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## **Puzzle me this?**

The Vietnamese reverse gender education gap

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**Abstract:** We investigate within the context of Viet Nam how circumstances at age 15 or 16 relate to completion of upper secondary education four years later. We exploit the longitudinal elements of the Viet Nam Access to Resources Household Survey to identify household and commune characteristics and emphasize how the effects of these characteristics vary by gender. The gender differences we find suggest that unequal treatment of girls within their households has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger. We find nothing in terms of local labour market conditions that could explain this gap.

**Keywords:** gender, Viet Nam, education gap

**JEL classification:** J31, J32, J33, M12

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## 1 Introduction

Education sets Viet Nam apart from other developing countries, especially in terms of its quality. As Dang and Glewwe (2018) show, PISA scores of 15-year-old students in Viet Nam are substantially higher than scores from countries with a similar level of income per capita and compare favourably to scores of high-income countries. Another feature of education in Viet Nam that it shares with many high-income countries—but which has not received as much attention—is the reversal of the gender education attainment gap. As net enrolments in primary and lower secondary education are almost universal, this reverse gap emerges most dramatically at the upper secondary level. In the period 2012 to 2016, upper secondary completion rates by women aged 19–20 are estimated to be between 9.0 and 17.7 percentage points higher than men’s, depending on the year and data source (see Table 1). We investigate the determinants of this gap using the Viet Nam Access to Resources Household Survey (VARHS) dataset, a rich longitudinal survey that in addition to households includes commune-level information. Our findings present us with a puzzle. We find little in terms of economic characteristics of the household and the community that can explain the gender gap. Indeed, we find that what matters for educational attainment at this level in fact works *against* females. This implies that the gap to be explained is in fact considerably larger than what appears in summary statistics, hence the puzzle.

The exact timing of the reversal varies depending on data source and measurement. Using net enrolment rates in upper secondary education, the reversal of the gender education gap emerged around 2005 and reached about 10 percentage points by 2014 (Dang and Glewwe, 2018). In terms of upper secondary completion rates, however, the reversal emerged in the early 1990s, with women having 4 percentage points higher rates than men already by 1993 (Nguyen, 2004).

Throughout this period, Viet Nam experienced rapid economic growth and significant advances in both male and female educational attainment. The longest and most up-to-date series of attainment are in Dang and Glewwe (2018). These show that net enrolments in 1992–93 were 85.6 per cent for primary, 72.3 per cent for lower secondary and 27.2 per cent for upper secondary. By 2014 these rates had risen to 98.0 per cent for primary, 94.8 per cent for lower secondary and 72.5 per cent for upper secondary. For the most part, however, these increases were achieved by 2004 with only marginal growth in the decade 2004–14. During that decade, at the secondary level there were no major shifts except the widening gender gap in upper secondary attainment. The Dang and Glewwe (2018) series shows that after 2004, upper secondary enrolments for boys started declining while for girls it kept increasing (with the exception of 2010), underscoring the reversal in the gender education gap.

Reversing the gender gap in education does not necessarily imply a reversal of the economic positions of men and women in the labour market, as education levels are not sufficient of themselves to reverse unequal treatment entrenched for decades, if not longer. Nevertheless, it would be reasonable to expect that shifts of such magnitude would be associated with improvements in the relative position of women in the labour market. It is unclear, however, whether this has happened in Viet Nam. To our knowledge, there is no consistent data series on earnings by gender going back to the early 1990s. The data reported in Pham and Reilly (2007) show that the female-to-male ratio in hourly wage rates increased from 0.76 in 1993 to 0.88 in 1998, where it remained until 2002. More than ten years later, in 2012 and 2016, when the cohorts of women that were more educated than men were already at the early stages of their careers, the Labour Force Survey shows that the ratio of monthly earnings was only 2 percentage points higher, at 0.90 (GSO 2013, 2017). At this level of aggregation, there is no indication that the convergence and subsequent reversal of gender education gaps payed off for women in Viet Nam. This is

consistent with estimates of the conditional gender earnings gap showing no signs of decreasing during the same period (Oostendorp and Doan 2013; Doan et al 2018). From the perspective of this paper, these results show no discernible link between gender differences in returns and enrolments. The absence of a link between labour market outcomes and education decisions is also reinforced by findings of other studies, which we discuss in Section 4.

The approach we take in this paper is to investigate how circumstances at age 15 or 16 relate to completion of upper secondary education four years later. We exploit the longitudinal elements of VARHS to identify household and commune characteristics and emphasize how the effects of these characteristics vary by gender. The gender differences we find suggest that unequal treatment of girls within their households has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger. We find nothing in terms of local labour market conditions that could explain this gap.

The paper proceeds as follows. In the next section we discuss the various literatures that bear on the question of differential gender attainment. In Section 3 we discuss institutional context, data, and methods. Section 4 discusses the results and Section 5 concludes.

## 2 Related literature

There is considerable literature on the determinants of educational attainment in Viet Nam, but few studies examine attainment systematically from a gender perspective. In practice this means that, for the most part, all determining factors are constrained to be constant across males and females, and gender enters models as an intercept shifting dummy. The most comprehensive study to date, Dang and Glewwe (2018), examines various measures of education attainment for several years over the period 1993 to 2014, using the Viet Nam Living Standards Survey (VLSS) and the Viet Nam Household Living Standards Survey (VHLSS). Particularly relevant to this paper are the results on secondary school enrolment among children aged 11–17, with secondary school including both lower and upper. The female indicator is estimated negative and significant for all years up to 2004, and positive and significant thereafter, hence following closely the pattern identified in the raw net enrolment series discussed above. When attainment is measured in years of schooling completed for individuals aged 15–25, gender differences disappear for most of the middle years of this period, possibly because the earlier cohorts with the more educated men are combined with the later cohorts with the more educated women.

The complement to the event of enrolling is the event of dropping out of school, so studies of the determinants of dropping out are also relevant to this paper. Of particular interest is the study by Coxhead and Shrestha (2017) because it estimates the probability of school attendance separately by gender and by rural and urban areas. Coxhead and Shrestha (2017) use the district-level employment rate in foreign firms as a proxy for the opportunity cost of staying in school, as employment in such firms typically does not require and hence does not reward, upper secondary education. The estimated effects for 2009 vary both by gender and by rural vs. urban area. Increases in the employment rate of foreign firms have statistically significant negative effects in urban areas for both genders aged 15 to 19, with the effects for females about twice the size of the male effects. In rural areas, the effects are insignificant for males but negative and significant for females (though smaller than the effects on females in urban areas). If the employment rate in foreign firms captures the opportunity cost of attending upper secondary education, as Coxhead and Shrestha argue, then the picture that emerges from these results is of girls in their late teens being much more responsive to the labour market than boys. In rural areas in particular, boys are not responsive to labour market incentives at all. With employment in foreign firms growing at a

rate between 3.0 and 3.5 per cent per year in the period 2006 to 2012, the predicted gap in enrolment rates would be the exact opposite of what we observe, as girls would tend to drop out and boys would tend to stay in school. The Coxhead and Shrestha results therefore reinforce the puzzle of the reverse gender gap.

Educational attainment depends on household resources and on the distribution of resources within the household, which in turn, at least in part, depend on fertility decisions. Various measures of resources have been found to be positively correlated with attainment in Anh et al (1998), Behrman and Knowles (1999), Dang and Glewwe (2018), Dang and Rogers (2016) and Rollerson and Iyer (2017). Among these studies, Behrman and Knowles (1999) test for gender differences and find that female enrolment in 1996 was considerably more responsive to household income than male enrolment, implying that female schooling was treated as something of a luxury good. Turning to the effects of the number of children, the estimates vary depending on how attainment is measured and the estimation method used. For 1994, Anh et al (1998) find that family size is negatively correlated with attendance but not with completion of secondary education except for family sizes greater than six. Dang and Rogers (2016) instrument the number of siblings using distance from family planning clinics and find that the effect on enrolment and completed years of schooling is statistically insignificant. In terms of gender effects, Tran and Nguyen (2014) find that the gender of the first-born child matters for the attainment of subsequent children. Male first-born children have a negative effect on both school enrolment and academic performance of subsequent children.

To the extent that an educational system maintains standards for grade completion, attainment should be positively correlated with effort and ability. Effort is difficult to observe but ability is typically measured using scores in aptitude tests. Rollerson and Iyer (2017), using data from the Vietnam Young Lives survey, find that maths scores in 2013 are positively correlated with grade 10 enrolment in 2016. They do not, however, test for gender differences.

In sum, estimates of the conditional gender gap in attainment confirm the reverse gender gap after 2006. The findings of those studies that test for gender differences reinforce the puzzle as, in contrast to boys, girls are found to respond to labour market conditions and households tend to prefer investing in the education of boys rather than girls.

### **3 Context, data, and methodology**

#### **3.1 Context**

The education system in Viet Nam comprises 5 years of primary, 4 years of lower secondary and 3 years of upper secondary level. By 2014, enrolment rates in primary and lower secondary were 98.0 and 94.8 per cent respectively, with virtual gender parity. Gender differences in enrolment arise in upper secondary where the overall enrolment rate in 2014 was 72.5 per cent with a reverse gender gap of about 10 percentage points. This gap arises mostly at the entry of upper secondary, as drop-out rates after entry are small and with very small gender differences (e.g. 1.16 per cent for boys and 0.96 per cent for girls in 2009 (MoET/UNESCO, 2013)).

Enrolment is one of several measures of education attainment. From a labour market perspective, it is perhaps more pertinent to measure attainment in terms of completion rates. We discuss completion rates in more detail below, but for now it is worth noting that the picture that emerges from completion rates is somewhat different from enrolment rates because in Viet Nam many pupils repeat grades while others return to school after interrupting their studies. As a result, upper

secondary completion rates are observed increasing with age even for those who are in their twenties. In addition, because males tend to have higher repetition rates than females (Nguyen, 2004), differences in enrolment rates may underestimate the magnitude of the reverse gender gap in attainment.

Another important feature of upper secondary education in Viet Nam is the role of the private sector and private finance, which became prominent in the mid-1990s. Nguyen (2004) reports that between 1993 and 1998 the share of upper secondary enrolment in private or semi-public schools increased from 4.2 per cent to 17.5 per cent while private financing increased from 60 per cent to 67 per cent.

### 3.2 Data

VARHS is a longitudinal survey with household and commune information collected every two years. In this paper we use the five VARHS waves from 2008 to 2016, which include samples drawn from 12 provinces across Viet Nam. Our analysis uses the cohorts becoming 19–20 years old in the period from 2012 to 2016, so that from the 2012 wave we select those born in 1992–93, from the 2014 wave we select those born in 1994–95, and from the 2016 wave we select those born in 1996–97.<sup>1</sup> Using their household identifiers, gender, year of birth, and relationship to head of household, we identify the same individuals in a wave four years earlier and extract household and commune characteristics which we use to predict educational attainment four years later. For example, for the cohort born in 1992–93 we use household and commune characteristics from the 2008 wave to predict educational attainment derived from the 2012 wave. This gives us a sample of 1,001 observations, with 52.7 per cent male.

Table 1 presents completion rates for 19- and 20-year olds derived from different surveys and for different population segments. The top two panels present upper secondary completion rates for urban and rural areas and the national level, derived from the 2012 and 2014 Vietnam Household Living Standards Survey (VHLSS). These can be compared with the top row of the third panel, presenting the upper secondary completion rates from VARHS (our sample). The estimates for men from the two VHLSS panels are close to each other, and the VARHS estimate is close to the national average from VHLSS. The estimates for women however, both across VHLSS years and across surveys, vary considerably. It is not clear why this variation arises for women and not for men. The gender gap in upper secondary derived from the VARHS sample stands at –17.7 per cent, substantially higher than the gaps from the 2012 VHLSS, but only about 3 percentage points higher than the national and rural gaps from the 2014 VHLSS. So in terms of magnitude, the gap we analyse in this paper is on the high end but not far off the national level.

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<sup>1</sup> In Viet Nam it is not uncommon for young adults in their 20s to enrol in upper secondary education. This implies that upper secondary completion rates increase as a cohort ages. We do not extend the analysis beyond the age of 20 because attrition rates in VARHS increase sharply after that age, with substantial gender differences.

Table 1: Completion rates of 19–20 year olds - by survey and urban vs. rural

|  | <i>Males</i> | <i>Females</i> | <i>Male-Female<br/>Gap</i> |
|--|--------------|----------------|----------------------------|
| <u>VHLSS 2014</u>  |              |                |                            |
| <i>(At Least) Upper Secondary</i>                                |              |                |                            |
| <i>All</i>   | 51.6         | 66.2           | -14.6                      |
| <i>Urban</i>   | 67.1         | 79.1           | -12.0                      |
| <i>Rural</i>   | 46.5         | 61.4           | -14.9                      |
| <u>VHLSS 2012</u>  |              |                |                            |
| <i>At Least Upper Secondary</i>                                  |              |                |                            |
| <i>All</i>   | 51.6         | 60.6           | - 9.0                      |
| <i>Urban</i>   | 70.7         | 77.3           | - 6.6                      |
| <i>Rural</i>   | 45.1         | 54.8           | - 9.7                      |
| <u>VARHS 2012, 2014, 2016</u>                                    |              |                |                            |
| <i>At Least Upper Secondary</i>                                  | 53.5         | 71.2           | -17.7                      |
| <i>Lower Secondary Only</i>                                      | 30.5         | 16.7           | 13.8                       |
| <i>Primary Only</i>  | 12.8         | 7.6            | 5.2                        |
| <i>Not Completed Upper Secondary <u>and</u> Attending School</i> | 6.3          | 4.0            | 2.3                        |

Notes: . Sample sizes: VHLSS 2014: 1,181 (598 female). VHLSS 2012: 1,461 (725 female). VARHS: 997 (472 female).

Source: Authors' calculation from VHLSS 2012, VHLSS 2014, VARHS 2012, VARHS 2014, and VARHS 2016.

Given that in Viet Nam upper secondary completion rates rise with age well into the 20s, the question arises as to whether a gap defined as of age 19–20 may be temporary, and perhaps completion rates will converge as our cohorts age. The bottom row of Table 1 shows the percentages of men and women aged 19 and 20 who have not completed upper secondary but are still in school. Although at 6.3 per cent for men and 4.0 per cent for women these percentages are sizeable, even if all of those studying went on to complete upper secondary, the gap would be reduced by only 2.3 points. Therefore some convergence may be likely, but not at a rate that will substantially reduce the reverse attainment gap.

Table 2 presents summary statistics of the variables used in our estimation, by gender. As expected, gender differences in means across gender are generally small. We note however that harvesting wages at the commune level, as reported by the commune representatives, are gender-specific, with the male wage about 5.6 per cent higher than the female wage.



Table 2: Summary Statistics

|   | Male   |        | Female |        | Total  |        |
|---|--------|--------|--------|--------|--------|--------|
|   | Mean   | S. Dev | Mean   | S. Dev | Mean   | S. Dev |
| Upper secondary completion rate                   | 0.535  | 0.499  | 0.712  | 0.453  | 0.619  | 0.486  |
| (Log of) household income                         | 10.480 | 1.272  | 10.444 | 1.477  | 10.463 | 1.372  |
| Father's education                                |        |        |        |        |        |        |
| Default: no primary                               |        |        |        |        |        |        |
| (AT least) upper secondary                        | 0.156  | 0.363  | 0.150  | 0.358  | 0.153  | 0.361  |
| Lower secondary                                   | 0.331  | 0.471  | 0.333  | 0.472  | 0.332  | 0.471  |
| Primary   | 0.230  | 0.422  | 0.231  | 0.422  | 0.231  | 0.421  |
| Missing   | 0.074  | 0.262  | 0.104  | 0.305  | 0.088  | 0.284  |
| Mother's education                                |        |        |        |        |        |        |
| Default: no primary                               |        |        |        |        |        |        |
| (AT least) upper secondary                        | 0.105  | 0.307  | 0.117  | 0.321  | 0.110  | 0.313  |
| Lower secondary                                   | 0.316  | 0.465  | 0.305  | 0.461  | 0.311  | 0.463  |
| Primary   | 0.278  | 0.448  | 0.303  | 0.460  | 0.290  | 0.454  |
| Missing   | 0.017  | 0.130  | 0.021  | 0.144  | 0.019  | 0.137  |
| Northern region                                   | 0.470  | 0.500  | 0.422  | 0.494  | 0.447  | 0.497  |
| Ethnicity - Kinh group                            | 0.690  | 0.463  | 0.735  | 0.442  | 0.711  | 0.453  |
| With upper secondary school in commune when 15–16 | 0.225  | 0.418  | 0.216  | 0.412  | 0.221  | 0.415  |
| Daily harvesting wage <sup>1</sup>                | 0.868  | 0.593  | 0.822  | 0.424  | 0.846  | 0.521  |
| Birth order (default: first born)                 |        |        |        |        |        |        |
| Second-born                                       | 0.373  | 0.484  | 0.356  | 0.479  | 0.365  | 0.482  |
| Third-born  | 0.156  | 0.363  | 0.182  | 0.386  | 0.169  | 0.375  |
| Later-born  | 0.082  | 0.274  | 0.102  | 0.303  | 0.091  | 0.288  |
| VARHS waves (default: 2012)                       |        |        |        |        |        |        |
| 2014  | 0.314  | 0.465  | 0.324  | 0.469  | 0.319  | 0.466  |
| 2016  | 0.318  | 0.466  | 0.326  | 0.469  | 0.322  | 0.467  |
| N   | 525    |        | 472    |        | 997    |        |

Note: <sup>1</sup> Unit: VND100,000.

Source: Authors' computations using VARHS 2008–16.

### 3.3 Methods

Our aim is to identify the main characteristics of a household and the local economy that correlate with the completion of upper secondary education for males and females. As mentioned earlier, because dropping out conditional on entry is very small and with negligible gender differences, the crucial point for upper secondary completion is that of entry. Age at the point of entry into upper secondary education in Viet Nam varies significantly. This variation arises for various reasons. We have already mentioned grade repetition and study interruption. Another reason is that age also varies at the entry points in earlier schooling stages, including primary (Nguyen, 2004). Furthermore, because the timing of entry into upper secondary is itself correlated with household and local economy characteristics, it is impossible to choose entry points without an element of sample self-selection. The choice of measuring completion rates at age 19 to 20, and measuring household and local economy characteristics at age 15 and 16, implies we allow for one year of possible delays upon entry to upper secondary due to earlier delay of entry, repetition, or interruption of studies, and at the same time allow an extra year for completion of upper secondary. Still, as Table 1 shows, there is a sizeable proportion of those who have not completed upper secondary by 19–20 who are still in school, so we check the robustness of our conclusions by modifying our dependent variable to model completion or enrolment instead of completion only.

Our approach is to try to control for observable factors that may determine enrolment and subsequent completion of upper secondary, subject to data constraints. Although we control for a number of personal, household, and local characteristics, we have no measure of personal ability or scholastic aptitude.

## 4 Results and discussion

Table 3 presents results from estimating the probability of completing upper secondary education by age 19–20 using linear probability models (LPMs), separately by gender. Estimation using probits yielded very similar results. All controls are measured as of 4 years earlier, i.e. at age 15–16. Columns 1–4 present estimates from a model that does not control for parent education and birth order effects, and columns 6–9 are from a model that includes the full set of controls. Columns 5 and 10 indicate whether coefficients statistically differ across gender when the sample is pooled and the same model is estimated with gender interactions. Detailed estimates of this pooled model with interactions are in the Appendix.

Table 3: Probability of upper secondary completion, by gender. Linear probability model estimates

|   | Model 1   |              |           |              |                   | Model 2   |              |           |              |                   |
|---|-----------|--------------|-----------|--------------|-------------------|-----------|--------------|-----------|--------------|-------------------|
|   | Male      |              | Female    |              | Gender difference | Male      |              | Female    |              | Gender difference |
|   | Coef. (1) | S. Error (2) | Coef. (3) | S. Error (4) |                   | Coef. (6) | S. Error (7) | Coef. (8) | S. Error (9) |                   |
| (Log of) household income                 | 0.009***  | 0.013        | 0.016***  | 0.012        |                   | -0.005*** | 0.015        | 0.008***  | 0.013        |                   |
| Father's education                        |           |              |           |              |                   |           |              |           |              |                   |
| Default: no primary education             |           |              |           |              |                   |           |              |           |              |                   |
| (AT least) upper secondary                | -         | -            | -         | -            | -                 | 0.319***  | 0.082        | 0.177***  | 0.092        | *                 |
| Lower secondary                           | -         | -            | -         | -            | -                 | 0.224***  | 0.077        | 0.168***  | 0.088        |                   |
| Primary education                         | -         | -            | -         | -            | -                 | 0.144***  | 0.072        | 0.180***  | 0.086        |                   |
| Missing                                   | -         | -            | -         | -            | -                 | 0.111***  | 0.092        | 0.135***  | 0.095        |                   |
| Mother's education                        |           |              |           |              |                   |           |              |           |              |                   |
| Default: no primary education             |           |              |           |              |                   |           |              |           |              |                   |
| (AT least) upper secondary                | -         | -            | -         | -            | -                 | 0.405***  | 0.078        | 0.468***  | 0.086        |                   |
| Lower secondary                           | -         | -            | -         | -            | -                 | 0.202***  | 0.074        | 0.426***  | 0.082        | ***               |
| Primary                                   | -         | -            | -         | -            | -                 | 0.176***  | 0.067        | 0.275***  | 0.081        |                   |
| Missing                                   | -         | -            | -         | -            | -                 | 0.227***  | 0.147        | 0.355***  | 0.154        |                   |
| Northern region                           | 0.191***  | 0.040        | 0.038***  | 0.039        | ***               | 0.148***  | 0.040        | -0.005*** | 0.038        | ***               |
| Ethnicity - Kinh Group                    | 0.475***  | 0.042        | 0.403***  | 0.049        |                   | 0.177***  | 0.064        | 0.058***  | 0.062        |                   |
| Upper secondary school in commune         | 0.112***  | 0.045        | 0.108***  | 0.045        |                   | 0.110***  | 0.041        | 0.081*    | 0.041        |                   |
| Daily harvesting wage                     | -         | -            | -         | -            | -                 | 0.017***  | 0.040        | -0.008*** | 0.054        |                   |
| Birth order effects (default: first born) |           |              |           |              |                   |           |              |           |              |                   |
| Second-born                               | -         | -            | -         | -            | -                 | 0.008***  | 0.044        | -0.071*** | 0.040        |                   |
| Third-born                                | -         | -            | -         | -            | -                 | -0.071*** | 0.054        | -0.135*** | 0.051        |                   |
| Later-born                                | -         | -            | -         | -            | -                 | -0.129*** | 0.075        | -0.149*** | 0.072        |                   |
| VARHS waves (default: 2012)               |           |              |           |              |                   |           |              |           |              |                   |
| Wave 2014                                 | 0.039***  | 0.048        | 0.028***  | 0.048        |                   | 0.059***  | 0.046        | 0.007***  | 0.046        |                   |
| Wave 2016                                 | 0.096***  | 0.048        | 0.061*    | 0.047        |                   | 0.093***  | 0.050        | 0.013***  | 0.056        |                   |
| Constant                                  | -0.050*** | 0.141        | 0.179***  | 0.129        | ***               | 0.007***  | 0.157        | 0.221***  | 0.135        | ***               |
| N   | 528       |              | 473       |              |                   | 525       |              | 472       |              |                   |
| R <sup>2</sup>                            | 0.195     |              | 0.168     |              |                   | 0.304     |              | 0.328     |              |                   |

Notes: Models estimated separately for males and females using linear probability models (LPMs). Robust standard errors next to coefficients. Statistical significance at the 1%, 5%, and 10% level is denoted by \*\*\*, \*\*, and \*, respectively. Gender Difference denotes the significance level of gender interactions in a pooled model. Detailed results of pooled Model 2 are in the Appendix.

Source: Authors' computations using VARHS 2008–16.

Surprisingly, net household income has very small effects that are not significant for either gender. This is contrary to findings of previous studies which, however, are not directly comparable to ours because they measure household resources contemporaneously with educational attainment. Measuring household resources contemporaneously with the educational attainment of an adult may imply a simultaneity problem. Family resources may be higher *because* of individuals with higher education attainment. Our approach avoids this potential problem as resources are measured 4 years earlier. Nevertheless, given the importance of private financing at the upper secondary level, it is surprising that net family income does not matter even in the absence of controls for parent education, as shown in columns 1 and 2. One possible reason for this may be that there tends to be much more variability in income than in expenditure or wealth measures.

Parental education effects are large, with some variation by gender. Higher levels of fathers' education are associated with higher completion rates for males but not for females (except relative to no primary education). On the mother's side, mother's education has strong positive effects for both boys and girls. The estimated effects are very similar by gender with the exception of the effect of lower secondary education, which is 20.2 percentage points for boys and 42.6 percentage points for girls, a difference that is statistically highly significant.

Gender differences are also significant in the regional effects. Males in the northern provinces are significantly more likely than males in other provinces and females nationally to complete upper secondary education. This is consistent with Guilmoto (2012) who shows sharp differentiations between the North and the rest of the country in terms of son preference practices. For example, northern provinces have the highest male to female ratios for children below 1 year of age and the highest son preference in fertility progression. Northern provinces are also differentiated from southern provinces in terms of practices of parents living with their married children. In all provinces it is more common for parents to reside with married sons rather than daughters, but this practice is exceptionally prevalent in all the northern provinces. With such practices prevalent, it is rational to invest in the education of male children because the male children act as insurance policy for old age. Ethnicity effects overlap with regional effects because of the uneven ethnic distribution across provinces. The Kinh and other ethnic groups with patrilocal and patrilineal practices are more heavily concentrated in the North, while groups like the Chăm and Raglay who practice matrilineal succession and the Khmer who practice bilateral succession are more concentrated in the South (Hoang et al, 2013). Our results show that males in households with a head of household from the Kinh group are significantly more likely than males with a head of household from another ethnic group and females nationally, to complete upper secondary education.

Gender differences are also present in birth order effects, though not statistically significant. Children that are not first born tend to have lower probabilities of completing upper secondary, but for males these effects are small and not statistically significant, at least for the first three children. For females on the other hand all the effects are negative and statistically significant and increase in absolute value as the order increases, suggesting that female children are disadvantaged within households.

In terms of commune level characteristics, the presence of an upper secondary school in the commune is significantly positively correlated with upper secondary completion. Perhaps this is unsurprising, though in Glewwe (2004) distance of primary and lower secondary schools did not matter for enrolment. More surprising is that there is no correlation between wages and upper secondary completion. VARHS includes information on four daily wage rates at the commune level by gender: wages for harvesting, ploughing, construction, and domestic help. Among the four types of employment, harvesting is arguably the one most rural residents enter into, so harvesting wage is one of the measures of local labour market conditions we use. Other measures included

the local employment rate and the local unemployment rate as derived from the 2009 census. None of these were statistically significant, suggesting no links between local labour markets and educational attainment.

The lack of correlation between local wage rates and completion rates is important because it implies no labour market link to the reverse gender gap. This is consistent with Coxhead and Shrestha (2017) for males in rural areas but not for females, as they found that higher employment rates by foreign-owned firms tend to increase female dropouts. It is also consistent with Beck et al (2016) who used VARHS samples from coffee-growing provinces and found that coffee price variation had no effect on school enrolment. Our result is also consistent with Mavrokonstantis (2011) who found that working at age 12 is not correlated with math aptitude tests at age 15 using the Vietnam Young Lives survey. This finding suggests that in Viet Nam work and study at the secondary level are not necessarily incompatible, possibly because of shorter school days. If work and schooling are not incompatible and work does not have detrimental effects on attainment, local labour market conditions would not necessarily be correlated with upper secondary completion. Of course this still leaves open the question of explaining the reverse education gap.

In sum, the only part of our results that contributes toward explaining the reverse gender gap, is the effects of mothers' education on females. This effect however is more than compensated by effects that work in the opposite direction. Fathers' education, region of residence, ethnicity of head of household, and birth order, all work toward increasing the gap. We estimate that if both males and females were treated as males, in the sense that secondary school completion for both were determined by the male coefficients, then the gap would be about 7 percentage points higher than it is.<sup>2</sup>

## 5 Final comments

Measured as attaining an education at the upper secondary level or above, women's education attainment in Viet Nam has been higher than men's since about the turn of the century. This higher attainment is not reflected in any significant improvement in the position of women in the labour market, so there are no obvious economic rewards sustaining this gap. In this paper we investigate the relationship between personal, household, and local characteristics at age 15 and 16, with completion of upper secondary education at age 19 and 20. We choose the age of 15 and 16 because these are the ages when most young people in Viet Nam make the decision to enter upper secondary education. The gender gap in upper secondary completion rates in our sample is 17.7 percentage points. To explain it we control for various characteristics, including birth order, father's and mother's education, household income, and local labour market conditions and we estimate the effects of these characteristics separately for males and females. We find that females are disadvantaged in the North of the country, in households with head of household of Kinh origin, and in relation to earlier born children. In contrast to boys, all of these characteristics have significant negative effects on the education attainment of girls. This implies that if females were treated equally to males, in the sense of female completion rates determined by the male estimated coefficients, the gender gap would be substantially higher.

Particularly puzzling is the lack of any relationship with local labour market conditions. We find that local wage rates at age 15 and 16 have no effect on the completion rates of either males or females. The lack of evidence supporting a labour market-based explanation is consistent with the

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<sup>2</sup> When estimated using probits, the increase in the reverse gap is even higher at 10 percentage points.

findings of Coxhead and Shrestha (2017) which suggest that male school attendance rates in rural areas are not correlated with foreign firm employment rates, as well as the Beck et al (2016) and Mavrokonstantis (2011) studies which find no effects on enrolment and attainment respectively.

Nevertheless, this still leaves unanswered the question of why the option of schooling beyond lower secondary education is so much more attractive to females than males. Our estimation does not control for scholastic aptitude, but the most recent PISA scores for Viet Nam show that in 2015 there were no statistically significant differences in the performance of 15-year-old boys and girls in science literacy and maths, though girls' performance was significantly higher than boys in reading (OECD, 2018). It is unlikely therefore that scholastic aptitude would explain a large part of the gap.

To the best of our knowledge, there is no government policy in Viet Nam aimed at reducing education costs specifically for women. There are scholarships from various non-profit organisations offered specifically to women, but it would be difficult to argue that the reverse education gap is sustained on the basis of such scholarships. Our evidence suggests instead that girls face higher costs accessing education because of barriers within and outside their households. As of 2018, women's retirement age is still 5 years earlier than men's, and even if the proposed changes are introduced, the gender gap will only be reduced to 3 years. Earlier retirement and child bearing imply that women have less time than men to recoup their investments in education, therefore requiring a higher return. Moock et al (2003) estimated that women's return to secondary (vs primary) and university (vs secondary) education was higher than men's in 1992–93, which was before the large increases in attainment that we discussed above. It is likely that this returns differential has disappeared or even reversed after the reversal of the gender gap in education attainment. It therefore seems possible, if not likely, that women in Viet Nam are over-educated, at least from a private rate of return to education point of view. The response to this challenge would not be to lower the attainment of future generations of women, but to increase employment opportunities requiring upper secondary (or higher) skills for both women and men.

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## Appendix

Table A1: Probability of upper secondary completion with gender interactions - LPM estimates

|   |              |                 | Interactions<br>(with female) |                 |
|---|--------------|-----------------|-------------------------------|-----------------|
|   | Coef.<br>(1) | S. Error<br>(2) | Coef.<br>(3)                  | S. Error<br>(4) |
| (Log of) household income                 | 0.002***     | 0.010           | ***                           |                 |
| Father's education                        |              |                 |                               |                 |
| Default: no primary education             |              |                 |                               |                 |
| (AT least) upper secondary                | 0.301***     | 0.069           | -0.105***                     | 0.062           |
| Lower secondary                           | 0.199***     | 0.057           | **                            |                 |
| Primary education                         | 0.160***     | 0.056           | *                             |                 |
| Missing                                   | 0.129***     | 0.064           | ***                           |                 |
| Mother's education                        |              |                 |                               |                 |
| Default: no primary education             |              |                 |                               |                 |
| (AT least) upper secondary                | 0.433***     | 0.057           |                               |                 |
| Lower secondary                           | 0.227***     | 0.064           | 0.171***                      | 0.063           |
| Primary                                   | 0.187***     | 0.060           | 0.078***                      | 0.071           |
| Missing                                   | 0.294***     | 0.105           | *                             |                 |
| Northern region                           | 0.150***     | 0.039           | -0.159***                     | 0.053           |
| Ethnicity - Kinh Group                    | 0.169***     | 0.057           | -0.106***                     | 0.067           |
| Upper secondary school in commune         | 0.095***     | 0.029           | *                             |                 |
| Daily harvesting wage                     | 0.011***     | 0.034           | ***                           |                 |
| Birth order effects (default: first born) |              |                 |                               |                 |
| Second-born                               | 0.006***     | 0.042           | -0.074***                     | 0.057           |
| Third-born                                | -0.073***    | 0.053           | -0.057***                     | 0.072           |
| Later-born                                | -0.138***    | 0.051           | *                             |                 |
| VARHS waves (default: 2012)               |              |                 |                               |                 |
| Wave 2014                                 | 0.056***     | 0.046           | -0.052***                     | 0.064           |
| Wave 2016                                 | 0.092***     | 0.049           | -0.087***                     | 0.061           |
| Female                                    |              |                 | 0.338***                      | 0.074           |
| Constant                                  | -0.062***    | 0.111           | ***                           |                 |
| N   |              |                 | 997                           |                 |
| R <sup>2</sup>                            |              |                 | 0.335                         |                 |

Note: These estimates were derived starting with a model fully saturated with interactions, then dropping interactions with coefficients whose statistical significance was rejected with a p-value greater than 0.50, then repeating until all coefficients of interaction terms had p-values less than 0.50. Robust standard errors next to coefficients. Statistical significance at the 1%, 5%, and 10% level denoted by \*\*\*, \*\*, and \*, respectively.

Source: Authors' computations using VARHS 2008–16.