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Economic Returns to Schooling in Transition: A Case of Mongolia*

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Abstract

This paper attempts to obtain the first available estimates on the rate of returns to education for Mongolia and to compare it with returns to education for other transition economies such as CEE and FSU. The Mincerian approach is the basis of our empirical analysis to estimate the returns to human capital.

A number of studies estimated the rates of return to education for transition countries and found an increasing trend in terms of the higher premiums for additional schooling years or educational qualifications during the transition period. Returns to education in transition economies vary between 2.8%-5.0% during 1985-1990, whereas between 5.2%-10.1% during 1994-1996.

The rate of returns to a year of schooling in Mongolia is estimated as 7.2%, which is higher than most of transition countries. The rate of return to university degree in Mongolia is the highest among transition economies and the returns to other educational qualifications are comparable with CEE and FSU countries.

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1. Introduction

In the past three decades a large number of studies have been conducted to examine the link between education and development. Some studies show that education variables could be significant on explaining country differences in economic and social development. Many recent empirical studies have shown a positive relationship between education and economic growth as well as development.

Lucas (1993) states: "The main engine of growth is the accumulation of human capital – of knowledge – and the main resource of differences in living standards among nations is differences in human capital. Human capital accumulation takes place in schools, in research organizations, and in the course of producing goods and engaging in trade."

Well educated and healthy work force is claimed as one of the key resources which can be utilized to fulfill the economic development of Mongolia as outlined in the government's development strategy [Bikales (2000)]. According to UNDP (1997), Mongolia already made progress in the area of human development. In considering the human development level and economic performance of Mongolia among transition economies, the rank of Human Development Index is better than the rank of real GDP per capita. For example, while Mongolia ranked 101st on GDP per capita, its rank on the Human Development Index (HDI) was 91st and was classified as a "medium human development" country [Source: UNDP (1997) Table 1, p.146-48]. This also indicates that Mongolia accorded a high priority to socio-economic development including education in the past.

In accordance with the country specific factors and the previous achievements in Mongolian education sector, effective labor force plays a significant supportive role for her economic and social development. Human development, especially through investments in education, supports the policies that accelerate economic growth combined with explicit measures to promote a provision of job places.

In Mongolia, two specific goals in education are decided:

- improving access, quality, and relevance of the education and training in the context of Mongolia's transition from a centrally planned economy to a market oriented economy;
- managing the production of graduates at the post-basic levels, in terms of quantity and skill level and mix, to match the demand for skilled labor.

In order to accomplish these goals and evaluate further accomplishments that can be achieved in education sector of Mongolia, there is emerging the need to examine the effects of education on economic growth.

Researches pertaining to Mongolia have focused mostly on the financing of higher education, vocational education reform, and the public expenditure side rather than on the effects of human capital on economic growth or the standard of living[1]. Moreover, Mongolia is not included in any of the most

comprehensive studies on the returns to education in transition economies [Newell & Reilly (1999), Svejnar (1999), Brainerd (2000), and Trostel. et al (2002)].

Psacharopoulos (1994) estimated returns to education for most of market economies in the world, and concluded that they ranged from 6.6% for the high per-capita income countries to 11.2% for the low income.

Returns to educational qualifications for selected transition economies, including Central and East European (CEE) and Former Soviet Union (FSU) countries, were estimated by Newell and Reilly (1999). They found the highest of 10.4% annual returns to university level in Federal Republic of Yugoslavia and the lowest of 3.8% in Czech Republic.

Trostel, et al (2002) estimated returns to a year of education in 28 countries, where seven transition economies were included. They divided countries between two groups: on the one hand, Bulgaria, Czechoslovakia, the Czech and Slovak republic and Russia exhibit a coefficient for years of schooling ranging between 3.1 and 5.2; on the other hand, Hungary, Latvia, Poland and Slovenia exhibit a coefficient for years of schooling ranging between 6.7 and 8.0.

This paper provides the first available estimates of rate of returns to education for Mongolia and makes a significant contribution to research on this subject. The results can now be used to compare the performance of Mongolia with other countries which are included in the previous studies.

The paper is organized as follows. Section 2 discusses the rates of return in transition countries from available studies and analyses the trends over the period of transition from communist regime to a market economy. Section 3 explains the data, methodology, the variables and procedures adopted in our empirical analyses. Section 4 evaluates and analyses the results of empirical analyses and Section 5 summarizes the empirical results and concludes. The rest of the paper is devoted to tables, appendices, and references.

2. Returns to Education in Transition Countries

Newell & Reilly (1999) present rate of returns to educational qualifications for nine countries with a geographical range covering Central and Eastern Europe (CEE), the Former Soviet Union (FSU) and the Federal Republic of Yugoslavia. Their paper differs from other studies as it examines the changes in the returns to educational qualifications, both across a variety of transitional economies and through time.

They focus on the returns to higher educational qualification comparing completed secondary education as a base group and then change the base category. They used age and its quadratic form to proxy labor-force experience and the monthly income in main job, at the same time including variables that refer to gender and cohort differentials in returns to education.

The highest estimated returns to university qualification are 10.3 for 1995 and 10.4 for 1996 in FDYugoslavia, Central Asian Republics followed, and the lowest rates are for the Czech and Slovak Republics.

The remaining countries, including Russia, have the estimates that are not out of kilter with the estimated returns to higher education reported for high-income market economies. The results from this research reveal some tendency for rates to rise in most transitional economies over the period considered. Within the frame of CEE countries, the annual return to university in Hungary increased from 4.5 to 6.9 in the period of 1992-1996. Poland has been characterized by a high degree of stability at about 7.7 since 1993. Results of FDYugoslavia show slight increase during 1995-1996. However, returns to university in Czech Republic stand at 1.5 and 3.8 for 1984 and 1992 respectively. Slovakia also shows the rise for rate of return from 2.3 to 4.2 for the same period. It should be noted that the rise in the case of Czech Republic and Slovakia is due to comparing the relatively low base and resulted from the year of 1984 when the wage compression in the former Czechoslovakia was at its peak. The estimated rates of return to higher educational qualifications for these two countries in 1992 are relatively low, reflecting the fact that centralized wage controls were still in place at this time. The returns to university in Russia during the period of 1992-1996 reveal 2.1 percents improvement standing at 6.3 in 1996, while returns to technical education vary between 2.8-3.5. Kazakhstan also shows a rise in the return to higher education, standing between 7.5-7.8. FSU countries' results vary substantially. For example, the return in terms of university degree is 8.1 for Uzbekistan and 17.9 for Kazakhstan. It is 5.5 for Azerbaijan in terms returns to higher education.

One common trend noticed for FSU countries and Russia, is that the returns to technical education declined more steeply while the returns to university degree relative to higher education are almost double. In most countries covered in this research, the differentials in return to higher education across gender groups were negligible. This result reveals that women have not suffered reduced returns relative to men in the transition era.

There is a controversy on the rising rate of return during the transition shown by Newell and Reilly's study. Trostel, et al (2001) estimated the rate of returns to schooling for 28 countries including transition economies such as Hungary, Poland, Russia, Slovenia, Bulgaria, Czechoslovakia, and Latvia using comparable microdata. Their study over the period from 1985 to 1995 is based on a common questionnaire. They found that transition countries have rates of returns to education that differ remarkably from one another. They found no significant increases (nor indeed decreases) in the returns to a year of schooling in transition countries. Transition economies included in this research, are characterized at very high mean schooling years, for instead, Russia with 13.2 years, Czech Republic with 13.24 years, and Latvia with 12.44 years, whereas Poland with 11.08 years, Hungary with 11.55 years, Bulgaria with 11.55 years.

OLS estimates of this research for Russia, Poland, and Czech Republic are very consistent with estimated returns to university degree by Newell & Reilly (1999). The rate of returns to schooling in Hungary is estimated at 7.5%, Poland at 7.3%, Slovenia at 8%, and Latvia at 6.7% for males. However, the rate in Czech Republic is 3.5%, Bulgaria 4%, Russia 4.4%, and Slovak Republic 5.2% for males. Therefore,

in summary, the countries studied can be divided into two groups. On the one hand, Bulgaria, Czechoslovakia, the Czech and Slovak republic and Russia exhibit a coefficient for years of schooling ranging between 3.1% and 5.2%; On the other hand, Hungary, Latvia, Poland and Slovenia exhibit a coefficient for years of schooling ranging between 6.7% and 8.0%. The relevant coefficient in the pooled regression including all the countries in the sample equals 4.8%. Nonetheless, all the countries exhibit rates of returns that are lower than those in the least developed countries included in the sample, such as the Philippines (11.3%). Gender differentials in rates of return to schooling were obvious from this study in favor of women including some transition countries.

A number of transition countries had been studied by country separate researches on the returns to education. Rutkowski (1996) studied the changing wage structure along with returns to education in Poland. He found a significant increase in rates of return to education. In the early 1990s, an investment in one more year of education in Poland yielded a rate of return of around 7.5% against 5% in 1987. From his research, Rutkowski concludes that in a reversal of the typical situation under a socialist economy, the relative position of white-collar workers against blue-collar workers is improved substantially during the transition period. The increases in returns to white-collar skills and to education are observed. This fact is more noticeable in the private sector which rewards high skills better than the public sector. Along with the increased returns to schooling, the age-earnings profile becomes substantially flatter, indicating that experience gained under previous economic conditions is now of lesser value.

One of available studies on Czech Republic is the work by Munich, Svejnar, and Terrell (2002). They found the highest returns (5.8%) to education among available studies on Czech Republic, although it was lower in comparison with other transition economies. Their explanation for the lower rate of returns in Czech Republic is that unlike Hungary and Poland, Czech Republic adhered to the wage grid until the very end of the communist regime. This can be one of the reasons.

Their overall estimates suggest that rate of return to schooling was 2.7% at the last year of communism (1989), and that it rose to 5.8% by 1996. However education and work experience gained during the transition do not always have higher returns than education and experience gained under communism. Those who obtained apprenticeship and vocational education during the transition do not have higher rate of return. This fact suggests that investment in this type of education under communism was excessive.

Munich, et al (2002) also investigated that privatized firms provide the highest rate of return to a year of education, followed by newly created private firms, and the state. Also, they point to the presence of a sheepskin effect that “wage rise faster with extra years of education when the extra year also conveys a certificate” and the effect is more pronounced at higher educational levels in both regime, and in overall during the transition than under communism.

Pastore and Verashchagina (2005) estimated rate of returns to education at 10.1% in Belarus by the mid-1990s. They use four types of wages in order to compare results and investigate some causation being attached to returns to education if such exists. That is,

- type one is the net monthly income from the main job that can be compared directly with the results from other transition economies
- type two includes various subsidies and in-kind payments from the main job, apart from the wage that can be expected as a compensation mechanism used by state firms to support low-wage workers
- type three includes earnings and other moneys from secondary jobs and entrepreneurial activities
- type four includes all sources of labor income

These types of earnings are used to capture the ability of high-skilled workers to implement complex strategies to increase their income in an economic environment where the wage from the main job is insufficient to survive. Secondary jobs and entrepreneurial activities often provide the means to increase earnings, especially for skilled workers. The hypotheses proposed is that the type one, three and four of wages are positively related to educational attainment. Their estimates by the wage1 and wage 3, are more sufficiently explain the variations in wages due to education qualifications, than those by the other two types of wage. This result confirms the impression that other sources of income depend on criteria different from human capital attainment. In 1996, the annual rate of return to post-compulsory education in Belarus was 12.6% for those with a university degree, which requires 7 additional years compared to compulsory education. The annual rate of return to technical secondary school, which requires 4 additional years after compulsory education, was 14%. For vocational (3 additional years) and general secondary (2 additional years) education it was 10% and 14.5% respectively. This suggests that the reward to high secondary school is higher than that to tertiary education. By the same token, obtaining a university degree compared to holding a secondary school diploma provides a lower annual rate of return, amounting 11% and 11.8% respectively.

Andren et al (2004) estimated the returns to education in Romania at 8.5% by 2000, which is the latest estimation. They found that rate of returns to education jumped more in the early 1990s than later on, but continued increasing along with increasing average schooling year.

Romania has experienced the shift of employment towards trade and consumer services, and students increasingly shifted from technical fields towards humanities, social sciences, and business. This shift is a common structural change in transition economies.

3. Data, Estimating Equations and Variables:

Data

The data source is the "Urban Poverty and in-Migration" survey (2004), which covers 6847 residents in 1500 households in Mongolia, capital city Ulaanbaatar. This Survey was conducted by "Population teaching and Research Center" in School of Economic Studies of the NUM (National University of Mongolia). The data set was collected through individual interviews of each household. The data used in the estimation of the rate of returns to education in Mongolia is based on cross-sectional data from this data source, consisting of 2155 individuals who are workers in the labor market and are aged 15 years and above. This cross-sectional data set consists of variables such as monthly income, highest education level acquired, race and age. The sample includes workers in the formal sector who are hired for one or more than one employers, and workers in the informal sector who are self-employed, working for assistance to another household, and do odd or casual works. Respondents answered individually the questions about their earnings at their main workplace, while the questions about household income from goods and money from outside, business income, and household production for its own consumption were generally asked only for the household level. Accordingly the estimation of the rate of returns to education is based only on income at the main workplace, since the other types of income could not be distinguished among household members. This sample excludes Mongolians working abroad in order to avoid from sample bias.

Estimating equations

The estimation methodology adopted in this paper is OLS (ordinary least-squares), since the main objective is to provide detailed and internationally comparable OLS estimates on returns to investment in human capital for Mongolia which is largely neglected in such studies. The Mincerian approach to estimate the returns to human capital is the basis of this analysis.

The familiar Mincerian wage equation is as follows:

$$\ln w_i = \beta_0+\beta_1 s_i +\beta_2 x_i+\beta_3 x_i^{\,2}+\varepsilon_I ; \qquad (1)$$

where, $\ln w_i$ is the natural logarithm of the wage for individual i, s_i is years of schooling, x_i is experience, x_i^2 is experience squared, and ε_I is a disturbance term.

The Mincerian earnings function is in fact a log-linear transformation of an exponential function and the coefficients have a semi-elasticity interpretation. They measure the *ceteris paribus* percentage change in the dependent variable for an unit change in any independent variable. The authors estimate the basic Mincerian earnings equation and its "augmented" and "extended" specification equations.

More generally, the "augmented" version of the Mincerian specification of the earnings equation is as follows:

$$\ln w_i = \beta_0+\beta_1 s_i +\beta_2 x_i+\beta_3 x_i^{\,2}+\delta X_i+u_i ; \qquad (2)$$

where X_i is a set of other variables assumed to affect earnings, and u_i is a disturbance term. β_1 is considered the private rate of return to one additional year of schooling, regardless of the educational level to which this year of schooling refers.

Augmented earnings equation includes dummy variables of gender and cohort dimensions. While the former dummy variable examines whether males benefit more than females due to the returns to education, the latter examines whether young cohorts secure higher wages than their older counterparts. The authors explore this issue by examining ceteris paribus differences in earnings between males and females, and between those aged 35 years and less and those aged over 35.

We estimate "extended" version of Mincerian specification using educational attainments instead of schooling year, and work experience as independent variables. We can estimate returns to education at different educational levels using the "extended" earnings function. Our main focus will be on the returns to completed secondary, vocational and technical, specialized technical, and university level education comparing incomplete secondary education, primary education and uneducated altogether as the base group (or omitted category). In fact, almost 80% of workers in our sample have finished at least complete secondary. Therefore, extended earnings equation includes a series of dummy variables referring to the completion of the main schooling stages, i.e. complete secondary, vocational and technical, specialized technical, and university level education.

Variables

The dependent variable is *Ln (wage)*, natural logarithm of an individual's wage or monthly income at main workplace.

The independent variables are: *Schyear, Exper, Exper*^{2}*, Male and Young* in the "augmented" version. These are described below.

Schyear is schooling year, substituted basing on the highest degree obtained[2].

It equals:

- 0, when worker's educational attainment is none;
- 3, for the workers aged 25 years and above, when educational attainment is primary;
- 4, for the individuals aged below 25 when educational attainment is primary;
- 8, when educational attainment is incomplete secondary;
- 10, when educational attainment is complete secondary;
- 10.5, for the workers aged 30 years and below, when educational attainment is vocational and technical;
- 11, for the workers aged above 30, when educational attainment is vocational and technical;
- 12, when educational attainment is specialized technical and equals 14 for the workers aged 33 years and below, when educational attainment is higher;
- 15, for the individuals aged above 33 years, when educational attainment is higher.

Exper is potential experience in labor market: As in most research on the rates of return to education, this paper uses an alternative way of substituting experience as "age-total schooling year - entrance age to school". Entrance age to school corresponds to 8 and 7 years, respectively for those aged above 30 years and those aged 30 years and below.

Male is a dummy variable: it equals 1, if worker is male.

Young is a dummy variable: it equals 1, if worker is aged 35 years and below.

A set of independent dummy variables in the extended version of Mincerian equation are as follows.

UNIV: it equals 1, if worker's highest educational attainment is higher education.

SPECTECH: it equals 1, if worker's highest educational attainment is specialized technical[3].

VOCAT: it equals 1, if worker's highest educational attainment is vocational and technical.

COMPSEC: it equals 1, if worker's highest educational attainment is completed secondary.

Being obeyed in the most similar studies on the rate of returns to education, we exclude non-pecuniary benefits earned by individuals. The emphasis on main job earnings is intended to minimize the introduction of measurement errors. In this way, this paper maintains a high degree of cross-country comparability. The next section will discuss the findings of the empirical analysis conducted through the methodology described above.

4. Empirical Results and Analysis

4.1 Average wages and earnings-experience profile

Table 1 shows the distribution of unconditional average monthly incomes and other distribution statistics by educational qualification. According to Table 1, 78.8% of workers in the sample have at least completed secondary education and a third has finished higher education. There is a clear pattern that average monthly earning increases as education level advances.

Table1: Descriptive statistics of wage distribution by the educational qualification.

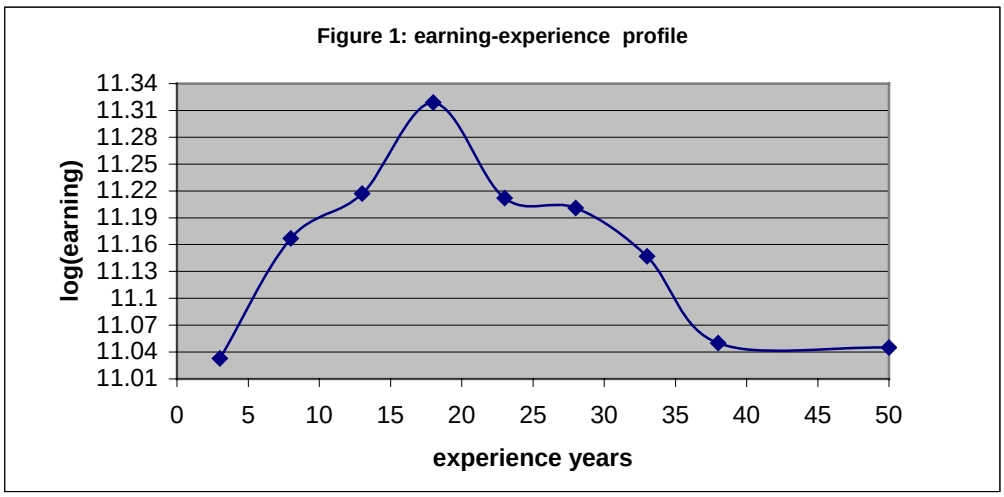
Educational Qualification	Obs	Share in total sample	Mean wage	Median wage	Ratio of mean wages to complete sec
General	***2155***	***100.0***	***92840***	***70000***	***1.1***
University	721	33.5	116000	90000	1.4
Specialized Technical	212	9.8	87510	60000	1.03
Vocational & Technical	109	5.1	96500	60000	1.14
Complete Secondary	655	30.4	84760	60000	**1.0**
Incomplete Secondary	381	17.7	71040	50000	0.84
Primary	63	2.9	59300	50000	0.70
Uneducated	14	0.6	54070	41500	0.64

Source: The data from "Urban Poverty and in-Migration" Survey (2004).

If we consider the ratios of mean wages compared to complete secondary education group, university graduates earn much higher wages than other education level groups. The ratios in table 1 show that individuals benefit as they complete advanced educational levels. Only one exception is the lower wage ratio of specialized technical group relative to vocational and technical groups. Later estimation results will explain this unclear pattern.

Experience is claimed as one of the factors determining wage differentials among workers. This variable varies from zero, referring to the new entrants in labor market, to 62 years referring to the older self-employed people or people still working after their retirement. However, the mean experience year of the sample is 17 that is very consistent with the age of middle age cohorts (around 37-42 years old) of Mongolians. The earnings-experience profile examines how individuals have been rewarded from the accumulation of human capital.

Figure 1 shows the earnings-experience profile that is calculated from the sample.



This profile shows strong concavity of earnings function with respect to labor market experience. Earnings rewards peak at 15-20 years' group of experience, whereas right and left tails show very equal symmetry if we ignore very few workers with the experience of more than forty years in the sample. Log(earning) increases gradually from the groups of experience 0-5 years to 6-10 years. Thereafter, increase in earnings is kept until the peak experience group, and then decline starts. The decline of the log (earning) in the right half of the profile is not consistent with human capital theory. The difference may be explained by the fact that experience gained under previous economic regime in Mongolia is now of lesser value. Thus, the earnings of the new entrants into labor market is almost same with the level of labor market leavers.

4.2 Regression results and Analysis

In table 2 we present estimates of the rates of returns to schooling based on earnings equation (1) and its "augmented specification", equation (2).

Table 2: OLS estimates of basic Mincerian equation and its "augmented" specification.

Dependent Variable: Log (wage)

Estimation equation	(1)	(2)
Independent Variables		
Schyear	0.066	0.072
	(0.004)***	(0.005)***
Exper	0.021	0.027
	(0.004)***	(0.006)***
$Exper^2$	-0.0004	-0.0005
	(0.000)***	(0.000)***
Male	-	0.203
		(0.027)***
Young	-	0.087
		(0.051)*
Constant	10.268	9.980
	(0.065)***	(0.114)***
Number of Observations	2155	2155
R-squared	0.101	0.126

Notes: Standard errors are in parenthesis. Asterisk * and *** denotes the significance level at 10%, 1%, respectively.

We estimated the Mincer equation (1) and its "augmented" version in order to make a direct comparison with other transition economies. In fact, estimated returns to education for CEE and FSU countries vary depending on the methodology by which they were derived.

The rate of returns to one more additional year in school increases monthly income by 6.6% or 7.2%, irrespective of educational level, in Mongolia. The coefficients on independent variables are strongly significant at the very narrow intervals of rejection except for the variable *Young*. However this variable is significant at 10% and shows a large economic effect in the rate of returns to education for young workers relative to their older counterparts.

Most studies carried out for transition economies estimated returns to a year of education including other explanatory dummy variables referring to gender, marital status and others. It should be noticed on

the comparison that our estimates used data from capital city, but other estimates on transition countries used data from whole country. The rate of returns to a year of schooling in Mongolia (6.6% or 7.2%) is higher than Czech Republic 5.8% [Munich et al (2005)], Russia 4.4% for males and 5.3% for females, Slovak Republic 5.2% for males and 6.4% for females, Bulgaria 4.0% for males and 5.7% for females [Trostel et al (2002)], lower than Poland 7.5% [Rutkowski (1996)], Romania 8.5% [Andren et al (2004)], Slovenia 8% for males and 10.1% for females, and Latvia 6.7% for males and 7.8% for females [Trostel et al (2002)].

The coefficient for gender dummy is positive and significant, and it suggests that *ceteris paribus* men have 20.3% higher earnings than women. This value is a little higher than in Belarus (17-18%) and is lower than in Poland (27.1%). The coefficient for age cohort distinction is economically sizable and significant, and it suggests that young people secure higher earnings than their older counterparts by 8.7%. However, if we interpret relative effects of gender and generation dummies in semi-logarithmic equations[4] *ceteris paribus* men have higher earnings, by 22.5% and *ceteris paribus* young workers have higher earnings, by 9.1%.

Table 3 presents estimates of the rates of return to different levels of education based on the "extended" earnings equation.

Table 3: OLS estimates of extended earnings equation.

Dependent Variable: Log (wage)

Independent Variables	Coefficient	standard error
UNIV	0.601	(0.039)***
SPECTECH	0.159	(0.052)***
VOCAT	0.177	(0.066)***
COMPSEC	0.190	(0.038)***
EXPER	0.036	(0.006)***
$EXPER^2$	-0.0007	(0.0001)***
Male	0.203	(0.026)***
Young	0.083	(0.050)*
Constant	10.426	(0.094)***
Number of Observations	2155	
R-squared	0.146	

Notes: Standard errors are in parenthesis. Asterisk *, and *** denotes the significance level

at 10%, 1%, respectively.

The significance in this estimation is also satisfactory as in basic and augmented versions. Coefficients for gender dummy and age generation dummy are almost the same as in the augmented version, whereas the coefficient for experience increased noticeably. It implies that the earnings-experience profile becomes more concave when we control for educational qualifications rather than schooling years. We can calculate annual returns to respective educational qualifications compared to incomplete secondary or compulsory education group from Table 3. The annual rate of return to post-compulsory education in Mongolia is 12.7% for those with a university degree which requires on average 6.5 additional years after completing 8th grade of secondary school[5].

Overall, in Mongolia university level education seems to provide a much higher payoff than in most transition countries. In fact, in Newell & Reilly (1999), returns to university level education compared to completed secondary education varied from 3.8% to 10.4%. Thus, countries of CEE have lower returns to university education level than Mongolia. For example, the rate of return to university degree compared to compulsory education is 10.4% in FRYugoslavia, 12.6% in Belarus, 7.8% in Poland, and 6.9% in Hungary.

The annual rate of return to specialized technical (technikum) education, which requires 4 additional years after compulsory education, was 4.3%. This is comparable with the returns to technical qualification in FSU countries, which were between 6.7%-2.4% in Kazakhstan during 1994-1996, 4.4% in Azerbaijan (1995), 4.8% in Uzbekistan (1995), and almost 3% in Russia (1996) in Newell et al (1999).

However, Mongolia's annual rate of returns to vocational and technical education compared to compulsory education is 7.7%, which is much higher than specialized technical education, even though it requires only 2.5 years after compulsory education.

In fact, under the command economy in the FSU countries, the specialized technical and vocational education schools functioned as supply-based vocational institutions. It was assumed that everyone had to be trained in a specific occupation prior to work and the specialized technical and vocational and technical schools accommodated at least 30 percent of graduates of the 8th grade of a general secondary school and approximately 10 percent of graduates of the 10th grade in Mongolia. The system described above began breaking down in the early 1990s, and it has been replaced with a more effective system. In mid 1990s, vocational education and training centers (VETCs) were established in the provinces (aimags) replacing the former Vocational Education Schools and at the same time specialized technical schools were completely abolished. In compliance with the market economy conditions, universities, colleges and other institutions for higher education provide education courses for the professionals who previously graduated from specialized technical schools (technikums).

Consequently, workers with specialized technical education in the sample are mostly in the older age cohorts, for example, more than 70% of them aged above 35 years. Life-long security of employment

and an interwoven social safety net provided through state-owned enterprises has been replaced by uncertainty. Therefore, these workers are likely to be employed in low-level occupations due to their lack of knowledge and skills in new economic environment. The more lucrative jobs are likely to be occupied by new graduates from university.

In the sample, workers with vocational and technical education possess almost equal age cohort dispersion. As a result of the structural change in the economy (with the increasing share of private sector in service, manufacturing, whole sale and retail sale, hotels and restaurants, and construction industries) graduates from newly replaced VETCs became available to be employed or self-employed in the labor market with the appropriate pay-offs. Therefore, factors that affect the market demand for workers with appropriate skills and knowledge in the newly expanding sectors can explain the distinction between the returns to respective qualifications.

The percentage of the returns to workers with vocational and technical education compared to those with compulsory education, is almost same as in the Czech Republic [7.6%, Munich et al (2005)] but lower than in Belarus [10%, Pastore et al (2006)]. Moreover, our estimate on annual returns to complete secondary education is 10.5% which is lower than in Belarus (14.5%).

This fact is difficult to explain, because Belarus has been characterized with longer compulsory schooling years and higher levels of average schooling than Mongolia. It is generally likely to result in lower returns to less advanced education levels. There is evidence that CEE countries with longer average schooling years or in which the majority of people have obtained complete secondary schools or high schools, tend to show lower rates of return to less advanced educational qualifications. For example, the rate of return to high school was between 3%-6.3% during 1992-1996 in Hungary, whereas it was between 6.5%-5.3% during 1995-1996 in FRYugoslavia [Newell & Reilly (1999)]. Also, as estimated by Munich and others, rate of returns to apprentices (2 years) was 4.8% and rate of returns to apprentices (3 years) was 3.8% for Czech Republic in 1996.

As evident from the discussion in this section, our estimates on returns to education for Mongolia are within the range of former estimations for transition economies in terms of both a year of schooling and different educational qualifications. Moreover, the estimates are close to the returns in those transitional countries that have experienced higher pay-offs for education.

5. Summary and Conclusions

This paper is the first attempt to investigate the effects of human capital on economic development in Mongolia by estimating rates of return to education. Moreover, the paper tries to find country specific factors that could explain some differences from other transition countries.

The results of the empirical analyses are very consistent with the previous empirical studies for transition economies. In fact, returns to education in Mongolia are within the range estimated by other

studies for transition economies. The rate of returns to a year of education is 7.2% in Mongolia. The return to university level education is sizable in comparison with CEE countries.

In our view, transition countries can be classified into two groups:

- The first group consists of most of the CEE countries that have relatively higher returns to education ranging from 6.7% to 10.1%. This group is made up of Mongolia, Belarus, Poland, Slovenia, Latvia, Romania, Hungary, and FRYugoslavia.
- The second group consists of those CEE countries and FSU countries that have relatively lower returns to education ranging from 3.1% to 5.8%. This group includes the Czech Republic, Slovakia, Bulgaria, Russia, and other FSU countries.

Therefore, transition countries possess higher or lower returns to education regardless of their geographical region. The results depend on economic implementation and lag in the transition process, in areas such as price and trade liberalization, development of institutional regulatory framework, effectiveness of stabilization policy, privatization program, and expansion of the private sector. In fact, countries such as Poland, Hungary, and former Yugoslavia had initiated significant reforms much earlier than other transition countries of CIS, FSU, and Mongolia, which started the reform process from the 1990s. Moreover, the Polish and Hungarian economies had significant emerging private sectors prior to the transition, whereas the remaining countries were almost 100% state-owned. The World Bank (1996, p.19) noted that some countries, typically in the CEE, started the transition process with more favorable macroeconomic and institutional conditions. Further, among CEE countries, the Czech Republic and Slovakia had tenacious centralized wage controls until after the 1990s, which resulted in the lower returns to education.

Mongolia is included in the high-intermediate reformers' group along with Bulgaria, Romania, Baltic countries, and Albania in terms of the ranking of liberalization index among transition economies, whereas Russia is in low-intermediate reformers' group and other FSU countries are included in the low-intermediate reformers' or slow reformer's group[6]. Therefore, Mongolia has experienced more rapid liberalization of domestic prices, foreign trade regime, including removal of export controls and taxes, privatization of large and small scale enterprises and banking reform relative to Russia, and other FSU countries, resulting in higher returns to education than in a number of CEE countries.

Returns to education in the transition period in Mongolia are much higher than the returns during communism as ascertained from the studies conducted for the transition economies. Therefore, we can suggest that returns to education in Mongolia have increased compared to those in the previous regime. Furthermore, average schooling years have increased over the last decade.

Appendixes :

Structure of the Education System in Mongolia

The Mongolian education system has changed substantially compared to that at the time of the centrally planned economy. The formal school system consists of primary education, secondary education, and higher education. Apart from the levels of education mentioned above, pre-school education is also provided.

Although a 10-years-of-school general education system was inherited from the previous regime and is still in place, the composition between primary, incomplete secondary and complete secondary education (3+5+2 structure) has changed several times during the transition period. For example, the structure was changed into a 6+2+2 model in 1990. In the 1992-1993 academic year, the general education structure was changed again to the former 3+5+2 structure. However, since 1993-1994, the academic year 10-years-of-school general education system has been adhering to the present 4+4+2 structure. Despite these changes in structure, the curriculum did not change. Therefore, the above modifications did not have much influence on the entire education system and its accomplishments.

The current 10-years-of-school education system comprises three levels:

- primary education (4 years, from the age 7 until 11);
- basic or incomplete secondary school (plus 4 years, from the age of 11 until 15);
- complete secondary school (plus final 2 years, from the age 15 until 18)

The incomplete secondary education is compulsory and ends at the age of 15, when the diploma of non-complete secondary education is granted. Primary and lower secondary education together comprises the *basic education level* which is compulsory. A combination of basic education and high school is termed as the general education [Law on Education, 2002 cited from Gerelmaa (2005)].

At the end of 15 years of the first two stages, namely primary and lower secondary school, graduates have two possibilities for high secondary school:

(a) general secondary school;

(b) technical and vocational school, and training, TVET.

Graduates from incomplete and complete secondary education can join TVET, which further requires 2.5 and at least one year, respectively. TVET comprises specialized complete secondary schools as well as post secondary diploma programs housed in higher education institutions. Correspondingly, graduates from the former are given only complete secondary education diploma, and graduates from latter a technical specification diploma. TVET graduates can try to access higher education institutions.

Tertiary education comprises higher education diplomas and bachelors degrees. Institutions involved in higher education are of the following types: colleges, institutions, and universities. The length of higher education is three years for the diploma program (granted diploma of higher education), four years for graduate program (granted diploma of bachelor degree). However, for some professional courses, the length can vary, for example, medical science. Graduates from universities and other higher

educational institutions can obtain a diploma, a bachelors' degree or a masters' degree. Pre-doctoral and doctoral degree courses are also offered. Some higher education institutions are approved by the Ministry of Education of Mongolia to provide magistrate (2 years) and doctoral program (three or four years). These comprise the post-graduate education.

Non-formal and distance education activities cut across the entire system.

At the result of the ongoing reforms in the education sector of Mongolia, from the 2005-2006 academic year, the general education system has been extended 11 years with a 5+4+2 structure. Due to the transition to thus year the 11-years school system, kindergartens, along with primary schools, offer primary school grade 1 curriculum to 7-year-old children this year only. Students who received primary school grade 1 education in kindergartens this year will be promoted to the grade 2 of the primary school next school year (September 2005- July 2006). This is a temporary measure designed to allow schools one-year preparation time for receiving children as young as 7 years old as well as to compensate for the shortage of classrooms and teachers for the new age cohort currently available in regular schools. Starting the next school year (September 2005) school will assume full responsibility for primary school grades 1 through 5 [Gerelmaa (2005)].

Table: Summary Statistics

Variable	mean	Std. Dev.	max	min
Log(wage)	11.18854	0.657033	13.59237	9.210340
Schooling year	11.17471	2.991164	15.00	0.00
Experience	1704988	10.07302	62.00	0.00
Experience square	392.1173	417.7830	3844.0	0.00
Male	0.514153	0.499916	1.00	0.00
Young	0.498376	0.500113	1.00	0.00
University	0.334571	0.471950	1.00	0.00
Special Technical	0.098376	0.297891	1.00	0.00
Vocational	0.050580	0.219189	1.00	0.00
Complete Secondary	0.303944	0.460066	1.00	0.00

Notes:

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1. For example, Altantsetseg (2002) Financing state higher education in Mongolia: Constraints and Opportunities. Available at http://www.policy.hu/~sodnomtseren/financing%20of%20state%20higher%20education.PDF. Accessed in 20, Dec 2005.

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2. The present and past education system in Mongolia is discussed in the Appendix. The substituted values on *Schyear variable* vary in regard to the changes in education system of Mongolia.
3. Specialized technical education diploma was granted after the completion of technikum before 1990s. Technikums were housed in higher education institutions, requiring 4 years study.
4. Relative effects' of dummies derived through the formula exp(coef) –1;
5. This figure is obtained dividing the exp(coef) –1 by the 6.5 years that are necessary on average to obtain a university degree after finishing compulsory education. Multiplying this value by 100 gives the percentage change for every year of additional education.
6. De Melo (1996) provides a liberalization index that is weighted average of rankings of liberalization in internal markets, external markets, and private sector entry. He ranked 26 transition countries into four groups: Advanced reformers; High-intermediate reformers; Low-intermediate reformers; and Slow reformers;

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