

## THE RETURN TO EDUCATION IN ARMENIA\*

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**Abstract** – This paper attempts to gauge the return to education in Armenia by examining how earnings vary with educational attainment. It employs household survey data where member wages and educational attainment are reported. The findings suggest that wages rise with educational attainment, albeit not uniformly and mostly for men. They also provide evidence on a large gap in pay between men and women.

**Keywords:** Returns to education, earnings, gender pay gap, Armenia  
**JEL:** I20, I21, I26

### 1. INTRODUCTION

Since the earlier works of Becker and Chiswick (1966) and Mincer (1974), a large body of the literature has addressed the return to investment in education. The primary focus of these studies has been on how earnings vary with years of schooling as well as the general attainment of education. Questions of interest range from the gain from completing primary education in developing countries, all the way to the gains from completing higher education. An additional question of interest is whether and by how much earnings due to educational attainment vary by gender. The latter is not just limited to the gender gap in pay as much as whether, as an example, the return to educating women in a developing country context beyond the primary grade has a higher return than that of educating males.

This paper expands on the literature by addressing the return to education in Armenia, a topic that has yet to be explored. Armenia represents an interesting case with a GDP under USD 3000, placing it in the middle low income country group designation, and a literacy rate that is close to 100 percent. What is not yet studied is whether individual

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earnings, as a measure of the return, vary with educational attainment? And if so, by how much? And furthermore, whether returns vary by gender. In order to extend the study of returns to education to Armenia, we employ household level data to explore how wages vary with education. The Armenian Household Integrated Living Conditions Survey has limited variables when compared to similar data for much of that of other developed countries. But it does provide adequate information on the attributes of individuals such as wages, age, educational attainment, gender, among others.

The findings suggest that in general wages rise by about 3 percent for each of year of schooling. This is much lower than the 10 percent return typically observed in studies on other countries. But measuring the return to years of schooling masks the fact that much of the gain is from completing higher education, in particular for men; when compared to secondary school completion, the return to higher education is close to zero for women. Another finding shows that women are paid much less than men at every level of education.

The remainder of this paper is organized as follows. Section 2 describes the available data. Estimates of the return to education are reported in Section 3. First, basic statistics are reported on the stylized facts of how wages vary with educational attainment and by gender. This is followed by multivariate estimates that control for individual attributes other than education. Section 4 concludes.

## 2. MODELING EARNINGS

### 2.1. Estimation.

In a Mincerian earnings equation, wages rise with education ( $e$ ) reflecting on rising productivity. Similarly, wages rise with experience ( $x$ ) but at a decreasing rate. Specified in semi-logarithm, the Mincerian earnings equation may be estimated as:

$$(2.1) \quad \ln wages(e, x) = \alpha + \beta e + \gamma x + \delta x^2 + \eta z$$

where experience ( $x$ ) enters in quadratic form, and  $z$  variables that control for personal attributes and non-market factors shaping wages.

In a transition country context, measuring or even defining experience is a challenge. As an example, given the compulsory nature of education as well as fixed compulsory periods of schooling years to graduate at a specific level, experience generally varies with age. When not available, experience can then be proxied as age less 6 years, to account for the first 6 years of pre-school life, less schooling years. But given the homogeneity of the age of the student population, using imputed experience is likely to yield estimates similar to those when using age as an explanatory variable.

Another consideration in a transition economy like Armenia is the severe economic dislocation that the population experienced since the break up of the Soviet Union in 1991. It is very likely that many of the workers in the survey experienced periods of job losses and have gained employment in occupations and industries that do not correlate well with their fields of studies and areas of training. This is likely to make it difficult to identify a meaningful measure of experience.

In addition to education and experience, other factors may influence earnings. As an example, nominal wages are likely to be lower in rural areas when compared to urban areas, reflecting on the cost of living and demand and supply considerations. In addition, there can be non-market factors such as discrimination that may shape the observed wages. Women, for instance, may get paid less than men consistent with the global evidence of a gender pay gap.

## 2.2. Data.

In order to explore how wages vary with educational attainment, we employ the 2003 year wave of the Armenian Household Integrated Living Conditions Survey. This is the latest survey we have been able to access. Of course, more recent surveys are available and span the years through 2015. However, and with the exception of a subset of variables, these are not publicly available. Indeed, surveys for the years 2004 through 2015 are publicly available but do not provide individual household member level information

TABLE 1. Reported education

Level of education	Freq.	Percent	Cum.
Primary	18	0.71	0.71
Non-complete secondary	91	3.58	4.28
General secondary	679	26.69	30.97
Secondary specialized	845	33.22	64.19
Non-complete high	32	1.26	65.45
High education	879	34.55	100
Total	2,544	100	

on size and sources of income. The latter is available only at the household level, with the parallel information on individual household members purged.<sup>1</sup>

The household survey consists of 10,584 individuals with reported wage earnings. These earnings are categorized by whether they report monthly or periodic earnings. We drop observations where earnings are reported periodically as we are unable to generate meaningful annual earnings, and retain only observations with reported monthly earnings. In addition, those under age 21 or over age 65 are excluded. We are left with 2,544 observations for individuals where their wages, including payments in kind, are known, as well as their ages, educational attainment, and gender, with urban vs. rural living arrangements observed.

The resulting sample, and as shown in Table 1, consists of 18 individuals with primary education, 91 individuals who did not complete secondary education, 679 who completed secondary education and graduated from high school, 845 who complete specialized or vocational secondary education, 32 who did not complete higher education, and 879 who completed higher education and hold university degrees. Over all, some 95 percent of the individuals in the sample had completed secondary education with one third graduating from college. Prior to reforms introduced in 2006, it took 10 years to complete secondary education, and another 5 years to graduate from a university.<sup>2</sup>

<sup>1</sup>See <http://armstat.am/en/?nid=15> and compare the information available for households and that for individual household members; the income source series Y in questionnaire (or variable y1\_3drm.\* in data set) is missing from the latter.

<sup>2</sup>Education reforms expanded the number of years from 10 to 12 for secondary education completion, and reduced to 4 from 5 years a college education takes.

TABLE 2. Mapping educational attainment into years of schooling

Level of education	Years
Primary	3
Not completed secondary*	8
General secondary	10
Secondary specialized	10
Non completed higher*	12
High education	15

\* By assumption.

While information is available on the educational attainment of individuals, no information is provided on the years of schooling. An attempt is made to map the former into the latter, with school year assumption reported in Table 2. As an example, ten years is assigned to those who have completed secondary education. For those who have failed to complete secondary and higher education, schooling years of 8 and 12 years are assumed, respectively. College graduates, those completing higher education, assumed to have completed 15 years of schooling, even though those with advanced graduate training are likely to have spent more more years of schooling. We recognize that these imputations, or rather assumptions, are likely to suffer from measurement errors.

Table 3 provides descriptive summary statistics for the 2544 observations. The mean reported monthly wages is 29690 Drams (sd= 56580), with 11.6 years of schooling and imputed 24 years of experience. The mean age of household members in the sample is 41.4 years (sd=10.3), with 52 percent male. About 77 percent reside in urban areas, of which 43 percentage points reside in the nation's capital, Yerevan. When comparing men to women, the latter are more likely to have completed higher education, 37 vs 32 percent, and also more likely to have completed specialized or vocational secondary education, 38 to 29 percent. Otherwise, men and women share similar attributes.

### 3. EMPIRICAL RESULTS

#### 3.1. Basic statistics.

The first column in Table 4 shows that earnings rise, but not uniformly, with educational

TABLE 3. Descriptive statistics

	All		Male (m)		Female (f)	
	Mean	std dev	Mean	std dev	Mean	std dev
Monthly wages, in Drams	29,690	56,580	39,570	76,154	19,168	14,901
Years of schooling	11.64	2.53	11.47	2.53	11.82	2.52
Primary	0.007	0.084	0.009	0.095	0.005	0.070
Not completed secondary	0.036	0.186	0.050	0.217	0.021	0.144
General secondary	0.267	0.442	0.319	0.466	0.212	0.409
Secondary specialized	0.332	0.471	0.290	0.454	0.377	0.485
Not completed high	0.013	0.111	0.013	0.113	0.012	0.110
High education	0.346	0.476	0.320	0.467	0.373	0.484
Experience	24.18	10.79	24.50	11.07	23.84	10.49
Age	41.36	10.31	41.5	10.72	41.2	9.85
Male	0.52	0.5	–	–	–	–
Capital	0.43	0.49	0.44	0.5	0.42	0.49
Urban	0.34	0.48	0.33	0.47	0.36	0.48
Rural	0.23	0.42	0.23	0.42	0.22	0.42
Observations	2,544		1,312		1,232	

attainment. The average monthly salary is 25,000 Drams for those with less than secondary education where the mean salary is 29,775 Drams. The latter rises to 34,143 Drams for college graduates, for an implied return of 2.8 percent. But the t-test for the difference in the mean wages of college graduates and secondary school graduates is only 1.51, with p-value of 0.13, perhaps reflecting on the large dispersion in pay of the former.

A similar albeit more pronounced pattern is observed for men. For the latter, the mean salary rises with educational attainment, or from about 30,000 Drams to about 49,000 Drams. When compared to those with secondary education, the annual return on higher education is about 6.4 percent; mean salary rises from 35,796 to 48,814 Drams; the t-test for differences in mean wages is 2.48, with p-value of 0.014.

In contrast to men, the pattern for women is uneven. Those with secondary education earn more than less educated counterparts; 20,132 Drams vs 14,000 Drams when compared to those who failed to complete secondary education. Similarly, those with general secondary education seem to earn more than those with specialized or vocational secondary education, unlike the trend observed for men. But the earnings rise very little

TABLE 4. Basic Trends: Wages by level of education (in Drams)

Level of education	All		Male (m)		Female (f)		t-test
Completion	Mean	std dev	Mean	std dev	Mean	std dev	$\overline{Wage}_m > \overline{Wage}_f$
Primary	25,500	15,508	29,833	16,050	16,833	10,759	2.036**
Not completed secondary	25,236	19,287	29,703	20,174	14,069	10,754	4.777***
General secondary	29,775	22,589	35,796	23,690	20,132	16,701	10.088***
Secondary specialized	25,513	21,140	35,504	23,569	17,349	14,513	13.120***
Not completed higher	30,869	21,476	39,485	24,212	21,105	12,610	2.738***
Higher education	34,143	91,379	48,814	129,849	20,720	14,307	4.410***
All	29,690	56,580	39,570	76,154	19,168	14,901	9.512***
Observations	2,544		1,312		1,232		

\*\*\* significant at the 1 percent level; \*\* significant at the 5 percent level.

when we move from secondary to higher education, or 20,132 vs only 21,101. The latter implies an annual return of 0.6 percent over the 5 years it took to complete a college education; the t-test for differences in mean wages is only 0.51, with p-value of 0.61.

While the stylized facts show that the return to education for men is steeper than that for women, the figures reported in Table 4 also suggests a wide gap in pay between the sexes. Women get paid much less than men at every educational level. For those with secondary education, for instance, women get paid about 56 percent of what men are paid. In the case of higher education, the gap is even wider, with women paid about 42 percent of the earnings of men. As shown in the last column of Table 4, the pay gap is statistically significant at every education level.

### 3.2. Multivariate estimates.

The basic statistics reported in column (1) of Table 4 provide some evidence on the effect of education on earnings, in particular for those who have completed higher education. Of course the observed trend may be explained by factors other than education. Differences in experience may shape compensation. In addition, the earnings figures in columns (2) and (3) deviate considerably suggesting that gender may play a role in establishing wages. There can also be factors such as geography that may have shaped the observed wages. Nominal Wages in general are likely to be higher in urban when compared to rural regions.

TABLE 5. Estimates for  $\ln$  wages

	All	Male	Female
VARIABLES	(1)	(2)	(3)
Primary	-0.0246 (0.154)	-0.00684 (0.193)	-0.0390 (0.263)
Not completed secondary	-0.347*** (0.0709)	-0.335*** (0.0873)	-0.348*** (0.126)
General secondary	-0.122*** (0.0330)	-0.150*** (0.0448)	-0.0621 (0.0499)
Secondary specialized	-0.204*** (0.0313)	-0.152*** (0.0468)	-0.242*** (0.0421)
Not completed higher	-0.00693 (0.113)	-0.0164 (0.160)	0.00860 (0.161)
Experience	0.0216*** (0.00466)	0.0278*** (0.00668)	0.0141** (0.00662)
Experience <sup>2</sup>	-0.000456*** (9.43e-05)	-0.000582*** (0.000132)	-0.000303** (0.000138)
Male	0.683*** (0.0253)	–	–
Urban, other than Capital	-0.303*** (0.0286)	-0.283*** (0.0412)	-0.333*** (0.0398)
Rural	-0.499*** (0.0324)	-0.547*** (0.0457)	-0.445*** (0.0461)
Constant	9.775*** (0.0566)	10.40*** (0.0817)	9.851*** (0.0749)
Observations	2,544	1,312	1,232
R-squared	0.300	0.130	0.121
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			
Note: Higher education and nation's capital are omitted categories			

In order to better gauge the relationship between earnings and education in equation 2.1, multivariate estimates are reported in Table 5 below.

The estimated effects of educational attainment reported in column (1) refine the implied returns to education from the basic statistics reported earlier. University graduates make more than those who failed to complete secondary education, as well as those who have completed general as well as specialized secondary education. Those who have

failed to complete secondary education earn 35 percent less than those who have graduated from college. Similarly, those who completed specialized or vocational secondary school earn 20 percent less than the compensation of college graduates.

With an estimated coefficient of  $-0.117$  ( $se=0.0324$ ), those who completed secondary education seem to receive about 12 percent less in pay than university graduates. This implies a total return on five years of higher education  $(1+r)^5$ , where  $r$  is the annual return to education, of 13.3 percent; the annual return is 2.5 percent.

As to other findings of interest, Earnings rise with experience but at a slow rate.<sup>3</sup> Men earn 69 percent more than women. Those employed in urban areas make 30 percent less than their counterparts in the capital. Similarly, those who live in rural areas receive 50 percent less.

Expanding on the gender gap in pay, columns (2) and (3) provide separate estimates for the earnings of men and women. Men with higher education, and as shown in column (2), earn more than those with less education. As examples, those who completed secondary education earn about 15 percent less, and those who failed to complete secondary education earn also 15 percent less. The findings for women are much different. While college graduates continue to earn more than those who did not complete secondary education, their pay is almost at par with those with secondary education. The return to higher education is essentially zero, and women have no gains in compensation from pursuing higher education.<sup>4</sup>

In an alternative specification, educational attainment is replaced by the number of schooling years, and the estimates in Table 5 replicated. As an example, graduates of higher education are assumed to have completed 15 years of schooling years. As noted earlier, we do not observe the number of years of education, and the number of years are

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<sup>3</sup>In an alternative specification not reported, age replaced experience which was imputed as age minus 6 years minus the number of schooling years. The estimated effects of education remained virtually unaffected using this specification.

<sup>4</sup>College graduates seem to have similar earnings to those with primary education and those who did not complete their higher education. There is no clear explanation for this pattern. One thought is perhaps this is due to the small number of observations on such individuals as revealed in Table 1.

TABLE 6. Alternative estimates for *ln* wages

	All	Male	Female
VARIABLES	(1)	(2)	(3)
Schooling years	0.0324***	0.0295***	0.0350***
	(0.00516)	(0.00719)	(0.00746)
Experience	0.0198***	0.0274***	0.0111*
	(0.00460)	(0.00661)	(0.00645)
Experience <sup>2</sup>	-0.000419***	-0.000572***	-0.000231*
	(0.000093)	(0.000131)	(0.000134)
Male	0.689***	–	–
	(0.0251)	–	–
Urban, other than capital	-0.300***	-0.276***	-0.323***
	(0.0287)	(0.0411)	(0.0399)
Rural	-0.498***	-0.539***	-0.450***
	(0.0324)	(0.0455)	(0.0462)
Constant	9.299***	9.947***	9.345***
	(0.0881)	(0.118)	(0.127)
Observations	2,544	1,312	1,232
R-squared	0.296	0.127	0.109
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			
Note: nation's capital is omitted category			

assumed to correspond to the completed academic degree or certificate, with midpoints assumed when not completed.

The estimated coefficient on schooling years in column (1) of Table 6 is 0.033, suggesting a rate of return of 3.3 percent for an additional year of study. All of the remaining explanatory variables considered in Table 5 retain much of their value and significance. Similar estimates for the return on schooling years are obtained for men (3.1 percent) and women (3.5 percent) in columns (2) and (3), respectively. But these estimates mask the heterogeneity in returns observed earlier in Table 5, and the uneven returns observed for women.

#### 4. CONCLUSION

This paper addressed how earnings vary with educational attainment in Armenia. The findings suggest uneven returns to education in particular for women, and provide evidence of a sizable gap in male-female earnings. But a caveat is order reflecting on the potential sample selection bias arising from excluding one third of the wage earners in the sample because they received periodic earnings. Another related concern is the exclusion of the self-employed.

This paper can be extended in a few directions. As an example, endogeneity of education or controlling for “ability” is a source of concern. While the evidence suggests that men those with higher education earn more, this does not necessarily mean that their education causes the difference in pay when compared to the less educated. It is entirely possible that the individual with the higher training may have attributes and or some characteristics that make him more successful resulting in higher pay. As an example, higher ability individuals are perhaps more likely to seek higher education. While not observed in the survey employed in this paper, possible instruments could include parents’ education.<sup>5</sup> The existing literature suggests that instrumental variable estimates based on family background can be higher than reported above. But, and as pointed out in Trostel et al (2002), it is not clear whether this should be attributed to measurement errors or the use of inadequate instruments.

Another useful extension is the control for public vs. private sector employment. de Castro et al (2013), for instance, find evidence of a wage premium in the public sector for those with lower education in Europe, but no evidence of a higher wage gap for women. Similarly, Falk (2012) finds higher compensation for low education US federal government employees, and a lower compensation for those with advanced degrees. Such occupation and sorting indicators are not available in the survey data employed here. But recent surveys suggest that such an indicator on public sector employment is edited and

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<sup>5</sup>See Card (1999) and Currie and Moretti (2003).

can be potentially explored.<sup>6</sup> But once again, this level of detail in these surveys is not publicly available.<sup>7</sup>

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<sup>6</sup>See <http://armstat.am/en/?nid=208>, typically in "Section D. EMPLOYMENT" of the Household's Integrated Living Conditions Survey questionnaire.

<sup>7</sup>In a yet one more extension, the benefits of education may be addressed in areas other than compensation and related to lifetime well being. See Oreopoulos and Salvanes (2009).