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Quantitative Approaches for Exploring the Influence of Education as Positional Good for Economic Outcomes

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Abstract: Education is one of the most important drivers for development and wellbeing both at the level of the society and at an individual level. Recognising the key role of education for social development, economic growth and individual wellbeing, education expansion has become an important objective for educational systems across the world. Education influences distribution of economic outcomes, making people pursue more education in order to obtain higher rewards. While expansion of education accelerates, new theories treat education as a positional good. From this perspective, due to its positional character, returns to education are affected in situations of skills imbalances characterised by a supply of graduates that surpasses the demand of the labour market. This paper employs this new perspective and explores the influence of education on economic outcomes in Romania. The authors present and discuss the use of traditional and new quantitative methods in order to shed light on the positional character of education. Our findings show that, in the case of Romania, the expansion of education did not reach the point at which education can be considered a positional good. The application of such methods is useful to inform a data-driven governance system targeting a better match between the supply and demand for education and skills.

Keywords: education; positional good; economic outcomes; skills governance

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1. Introduction

Education has become increasingly important over time, becoming one of the most important contributing factors for economic outcomes. In the 20th century, education played an increasingly important role in society given that prior to the 1950s, higher education was only available to children born into privileged social classes, but after the 1950s, it became affordable to a larger segment of the population [1]. Thus, most of the countries have experienced educational expansion in the last few decades, especially on the tertiary level [2]. As education influences the distribution of economic outcomes, people are encouraged to pursue more education in order to obtain higher rewards. Hence, economic factors play a very important role in motivating people to pursue additional education [2].

More recent theories consider that while education expands, it becomes more and more a positional good. This paper explores the influence of education as a positional good on economic outcomes in Romania. Thus, the study aims to develop our understanding on whether the expansion of the participation in education and, subsequently, the number of more highly educated people can influence the distribution of economic outcomes. Such an influence would indicate that the increasing supply of education and skills surpasses the existing demand, suggesting an imbalanced labour market. Moreover, the results of our paper are informative both for governance of the labour market aiming to match the skills demand and supply, as well as for people deciding whether to further invest in education.

In the last decade, Romania has displayed an ongoing process of expansion of education. According with Eurostat statistics, the population aged 15–64 years old with at

least upper secondary education increased from 70.8% in 2012 to 78.4% in 2021. Moreover, population aged 25–64 years old with tertiary education increased from 15.3% in 2012 to 18.8% in 2021. Additionally, the expansion of education is suggested by the fact that younger cohorts register higher shares of tertiary education (25–34 years old: 23.3%, 35–44 years old: 25.5%, 45–54 years old: 15.6%, 55–64 years old: 10% in 2021).

The remainder of the paper is structured as follows. First, a theoretical background is provided including human capital and signalling theories, but also the perspective of education as a positional good. Then, we discuss some methods that are used to analyse the influence of education on economic outcomes and to assess education as a positional good. In the next sections, we present the methodology of the study and some estimates for Romania. We further discuss our results that are useful to inform a data-driven governance system targeting a better match between the supply and demand for education and skills. Finally, our conclusions driven from the main findings of the empirical analysis close the paper.

1.1. Theoretical Framework

Education is an important determinant of the individual income, but also one of the most significant drivers of the human capital [3]. The concept of human capital was promoted by J. Mincer in 1958, when he attempted to develop an earnings model based on schooling and professional experience [4]. With the help of this model which only took into account the years of education, the age and the number of weeks worked each year by an individual, Mincer explained almost 60% of the variation in the annual income for US whites, this model being applied afterwards with the same success in more than one hundred countries [3]. Based on his studies related to education, experience and earnings, the foundations of the human capital theory have been laid [4]. Few years later, in 1962, human capital theory was first developed by Becker and Schultz [5]. According to human capital theory, individuals decide whether to pursue more education based on cost-benefit analyses that assess whether future returns on the increase in years of education over their current level of education are greater than the direct and indirect costs [2]. In other words, individuals will invest in education only when marginal benefits exceed or are equal to marginal costs [5]. Among the main assumptions of human capital theory is that education leads to a higher level of productivity which means that each extra year of education provides skills that increase an individual's productivity [6]. On the other hand, Bol [1] argued that even if human capital theory cannot predict how education effects change as educational expansion proceeds, educational returns are related to supply and demand differences: returns increase when there is more demand than supply, while returns decline when educational expansion is not accompanied by an equal expansion of the labour market.

Even though human capital theory remains an essential perspective of economics of education, it is not the only theory to consider [7]. Besides this theory, the labour market returns to education are also explained by the signalling theory. This theory was developed by M. Spence in the 1970s, when he brought to light the idea that the education level represents a "signal" for employers when they have to choose between workers with different skills and productivity [4]. In signalling theory, it is claimed that a substantial component of a worker's ability cannot be directly observed by an employer but rather must be signalled by education [8]. Moreover, according to Page [9], signalling theory differs from human capital theory by its premise as a workers' innate productivity level is identified by their school years rather than by their development, and more educated workers receive better salaries not because of acquired skills, but because education gives them accreditation. However, these two theories do not completely exclude each other because in addition to enhancing workers' productivity, education may also signal their innate abilities [9]. On the other hand, an important difference between the two theories is the following: in the human capital theory, educational returns are based on absolute levels, whereas under the signalling approach, investments in education are tied to relative

levels of education [10]. Furthermore, some of the signalling theory's assumptions are the following [9]:

- The level of productivity that individuals innately possess is not influenced by their education level;
- Higher education incurs additional costs, which differ for high-productivity and low-productivity workers for the simple reason that those who learn easily can acquire skills more cheaply than others;
- Since employees know their skill level, but employers do not, asymmetric information exists concerning workers' productivity;
- Because employers cannot observe individual workers' actual productivity, they use their educational qualifications to predict productivity, make hiring decisions, and set wages because they assume individuals with more education are more productive.

Another important concept for our study is related to education as a positional good. This term, positional good, means that a good's value depends more on a relative consumption than an absolute one because the value of a good for an individual depends on how it relates to other individuals [10]. In the last decade, some researchers found that as education expands, it becomes more and more a positional good [1,2,6]. Bol [1] used both absolute and positional education measures and demonstrated that with the expansion of education, rewards in the labour market are based more and more on a relative measure of individuals' educational level than on absolute one, this relative position being now more important than in times when the education system was not so expanded. Moreover, another study found that the expansion of education leads to a greater life satisfaction because individuals with higher education levels than the average level are more satisfied with life than their counterparts who possess lower education than the average level [11]. However, the expansion of education is not the same everywhere. The returns to education decrease along with education's expansion because education has scarcity status and a decrease in scarcity reduces its premium [2].

1.2. Objective of the Study

Over time, various methods for analysing the influence of education on economic outcomes have been developed, both at the macroeconomic level and at the microeconomic level.

At micro level, the economic returns to education are traditionally determined by measuring the labour market performance of highly educated people versus the less educated ones based on their absolute education level. Nevertheless, existing evidences indicate that in societies with a high level of education expansion, education functions as a positional good on the labour market, in which a worker's relative position (not a worker's absolute level of education or skills) has an increasing significance [2].

In practice, economists use earnings functions to estimate the returns to education, and Mincer's equation is among the most widely used [12,13]. By constructing an empirical formula for a person's income over their lifetime, Mincer proved that incomes are linear functions of education and concave functions of labour market experience, which means that income grows quickly when people are young, reaches a maximum and then decreases [3].

The traditional Mincer model includes three fundamental variables: income, education, and labour market experience. This empirical evidence helps individuals to decide if and how to invest in their human capital by providing useful indicators, especially in the form of projected future wages [13]. A study conducted in Romania by Oancea et al. [3], who have used the Mincer equation to see the education's influence on the income, found that over the years, return to education has increased as compared with previous studies, master's and bachelor's degrees increase income, while doctorate degrees do not. The fields of education with the highest return rate are medicine, economics, and law. Moreover, the Romanian labour market is rewarding higher education: employees with higher education earn significantly higher incomes than the rest of the workforce, consistent with findings

at the global level, where tertiary education generates the highest returns, followed by primary and secondary education [3,13]. According to some empirical findings, the Mincer equation estimates show that each additional year of education produces an individual rate of return to schooling of about 5–8% per year, with a range of as low as 1% to more than 20% in some countries [13].

Given that education has been and will always be an extremely important aspect both for individuals and for society as a whole, it is very important to assess whether it acts as a positional good. Over time, several studies have addressed this topic and showed that under the condition of expansion of education, it can be considered more and more a positional good. A recent longitudinal study from Vietnam showed that, as education expands, the effect of the absolute measure of higher education on earnings remains constant, but the effect of its relative measure changes [2]. This is consistent with the positional theory of education, predicting that the absolute level of education is not essential, but its level relative to that of others is more important [2].

Our paper employs this new perspective and assesses the influence of education on economic outcomes in Romania. We use both the absolute and relative measures of education in our study in order to explore the extent to which education can be considered a positional good in Romania.

2. Materials and Methods

2.1. Participants

In order to reach our objective, we use micro-data from EU-Statistics on Income and Living Conditions (EU-SILC 2020) which is a standardised statistical survey that collects data on education, employment and income at an individual level. The analysis is focused on the sample for Romania. As we are interested in assessing the influence of education on monetary outcomes, we restricted our sample to full-time employees. The final sample used for analysis included 5628 persons (56% women and 44% males). With respect to education, 6% of the participants have primary education, 69% have secondary and post-secondary non-tertiary education and 26% have tertiary education.

2.2. Research Methods

This paper aims to empirically explore the influence of education as a positional good for economic outcomes, using a customized Mincer equation [13] based on the elastic net regression feature selection approach [14].

For education, we used two alternative measures:

- number of years of education and
- educational position of the person in the educational distribution (share of individuals reaching at most the educational attainment of the person).

The first variable provides an absolute measure of education indicating the stock of education acquired by a person. The econd variable considers education as a positional good, measuring the position held by a person in the educational distribution. The higher his/her position, the lower the share of individuals holding a higher level of education than his/her own. We use the two measures of education alternatively in order to highlight how different conceptualizations of education influence the results.

For the economic outcome, we use the net employee cash or near cash income measured in the local currency.

The form of Mincer equation is the following:

$$W_i\beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + controlvariables + \varepsilon \quad (1)$$

where: W_i is the wage of the person i; S_i is educational variable, X_i is the number of years spent on the labour market; control variables: region, sector, degree of urbanisation, gender, age.

The analysis is built into a twostep iterative procedure. In the first stage, we have determined the most relevant variables of wage variations exploring the influence of both proxies of education, while in the second step, we have constructed two Mincer regressions, one for each proxy of education.

To choose the significant variables, the elastic net with regression coefficients approach has been applied, allowing not only for the selection of relevant variables, but also improving the stability and practicality of the developed model. Representative feature selection approaches include stepwise regression (SR), partial least squares (PLS), least absolute shrinkage and selection operator (Lasso), and elastic net (Enet), and their regression coefficients carry significant information.

Variable selection methods and variable projection methods are the two types of feature selection methods. Variable selection methods such as SR and Enet try to pick a subset of the original variables to use in a model, whereas variable projection methods such as PCA and PLS aim to project the original variables in a specified direction to generate a new set of variables. Shrinkage methods [15] are based on original least squares (OLS), such as ridge regression, lasso [16,17] and Enet [14].

We can utilize Enet to further select quality-related variables and reduce model complexity by shrinking the coefficients of redundant variables to zero, making them more stable and trustworthy than other approaches. The elastic net with regression coefficients approach is developed in this paper to perform variable selection based on Enet's regression coefficients.

Considering the multiple linear regression model with p predictors $x_1, \ldots, x_p$, the response y is predicted by $\hat{y} = \hat{\beta}_0 + x_1\hat{\beta}_1 + \cdots + x_P\hat{B}_P$.

A model fitting procedure produces the vector of coefficients $\hat{\beta} = (\hat{\beta}_0, \cdots, \hat{\beta}_P)$. Ordinary least squares (OLS) estimation is obtained by minimizing the residual sum of squares, but OLS often does poorly in both prediction and interpretation.

Penalization techniques have been proposed to improve the performance of OLS [18]. If Ridge regression minimizes the residual sum of squares subject to a bound on the L_2-norm of the coefficients, producing a parsimonious model, because it always keeps all the predictors in the model, Lasso is a penalized least squares method which imposes an L_1-norm penalty on the regression coefficients and is used for both continuous shrinkage and automatic variable selection simultaneously.

Elastic net is a hybrid of the two most common regularized linear regression types, ridge and lasso. Ridge employs an L_2 penalty, whereas Lasso employs an L_1 penalty, while elastic net uses both the L_2 and the L_1 penalty. Enet, like lasso, performs automatic variable selection and continuous shrinkage while also being able to pick groupings of associated variables [19]. By combining the L_1-norm penalty (lasso) and the L_2-norm penalty (ridge), Enet reduces the regression coefficients:

$$\hat{\beta}_{enet} = \left(1 + \frac{\lambda_2}{n}\right)\left\{arg_{\beta}\min\| y - \sum_{j=1}^{p} x_j\beta_j\|^2 + \lambda_1\|\beta\|_1 + \lambda_2\|\beta\|_2^2\right\} \quad (2)$$

Elastic net method can select groups of highly correlated variables, but the correlation between most variables all reaches up to 0.95 which leads to the inefficiency of elastic net to obtain a sparse model and makes the results hard to interpret [20].

In order to compare the impact of the two education variables on economic outcomes, the standardized beta coefficient has been used to compare the strength of the effect of each individual independent variable on the dependent variable. The higher the absolute value of the beta coefficient, the stronger the effect. Standardizing coefficients allow to compare the relative importance of each coefficient in the elastic net regression model.

3. Results

The empirical results of both models based on two different proxies of education revealed some variation in the identified important variables.

3.1. Years in Education and Wages

In the first model (which includes an absolute measure for education), the most relevant variables in explaining the variations in wages are the type of sector (public services), gender (female), years spent in education, degree of urbanization (thinly populated area and intermediate area) and region (macro-region 2 and macro-region 4) (Figure 1).

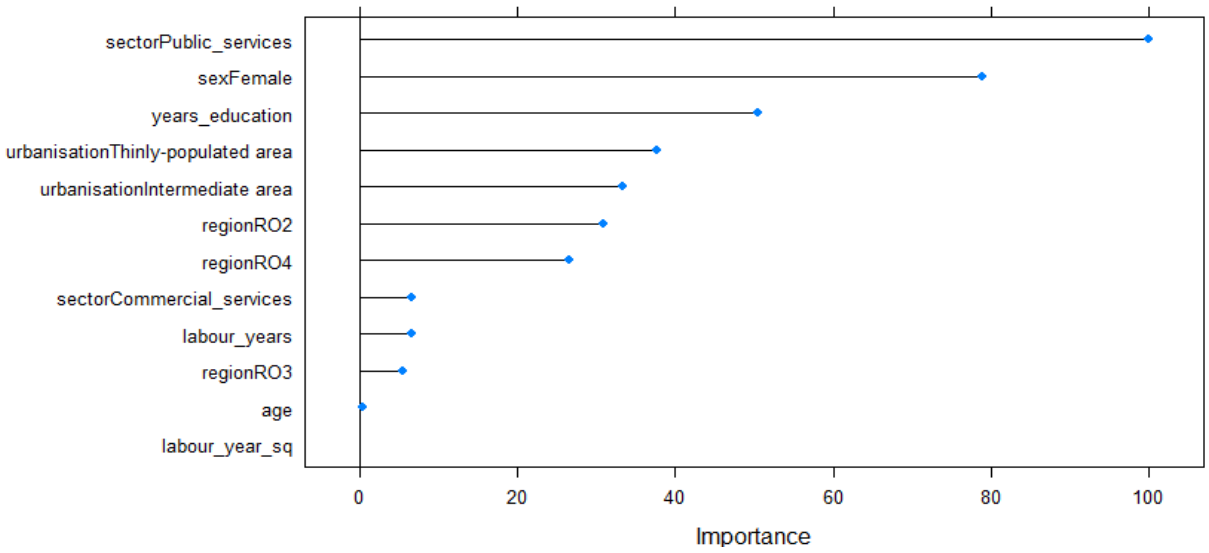

Figure 1. Relevant variables in explaining the variations in wages based on Enet method for Model 1.

The results provided by the customised Mincer equation (Table 1) show that people working in public services have higher wages, while being a female decreases the income level. The stock of education in terms of number of years spent in education is positively associated with higher wages. Additionally, living in thinly-populated or intermediate populated areas influences negatively the wage levels. The region in which a person lives influences his/her earnings as macro-regions 2 and 4 have more important negative impact on wage level. Working in commercial services has a negative impact on earnings. Although its influence is weak, number of years in the labour market is positively associated with higher wages.

Table 1. Coefficients for Model 1 using the absolute measure of education.

Intercept	−1353.462
Years in education	532.292
Labour years	71.711
Region RO2	−326.259
Region RO3	−58.999
Region RO4	−281.407
Urbanisation (intermediate area)	−351.889
Urbanisation (thinly populated area)	−397.137
Sector (commercial services)	−71.748
Sector (public services)	1052.452
Sex (Female)	−830.274
Age	5.271
Labour years squared	−1.408

3.2. Position in Educational Distribution and Wages

In the second model (which includes a relative measure for education), the most relevant variables in explaining the variations in wage are type of sector (public services), gender (female), degree of urbanization (thinly populated area and intermediate area) and region (macro-region 2 and macro-region 4) (Figure 2).

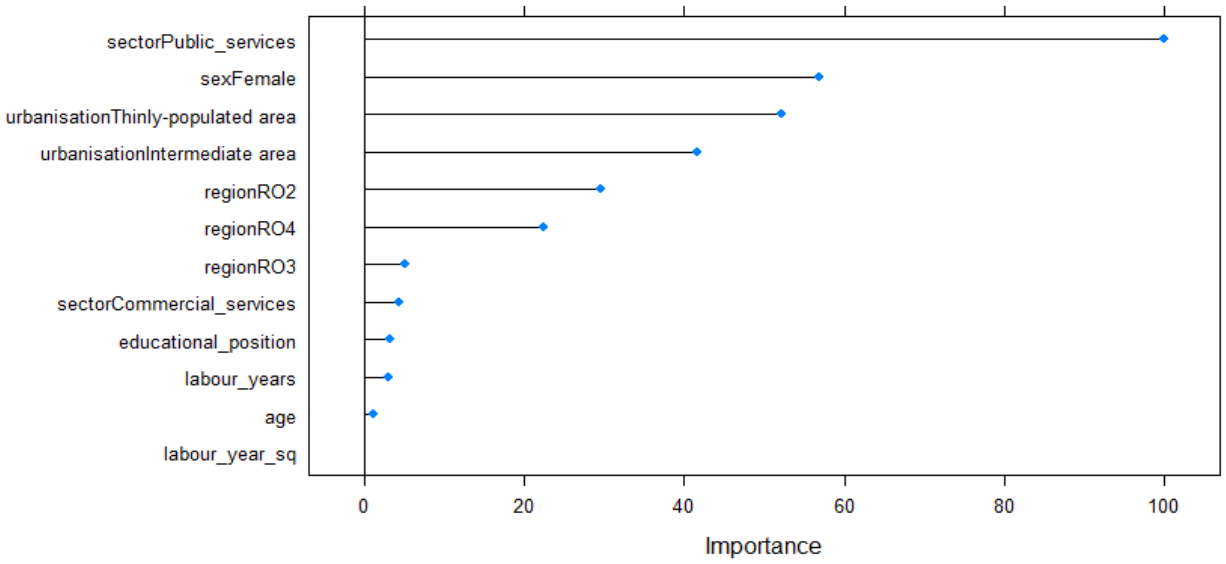

Figure 2. Relevant variables in explaining the variations in wages based on Enet method for Model 2.

Similar with the first one, the results of the second model (Table 2) show that working in public services is positively associated with higher wages, while being a woman is negatively associated. Additionally, living in areas outside the big urban concentrations has a negative impact on earnings. In addition, people from macro-regions 2 and 4 have significantly lower wages. With respect to education, the results show that a higher position in the educational distribution is associated with higher wage levels.

Table 2. Coefficients for Model 2 using the relative measure of education.

Intercept	1401.591
Educational position	48.479
Labour years	44.962
Region RO2	−420.956
Region RO3	−73.207
Region RO4	−321.095
Urbanisation (intermediate area)	−591.829
Urbanisation (thinly populated area)	−742.176
Sector (commercial services)	−64.071
Sector (public services)	1423.120
Sex (Female)	−810.719
Age	18.601
Labour years squared	−1.303

3.3. Comparing the Influence of Absolute and Relative Measures of Education

Comparing the influence of the two alternative measures of education on wages, one can notice that the number of years in education exhibits a higher degree of importance in comparison to educational position. This result has been better highlighted through the analysis of the standardised coefficients' values, the coefficient of the number of years in education revealing a higher impact in comparison to the educational position (Table 3).

Table 3. Standardized Coefficients of both models (alpha = 0.1).

	Model M1	Model M2
Years in education	0.427	
Educational Position		0.288
Labour years	0.292	0.184
Region RO2	−0.053	−0.068
Region RO3	−0.010	−0.012
Region RO4	−0.045	−0.051
Urbanisation (intermediate area)	0.008	0.026
Urbanisation (thinly populated area)	0.072	0.135
Sector (commercial services)	−0.013	−0.012
Sector (public services)	0.151	0.205
Sex (Female)	0.154	0.151
Age	0.018	0.071
Labour years squared	−0.247	−0.226

4. Discussion

Many countries display an accelerated process of educational expansion [21]. This paper contributes to the debate on a potential change in the monetary return to education as the supply of education increases and education may act as a positional good. Our approach explored the influence of education on economic outcomes by using two alternative measures for education. On the one hand, we assess the influence of education as reflected by an absolute measure such is the number of years spent in education. On the other hand, we used a relative measure for the position of individuals in the educational distribution, considering the theory of education as positional good.

When comparing the results provided by the two alternative estimations, one can notice that the stock of education is more important for wages than one's position in the educational distribution in the case of Romanian employees. Thus, our results show that the number of years spent in education registers a higher degree of importance in comparison to educational position. These results suggest that higher levels of education bring higher monetary benefits to individuals, while the level relative to that of others is less important.

So, in the case of Romania, although participation in education has increased constantly in the recent period, the education attainment seems to be a more important predictor for the wage level than the educational position. This result suggests that investing in education brings high returns in Romania and that education has not become a positional good. This is in contrast with findings of previous studies from countries such as Germany [22] and Vietnam [2], but is consistent with results found for China [23] and developing countries from Africa, Latin American, Asia and Eastern Europe [24]. The debate on whether and in which conditions education acts as a positional good in relation to monetary and non-monetary outcomes is still in progress [25]. Moreover, cross-country studies indicated important variations in relation to the characteristics of the macroeconomic context [26,27]. In the case of Eastern European countries, it seems that the high rhythm of economic growth fuels an increasing level of human capital demand, resulting in high returns to education [24].

The main limitation of the study is related with the fact that it provides an assessment at one point in time, unable to provide evidence on the existing changes in time, as the participation in education has expanded.

5. Conclusions and Final Reflections

5.1. Main Findings

The findings of this study show that, in the case of Romania, additional years in education provide higher wages, while the share of people reaching a higher level of education is less important. Thus, investing in education continues to bring higher economic rewards

for individuals, suggesting that the expansion of education did not reach the point in which education can be considered a positional good in Romania.

5.2. Implications

Based on the presented methods and results, the governance system targeting a good match between the supply and demand for education and skills can continue to support the expansion of education in Romania. Such expansion will continue to be beneficial for both the economy and individuals. Future systematic monitoring of the influence of education on economic outcomes using both measures of education will provide the necessary inputs for the governance system with regard to the match between the supply and demand for education. Moreover, these methods are useful in identifying profiles of vulnerable populations such as those living in low populated areas in the case of Romania. For such communities, more effective and targeted support measures have to be put in place in order to reduce the earnings and social inequalities. In addition, while education remains a key way to promote social development and wellbeing, the gender wage gap has to remain a top concern of the governance system.

5.3. Future Research

Future directions of research include a longitudinal study aiming to explore how educational expansion changes the relationship between education and income in time, as well as a study assessing existing variations at regional or sectoral levels in this respect. In addition, another interesting direction for further study is the link between educational expansion and social inequalities.

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