Qualification mismatch in the labor market and the impact on earnings: evidence from Vietnam

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Abstract

Purpose – The purpose of this paper is to investigate the incidence and earning effects of the vertical mismatch between attained and required educational qualifications in a developing country's labor market.
Design/methodology/approach – Following Duncan and Hoffman (1981), this paper uses the augmented Mincerian wage equation to decompose the actual years of education of a person into years of over-education, years of required education and years of under-education. These years of education are then fitted in an ordinary least squares model to measure the earning effects of an employee when his/her attained educational qualifications are higher or lower than the required educational level in his/her job.
Findings – Unlike studies in developed countries, this paper finds that Vietnam has a higher incidence of under-education than over-education due to a large proportion of the population in rural and remote areas not having access to formal education. Further, qualification mismatch has an asymmetric effect on earnings in the sense that the wage rate is flexible downward but rigid upward. In particular, years of schooling that are in excess or in deficit of the required level for the job are not compensated with higher earnings. This paper concludes that although qualification mismatch incidence in Vietnam is different from that in developed countries, mismatched workers also suffer from significant wage penalty.
Originality/value – This paper makes a significant contribution by providing the first evidence from a developing country to the vertical mismatch literature which has already been overwhelmed with studies from advanced economies.

Keywords Earnings, Vietnam, Labour market, Education, Qualification mismatch
Paper type Research paper

1. Introduction

Studies on school-to-work transition have increasingly focused on the mismatch between required and attained qualifications of workers (Assirelli, 2015). This mismatch can have certain negative ramifications on individuals such as wage penalty (Allen and van der Velden, 2001), job dissatisfaction (Tsang and Levin, 1985), depreciation of skills (Büchel and Mertens, 2004), and lower access to further training and education (Quintini, 2011).

The literature on qualification mismatch often reports findings from Western developed countries where labor market conditions could be very different from those in a developing country (Bedir, 2014; Chua and Chun, 2016). This paper aims to close the gap in the

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literature by investigating the incidence of vertical qualification mismatch in Vietnam's labor market where jobs do not commensurate with people's educational level. In addition, we analyze the earning effects of this mismatch using the linear regression technique. The paper, to the best of our knowledge, is the first paper investigating the qualification mismatch incidence and effects on earnings in Vietnam.

Vietnam is an interesting case study because of several reasons. First, as a transition economy, Vietnam has undergone massive structural changes in all sectors from a central-command to a market-based economy since *Doi Moi*[1] policy in 1986. The strong economic growth, the radical shift in economic structure and the emergence of new service sectors (such as finance, banking, communication) in the economy, on the one hand, have created new opportunities in the labor market. On the other hand, they have posed challenges to workers for they require different skill and education profiles (Tran, 2018). Second, as a country under the strong Confucianism influence, education plays a highly important role in the society, evidenced by increasing investment in education or social stratification based on formal qualifications. However, there exists a paradox that the more educated, the higher the unemployment rate. For instance, the unemployment rate of people with some forms of post-school training is around 3.5–5.6 percent, while this rate for people without post-school training is limited to roughly 1.3–1.8 percent (General Statistics Office, 2014). This official statistics coupled with overwhelming information on newspapers about the difficulties of university graduates in finding jobs create an illusion that Vietnam is already at the saturation stage of tertiary education graduates.

Using the Labor Force Survey in 2015 in Vietnam, we show a rather surprising result that unlike developed countries, Vietnam has a higher incidence of under-education than over-education, possibly due to the fact that a large proportion of population in rural areas not having access to formal education. The over-education incidence is around 11.2 percent, while under-education incidence is 56.1 percent. Further, in a related study, Tran (2018) shows a non-negligible drop-out because students are not excited about study contents and pedagogical methodology. This calls for the Government intervention to lift the financial burden of young people so that they can stay longer in education, but, more importantly, to radically change the educational system to be more in line with students' needs and interests.

Using augmented Mincerian wage equation, we find that returns to each year of over-education and under-education are significantly lower than those to each year of required education. In terms of policy recommendation, it is appropriate to improve matching processes in the labor market by more transparent information dissemination, higher incentives to raise intensity of job search and on-the-job training to update skills and education profiles of workers.

The remainder of the paper is organized as follows: Section 2 briefly describes the context of education and labor market in Vietnam and reviews literature in the field. Section 3 presents data and methodology in which we formulate our estimation models. Section 4 reports and analyzes empirical results of qualification mismatch incidence and impacts on earnings. Finally, Section 5 gives concluding remarks and proposes policy recommendations to improve the labor market success of mismatched workers in Vietnam.

2. Background and literature review

From the supply side, since the 1990s, Vietnam has implemented a number of higher education reforms, particularly, through wage policies and investment to offer a wider range of university programs (MOET, 2015; Nguyen and Vu, 2015). From 2000 to 2012, total expenditure on education as a percentage of GDP increased substantially from 3.57 to 5.73 percent (MOET, 2015). As a result, total tertiary enrollment rate in Vietnam more than tripled from 732,187 students in 2000 to 2.25m students in 2013 (The United Nations Educational, Scientific and Cultural Organization, 2013). However, training programs are often criticized to be inflexible, and focusing on theory rather than practice (Hayden, 2005).

Further, under the influence of Confucianism, the society pays more attention to formal qualifications and little to employability and productive skills; hence, there is a significant discrepancy between what students learn at school and what they can do at work (MOET, 2015). Eventually, the low productive skills of graduates lead to a mismatch between formal qualifications and occupations (Chua and Chun, 2016).

From the demand side, the International Labor Organization (ILO) finds that there is a clear bias toward lower quality job in terms of monetary rewards, stability and security due to limited number of "good" jobs in low-income countries (ILO, 2013). We, therefore, expect to find a high incidence of qualification mismatch, given the current situation of demand and supply in the labor market in Vietnam.

Theoretically speaking, every occupation has a required level of education (E^r) for optimal job performance (Hartog, 2000; Mendes de Oliveira *et al.*, 2000; McGuinness, 2006; Chiswick and Miller, 2009). Individuals whose education level is higher than this required level are classified as over-educated (E^o), and those whose education level is lower than this required level are classified as under-educated (E^u). Collectively, they form the over-education-required education- under-education (ORU) status (Beckhusen *et al.*, 2013). In the case of over-education, a worker's human capital is not fully utilized, leading to labor productivity below the potential level. Given that firms pay no wage premium for human capital that does not enhance labor productivity, over-educated workers would receive lower wages than workers with the same qualifications but well-matched to their jobs (Allen and van der Velden, 2001; Black, 2013). In the same manner, under-educated workers are also generally found to earn lower wages than their well-matched colleagues (Verhaest and Omey, 2012). However, this result is rather trivial and not surprising because compared to adequately educated workers, under-educated workers invest less in their education, and thus receive less in earnings. Therefore, in this paper, we focus more on the effect of over-education on earnings.

Becker (1964) argues that human capital does not only consist of schooling years, but also labor market experience, on-the-job training, innate ability and social network (family or peer influence). Therefore, individuals, deemed to be over-educated, tend to lack labor market experience or necessary job training. On the contrary, under-educated individuals tend to possess more experience to justify their lack of formal schooling (Becker, 1964; Nielsen, 2011). In other words, perceived mismatch may partly be a statistical artefact that reflects unobserved labor market sorting due to individual heterogeneities (ability/motivation) within educational categories (McGuinness and Pouliakas, 2016; Rohrbach-Schmidt and Tiemann, 2016). The excess (deficit) education, therefore, does not genuinely relate to under (over)-utilization of skills, but to compensate for the deficiencies (surplus) in human capital (Black, 2013). Consequently, only years of actual education matter to earnings. In that sense, the returns to each year of required, over- and under-education should be equal. In other words, there is no reward or penalty of being over- or under-educated.

Empirical evidence from developed countries shows that the over-education rate among native-born citizen ranges from under 20 percent in Luxemburg and Poland to over 50 percent in Southern Europe, while under-education is negligible (Organization for Economic Co-operation and Development, 2015). Recent empirical studies in developing countries also present a significant portion of an over-educated workforce: approximately 38.6 percent in developing Asia, 30.1 percent in Peru but only 10.80 percent in Egypt (Chua and Chun, 2016; ILO, 2013; Bedir, 2014). Further, according to the ILO (2013), under-education is also substantial in low-income countries, for instance, 56.4 percent in Cambodia, 45.7 percent in Liberia, 43 percent in Jordan, but only 21.8 percent in Sri Lanka (ILO, 2013; Chua and Chun, 2016).

In this paper, we investigate the qualification mismatch in Vietnam to form a better comparison with other countries.

3. Methodology and data

3.1 Methodology

Measuring qualification mismatch incidence and its impacts on earnings. First, as the Labor Force Survey does not provide the exact number of years a person spends on schooling, we need to convert his/her final qualification into years of education. In other words, to measure the actual years of education (E_i), we use the theoretical years of schooling defined in the International Standard Classification of Education – 2011 (ISCED – 11) for an individual who has achieved a given level of qualification. For example, a person who has *Bang tot nghiep pho thong trung hoc* (Baccalaureate or ISCED – 11 Level 3–4) will be assigned 12 years of education. Second, to identify required level of schooling (E_i^r), we use the objective method based on the International Standard Classification of Occupations – 2008 (ISCO – 08). In particular, the ISCO – 08 defines four skill levels required for the job, from elementary (1) to highly skilled (4) level. These skills levels are then mapped to the corresponding required level of education in the ISCED – 11 to determine the required years of schooling for a job. For instance, a person, working as a manager with a skill level of 4, will be required to have at least 16–18 years of education (the exact number of years depends on the sub-category of this management position). The advantages of using objective method as opposed to subjective method are that it is based on the technology of the job and overcomes the measurement errors often found in survey data (Hartog, 2000; Leuven and Oosterbeek, 2011).

Following Duncan and Hoffman (1981), we decompose actual years of education using the following definition:

$$E_i \equiv E_i^r + E_i^o - E_i^u,$$

where:

$$E_i^o \equiv \begin{cases} E_i - E_i^r, & \text{if } E_i > E_i^r \\ 0, & \text{otherwise} \end{cases}, \text{ and } E_i^u \equiv \begin{cases} E_i^r - E_i, & \text{if } E_i < E_i^r \\ 0, & \text{otherwise} \end{cases}.$$

The augmented Mincerian earnings function can then be written as:

$$LnY_i = \beta_0 + \beta_1 E_i^r + \beta_2 E_i^o + \beta_3 E_i^u + X_i\gamma + \varepsilon_i, \quad (1)$$

where LnY_i is the natural logarithm of hourly wages; β_1, β_2, β_3 are the returns to years of required education, over-education and under-education, respectively; X_i is a vector control for individual characteristics; and ε_i is a classical, idiosyncratic error.

The ordinary least square (OLS) estimate of βs will be unbiased and consistent estimates of the causal effect of education on earnings, provided that there is no correlation between ε_i and E_i ($Cov(\varepsilon_i, E_i) = 0$). However, because of the non-random assignment of individuals to completed schooling levels and to job requirements, this assumption may not hold, which may lead to biased estimates (Leuven and Oosterbeek, 2011). In particular, this is a classical example of omitted variable bias, in which the non-observable personal characteristics of a person such as cognitive and non-cognitive skills might have a positive correlation with the decision to invest in education. This investment in education, in turn, determines the wages that he/she can earn later in life. In this case, the coefficient estimates of E_i does not simply give the direct effect of schooling years on wages, but rather its sum with the indirect effects of other unobservable characteristics (such as cognitive and non-cognitive skills and motivation level) on wages. Consequently, the coefficient estimates of schooling years on earnings are often biased upward.

In order to minimize the unobserved individual heterogeneity, which results in biased estimates, the model controls for a detailed set of individual characteristics: age cohorts, labor market experience, gender, marital status and region of settlement. This practice, unfortunately, does not rule out the possibility that the model still contains some unobservable variables. However, this would not harm our specific analysis since we do not focus on the returns to education (over-education and under-education) *per se*, but on whether over- and under-educated workers have lower returns to education than a well-matched worker having the same characteristics. Therefore, under our assumption that the biases of the coefficient estimates of E_i^r, E_i^o and E_i^u go in the same direction (i.e. upward bias), we can still make the intended comparison.

3.2 Data

The paper uses the Labor Force Survey conducted by the Vietnam Ministry of Planning and Investment under the technical assistance of the ILO in 2015. This is a representative annual household survey aimed at collecting fundamental information about the labor market such as employment activities, education, income and job search behaviors. This cross-sectional dataset consists of 205,714 people. Our target sample is people in the working age (from 15 to 64 years old) and working full-time in the formal sectors of the economy (excluding the military sector) as the information of people working in the informal sectors is usually unreliable (Black, 2013; Bedir, 2014). We do not include people working in the informal sectors in our analysis because people working in these sectors often face with low incomes, limited opportunities for skill development and precarious working conditions (ILO, 2013). Thus, this group of workers often has different motives to participate in the labor market than the workers in the formal sectors. Including workers in the informal sectors in our models will potentially lead to selection biases. Further, we want to maintain only a sample of workers in the formal sectors to be comparable with other previous studies in this field.

Following the approach of Bedir (2014), the informal sector consists of people working for companies without business registration, in subsistent farming, or whose wages fall below the minimum wage in 2015 (2.150m Vietnamese Dong/month). After excluding people outside our target sample, the effective sample size is 29,635.

4. Findings and discussion

4.1 Qualification mismatch incidence

A summary of key variables in our sample is presented in Table I. On average, we find that years of acquired education of Vietnamese workers are slightly lower than years of required education (roughly two years in deficit). This can be explained by low proportion of individuals having tertiary degrees (approximately 35 percent, compared to over 60 percent in developed countries) (ILO, 2013; Chua and Chun, 2016). The table also shows a statistically significant difference in tertiary educational attainment between two genders (males: 30.8 percent, female: 37.6 percent)[2].

In Table I, we report the incidence of qualification mismatch. The incidence of under-education seems to be more substantial (56.1 percent) than over-education (only 11.2 percent). In particular, we find that qualification mismatch is a bigger issue for males than for females. However, the unemployment rate of female workers (2.3 percent) is twice as high as that of males (1.1 percent), even though both rates are rather small.

This is an interesting finding because despite the higher education reform which increases the number of tertiary education students, over-education seems not to be a big problem in Vietnam's labor market, unlike a common claim that Vietnam is at the stage of "too many masters, and too few laborers" (Tran, 2018). The qualification mismatch with

	Total	Male	Female
Years of acquired education	12.03 (4.05)	11.83 (4.05)	12.27 (4.03)
Years of required education	14.14 (2.48)	14.05 (2.54)	14.25 (2.39)
Education level (figures in percentage)			
Primary or less (< = ISCED 1)	0.137	0.140	0.133
Lower secondary (ISCED 2)	0.193	0.207	0.176
Upper secondary (ISCED 3–4)	0.308	0.321	0.294
Undergraduate (ISECD 5–6)	0.339	0.308	0.376
Postgraduate (ISCED 7–8)	0.023	0.024	0.021
Total	1.000	1.000	1.000
% mismatch incidence using difference between years of education acquired and required			
Well-matched	0.311	0.288	0.337
Over-educated	0.112	0.116	0.109
Under-educated	0.561	0.585	0.531
Unemployed	0.016	0.011	0.023
Total	1.000	1.000	1.000
Mean age	36.09	36.80	35.27
% female in population	0.464		
% share of employment by occupation			
High-skill white collar	0.398	0.361	0.442
Low-skill white collar	0.266	0.234	0.303
Crafts and related trade worker	0.271	0.332	0.201
Elementary and skilled agricultural worker	0.065	0.073	0.054
Total	1.000	1.000	1.000
Log (ln) hourly wage	3.23 (0.52)	3.28 (0.53)	3.17 (0.49)
Observations (*n*)	29,635	15,885	13,750

Note: Figures are unweighted, and standard errors are in parentheses
Source: Authors' calculation

Table I.
Summary statistics – Labor Force Survey (15–64 years old)

more pronounced under-education rate could be explained by relatively low educational attainment. But, more importantly, labor markets in developing countries are often characterized by a large share of informal sector employment. This sector generally does not require high levels of qualifications, which makes over-education incidence more severe among self-employed workers (Chua and Chun, 2016). Since we already omitted observations in the informal sector of the economy, over-education incidence could be underestimated in our effective sample.

In Table II, we compare the distribution of mismatch across years of working experience, educational attainment, regions of settlement and occupational groups. There is evidence that over-education rate decreases with years of experience (from 22.8 to only 5.7 percent), and under-education rate increases with years of experience (from 39 percent up to 74.5 percent). These results are expected in the standard human capital theory as working experience can be treated as a substitute to formal qualifications (Becker, 1964; Nielsen, 2011; Black, 2013). The higher over-education rate for younger workers could also arise from greater difficulties in signaling their abilities or lack of information and experience with job search (Chua and Chun, 2016). And the higher under-education rate of people approaching retirement could be consistent with rising educational levels and changing job expectations in developing countries (Chua and Chun, 2016).

Disaggregation by regions of settlement does not show significant difference in the distribution of mismatch. However, the situation in rural areas seems to be better, evidenced by higher well-matched rate and lower under-education rate. In Vietnam's context, we would argue that this result is due to the fact that people move from rural to

	Qualification – job match			
	Well-matched	Over-educated	Under-educated	Total
Working experience				
Less than 5 years	0.382	0.228	0.390	1.000
From 6 to 10 years	0.368	0.148	0.484	1.000
From 11 to 20 years	0.356	0.106	0.538	1.000
From 21 to 30 years	0.269	0.071	0.660	1.000
Above 30 years	0.198	0.057	0.745	1.000
Education level				
Primary or less (< = ISCED 1)	0.144	0.000	0.856	1.000
Lower secondary (ISCED 2)	0.000	0.098	0.902	1.000
Upper secondary (ISCED 3–4)	0.123	0.037	0.840	1.000
Undergraduate (ISECD 5–6)	0.761	0.180	0.059	1.000
Postgraduate (ISCED 7–8)	0.000	1.000	0.000	1.000
Regions				
Urban	0.274	0.113	0.613	1.000
Rural	0.347	0.115	0.538	1.000
Occupational groups				
High-skill white collar	0.647	0.076	0.277	1.000
Low-skill white collar	0.107	0.149	0.744	1.000
Crafts and related trade worker	0.034	0.049	0.917	1.000
Elementary and skilled agricultural worker	0.306	0.484	0.210	1.000

Source: Authors' calculation

Table II. Distribution of education mismatch by sector

urban areas to find employment, which, thus, raises the incidence of under-education in the city.

Statistics of qualification mismatch across occupational groups reveal the highest under-education rate in Crafts and related trade workers with 91.7 percent, as this category generally does not require high formal qualifications to perform the job.

4.2 Impacts of qualification mismatch on earnings

Table III summarizes our estimates of impacts on earnings of qualification mismatch using OLS under the ORU framework. The first column reports the raw estimates in a model with no control variables. In the second column, we add a full list of control variables. In columns 3 and 4, we compare the results between males and females. In columns 5 and 6, we compare the results between rural and urban areas.

First, we find that in the model with all control variables, the return to years of required education is approximately 7.8 percent, the return to years of over-education is 6.3 percent and to years of under-education is −4.1 percent, *ceteris paribus*. These results are higher than findings in the mismatch literature. For example, Groot and van den Brink (2000), in a meta-analysis of 50 estimates on the returns to different educational components in developed countries, show that the unweighted averages of the return to required education of 5.6 percent, to over-education of 3 percent and to under-education of −1.5 percent, respectively.

Second, the returns to qualification mismatch also show heterogeneous impacts with respect to gender and region of settlement. In particular, females have higher returns to both required and over-education, and lower under-education wage penalty compared to males. This is similar to the findings of Moock *et al.* (2003) that the returns to higher education are higher for females than for males in Vietnam. In addition, the returns to years of required education in urban areas is larger than in rural areas (8.7 and 7.3 percent, respectively). However, years of under-education is penalized more strongly in urban than in rural areas,

Table III.
Qualification mismatch and impacts on earnings – OLS

	Full sample (1)	Full sample (2)	Male (3)	Female (4)	Urban (5)	Rural (6)
Years of required education	0.069*** (0.001)	0.078*** (0.002)	0.076*** (0.002)	0.081*** (0.002)	0.087*** (0.003)	0.073*** (0.002)
Years of over-education	0.048*** (0.003)	0.063*** (0.003)	0.058*** (0.004)	0.068*** (0.004)	0.079*** (0.005)	0.053*** (0.004)
Years of under-education	−0.026*** (0.001)	−0.041*** (0.001)	−0.043*** (0.002)	−0.039*** (0.002)	−0.042*** (0.002)	−0.039*** (0.002)
Age cohorts						
15–25		Ref	Ref	Ref	Ref	Ref
26–35		0.018 (0.011)	−0.003 (0.016)	0.035** (0.016)	0.027 (0.018)	0.012 (0.015)
36–45		0.028 (0.019)	−0.004 (0.027)	0.058** (0.027)	0.020 (0.030)	0.033 (0.025)
46–55		0.027 (0.027)	−0.027 (0.039)	0.087** (0.038)	−0.023 (0.044)	0.057* (0.035)
56–64		−0.004 (0.037)	−0.018 (0.051)	0.004 (0.055)	−0.107* (0.059)	0.067 (0.047)
Years of experience		0.027*** (0.001)	0.030*** (0.002)	0.023*** (0.002)	0.025*** (0.002)	0.028*** (0.002)
Years of experience-squared		−0.004*** (0.000)	−0.004*** (0.000)	−0.003*** (0.000)	−0.003*** (0.000)	−0.004*** (0.000)
Gender						
Male		Ref			Ref	Ref
Female		−0.104*** (0.005)			−0.133*** (0.008)	−0.084*** (0.007)
Marital status						
Single		Ref	Ref	Ref	Ref	Ref
Married		0.053*** (0.007)	0.088*** (0.011)	0.031*** (0.009)	0.025** (0.011)	0.076*** (0.009)
Region						
Urban		Ref	Ref	Ref		
Rural		−0.079*** (0.005)	−0.097*** (0.007)	−0.062*** (0.007)		
Constant	2.334*** (0.020)	1.958*** (0.025)	1.985*** (0.034)	1.816*** (0.036)	1.893*** (0.043)	1.901*** (0.030)
Number of observations	29,635	29,635	15,885	13,750	12,586	17,049
R^2	0.132	0.248	0.245	0.236	0.222	0.272

Notes: ORU Model. Dependent variable: natural logarithm of hourly wages. Sample of workers from 15 to 64 years old, working full-time in the formal sectors of the economy (excluding the military sector). We use age cohort dummies instead of age to avoid multicollinearity with years of experiences. Heteroskedasticity robust standard errors in parentheses. *,**,***Significant at 10, 5 and 1 percent levels, respectively
Source: Authors' calculation

probably due to the fact that there are more under-educated people in urban than in rural areas.

Other control variables also show expected directions and are statistically significant at the 1 percent level. As shown by adjusted R-squared, the models explain roughly 24–27 percent of the variations in individuals 'earnings. This explanatory power may seem relatively low, but it is quite common in empirical research on wages (Black, 2013).

In short, unlike the conventional Mincerian model of the returns on education, where the relationship between education and earnings is taken for granted as linear and strictly increasing (i.e. strictly monotonic), the relationship between investment in education and return to education under the ORU model is likely not monotonic because years of over-education and under-education result in lower returns than years of required education. In addition, as we noted earlier, these estimates could still be biased due to confounding factors which are unobserved but affect both education and wages such as individual abilities and motivation.

5. Conclusions

Qualification mismatch has become a topical issue in labor market policy in recent years, as there is more and more evidence showing negative aspects of mismatch on both individuals and the society. This paper investigates the effect of qualification mismatch on earnings in Vietnam's labor market. The data are taken from the Labor Force Survey 2015, and the estimations are performed with linear regression models.

First, it has been found that contrary to the qualification mismatch incidence in developed countries, under-education is a more severe problem in Vietnam than over-education. This finding is similar to those in other low-income countries due to the low attained education level of the whole population and an unequal access to formal schooling of people in rural and remote areas. This is a serious problem which calls for further research because under-education results in low productivity growth and low capacity for economic development (ILO, 2013).

Second, over-educated workers tend to have less working experience, while under-educated tend to have more working experience, which is in line with the prediction of the human capital theory.

Third, the returns to each year of over-education and under-education are lower than the returns to each year of required education even when we control for years of working experience. This shows that experience is not a perfect substitute for formal qualification, and over- or under-education is not simply a statistical artefact but has a relation to under-(over-)utilization of human capital. The situation is, however, better for females and people in urban areas in the sense that they have higher returns to over-education years and lower penalty for under-education years.

As the data do not allow us to investigate the horizontal mismatch incidence where people work in a profession different than the one they have been trained for, we can only focus on the vertical mismatch where education is quantitatively higher or lower than the required level of education in the job that they hold. We acknowledge that this could be a drawback of this research because we do not have information about workers' fields of study; however, this paper still makes a significant contribution by providing first evidence from a developing country to the vertical mismatch literature which has already been overwhelmed with studies from advanced economies. In terms of policy responses, it seems appropriate to introduce measures that improve matching process in the labor market through more transparent information dissemination, higher incentives to raise the intensity of job search and on-the-job trainings should be provided to raise the productivity as well as the earnings level of workers, especially in the case of under-education.

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Notes

1. *Doi Moi* means reform or renovation.
2. Pearson χ^2 test of difference in proportions $= 243.2$, indicating a statistically significant difference in tertiary educational attainment between males and females at the 1 percent level.

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