CALCULATE THE RETURN OF INVESTMENT IN EDUCATION IN MONGOLIA BY RETURN-COST RATIO AND NET PRESENT VALUE METHOD

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ABSTRACT

There is not much assessment and conclusion on how effectively investment in education in Mongolia has been and in which way to improve the effectiveness going forward. In other words, it cannot be concluded that investment in education has been good only based on the fact that investment in education from the state budget has been increasing. Instead, it should be concluded based on how effectively it has been spent and managed, and what are the long term benefits from the investment. This research analyzed the current situation of macro level investment in education in Mongolia and the investment in education was analyzed by investment return measures of return-cost ratio and net present value, and finally, conclusion was given on the effectiveness of the investment and recommendation on how to improve it was given too. There are two concepts that social benefit and private benefit on investment in education. This research only covered the social benefit due to high probability of error occurrence in assessing private benefit and many aspects that cannot be measured by money in private benefit.

Keywords: Investment, Education, Return-cost ratio, Net present value, Lag

INTRODUCTION

Educational economics is a relatively new topic which being researched in Mongolia. Within which particularly research on the issue related to investment in education and much analysis of the return of the investment have not been done. There are the concepts of social and private return of investment in education (Zayadelger, 2011). This research work shows the possibility of calculating the social return in country level based on macroeconomic data.

It is useful to know how efficient, economically beneficial and optimal the investment in education has been by analyzing the return of the investment in education. Besides that, it will be helpful in defining the state policy of the education sector. Therefore, as it has been necessary to calculate the return of the investment in education in Mongolia, I chose this topic.

The purposes of research are to assess and reach conclusions on the current situation of the investment in education in Mongolia. The methodology includes calculating the return of the investment in education by examining return-cost ratio (Perkins et al., 2006) and net present value of net profit (Perkins et al., 2006) .

A few books and materials had been published on educational economics in Mongolia; however, these publications didn't include that much content about practical application. In this situation, the new aspect of this research is it as applied modern computer software to calculate and analyze the return of the investment in education.

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This research tries to define the most suitable investment return calculation method for Mongolia, how to calculate the return realistically, and particularly presented the idea of if the return calculation methods could be applied with time lagged data.

The return analysis was started being applied in practice from 1800s to calculate cost of road and bridge (Kenneth, 1844), to do environmental analysis, and to calculate cost of war. From the mid-1900, people started researching educational return issues and analyzing the relation between education and income and making return analyses. From 2000s, UNESCO, OECD and other researchers started developing approaches to calculate human capital, social and private returns. In Mongolia, a few researches have been made since 2006 (Amarjargal, 2006; Pastore, 2009; Otgontugs, 2013); however, there is no research which analyzed the topic in macro level.

The major subjects of the research are the investments in education in Mongolia between 2002 and 2016, the revenue of educational sector in GDP, the rate of inflation and the expenditure of educational sector in budget.

The practical importance of this research includes saving in-effective costs by calculating return of the investments made in education, to produce optimal policy based on the return analysis, as result to make correct investment in education which is the base of income source. Another practical importance is to provide other people who are doing or interested to do the research in this field with knowledge and information by introducing the methods to calculate the return of investment in education and, further, to introduce to the public.

DATA COLLECTION AND METHOD

This research used to data sources include Mongolian Statistical Yearbook. (2002-2016), Bulletin of Statistical. (2016). Education at a Glance 2011: OECD Indicators, Psacharopoulos. (2009). Returns to investment in higher education: A European survey. CHEPS-led consortium for the European Commission, UNESCO. (2012). Youth and skills: Putting education to work. UNESCO Publishing, EFA Global Monitoring Report.

The methods of return-cost ratio and net present value of net profit are applied in this research. The results of the methodology process were processed by software of Microsoft Excel 2010 and SPSS 22.0.

Investment in education is based on micro and macroeconomic theory of human capital (Becker, 1993), labor economic theory (Mincer, 1970; Duryea et al., 2003), and educational return theory (Bennel, 1998; Psacharopoulos et al., 2004; Boser, 2011) . UNESCO and OECD defined the differences of knowledge, competence, and capacity. The human capital increases with additional investments, however depreciates if it is not used and developed further. Inherent competence, investment, and the labor market situation influence to the accumulation of the human capital. The human capital investment has several different types including private, household, social, organizational, and governmental human capitals (Zayadelger, 2011). The return analysis could be made by return-cost ratio and present value of net profit.

RESULTS

Calculating the return by return-cost ratio

$$PI_{2002} = \frac{\sum_{t=1}^{n} \frac{R_t}{(1+r)^t}}{C_t} = \frac{\sum_{t=1}^{1} \frac{R_{2002}}{(1+r)^1}}{C_{2002}} = \frac{\frac{57323}{(1+0,016)}}{103708.9} = 0,54 \prec \quad .$$

As the result is less than 1, it shows that the return of the investment in education in Mongolia was low in 2002. If the result was higher than 1, it would indicate high return.

$$PI_{2016} = \frac{\sum_{t=1}^{1} \frac{R_{2016}}{(1+r)^{1}}}{C_{2016}} = 0,87 \prec \quad .$$

As the result is less than 1, it shows that the return of the investment in education is low. The below graph compares the returns of 15 years between 2002 and 2016 with the normal return index of 1.

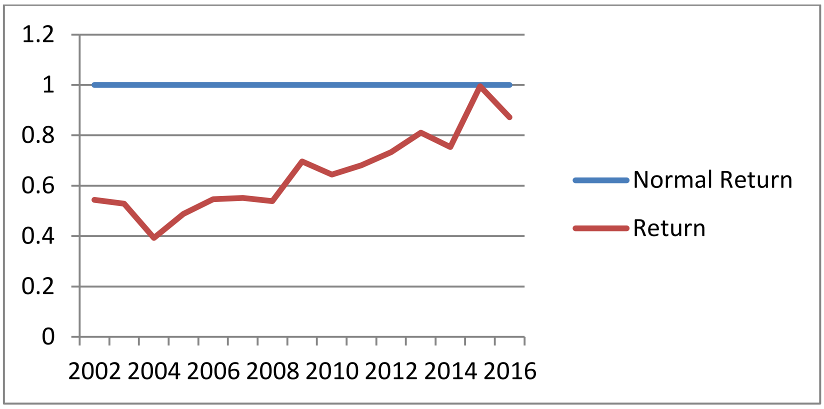

Figure 1. Return calculated by return-cost ratio

From the graph it looks that in the past 15 years the return of the investment in education in Mongolia has been low. At least it never reached the normal return index of 1.

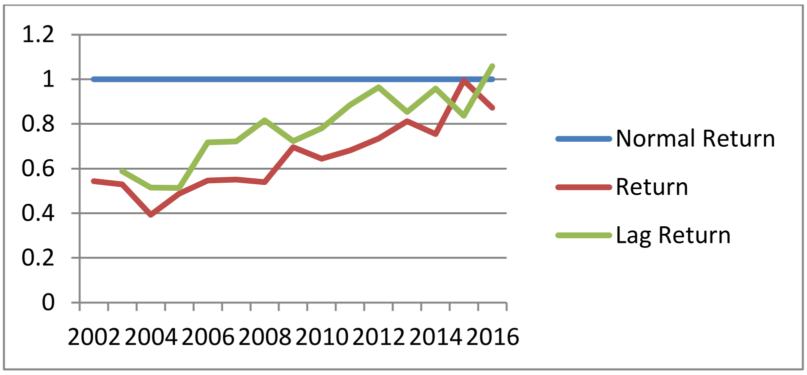

Figure 2. Lag return calculated by return-cost ratio

The reasons of the fluctuations are: (1) in 2004, 2007, 2008, 2010, and 2013 inflation was high or in two digits numbers which resulted in low return in those years, (2) in 2006, 2008, 2011 and 2014 the education sector's contribution to the total GDP of the country significantly grew which resulted in higher returns in those years, and (3) as this index is calculated with the investment in education as the denominator, when the investment increases strongly in 2004, 2008, 2011and 2013 the return index decreases in those years.

Now, in order to make the calculation more realistic, the analysis is made with an assumption that the investment brings income after one year. The result is:

$$PI_{2016} = \frac{\sum_{t=1}^{1} \frac{R_{2016}}{(1+r)^{1}}}{C_{2015}} = 1,06 \succ \quad .$$

As the result is becoming closer to 1, the return is improving. In the above graph figure 1, the line of returns calculated with one year lag has been added.

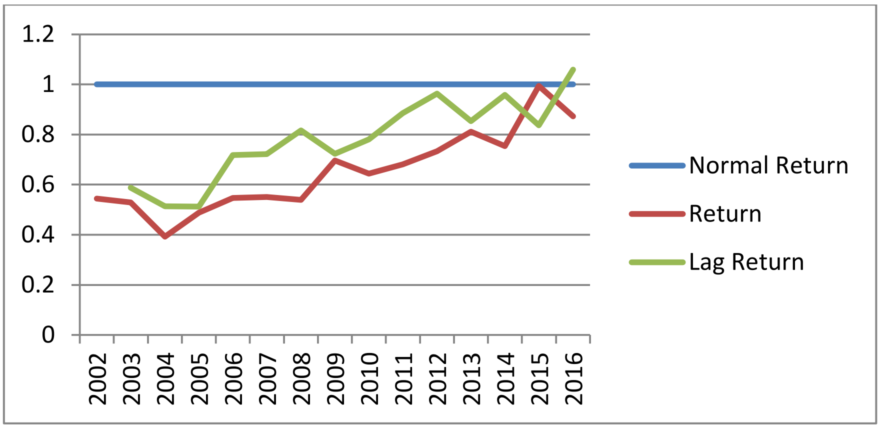

Figure 2. Lag return calculated by return-cost ratio

From the above graph it looks that the return calculated with 1 year lag improves and becomes closer to 1. Therefore, it could be better to change the formula as follows:

$$PI_t=\frac{\sum_{t=1}^{n}\frac{R_t}{(1+r)^t}}{C_{t-1}}$$

Calculating the return by net present value method

$$NPV_{2002}=\sum_{t=1}^{n}\frac{R_t}{(1+r)^t}-C_t=\sum_{t=1}^{1}\frac{R_{2002}}{(1+r)^1}-C_{2002}=\frac{57323}{(1+0,016)}-103708.9=-47288.6\prec$$

In 2002, Mongolia spent MNT103708.9 million in education sector, education sector GDP was MNT57323 million, and the net present value was –MNT47288.6 million or the expenditure exceeded income by this amount. This indicates that the return of the investment in education was efficient.

$$NPV_{2016}=\sum_{t=1}^{1}\frac{R_{2016}}{(1+r)^1}-C_{2016}=-155455\prec\quad .$$

It also indicates that in 2016 the investment in education return was no efficient.

The below graph shows the line plotted by the net present value of investments of every year.

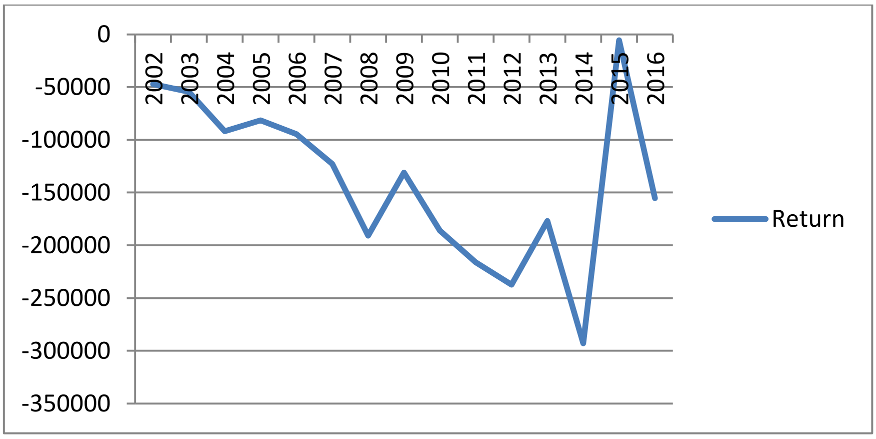

Figure 3. Return calculated by net present value method

From the graph, it looks that the return of the investment in education in Mongolia has been decreasing every year and, in the last few years, the return decrease is becoming stronger. In other words, although the investment in education has been increasing, its return has been seamlessly decreasing.

If case of $NPV \geq 0$ the investment should be made. Unfortunately, no singly year satisfies this condition.

Now, in order to make the calculation more realistic, if we assume that the investment made in a particular year brings income after one year, the result is:

$$NPV_{2016} = \sum_{t=1}^{1} \frac{R_{2016}}{(1+r)^1} - C_{2015} = 59405.7 \succ$$

From here it is clear that the result from the new formula is better than the result from the former formula. Therefore, we can hypothesis that the investment brings income with time lag. If show the result graphically:

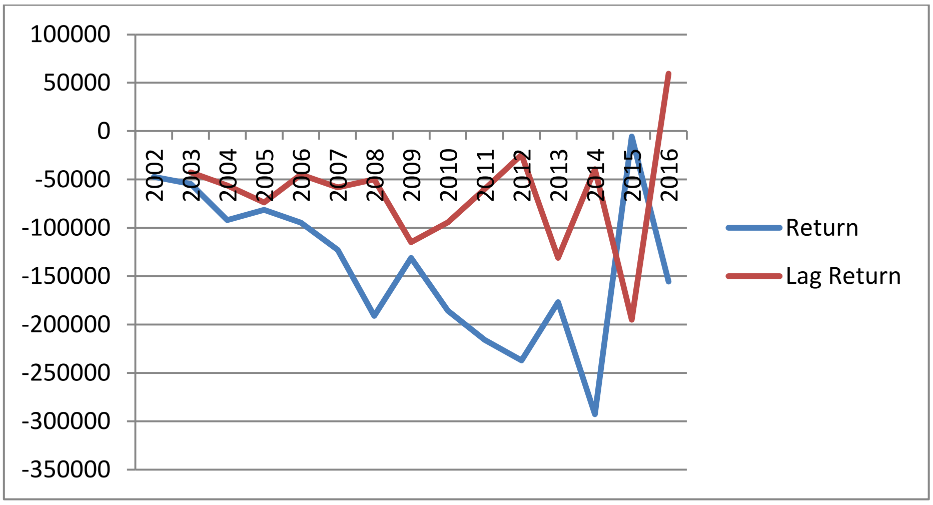

Figure 4. Lag return calculated by net present value method

The result has improved with one year time lag and the net present values have become closer to zero. Therefore, it could be better to change the general formula as follows:

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+r)^t} - C_{t-1}$$

The payback period of the investment in education can be calculated by the following formula:

$$P = \frac{C_0}{R_t}$$

Where P - payback period, R_t - revenue from education, C_0 - cost spent in education, t - time

$$P_{2016} = \frac{C_0}{R_t} = \frac{1215572.9}{1071779.2} = 1.1$$

Between 2002 and 2016, the payback period ranges between 1.0 and 2.3. Specifically, in 2004, the payback period was the longest or 2.3 years and, in 2015, it was the shortest or payback period was 1.0 years. These numbers indicate that in the past 15 years, the investment in education in Mongolia have been fully paid back in relatively short period of time.

CONCLUSION

The investments in education made between 2002 and 2016 had low return or could not reach normal return level according to return-cost ratio analysis. If assume there is 1 year lag in income inflow, the return improves.

When calculated the return by the net present value of net profit method, the investment return had decreased during the analysis period and in the last few years it had declined even faster. In other words, though the investment in education has been increasing continuously, the return has been continuously decreasing. If assume there is 1 year lag in income inflow, the return improves and the net present value becomes closer to zero.

Between 2002 and 2016, the investment in education had been repaid within 1.0 to 2.3 years.

In conclusion, though the investment in education in Mongolia has been continuously increasing but the return has not been substantial.

Findings suggest that it could be appropriate to use the basic return formulas with 1.0 to 2.3 years lag when using in education sector. However, this is only quantitive result.

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