancaster (2005) defined schooling for age (SAGE) as:

$$\text{SAGE} = \left(\frac{\text{Years of Schooling}}{\text{Age}-E}\right) \text{x}100,$$

where E is the normal school entry age.

the *quality* of education that is imparted by teachers or acquired by students. Some international studies use results from the Organisation for Economic Co-operation and Development's Programme for International Student Assessment (PISA) standardised tests. However, Viet Nam's PISA data have been recognised as drawn from a non-random sample (Dang and Glewwe, 2018).

Our study also connects to a worldwide literature that identifies ethnicity with differential access to and benefits from schooling (e.g. Baert and Cockx, 2013). Ethnic variation is of particular salience in Viet Nam (Kozel, 2014; Baulch et al., 2010).

3.1. Trends in Viet Nam data

In Viet Nam, growth has been concentrated in export-oriented processing industries such as garments, footwear, and electronics. Employment and skill premium trends are broadly consistent with the Stolper–Samuelson conclusion of the previous section – that growth has raised relative demand for less-skilled workers and lowered the skill premium, other things being equal. In this section, we summarise evidence from studies of these trends.

The Viet Nam–US Bilateral Trade Agreement (USBTA) of 2001 brought about a sudden and substantial lowering of US tariffs on Viet Nam's exports. Using a measure of provincial exposure to export-increasing trade policy changes, Fukase (2013) found that the effect of the USBTA on relative wages in export-exposed provinces significantly mitigated a generalised national rise in the skill premium due to ongoing domestic economic reforms. In another study, McCaig and Pavcnik (2018) found that the USBTA induced a substantial increase in formal employment in the industries most closely related to trade and amongst younger workers, who are both more mobile and more intensively employed in the expanding industries.

Internal migration responses to globalisation in Viet Nam have been substantial (Coxhead, Nguyen, and Vu, 2019). Rapid expansion of low-skilled jobs appears to have raised the opportunity cost of schooling: in particular, globalisation-related job creation, proxied by the local intensity of jobs in foreign-invested firms, is seen to have had a significantly negative effect on high school attendance (Coxhead and Shrestha, 2017). In short, the aggregate evidence points to a clear tension between the positive

schooling effects of income growth and the negative effects of a booming low-skilled job market.[6]

Structural change in labour demand translates into differential changes in demand for skills, and changes in the skill premium reflect these (Katz and Murphy, 1992). During Viet Nam's reform era, returns to education rose rapidly with the relaxation of the command economy wage grid. However, recent studies have shown that returns to schooling peaked around the mid-2000s (Doan and Gibson, 2012; Doan, Tuyen, and Quan, 2018; Phan and Coxhead, 2013). According to Doan, Tuyen, and Quan (2018), the return to an additional year of schooling in 2014 was only 5.7%, significantly down from its peak of almost 11% in 2008, and lower than world averages. The returns to upper secondary schooling in particular are very low, with wages of Grade 12 graduates barely above those to Grade 9 graduates.[7] The differences are especially small for cohorts that are close in age to the current generation of school-leavers.[8] [9]

[6] In another uniquely Vietnamese dimension, low overall returns to private sector employment of skilled workers have been exacerbated by capital constraints due to crowding out by state sector enterprises (Phan and Coxhead, 2013).

[7] These numbers are lower than the widely accepted world average of 10% (Psacharopoulos and Patrinos, 2004), but are comparable with estimates from similar regional economies. Tangtipongtul (2015) estimated an average return to education in Thailand of about 13%, but this is highly convex, with estimated returns to primary schooling only 1.8%, and general secondary school only 5%; the majority of the labour force is educated to these levels or below. For Indonesia, overall returns are estimated in the medium–high single digits (Purnastuti, Miller, and Salim, 2013; Newhouse and Suryadarma, 2011; Coxhead, 2014).

[8] Other dimensions of employment show similar differences and trends. Demombynes and Testaverde (2018) showed no gain, and perhaps a decline, in formal relative to informal employment.

[9] Some studies have attributed declining returns to schooling to the rising supply of high school and college graduates (e.g. Doan, Tuyen, and Quan, 2018). However, comparable countries have experienced rapid growth in educational attainment without lower returns. China, whose experience Viet Nam's closely resembles, is one. From 1995 to 2014, college admissions in China increased more than sevenfold (Li et al., 2017) yet returns to college education increased (Gao and Smyth, 2015). The most likely explanation is capital–skill complementarity – the growth of skilled labour raises returns on capital investments, and the resulting increase in capital stocks raises skilled labour productivity, thus increasing returns to education. This complementarity favours the growth of industries that are intensive in capital and skills, a progression that is evident in China's recent history but much less visible thus far in Viet Nam. Tertiary enrolments in Viet Nam increased from 1998 to 2013 by a factor of 2.5 (Doan, Tuyen, and Quan, 2018) – a substantial gain, but far smaller than in China. So, if returns to schooling have fallen in Viet Nam despite a huge investment boom, then either the type of new investment was not conducive to capital–skill complementarities and/or its impacts were diminished by other factors.

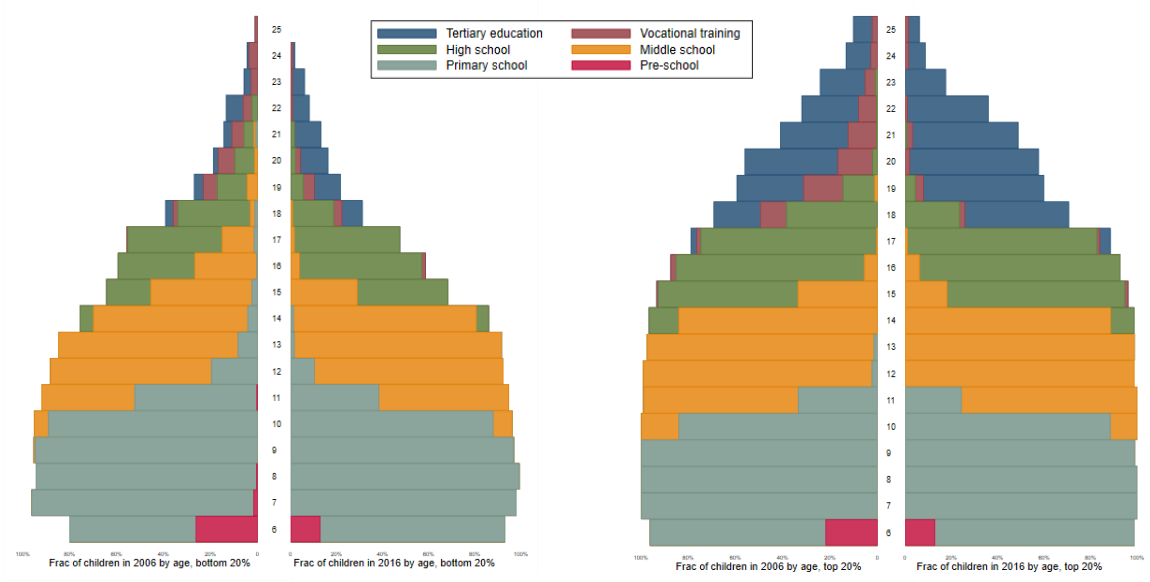
If skill premiums are small, then it also follows that the economics of decision-making over the transition from school to work will be dominated by two near-term considerations: the financial cost of schooling, and the opportunity cost of time spent in school and thus not in the labour force. The logic of this calculation is clear from Figure A (Hamermesh and Rees, 1996).

3.2. Schooling trends and policy targets

The Government of Viet Nam's education strategy for 2011–2020 includes the following targets (amongst others): 'By 2020, the rate of primary school students and lower secondary school students of eligible age will reach 99% and 95% respectively; 80% of young people will reach education of upper secondary school level or equivalent at eligible age'. The first two goals have been reached. The third − high school enrolments − remains unfulfilled.

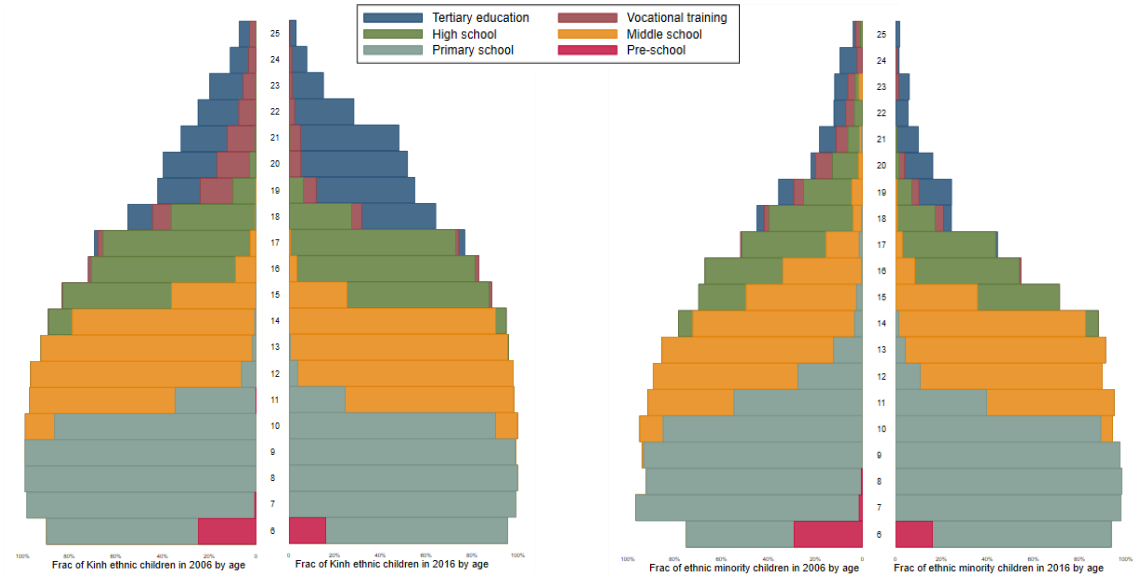
Conflicting trends and population heterogeneity present the designers of education policy with a particular challenge, since it is no longer the case that 'one size fits all' in measures to promote schooling. This heterogeneity is especially important in Viet Nam, where the pace of economic growth is rapid but has not had uniform effects. For example, Figure 4 shows the proportion of children in school, by level of schooling, for the top and bottom quintiles of households by expenditure over a decade-long interval, 2006−2016. In the top quintile, school persistence and grade progression were already high in 2006 and improved even more, especially at upper secondary and tertiary levels. Amongst households in the bottom expenditure quintile, the change was far more modest. This differential response may be due to (i) greater income effects amongst wealthier households; (ii) labour demand growth causing a higher increase in the opportunity cost of schooling; (iii) institutional differences in the rates of return to secondary and tertiary schooling (Phan and Coxhead, 2013); or (iv) differences in the ethnic composition, since ethnic minority groups are heavily over-represented in the lowest income quintile (Kozel, 2014). Figure 5 confirms that, by comparison with the *kinh* majority, educational progress amongst Viet Nam's ethnic minority children has been solid up to about age 14, but sparse thereafter.

Figure 4: Enrolment Rates by Age and School Type (1st and 5th Quintiles), 2006 and 2016



Source: Authors' calculations based on data from the Viet Nam Household Living Standards Survey 2006 and 2016.

Figure 5: Enrolment Rates by Age, School Type, and Ethnicity, 2006 and 2016



Source Authors' calculations based on data from the Viet Nam Household Living Standards Survey 2006 and 2016.

Improving the supply of educational resources – schools, teachers, books and equipment, and services such as curriculum design – is fundamental and is the primary policy domain of public sector agencies with educational mandates. However, schooling demand beyond the age of compulsory education is also subject to influence from labour markets, credit markets, and more. Employment, returns to skills, and incomes may all rise in the course of economic growth, but each of these changes will have a distinct (and not necessarily positive) influence on incentives to remain in school (Becker, 1954). Moreover, each of these variables may have different effects on schooling when individuals are heterogeneous along some exogenous or differentially constrained dimension such as ethnicity, credit access, or labour mobility.

4. Data

This project uses a unique data set with significant complementarities to existing data on schooling and labour market transitions in Viet Nam. Students completing Grade 9 (lower secondary school) who wish to continue to upper secondary and perhaps beyond must take the G10 exam. This qualifying test covers two core subjects (mathematics and literature) and may include other subjects at the discretion of provincial education authorities.[10] High schools use these results in their admissions process, setting minimum scores based on a variety of factors including school capacity and quality. We have access to individual G10 exam scores, plus some other basic information about test-takers, for four provinces and several years in each province. We do not have household data for the test-takers. We merge these records at district level with data from the Viet Nam Household Living Standards Survey (VHLSS, initially known as the Viet Nam Living Standards Survey); censuses; and labour force surveys – to provide additional information on local incomes and distribution, population structure, and labour demand.

[10] When test scores are the dependent variable, province fixed effects play an especially important role since the G10 exam is not nationally uniform. All exams are required to have math and literature sections, but individual provinces have the discretion to add other sections and to apply their own grading standards.

A test such as the G10 exam provides a reasonably clear indication of the candidate's intention to continue their studies, since there is no reason for taking the test other than to continue in school. As noted, however, an important qualification is that not all children who are eligible to take the G10 exam actually choose to do so.

This data set is unique, but it is not the only vehicle for studying educational investment and attainment in Viet Nam. In the early years of Viet Nam's transition from a command economy to a mixed economy, nearly all studies of the educational implications of growth relied on data from the biennial VHLSS. Early studies found evidence of a strong income effect from domestic market liberalisation, leading to the withdrawal of children from the family/farm labour force and a preference for increased schooling, even amongst low-income households (e.g. Edmonds and Pacvnik, 2005). Income effects may have been found to dominate in early studies, in part because large-scale labour demand growth by foreign-invested firms and their domestic counterparts began in earnest only from about the year 2000.

Whereas the VHLSS data used in most other studies have minimal panel components, Mergoupis, Phan, and Sessions (2018) used a longitudinal survey of rural households (Viet Nam Access to Resources Household Survey) to evaluate schooling decisions in the context of labour market trends. They found no relationship between local labour markets and schooling decisions. However, the Viet Nam Access to Resources Household Survey is designed to study rural asset markets, and its indicator of labour market activity is wage offers in agricultural tasks such as harvesting. Agriculture, while still a large employer, is no longer the primary source of jobs for school-leavers, and wages for seasonal work such as harvesting may not convey an accurate labour market signal.

Beginning in the early 2000s, an important new data set has spawned an increasingly rich set of studies. Viet Nam is one of four countries in the Young Lives survey, a longitudinal study of child poverty with a strong focus on education. Young Lives surveys collect detailed data on a panel of children who have been followed since 2002, enabling in-depth studies linking individual and family conditions to educational outcomes (Rolleston et al., 2013). Rolleston and Iyer (2019), for example, used Young Lives data to confirm 'meritocratic progression' by finding that good test scores in Grade 5 predict progression to Grade 10. Nguyen (2016) examined the

outcomes for children 'left behind' by parents who migrate for work. Ethnicity accounts for a large share of the income and education gap in Viet Nam, and for this reason is much studied (Baulch et al., 2010; Truong, 2011; Glewwe, Chen, and Katare, 2015; Arouri, Ben-Youssef, and Nguyen, 2019; Nguyen, 2019); the most detailed studies in this literature also rely on Young Lives data. One conclusion that emerges consistently from these studies is that while individual and household conditions matter for all children's educational decisions and outcomes, external factors – including parental education and economic conditions, peer and school effects, and language barriers – are of greater importance to children from minority backgrounds (Glewwe, Chen, and Katare, 2015; Nguyen, 2019). This conclusion, if robust in nationally representative data, suggests that measures aimed at improving education for ethnic minority children should focus more on their circumstances and less on providing specialised schools or curricula, as at present.

The data set we will use is in some respects complementary to Young Lives. We lack detailed information on individuals but will ultimately have more complete geographical coverage.[11] This will mean greater capacity to exploit local variation in labour markets, school access and quality, and community-level characteristics. Extant Young Lives studies reveal very little about 'macro' labour market influences on school decisions, yet there is clearly a need to focus on opportunity cost since a child aged 15 is legally able to enter full-time employment. The ethnicity gap in labour market opportunities is of particular salience given Viet Nam's dynamically growing economy. If demand for low-skilled workers is growing fast but ethnic minority children have been historically less able or willing to migrate for work, how is their schooling affected? If rapid growth is causing changes in the skill premium in employment, how will that interact with ethnicity-based differences in expected returns to schooling? If rapid economic growth and liberalisation of domestic policies

[11] While the Young Lives data form a very rich panel, they have some drawbacks. First, ethnic minority representation is 12% of the Young Lives sample, but 16% of Viet Nam's youth population (a related concern is *which* ethnic minority groups are represented, and whether they, in turn, adequately capture variation amongst Viet Nam's 57 ethnic groups). Second, Young Lives oversamples populations close to major cities. Sixty-three percent of the Young Lives sample comes from provinces whose capitals are no more than a 1.5-hour drive from the centre of the closest major city – either Ho Chi Minh City, Hanoi, or Da Nang respectively (these are our own calculations based on data reported in Young Lives 2013). Viet Nam's true population distribution is considerably more remote, on average, than this.

create new opportunities for entrepreneurial activities by the self-employed or family businesses, how does *that* interact with ethnicity and other exogenous differences?

4.1. Constructing the data

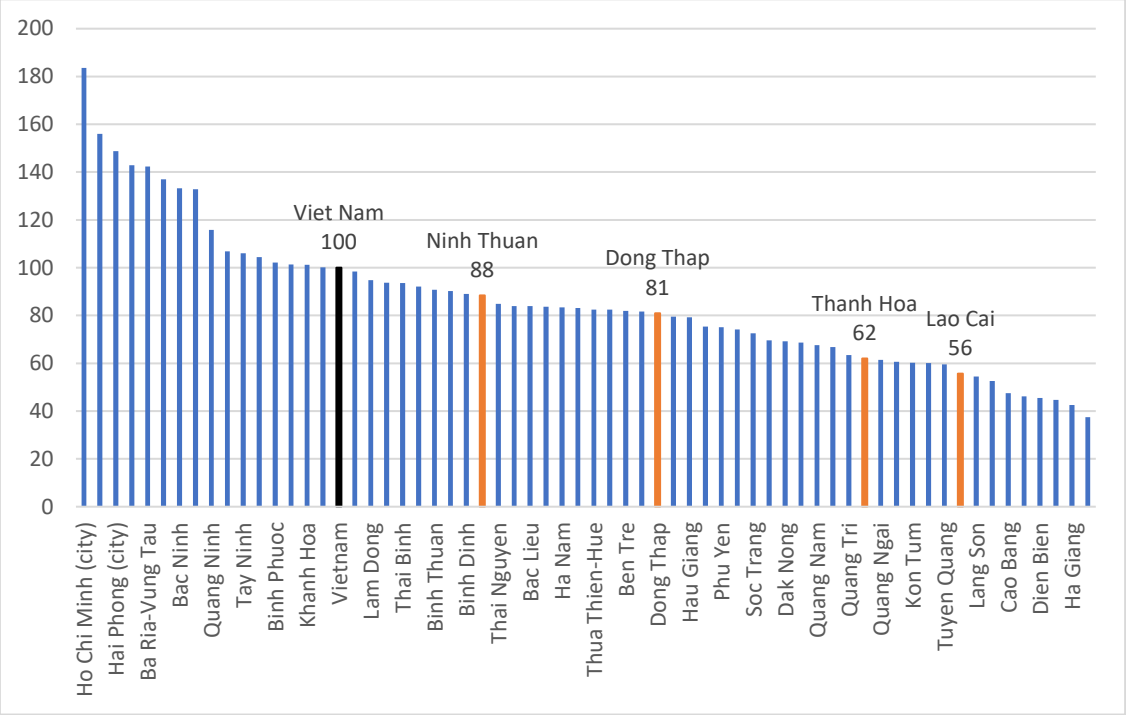
We want to understand why some children choose to take the G10 test while others do not. Conditional on taking the test, we also seek to explain variation in the scores obtained.

The G10 test data cannot be matched with individual records from other socio-economic surveys, but we can identify the lower-secondary school attended as well as the upper secondary school where they take the exam – that is, their intended Grade 10 school. This is sufficient for multi-level analysis after merging with data from the VHLSS and labour force surveys at district level.

We have individual test score records for several years in four rural provinces (Dong Thap, Ninh Thuan, Thanh Hoa, and Lao Cai) as well as Ho Chi Minh City. Our analytical methods are constrained by the paucity of complementary information on individual test-takers. Therefore, in this chapter we use individual observations from the rural provinces, aggregated to district level.

It is very important to note that our data are drawn from relatively poor provinces and as such are not nationally representative (Figure 6). Rather, they embody characteristics analogous to the 'last mile' problem of delivery costs that are convex both in distance and in level of schooling. At the extensive margin of development, people live in more remote locations, are more sparsely distributed, and are typically less wealthy, more rural, and more dependent on agriculture. These populations may also be less well connected in terms of services, information flows (internet and telecommunications backbone), and migrant networks. In addition, per-student educational costs at high school level are typically several times greater than at primary level in the developing world (UNESCO, 2011). Moreover, the task of keeping children in school beyond the legal working age is more challenging than that at lower grades due to opportunity cost. From the student's point of view, the direct and implicit costs of getting an education of a given quality are higher than for populations in regional centres and cities.

Figure 6: Provincial Average Per Capita Income as a Percentage of the National Average, 2014



Note: Not all province names included due to space constraints.
Source: General Statistics Office of Viet Nam (2015).

4.1.1. Participation rate

We have test score data only for children who have taken the G10 exam. We first want to know what fraction of the eligible population they are. We use the 2014 Intercensal Survey of Population and Housing to compute the size of each cohort of test-taking age in our data set. We then use a count of test participants as the numerator, and the census count as the denominator to calculate the G10 participation rate or the fraction of children taking the test in a given year.[12]

Table 1 summarises district-level results for the four provinces.[13] Provincial average rates range from 42% to 55%, and girls take the test at a much higher rate than boys in two provinces while in a third, Lao Cai, their rate is much lower. Within

[12] A more accurate count of the eligible population would come from counts of school enrolment by the same cohort in years preceding the test, e.g. Grades 7–8. Obtaining these data is an ongoing research task.
[13] The provinces in our data set are poorer and more rural than the national average, so these test participation rates are also somewhat below the national average rate.

provinces, district-level averages display a very wide range in Lao Cai, and smaller yet still notable ranges in the other provinces. Lao Cai is remarkable in that the range of district average test-taking rates is 21%–74% for boys, and 11%–73% for girls.

Table 1: Test-Taking Rates in Sample Provinces

Province (No. of districts)/cohort	Sample	Mean	S.D.	Min	Max
Lao Cai (9)	All	0.358	0.195	0.124	0.681
1999 and 2002	Male	0.359	0.189	0.123	0.725
	Female	0.371	0.233	0.104	0.744
Thanh Hoa (26)	All	0.779	0.149	0.403	1.325
2002–2003	Male	0.711	0.198	0.416	1.348
	Female	0.866	0.227	0.268	1.396
Ninh Thuan (7)	All	0.598	0.175	0.382	1.013
2000–2002	Male	0.521	0.239	0.219	1.235
	Female	0.704	0.167	0.450	1.031
Dong Thap (12)	All	0.569	0.086	0.380	0.749
2000–2002	Male	0.530	0.110	0.306	0.885
	Female	0.621	0.103	0.415	0.813

S.D. = standard deviation.
Note: Cohort shows the birth year of the eligible population.
Source: Authors' calculations from Grade 10 test score data.

4.1.2. Household income and other controls

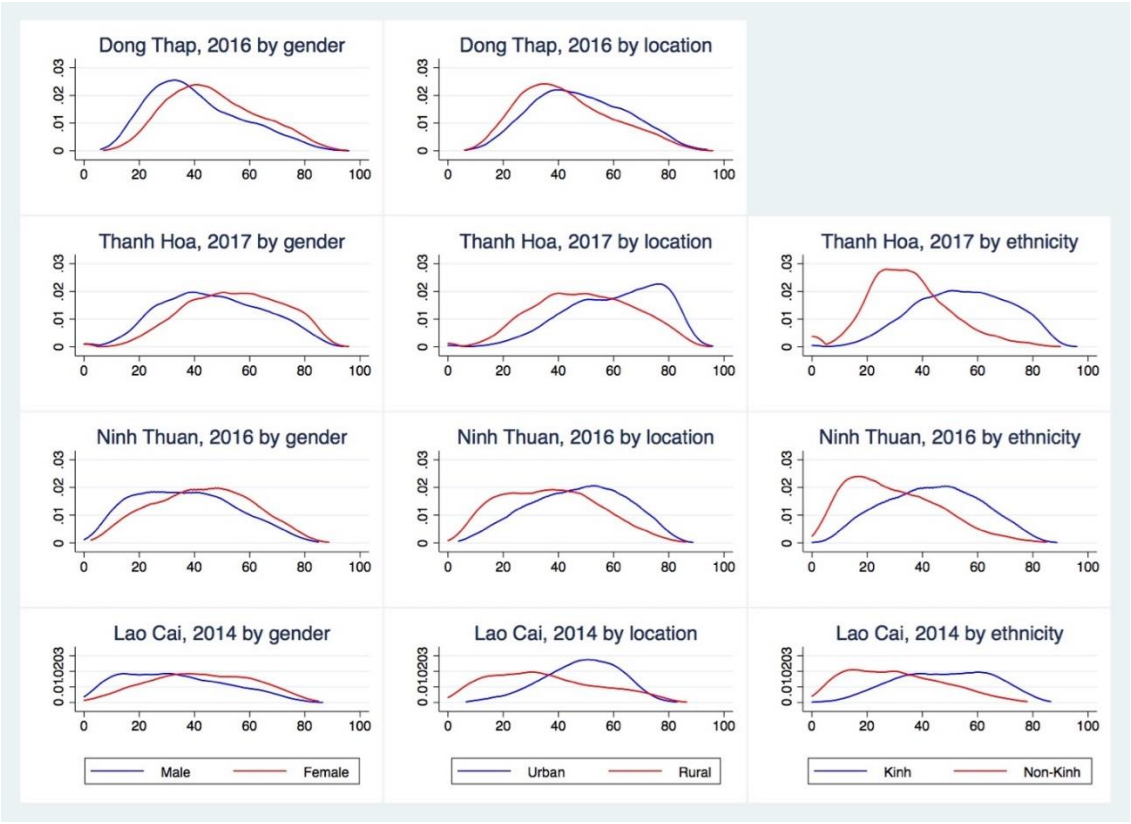
Because the district-level data set is small, we can use only a few variables to capture local economic conditions. At district level, we seek to control for household SES. The maintained assumption in this multi-level model is that variation within a location is less than that between locations, so a district-wide measure of economic well-being is a meaningful statistic for individual test-takers. We use district-level income and poverty data merged from the VHLSS,[14] as well as location and cohort fixed effects, to sweep out other unobserved variation.

[14] The VHLSS covers only a sample of districts in each province. These have been expanded to a full set of district-level SES data using small-area estimation techniques by Nguyen (2016).

4.1.3. G10 test scores

Individual test scores are a composite of results for components of the G10 exam and sum 50. Figure 7 summarises individual test score distributions over some relevant characteristics. There is wide variation within provinces by ethnicity and location as well as (in some) by gender. These distributions also highlight differences *between* provinces in locational and gender-based disparities (Dong Thap Province has a negligible minority population).

Figure 7: G10 Test Score Distributions by Gender, Location, and Ethnicity



Source: Authors' calculations from Grade 10 test score data.

4.1.4. Labour market variables

The literature on school attainment in developing countries contains surprisingly few studies addressing demand-side phenomena. Studies that do address demand-side phenomena typically focus on the effects of globalisation, especially export orientation and foreign investment. Atkin (2016) found that the establishment of *maquiladoras* (foreign-invested factories producing for export) in Mexico had a negative effect on school enrolment amongst teenage children in those localities. Blanchard and Olney (2017) found a negative relationship between growth in less skill-intensive exports and educational attainment in a global panel of countries. Coxhead and Shrestha (2017) found that district-level FDI employment shares in Viet Nam robustly predicted the propensity for teenage children to be out of school.

Foreign firms seldom employ more than a very small fraction of the overall labour force. In all these cases, the 'treatment' variable should be interpreted less as a measure of direct employment effects and more as indicating an elevated overall level of labour demand. In general, foreign investment leads indirectly to the creation of many more jobs than in the industry or sector to which the investment is directed. In the US, Moretti (2010) found large effects of greenfield investment in tradable sectors on jobs in non-tradable sectors, with 1.6–2.9 jobs created in the latter for every one created in the former (no comparable study exists for Viet Nam, to our knowledge). Some of the newly created jobs come at the expense of jobs elsewhere – under full employment, there would be zero net job creation – but in developing economies there is often capacity for additional labour supply from unemployed workers or from 'disguised unemployment', or along other labour supply margins such as female labour force participation and school-to-work decisions by young people. Fu and Balasubramanyam (2005) revisited 'surplus labour' arguments and evidence in China, and found that both export orientation and FDI induce increases in total employment.

In Viet Nam, employment by foreign-invested firms is a small (though rapidly rising) share of total employment. The Labour Force Survey shows instead that more than 90% of young school-leavers aged 15 and 16 are employed in household businesses. However, these businesses, most of which produce a variety of services (e.g. construction, trade and transport, retail, and personal services such as hairdressing

and household help) flourish mainly in areas experiencing large injections of new investment.

Stimuli to employment may both increase incomes and raise the opportunity cost of schooling. Coxhead and Shrestha (2017) pursued a quantity-based approach using FDI employment shares. Another approach to labour demand is through the influence of skill premiums. A higher skill premium indicates a higher relative return to investment in education and should in principle be positively associated with test participation. However, this is conditional on a number of factors, most prominently SES. If highly educated workers are mobile while the less educated are less so, then the value of a local skill premium may reflect labour immobility – a function of poverty, credit constraints, and perhaps other differences such as belonging to an ethnic minority community – as much as it does the returns to education per se. For this reason, the use of the skill premium to signal labour market activity should be accompanied by a rich set of other controls. In their absence, the skill premium is likely to be strongly correlated with other indicators of SES – and this is the case with our Viet Nam data in their present form. Accordingly, we use the Coxhead-Shrestha measure, the percentage of workers employed in FDI industries, as an indicator of labour market activity that is only weakly correlated with SES.[15] We expect that relatively greater labour demand, other things being equal, should be negatively associated with test participation.

5. Determinants of Test Participation

We first examine the correlations of test participation and measures of SES. Table 2 shows summary statistics for variables to be used in the estimation. Table 3 shows the SES correlates of the G10 exam participation rate at district level, obtained using ordinary least squares (OLS). The explanatory variables are the log of per capita expenditure, poverty headcount, poverty gap, poverty gap squared (poverty severity), and the ethnic minority fraction of the district population. Any one of these district-

[15] Several districts in our data report zero values for FDI employment. A few districts report very high values and the estimates are sensitive to these. To maintain the focus on relationships in the mass of the distribution rather than in its tails, we have dropped the seven highest FDI share observations.

level SES measures (they are all very highly correlated), together with province-level fixed effects, explains roughly 60% of the variation in the participation rate. Most education policies target communities rather than individuals, so the case for the multi-level approach in our study seems defensible.

Table 2: Summary Statistics

Variable	Obs.	Mean	S.D.	Min	Max
Ln per capita expenditure	120	9.89	0.33	9.07	10.66
Poverty headcount (%)	120	0.25	0.21	0.01	0.82
Poverty gap	120	0.06	0.07	0.00	0.31
Poverty severity	120	0.02	0.03	0.00	0.14
Ethnic minority population (%)	120	0.30	0.37	0.00	1.00
FDI employment share	120	0.40	0.75	0.00	3.40
Test participation rate	120	0.62	0.21	0.12	1.33
Test score (%)	120	44.14	9.98	15.63	66.90

FDI = foreign direct investment, Obs. = observations, S.D. = standard deviation.
Sources: Authors' calculations.

An important point relating to Table 3 is that the correlation amongst and between the SES and ethnic minority variables is very high, averaging about 0.9. This almost exact mapping reflects the widening inter-ethnic disparity in economic growth rates during Viet Nam's boom years. In 2016, ethnic minority (i.e. non-*kinh* and Hoa) groups made up about 15% of Viet Nam's population but accounted for 75% of the poor population (World Bank, 2018).

Table 3: Correlates of G10 Test Participation Rate in District Data

Variable	(1)	(2)	(3)	(4)	(5)
Log of p.c. exp.	0.247***				
	(6.40)				
Pov. headcount		-0.454***			
		(-6.77)			
Pov. gap			-1.301***		
			(-6.65)		
Pov. severity				-2.845***	
				(-6.42)	
Ethnic min. share					-0.233***
					(-5.76)
Constant	-1.970***	0.639***	0.623***	0.609***	0.584***
	(-5.26)	(11.88)	(11.79)	(11.60)	(11.02)
N	120	120	120	120	120
F	35.556	38.266	37.907	36.864	33.376
r2	0.609	0.627	0.624	0.618	0.594

Notes: *t* statistics in parentheses. Province and year controls not reported. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Authors' calculations.

We next turn to the main hypothesis test – that of a separate labour market effect on the propensity to take the G10 test. Table 4 reports the results of the OLS regressions, again with district average test participation rates as dependent variables and including district SES as well as province and year fixed effects. The provincial capital is also identified by a dummy variable, since as the seat of government it is likely to have a distinct labour market structure and population.

The variable of interest in Table 4 is the percentage of the district labour force employed by FDI enterprises. This variable is significant throughout, with a consistent value of –0.041± 0.003. This is economically meaningful, with an average marginal effect similar in magnitude to that of per capita expenditure. At the mean, a one standard deviation increase in the percentage of workers employed in FDI enterprises is associated with a reduction in the district G10 participation rate of about 4 percentage points. Comparable with Coxhead and Shrestha (2017), a higher rate of FDI employment is associated with a lower propensity to seek to continue in school after reaching working age. Employment growth raises the opportunity cost of schooling, and there is clear evidence that this substitution effect is important – even in Viet Nam's relatively remote, agricultural, and poor provinces.

Table 4: Correlates of G10 Test Participation Rate, with Labour Market Variable

Variable	(1)	(2)	(3)	(4)	(5)
FDI employees (%)	-0.040**	-0.044**	-0.042**	-0.039**	-0.038**
	(-2.17)	(-2.44)	(-2.35)	(-2.23)	(-2.00)
Log of p.c. exp.	0.292***				
	(6.30)				
Pov. headcount		-0.505***			
		(-6.87)			
Pov. gap			-1.453***		
			(-7.01)		
Pov. severity				-3.209***	
				(-6.94)	
Ethnic min. share					-0.244***
					(-5.59)
Provincial capital	0.012	0.071	0.089*	0.098**	0.107**
	(0.23)	(1.54)	(1.97)	(2.18)	(2.26)
Constant	-2.428***	0.632***	0.606***	0.587***	0.561***
	(-5.46)	(10.85)	(10.98)	(10.91)	(9.72)
N	120	120	120	120	120
F	22.346	24.025	24.436	24.224	20.447
r2	0.672	0.688	0.692	0.690	0.652

FDI = foreign direct investment.
Notes: *t* statistics in parentheses. Province and cohort controls not reported. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Authors' calculations.

The final column of Table 4 again uses the ethnic minority fraction in the district population in place of SES controls. The well-known correspondence between ethnic minority status and poverty in Viet Nam (World Bank, 2018) is immediately on display. Children in districts with higher ethnic minority concentrations are less likely to take the G10 exam. The fact that minority status is so highly correlated with measures of SES or poverty that they cannot both be included in a single regression model speaks eloquently to the differential experience of this part of the Vietnamese population.

6. Determinants of Test Scores

It is in principle possible that the G10 participation rate simply reflects the selection by children over a range of cognitive ability (or prior educational experience), in which higher-ability children opt to acquire more skills while lower-ability children choose to take blue-collar jobs. If this is the only (or the dominant)

explanation for test participation, policy measures to encourage G10 test-taking and progression to upper secondary school may simply set lower-ability children up for failure without adding appreciably to the stock of skilled workers. On the other hand, if economic or other factors are also important then it is also possible that children of higher cognitive ability but limited economic means are selecting out. If so, then expanding test participation may make a positive contribution to skills accumulation both at the individual and aggregate levels. With test scores from children who do take the exam, we can make an initial exploration of these issues.

The propensity to take the G10 exam is endogenous, so to account for non-random selection into the sample for which scores are available, we propose a two-stage least squares model. In the first stage, we instrument the exam participation rate using the fraction of FDI workers and SES variables. In the second stage, the instrumented participation rate enters as a control in the test score equation. The data set is not large, so the reported estimates should be treated with caution. Table 5 shows these estimates for three plausible models (a final column in the table reports OLS estimates, for comparison).

Diagnostics on the first-stage regressions confirm the relevance and validity of the instruments. The null hypothesis of an exogeneous participation rate is rejected. In the first-stage regressions, higher district-level per capita expenditure has a positive association with the test-taking rate as before, while poverty and the ethnic minority population share each have a significant negative association. In the second stages, the instrumented test participation rate has a significantly positive influence on test scores. The sign and significance of this estimate lends support to the idea that measures to encourage G10 participation are likely to attract more candidates of higher ability rather than of lower ability. In this table, the participation rate variable is scaled from 0 to 100, so a 1 percentage point increase in this rate raises test scores by 0.75–0.89 points, depending on the model. The mean participation rate is 62%, with a standard deviation of 21, so in these estimates a one standard deviation increase in the participation rate raises test scores by 16–19 percentage points.

Table 5: 2SLS Estimates of Test Scores Using Share of FDI Employment

Variable	(1) First test rate (%)	(1) Second score	(2) First test rate (%)	(2) Second score	(3) First test rate (%)	(3) Second score	(4) OLS
Test participation		0.766***		0.754***		0.891***	0.220***
		(0.129)		(0.120)		(0.160)	(0.046)
FDI employment (%)	-3.968**		-4.373**		-3.777**		
	(1.829)		(1.793)		(1.888)		
Ln p.c. exp.	29.186***						
	(4.630)						
Headcount pov.			-50.466***				
			(7.341)				
Ethnic min. share					-24.418***		
					(4.369)		
Prov. capital	1.174	2.790	7.080	2.958	10.741**	1.094	10.233***
	(5.037)	(3.797)	(4.587)	(3.703)	(4.753)	(4.392)	(2.421)
Constant	-242.83***	3.659	63.171***	4.105	56.086***	-0.845	23.41***
	(44.511)	(5.885)	(5.823)	(5.596)	(5.770)	(7.068)	(3.00)
R-squared	0.672		0.688		0.652		0.507
IV F-stat		19.99		23.75		15.73	
Durbin pval		0		0		0	
Sargan pval		0.0302		0.0288		0.0477	

2SLS = two-stage least squares, FDI = foreign direct investment, OLS = ordinary least squares.
Note: N. obs = 120. Province and cohort controls not reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations.

Finally, we note once again the special circumstances of ethnic minority districts. In these, the propensity to take the G10 exam is significantly lower than in *kinh*-majority districts. However, our results with the current data indicate that once differences in test participation are controlled, and taking account of province and year fixed effects, there is no significant ethnicity-based difference in test scores.

The two-stage model is not free of problems, mostly those related to the small data set. We are not strongly confident that the exclusion restriction holds for SES and ethnic minority variables. It is possible that district variables such as per capita income affect test scores independently as well as through the test-taking rate. This concern can only be alleviated by obtaining more data and exploiting greater variation through time and across observational units.

6.1. Discussion

The estimation results in Tables 4 and 5 provide useful information in their own right and create optimism that stronger and richer results could be obtainable with a larger data set. Of course, the size and representativeness of our data set is only one of several potential challenges to the validity and accuracy of the reported results. The data set lacks substantial variation through time, and this (as well as the small number of total observations) is reason to treat the results with caution. We conclude this section with a brief discussion of some other threats to be considered and, if possible, addressed in future research.

Omitted variables. We have minimal information on individual children, so we are required to assume that individual differences in G10 exam participation and scores are randomly distributed after controlling for known characteristics (ethnicity, age, G9 school, and local social and economic characteristics, including economic and labour market conditions). In this way, our study is complementary to Young Lives, which contains a rich set of individual characteristics but covers a small sample with limited cross-sectional variation.

Endogenous selection into lower-secondary schools. Some children may attend schools outside their hometown to take advantage of better educational opportunities (this

can be seen in the summary statistics, where the maximum value of the test participation rate is above 100% in some districts). If this is widespread, then estimates of community-level influences over outcome variables will exhibit bias. The test score data sets record whether a child is a migrant to the area where they attend school, so there is some capacity to control for this form of selection.

Endogenous investment in schools and educational services: wealthier communities naturally lobby to win high-quality schools and teachers. If this is widespread and unobserved in the data, then we will overestimate the effects of community characteristics. Conversely, if there is deliberate 'catch-up' investment in deprived areas (and if that investment is effective), then we may underestimate the influence of community characteristics. In both cases, information on specific investments will help. School-level data from the Ministry of Education and Training will help minimise this source of bias.

7. Conclusions and Policy Discussion

Viet Nam's economy has emerged into middle income after a generation of very rapid growth. That growth has been anchored on globalisation, in which the country has exploited its comparative advantage in low-skilled labour-intensive activities. The pattern of growth is not unambiguously positive. While higher per capita incomes (on average) facilitate schooling, the labour market offers instant rewards to school-leavers from a very young age. Moreover, the pattern of income gains and job market opportunities appears to be unevenly distributed; for poorer individuals, labour market effects might dominate income effects. More work with richer data is required to quantify and understand these variations.

In this study, we examine newly available data on education–labour market interactions from several less-privileged provinces within Viet Nam. These data are drawn from provinces at the extensive margin of educational development. Their populations are poorer and ethnic minority groups are more prevalent than in the nation as a whole. In locations such as these, the marginal cost of providing additional educational opportunities, especially at upper secondary level, is likely to be high. This, in turn, is a

factor inhibiting both poverty reduction and intergenerational mobility, and as such places an additional burden on policy.

Amongst districts in these provinces, there is considerable variation in the propensity to attempt the entrance examination to Grade 10 – the gateway grade to rise above blue-collar labour market status. This variation runs in predictable patterns across SES and ethnicity. We also find that the labour market plays a significant role in *discouraging* education beyond the working age. Looking further, we find that after instrumenting, the test participation rate is positively associated with test scores. This seems to indicate positive selection into test participation. One narrative consistent with this finding is that measures to raise the participation rate will tend to pull in children whose ability qualifies them to do well in upper secondary school but who might otherwise have opted out of education after 9th grade. If robust, this is a positive sign for individual human capital accumulation at both individual and aggregate scales.

The idea of policies or programmes to raise test participation rates is enshrined in the Education Law of 2019, which made education to Grade 9 free in the public school system. The intent of the law is clearly to promote further educational deepening, so progression to Grade 10 (and beyond) has become a focus of education policy. How to achieve educational deepening, at what cost, and with what aggregate or individual benefits, is a compelling set of questions for Viet Nam.[18] At present, education policy reforms are focused on supply-side innovations (such as school construction, teacher quality, and curriculum reform) and distributional equity. These are important areas. Curriculum reform, in particular, has the potential to alter the balance of costs and returns to upper secondary schooling – especially as the current curriculum at that level is tightly focused on academic work in preparation for the college entrance examination, rather than on preparation for labour market entry per se. Our findings, however, indicate that the task of expanding educational attainment extends well beyond the mandate of the Ministry of

[18] Goldin (1998) presented a strikingly similar account of US secondary educational development during 1910–1940.

Education. In effect, any policy that affects the labour market is also, de facto, a policy affecting educational incentives and opportunities.

Looking beyond one country, Viet Nam has some special features, but it is also broadly representative of developing countries that arrived late to globalisation and now (or will soon) confront the need to move beyond production based on natural resources, low-skilled labour, and largely foreign capital. Indonesia, Bangladesh, Cambodia, and other countries now face similar human capital investment challenges to Viet Nam. Lessons from one country will benefit others.

References

Almond, D. and J. Currie (2011a), 'Killing Me Softly: The Fetal Origins Hypothesis', *Journal of Economic Perspectives*, 25(3), pp.153–72.

Almond, D. and J. Currie (2011b), 'Human Capital Development Before Age 5', in O. Ashenfelter and D. Card (eds.) *Handbook of Labor Economics*, Volume 4b. Amsterdam: North-Holland, pp.1315–486.

Arouri, M., A. Ben-Youssef, and C.V. Nguyen (2019), 'Ethnic and Racial Disparities in Children's Education: Comparative Evidence from Ethiopia, India, Peru, and Viet Nam', *Children and Youth Services Review,* 100, pp.503–14.

Atkin, D. (2016), 'Endogenous Skill Acquisition and Export Manufacturing in Mexico', *American Economic Review*, 106(8), pp.2046–85.

Baert, S. and B. Cockx (2013), 'Pure Ethnic Gaps in Educational Attainment and School to Work Transitions: When Do They Arise?', *Economics of Education Review*, 36, pp.276–94.

Baulch, B., T.M.N. Hoa, T.T. Phuong, and T.P. Hung (2010), 'Ethnic Minority Poverty in Vietnam', *Working Paper*, No. 169. Manchester: Chronic Poverty Research Centre.

Becker, G. (1954), *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. New York: Columbia University Press.

Blanchard, E.J. and W.W. Olney (2017), 'Globalization and Human Capital Investment: Export Composition Drives Educational Attainment', *Journal of International Economics*, 106, pp.165–83.

Card, D. and J. Rothstein (2007), 'Racial Segregation and the Black-White Test Score Gap', *Journal of Public Economics*, 91(11–12), pp.2158–84.

Coxhead, I. (2014), 'Indonesia: Returns to Occupations, Education and Ability During a Resource Export Boom', in P.-C. Athukorala, A.A. Patunru, and B. Resosudarmo (eds.) *Trade, Development and Political Economy in East Asia: Essays in Honour of Hal Hill*. Singapore: Institute of Southeast Asian Studies, pp.134–52.

Coxhead, I. and R. Shrestha (2017), 'Globalization and School–Work Choices in an Emerging Economy: Vietnam', *Asian Economic Papers*, 16(2), pp.28–45.

Coxhead, I., V.C. Nguyen, and H.L. Vu (2019), 'Internal Migration in Vietnam, 2000–2012', in A.Y.C. Liu and X. Meng (eds.) *Rural–Urban Migration in Vietnam*. Cham, Switzerland: Springer, pp.67–96.

Dang, H.-A.H. and P. Glewwe (2018), 'Well Begun, But Aiming Higher: A Review of Vietnam's Education Trends in the Past 20 Years and Emerging Challenges', *Journal of Development Studies*, 54(7), pp.1171–95.

Deardorff, A. (2002), 'Introduction to the Lerner Diagram'. http://www-personal.umich.edu/~alandear/writings/Lerner.pdf (accessed 31 January 2020).

Demombynes, G. and M. Testaverde (2017), 'Employment Structure and Returns to Skill in Vietnam: Estimates Using the Labor Force Survey'. Hanoi: World Bank (mimeo).

Doan, T. and J. Gibson (2012), 'Return to Education in Vietnam During the Recent Transformation', *International Journal of Education Economics and Development*, 3(4), pp.314–29.

Doan, T., Q.T. Tuyen, and L. Quan (2018), 'Lost in Transition? Declining Returns to Education in Vietnam', *European Journal of Development Research*, 30(2), pp.195–216.

Edmonds, E. and N. Pavcnik (2005), 'The Effect of Trade Liberalization on Child Labor', *Journal of International Economics*, 65(2), pp.401–19.

Findlay, R. and H. Kierzkowski (1983), 'International Trade and Human Capital: A Simple General Equilibrium Model', *Journal of Political Economy* 91(6), pp.957–78.

Fu, X. and V.N. Balasubramanyam (2005), 'Exports, Foreign Direct Investment and Employment: The Case of China', *The World Economy*, 28(4), pp.607–25.

Fukase, E. (2013), 'Export Liberalization, Job Creation, and the Skill Premium: Evidence from the US–Vietnam Bilateral Trade Agreement', *World Development*, 41, pp.317–37.

Gao, W. and R. Smyth (2015), 'Education Expansion and Returns to Schooling in Urban China, 2001–2010: Evidence from Three Waves of the China Urban Labor Survey', *Journal of the Asia Pacific Economy*, 20(2), pp.178–201.

General Statistics Office of Viet Nam (2015), *Statistical Yearbook of Vietnam 2015*. Hanoi: GSO.

Glewwe, P., Q. Chen, and B. Katare (2015), 'What Determines Learning Among Kinh and Ethnic Minority Students in Vietnam? An Analysis of the Round 2 Young Lives Data', *Asia & the Pacific Policy Studies*, 2(3), pp.494–516.

Goldin, C. (1998), 'America's Graduation from High School: The Evolution and Spread of Secondary Education in the Twentieth Century', *The Journal of Economic History*, 58(2), pp.345–74.

Hamermesh, D. and A. Rees (1996), *The Economics of World and Pay*, 6th edition. New York: Harper and Row.

Hanushek, E.A. and L. Woessmann (2012), 'Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation', *Journal of Economic Growth* 17(4), pp.267–321.

Katz, L.F. and K.M. Murphy (1992), 'Changes in Relative Wages, 1963–1987: Supply and Demand Factors', *Quarterly Journal of Economics*, 107(1), pp.35–78.

Kozel, V., ed. (2014), *Well Begun but Not Yet Done: Progress and Emerging Challenges for Poverty Reduction in Vietnam*. Washington, DC: World Bank.

Li, H., P. Loyalka, S. Rozelle, and B. Wu (2017), 'Human Capital and China's Future Growth', *Journal of Economic Perspectives*, 31(1), pp.25–48.

McCaig, B. and N. Pavcnik (2018), 'Export Markets and Labor Allocation in a Low-Income Country', *American Economic Review*, 108(7), pp.1899–941.

Mergoupis, T., V. Phan, and J.G. Sessions (2018), 'Puzzle Me This? The Vietnamese Reverse Gender Education Gap', *UNU-WIDER Working Paper Series*, No. 2018/116. Helsinki: United Nations University World Institute for Development Economics Research.

Mincer, J. (1962), 'Labor Force Participation of Married Women: A Study of Labor Supply', in NBER, *Aspects of Labor Economics*. Princeton: Princeton University Press, pp.63–105.

Moretti, E. (2010), 'Local Multipliers', *American Economic Review*, 100(2), pp.373–77.

Neal, D.A. and W.R. Johnson (1996), 'The Role of Premarket Factors in Black–White Wage Differences', *Journal of Political Economy*, 104(5), pp.869–95.

Newhouse, D. and D. Suryadarma (2011), 'The Value of Vocational Education: High School Type and Labor Market Outcomes in Indonesia', *The World Bank Economic Review*, 25(2), pp.296–322.

Nguyen, C.V. (2016), 'Poverty and Inequality Estimates Using the 2014 Vietnam Household Living Standard Survey and the 2014 Intercensal Population and Housing Survey', Unpublished.

Nguyen, H.T.M. (2019), 'Ethnic Gaps in Child Education Outcomes in Vietnam: An Investigation Using Young Lives Data', *Education Economics*, 27(1), pp.93–111.

Phan, D. and I. Coxhead (2013), 'Long-Run Costs of Piecemeal Reform: Wage Inequality and Returns to Education in Vietnam', *Journal of Comparative Economics*, 41(4), pp.1106–22.

Psacharopoulos, G. and H. Patrinos (2004), 'Returns to Investment in Education: A Further Update', *Education Economics*, 12(2), pp.111–34.

Purnastuti, L., P. Miller, and R. Salim (2013), 'Declining Rates of Return to Education: Evidence for Indonesia', *Bulletin of Indonesian Economic Studies*, 49(2), pp.213–36.

Ray, R. and G. Lancaster (2005), 'The Impact of Children's Work on Schooling: Multi-Country Evidence', *International Labour Review*, 144(2), pp.189–210.

Rolleston, C. and P. Iyer (2019), 'Beyond the Basics: Access and Equity in the Expansion of Post-Compulsory Schooling in Vietnam', *International Journal of Educational Development*, 66, pp.223–33.

Rolleston, C., Z. James, L. Pasquier-Doumer, N.T.M.T. Tran, and T.D. Le (2013), 'Making Progress: Report of the Young Lives School Survey in Vietnam', *Working Paper*, No. 100. London: Young Lives, Oxford Department of International Development, University of Oxford.

Schultz, T.W. (1960), 'Capital Formation by Education', *Journal of Political Economy* 68(6), pp.571–583.

Solli, I.F. (2017), 'Left Behind by Birth Month', *Education Economics*, 25(4), pp.323–46.

Strøm, B. (2004), 'Student Achievement and Birth Effects', Manuscript. Gjøvik: Norwegian University of Science and Technology.

Tangtipongtul, K. (2015), 'Rates of Return to Schooling in Thailand', *Asian Development Review*, 32(2), pp.38–64.

Thomas, M.K. (2004), 'The SAT II: Minority/Majority Test-Score Gaps and What They Could Mean for College Admissions', *Social Science Quarterly*, 85(5), pp.1318–34.

Truong, H.C. (2011), 'Eliminating Inter-Ethnic Inequalities? Assessing Impacts of Education Policies on Ethnic Minority Children in Vietnam', *Working Paper*, No. 69. London: Young Lives, Oxford Department of International Development, University of Oxford.

UNESCO (2011), 'Global Education Digest 2011: Comparing Education Statistics Around the World – Focus on Secondary Education', Technical Report. Montreal: UNESCO Institute for Statistics.

Winters, L.A., N. McCulloch, and A. McKay (2004), 'Trade Liberalization and Poverty: The Evidence So Far', *Journal of Economic Literature*, 42(1), pp.72–115.

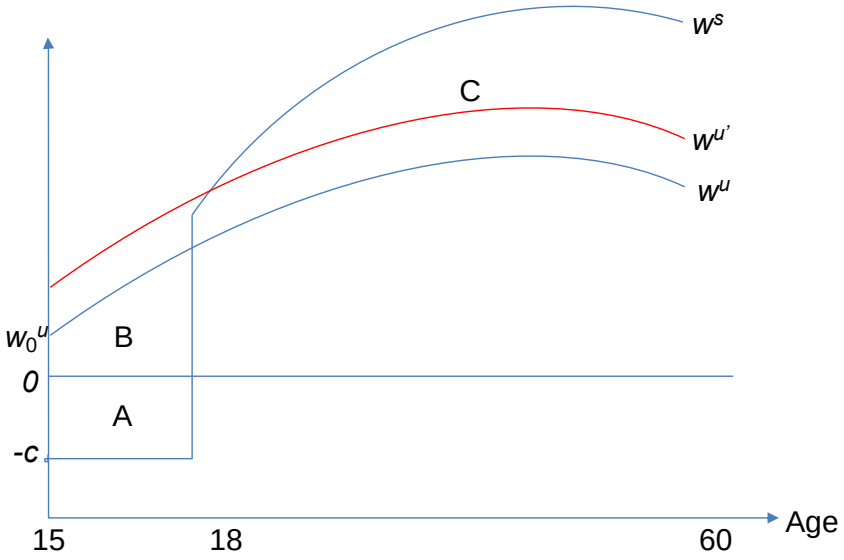
World Bank (2018), *Climbing the Ladder: Poverty Reduction and Shared Prosperity in Vietnam*, Vietnam Poverty and Shared Prosperity Update Report. Washington, DC: World Bank.

World Bank (2020), World Bank Open Data. www.data.worldbank.org (last accessed 23 September 2020).

World Economic Forum (2018), *Readiness for the Future of Production Report 2018.* Geneva: World Economic Forum. http://www3.weforum.org/docs/FOP_Readiness_Report_2018.pdf.

Young Lives (2013), 'Making Progress: Report of the Young Lives School Survey in Vietnam' (Summary Report). https://www.younglives.org.uk/sites/www.younglives.org.uk/files/Vietnam-School-Survey_Summary.pdf (accessed 10 July 2019).

Appendix: Figure A: Schooling Costs and Returns



Notes: Unskilled wage earnings over the life course are shown as line w^u. Secondary education incurs costs A (by assumption, from ages 15 to 18) and results in earnings shown as line w^s. Secondary education is a benefit if in present value terms, C > A+B. Parental income growth (i.e. eased credit constraints) and reduced schooling costs lower -c, and so reduce area A. These are *income effects.* Changes in w^u relative to w^s alter B and C. These are *substitution effects*. Example: an increase in low-skilled labour demand (to w^u') enlarges area B and reduces C.
Source of figure: Adapted from Hamermesh and Rees (1996).

ERIA Discussion Paper Series

No.	Author(s)	Title	Year
2020-31 (no. 358)	Araba SEY	Gender Digital Equality Across ASEAN	February 2021
2020-30 (no. 357)	Kimty SENG	Child Education: Rethinking Microcredit in Cambodia	December 2020
2020-29 (no. 356)	Dyah PRITADRAJATI	Determinants of School Enrolment: Relationship between Minimum Wage and Human Capital Investment	December 2020
2020-28 (no. 355)	Duc Anh DANG and Vuong Anh DANG	The Role of Innovation in Skill Development: Evidence from Small and Medium-Sized Enterprises in Viet Nam	December 2020
2020-27 (no. 354)	Sasiwimon Warunsiri PAWEENAWAT	Intergenerational Transmission of Human Capital: The Case of Thailand	December 2020
2020-26 (no. 353)	Nobuaki YAMASHITA and Trong-Anh TRINH	The Effects of Prenatal Exposure to Plentiful Rainfall on Cognitive Development in Viet Nam	December 2020
2020-25 (no. 352)	Han PHOUMIN, Fukunari KIMURA, and Jun ARIMA	Potential Renewable Hydrogen from Curtailed Electricity for ASEAN's Clean Energy: Policy Implications	November 2020
2020-24 (no.351)	Takahiro AKITA and Sachiko MIYATA	Measuring the Pro-Poorness of Urban and Rural Economic Growth in Indonesia, 2004-2014	November 2020
2020-23 (no.350)	Takahiro ONO and Venkatachalam ANBUMOZHI	Effects of Business Continuity Planning on Reducing Economic Loss due to Natural Disasters	November 2020

2020-22 (no.349)	HAN Phoumin, Fukunari KIMURA, and Jun ARIMA	Energy Reality and Emission in ASEAN: Energy Modelling Scenarios and Policy Implications	November 2020
2020-21 (no.348)	Bin NI and Ayako OBASHI	Robotics Technology and Firm-level Employment Adjustment in Japan	November 2020
2020-20 (no.347)	Pavel CHAKRABORTHY and Prachi GUPTA	Does Change in Intellectual Property Rights Induce Demand for Skilled Workers? Evidence from India	November 2020
2020-19 (no.346)	Makoto IKEDA and Thawatchai PALAKHAMARN	Economic Damage from Natural Hazards and Local Disaster Management Plans in Japan and Thailand	October 2020
2020-18 (no. 345)	Tony CAVOLI and Ilke ONUR	Financial Inclusion, Active Bank Accounts and Poverty Reduction in India	October 2020
2020-17 (no. 344)	Rashesh SHRESTHA and Samuel NURSAMSU	Financial Inclusion and Savings in Indonesia	September 2020
2020-16 (no.343)	Kimty SENG	The Poverty-Reducing Effects of Financial Inclusion: Evidence from Cambodia	September 2020
2020-15 (no. 342)	Rajabrata BANERJEE, Ronald DONATO, and Admasu Afsaw MARUTA	The Effects of Financial Inclusion on Development Outcomes: New Insights from ASEAN and East Asian Countries	September 2020
2020-14 (no. 341)	Rajabrata BANERJEE and Ronald DONATO	The Composition of Financial Inclusion in ASEAN and East Asia: A New Hybrid Index and Some Stylised Facts	September 2020
2020-13 (no. 340)	Tony CAVOLI and Rashesh SHRESTHA	The Nature and Landscape of Financial Inclusion in Asia	September 2020
2020-12 (no. 339)	Han PHOUMIN, TO Minh Tu, and THIM Ly	Sustainable Water Resource Development Scenarios and Water	September 2020

		Diplomacy in the Lower Mekong Basin: Policy Implications	
2020-11 (no. 338)	Kiki VERICO and Mari Elka PANGESTU	The Economic Impact of Globalisation in Indonesia	August 2020
2020-10 (no. 337)	Yuziang YANG and Hongyong ZHANG	The Value-Added Tax Reform and Labour Market Outcomes: Firm-Level Evidence from China	August 2020
2020-09 (no. 336)	Juthathip JONGWANICH, Archanun KOHPAIBOON, and Ayako OBASHI	Technological Advancement, Import Penetration, and Labour Markets: Evidence from Thai Manufacturing	August 2020
2020-08 (no. 335)	Duc Anh DANG and Thu Thu VU	Technology Imports and Employment in Developing Countries: Evidence from Viet Nam	August 2020
2020-07 (no. 334)	Hiroaki ISHIWATA, Hiroyuki WADA, Koji SUZUKI, Makoto IKEDA, and Naoto TADA	A Quantitative Analysis of Disaster Risk Reduction Investment Effects for Sustainable Development: Indonesia Case Study	June 2020
2020-06 (no. 333)	Dao Ngoc TIEN and Nguyen Quynh HUONG	Assessment of Industrial Cluster Policies in Viet Nam: The Role of Special Economic Zones in Attracting Foreign Direct Investment	June 2020
2020-05 (no. 332)	Ayako OBASHI and Fukunari KIMURA	New Developments in International Production Networks: Impact of Digital Technologies	June 2020
2020-04 (no. 331)	Upalat KORWATANASAKUL, Youngmin BAEK, and Adam MAJOE	Analysis of Global Value Chain Participation and the Labour Market in Thailand: A Micro-level Analysis	May 2020

2020-03 (no. 330)	Ha Thi Thanh DOAN and Huong Quynh NGUYEN	Trade Reform and the Evolution of Agglomeration in Vietnamese Manufacturing	April 2020
2020-02 (no. 329)	Kazunobu HAYAKAWA, Tadashi ITO, and Shujiro URATA	Labour Market Impacts of Import Penetration from China and Regional Trade Agreement Partners: The Case of Japan	April 2020
2020-01 (no. 328)	Fukunari KIMURA, Shandre Mugan THANGAVELU, Dionisius A. NARJOKO, and Christopher FINDLAY	Pandemic (COVID-19) Policy, Regional Cooperation, and the Emerging Global Production Network	April 2020

ERIA discussion papers from the previous years can be found at:

http://www.eria.org/publications/category/discussion-papers