

The Progressive Tax System and Returns on Educational Investment: The Armenian Case

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Abstract Over the years many researchers have time and again proven that higher taxes, although promoting equality to some extent, hamper economic growth. As to why this happens, there are many theories ranging from incentives to work to human capital depreciation. Human capital has been put in the center of endogenous growth theories in the last decade. The returns on education were also largely discussed as a way to calculate the efficiency of the educational system in providing workers with higher value added. However, the effects of the tax system in use are usually omitted.

In this article we will discuss the effects of a progressive tax system on higher education. Precisely, on the decision making processes of individuals that are choosing their career path and the specialization.

In the first part we define the notion of human capital and explain the reasoning behind the choice of the private educational investment IRR as the target of study. We then provide the mathematical definition of the returns to education that we will be using to evaluate the said tax effects. Next we briefly review the international literature on the effects of taxation on economic growth. We then modify the optimization equations to reflect the effects of the tax system on the educational IRR. Finally, we discuss the Armenian case and calculate the before and after tax IRRs for the progressive and flat rate tax systems.

We conclude with the follow-up study propositions that arise from the current lack of data in the Armenian job and higher education markets.

Keywords Progressive taxation - Return to education – Investment – human capital

JEL Classification I26 - H24 - I28

Human capital

Capital is usually defined as Items purchased currently that produce benefits in the future. For reasons to be spelled out shortly, education produces monetary and, perhaps, nonmonetary benefits and qualifies as investment in human capital. As the phrase “human capital” suggests, individuals have certain capacities or skills of a cognitive, physical, social, or psychological nature with which they earn a living.

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The level of any one skill possessed by an individual is partly determined by genetic inheritances and is partly acquired in the family, from friends, from formal education, and so on. The type of education in which we are primarily interested increases inherited skill levels by developing a person's cognitive and/or affective attainment levels. For example, higher education is capable of teaching a person general facts, the use of specific These costs system and should due strictly to screening Higher education and earnings 26 tools, and general problem-solving techniques. In addition, it can influence a person's behavior by making him more tolerant of diversity, better able to stand stress, a better leader, and more disciplined mentally. All these aspects of cognitive and affective behavior could make a person a more productive and effective worker.¹

Thus, human capital can be defined as the total of educational spending by the public and private sectors. It is much more important to study the role of the private sector investment and behavioral patterns of investors, as governments are always reluctant to either increase or decrease spending on education, as economic and social effects are taking a relatively long time to manifest. The private sector however does not have the issue of showing results right here and now to appease the general public and is only conserved with increasing returns, be that financial returns or utility returns.

The Human Capital index is based upon 4 main pillars²:

- The Education pillar contains indicators relating to quantitative and qualitative aspects of education across primary, secondary and tertiary levels and contains information on both the present workforce as well as the future workforce.
- The Health and Wellness pillar contains indicators relating to a population's physical and mental well-being, from childhood to adulthood.
- The Workforce and Employment pillar is designed to quantify the experience, talent, knowledge and training in a country's working-age population.
- The Enabling Environment pillar captures the legal framework, infrastructure and other factors that enable returns on human capital.

As we can see, only education does not ensure high levels of human capital. However the definitions of the pillars imply that the Education pillar is the only one that is fully dedicated to the creation of human capital. Indeed, we can treat the Health and Wellness pillar as capital maintenance costs. The Workforce Employment pillar does have a capital generation element in it, which is the experience, however the rest of the building blocks of the pillar are indicators of endowment of the country's workforce. Finally Enabling Environment could be called the public good which a firm needs to utilize in order to be able to use capital. For example, if spending on education is buying a truck, then Health and Wellness would be buying parts, fuel and paying for repairs of the truck. Workforce and Employment would be the situation in the market for truck services as well as the initial budget with which we buy the truck, finally Enabling Environment would be a road which a firm would have to use in order to utilize the truck.

Thus if a country wants to generate more human capital, education investment would be the logical way to go. The Solow model relies heavily on measures of human capital to calculate expected economic growth. This is supported by empirical evidence. Gemmill (1996) studying OECD data has found that 1% increase in initial tertiary human stock was associated with a 1.1% increase in per capita GDP. When these OECD results were compared to a wider sample of countries, it was found that primary human capital had the most impact in the poorest group of the less developed countries and secondary human capital was the most significant variable

1 Chapter Title: The Human-Capital Approach to Higher Education Chapter Author: Paul J. Taubman, Terence Wales, 1974

2 Human Capital Index, World Economic Forum 2013

for the intermediate group of less developed countries. Barro (1997), using modified data in panel format and applying more sophisticated estimating techniques, produces a similar set of findings to the earlier paper. An extra year of male upper-level schooling is associated with a 1.2 % increase in per capita GDP growth rate.

As it was already mentioned, currently we are more interested in the behavior of the private sector as regards investments in human capital. Thus we need to evaluate the role that taxation plays for the educational IRR as in turn this measure plays an important role for enrollment and the tertiary human stock. Furthermore, effects of diminishing returns to education might translate into a much higher downturn for economic growth and poverty than just loss of a larger part of income by population with higher education degrees.

Returns on education

The typical human capital theory (Becker, 1964) assumes that education, s , is chosen to maximise the expected present value of the stream of future incomes, up to retirement at date T , net of the costs of education, c_s . So, at the optimum s , the PV of the s -th year of schooling just equals the costs of the s -th year of education:

$$\sum_{t=1}^{T-s} \frac{w_s - w_{s-1}}{(1 + r_s)^t} = w_{s-1} + c_s$$

where r_s is called the internal rate of return. Optimal investment decision making would imply that one would invest in the s year of schooling if $r_s > i$, the market rate of interest. Thus we can call the r_s an IRR of education of a sort.

If T is sufficiently large, the equation takes on the following form:

$$\frac{w_s - w_{s-1}}{r_s} = w_{s-1} + c_s$$

In their review Willson and Briscoe (2004) assume that C is small in comparison to sum of wages, thus simplifying the abovementioned equation to a logarithmic one. However, in case of developing countries costs of education usually exceed the opportunity cost of missed wages by far, thus we will abstain from the last steps and use the high C assumption.

Taxation and education

Usually, the studies on returns to education neglect the role that taxes play in wage distribution, thus arriving at higher educational IRR. However, for the person making an educational investment the thing that matters most is the after tax returns, thus if we assume positive returns on education, then the progressive taxation, which is widely proposed as a solution to inequality, may start playing a role.

The progressive tax system usually takes form of a gradual/ladder tax, when different tax rates are applied to incomes that exceed certain level.

We assume that there are 2 steps, for simplicity. Then the optimization function will take the following form

$$\sum_{t=1}^{T-s} \frac{(1 - k_2)w_s - (1 - k_1)w_{s-1}}{(1 + r_s)^t} = (1 - k_1)w_{s-1} + c_s$$

Naturally, if T is sufficiently large, we can write

$$\frac{(1 - k_2)w_s - (1 - k_1)w_{s-1}}{r_s} = (1 - k_1)w_{s-1} + c_s$$

Let us denote the initial added wage as Δw and the wage after progressive tax as ΔW . It is clear, that under progressive tax assumption, the difference between the higher education wage and the initial wage is larger than in the initial scenario without tax consideration. Naturally, the more progressive the system, the smaller will be the difference.

Thus, we arrive at the following representation of the edu-IRR.

$$\frac{1}{r'_s} = \frac{(1 - k_1)w_{s-1} + c_s}{\Delta W};$$

$$\frac{1}{r'_s} = \frac{(1 - k_1)w_{s-1} + c_s}{\Delta w}$$

Where ΔW is the added income in case of flat rate tax and Δw is the added income in case of the progressive tax. No complicated computations are needed at this point. It is clear, that higher Δw means IRR, which is precisely what happens, when a progressive tax rate is introduced. Thus by manipulating the progressive and flat tax rates we can arrive at an equivalent of a flat rate tax which will have the same negative IRR effect as the progressive tax system implemented.

Returns to education in Armenia

Armenia has a very high undergraduate education enrollment and completion rates as well as homogenous schooling years' distribution: both in geographical and social terms. The difference comes in undergraduate and graduate schooling years. Even then, every year about 70% of the students choose to continue education in the higher education institution and most of them get accepted. This drives down the returns to education due to abundance of human stock with tertiary degrees.

According to the Armenian law on income tax, persons receiving wages that do not exceed 120 thousand AMD are subject to income tax of 24.4%, while persons receiving wages in the range from 120 to 2000 thousand AMD are subject to the income tax calculated as sum of 29,280 AMD and 26% of the sum exceeding 120 thousand AMD. Finally, persons with wages exceeding to 2000 thousand AMD will have to pay the sum of 518,080 AMD and 36% of the amount exceeding 2 mln AMD.

According to the NSS RA, in 2013 the average monthly income of persons with Complete secondary education amounted to 84,882 AMD per month, the average income of persons that have received higher education has amounted to 108,739 thousand AMD. Assuming, that the 100% of education is coming from wages, we calculate the before tax wage level for persons with higher education- around 144,350 AMD, and for person with secondary education- 112,000 AMD. If we take into consideration the decision making process of the individual, that has just recently finished school, we can see that he will most likely be comparing current or last year wages to the expenses that he or she needs to undertake to get the higher education and a higher paying job. On the other hand, this person will be calculating opportunity cost of education as years of income lost. Maturity age in Armenia, is 18, the pension age for men is 65 years. School graduation usually occurs around 18 years old. Thus we assume that an individual will be working for 47 years. We next assume that an individual cannot work while receiving higher education.

According to NSS RA average price of tertiary education in Armenia amounted to about 346 thsd. AMD. In accordance with equation perceived investments in education will amount to 6,771,641 AMD, which is the sum of 4 years of missed wages. The delta W will be 384,000 AMD per year.

Table 1

Unit measure: AMD per year	Delta W	Investment in education	Wage for persons with secondary education
Before tax	384,867	6,771,641	1,347,333
Current system	274,409	5,224,902	960,648

Thus, the expected average IRR with zero taxes would amount to only 5.03%. This implies an extremely low IRR, thus the high rate of employment must be explained by the higher job opportunities for the graduate or extremely low workforce protection and market power. With the official rate of unemployment around 18% both of those explanations might be true.

The current progressive tax system lowers IRR to 4.49% which after we install the values in the abovementioned equation is equivalent to the effect from 28.7% flat rate tax.

It is noteworthy to mention, that the effective tax rate in Armenia is equal to 25.3%. Thus, the flat rate tax with zero educational effect would generate a significantly larger revenue while producing the same negative educational effect as the current progressive system.

Furthermore, it is safe to assume that the lower IRR will cause fewer students to achieve higher education, which will decrease the rate of human capital accumulation and subsequently, growth.

Conclusion and future research

In this article we have discussed the effects of a progressive tax rate on education. We have used the existing definition of internal rate of return on education as well as the definition of human capital for identifying and quantifying those effects. Finally, we used an example of a developing country to show the exact effects and the alternative to the tax system in use that would cause the exact same effect with higher public revenues.

Thus we can conclude that the progressive tax system, although promoting equality and wealth redistribution, is harming the IRR on educational investment as a consequence decreasing the stock of those who desire to achieve higher education and lowering human capital growth rates. Furthermore, the same negative effect is achieved by instituting a flat rate tax that would (under equal conditions) generate much more government revenue that could later be used as for social support and public investments. As our main focus was on Armenia, it is noteworthy that the poverty rate among persons with tertiary education was at 17.6% in 2014 while the poverty rate for persons with secondary education was at 33.6% during the same year. This implies that diminishing returns to education brought by progressive tax system might nudge some of the populace into the decision of not taking higher education, thus pushing them into groups with higher poverty rates.

However, there is a third way to tax higher earning individuals which is considered superior to the income tax, and that is use of various forms of consumption taxation. This however, presents a problem for the evaluation method used in this article, as it implies the need for real wage evaluation and use in the IRR calculations. The problem arises from the fact that the various income groups have different consumer baskets which would imply different levels

of consumption taxation. Finally, we are using averaged data and not considering the job opportunities as a gain which is visible to the populace.

The further steps thus would include:

- Disaggregate the wages and educational investment in accordance with NACE 2 grouping, to arrive at more precise IRR evaluations for different sectors of economy.
- Research and evaluate the effects of consumption taxes on real and perceived educational IRR
- Evaluate the perceived IRR under current conditions, as it might widely differ from the real IRR

References

Becker G (1964) *Human Capital*. Chicago: University of Chicago Press.

Becker G (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, Columbia University Press: New York.

Taubman PJ, Wales T (1974) *The Human-Capital Approach to Higher Education* Chapter Author: Volume ISBN: 0-07-010121-3.

Lange F, Topel R (2004) *The Social Value of Education and Human Capital* University of Chicago, Yale.

Wilson RA, Briscoe G (2004) In: Descy P, Tessaring M (eds) *The impact of human capital on economic growth: a review Impact of education and training Third report on vocational training research in Europe: background report*. Luxembourg: Office for Official Publications of the European Communities

Psacharopoulos G (2004) *Returns to Investment in Education: The World Bank*, Washington, DC, World Development, Vol. 22 (9):132.5-1 343

Oosterbeek H, Walker I (2000) *The Returns to Education A Review of Evidence, Issues and Deficiencies in the Literature* Colm Harmon, ISSN 2045-6557.

Acemoglu D (1996) *Microfoundation for social increasing returns in human capital accumulation*. *Quarterly Journal of Economics*, Vol. 111 (3): 779-804

Barro RJ, Lee JW (1993) *International comparisons of educational attainment*. *Journal of Monetary Economics*, 1993, Vol. 32 (3): 363-394.

Barro RJ, Lee JW (2001) *International data on educational attainment: updates and implications*. *Oxford Economic Papers*, Vol. 53 (3): 541-563

Barro RJ, Sala-I-Martin X (1995) *Economic Growth*. New York: McGraw Hill.

Gemmell N (1996) *Evaluating the impacts of human capital stocks and accumulation on economic growth: some new evidence*. *Oxford Bulletin of Economics and Statistics*, Vol. 58 (1): 9-28.