

# ANALYSIS OF EARNINGS SURPLUS BY EDUCATIONAL LEVEL IN HUNGARY, BETWEEN 2004 AND 2013

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**Abstract**—According to the human capital theory, education can be seen as an investment into individual human capital. The profitability of human capital investment is partly determined by the individuals' work-related earnings. The study examines how work-related earnings and the gap between gross earnings at different educational level changed in Hungary, between 2004 and 2013. An indicator is defined and presented to measure the change in gross earnings and net earnings caused by the education as human capital investment. Moreover we examine the change in earnings surplus by educational level, look for the answer to the question whether the gap between earnings for individuals with different educational attainment increased or decreased in Hungary from 2004 to 2013.

**Keywords**—educational level, marginal earning rate, investment in human capital, tax burden

## I. INTRODUCTION

THE main topic of our examination was given by the human capital theory. According to the human capital theory, individual's knowledge and skills can be referred to as capital and all activities which with present expenditures make future benefits while productivity of the individual grows can be interpreted as an investment. Many researchers have examined the significance and the main features of investments in human capital [1], [2], [3], [4], [5], [6]. Expenditures on health, training, education and migration can be seen as an investment in human capital. The profitability and the rates of return of education can be measured from the individual's, the society's and the state's point of view. The individual rates of returns show how profitable for an individual to finish higher level of education. The main component of the profitability is the earning surplus achieved with the investment in human capital.

The purpose of this paper is to examine the main characteristics of earnings surplus by educational levels. We examine how earnings differences between individuals with a given education level and ones with next lower educational level changed in Hungary, between 2004 and 2013. We define the marginal earning rate (MER) as an indicator to measure the impact of

investment in education on gross and net earnings from employment.

## II. CHANGES OF GROSS EARNINGS BY EDUCATIONAL LEVEL IN HUNGARY, BETWEEN 2004 AND 2013

We examine the gap between gross earnings at different educational level in Hungary, between 2004 and 2013. Data of gross earnings was provided by the National Employment Service [7]. "Gross amount of the regular earnings elements took into account in the reference month, plus 1/12<sup>th</sup> of the total amount of non-monthly bonuses, reward and 13<sup>th</sup> month's pay received in the previous year" [7]. The report of earnings includes full time and part-time employees. The survey covered enterprises with a staff of 5 or more as well as non-profit organizations, and public institutions without headcount limit [7]. Individuals' gross earnings from employment rises with each level of education attained, except for primary school qualification [Fig. 1.]. The largest increase of gross earnings occurred for individuals with apprentice vocational school and primary school (by 69.5% and 60.9% respectively).

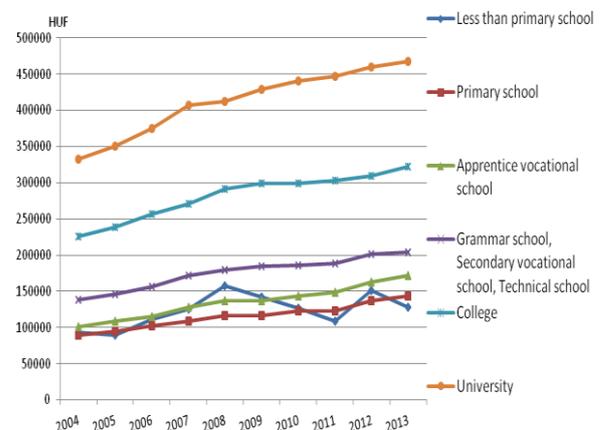


Fig 1. Average gross earnings by educational attainment in Hungary, between 2004 and 2013 [7]

The smallest increase of gross earnings occurred for individuals without primary school graduation (38.3%)

and for individuals with university degree (40.9), as shown in Fig. 1.

The gap between earnings at a given educational level and the lower level for employees increases by educational attainment, as shown in Fig. 1 and Fig 2. Earnings differences between individuals with apprentice vocational school and primary school increased by 43.5%. The ratio of gross earnings at tertiary educational level and next lower educational level decreased in Hungary between 2004 and 2013, as shown in Fig 2. The largest decrease occurred for individuals with secondary upper school by 13.2 percentage points [Fig. 2.]. However, the earnings difference at primary school level as a percentage of earnings of the agents without primary school qualification was negative in 2004 and between 2006 and 2012 (with exception of 2011).

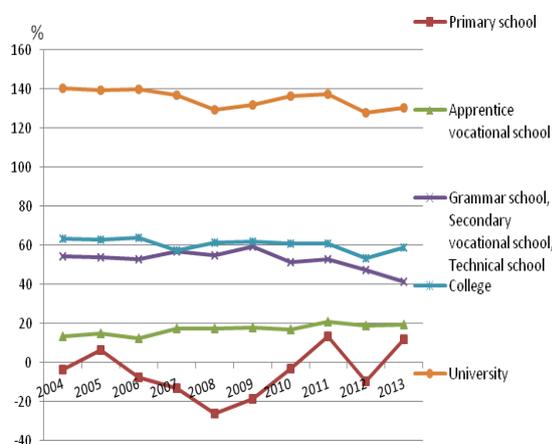


Fig 2. The change in gross earnings differences between individuals with a given education level and ones with next lower educational level in Hungary, between 2004 and 2013

### III. CHANGES OF GROSS EARNINGS AND NET EARNINGS CAUSED BY THE CHANGE IN EDUCATION ATTAINMENT IN HUNGARY, BETWEEN 2004 AND 2013

We turn our attention to the alteration in the gross earnings caused by the change in individual educational attainment. We define an indicator to measure the mentioned change in earnings. The calculation of the indicator is based on the presumption that the labour market rewards the highest completed education level and an additional completed year of school. This assumption is a very strong condition since the change in earnings depends on many factors such as employment status, the productivity of an economy, the type of occupation, regions, work experience, and employee's age and gender. However, the marginal earning rate (MER) measures the change in earnings in an environment determined by economic and social factors.

Marginal earning rate on education shows how the individual's average earning changes as individual's educational attainment changes, with all other variables unchanged:

$$MER = \frac{\Delta E}{\Delta EDA} = \frac{E_j - E_{j-1}}{EDA_j - EDA_{j-1}}, \quad (1)$$

where  $EDA_j$  is the sum of the years of schooling completed by the individual ( $j$ -th level of education level),  $E_j$  is the average earning for an individual with  $j$ -th educational qualification. Marginal earning rate on education reflects the increase in gross earning (net earnings) when the years of schooling rises by one unit at given educational level.

The largest gross proceeds from investment in education occurred in the case of tertiary education. One year of study at a university yielded 52 923 HUF in 2013 (Fig. 3.). The value of MER for individuals with primary school was negative in 2004, because the average gross earning for individual with primary school qualification was less than that of individuals with a lower level of educational qualification (Fig. 1. and Fig 4.).

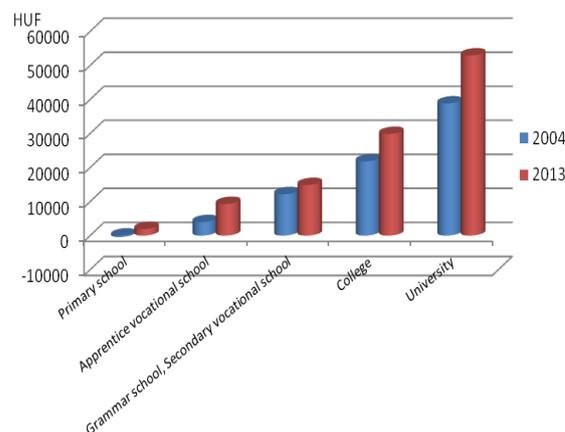


Fig 3. The change in marginal gross earning rate on education by educational level in Hungary, in 2004 and 2013

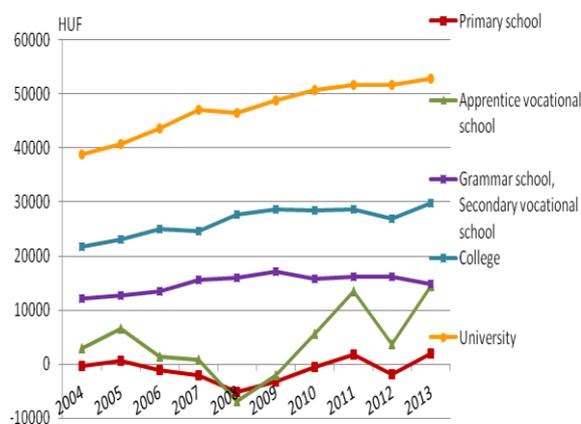


Fig 4. Marginal gross earning rates on education by educational level in Hungary, between 2004 and 2013

The earning surplus gained from attaining one extra year of tertiary education increased by 40% between 2004 and 2013. The participation rates in tertiary level of education decreased from 2004 to 2013. The number of

students enrolled in tertiary education decreased by 9.81% from 2004 to 2013 [8]. According to the change in gross earnings, the value of the university and college qualification increased with a considerable measure. The change in MER was the highest for individuals with primary school qualification, the value of MER was -421 HUF in 2004 and 1 943 HUF in 2013 (Fig. 3.).

As a matter of fact, the marginal earning rate on education can be calculated in two ways. Gross earnings and net earnings can be taken into account when calculating the marginal earning rate. We can distinguish marginal gross earning rate (*MGER*) and the marginal net earning rate (*MNER*), depending on which earnings measure is used:

$$MGER = \frac{\Delta BTE}{\Delta EDA} = \frac{BTE_j - BTE_{j-1}}{EDA_j - EDA_{j-1}}, \quad (2)$$

$$MNER = \frac{\Delta PTE}{\Delta EDA} = \frac{PTE_j - PTE_{j-1}}{EDA_j - EDA_{j-1}}, \quad (3)$$

where  $BTE_j$  is the before-tax earnings for individual with  $j$ -th educational qualification and  $PTE_j$  is the post-tax earnings for individual with  $j$ -th educational qualification.

The gross earnings are determining factors in social costs and social benefits, contained in social rates of returns calculations. However, post-tax earnings are taken into account for private benefits and private indirect costs when calculating the private rates of return to education. In the following, we determine the marginal net earning rate that shows the change in post-tax earnings as the year of school increases by only one unit.

The extent of taxes on labour income and the para-fiscal charges (and tax wedges) are very high in international comparison in Hungary. The tax wedge shows how much the government collects revenues as a result of taxing the labour force. Tax wedge is the sum of personal income tax and employee plus employer social security contributions together with any payroll tax less cash transfers, expressed as a percentage of labour costs [9]. The largest tax wedge for a single person without children at 100 per cent of the earnings of an average worker could be found in Belgium (55.4%) and Germany (52.2%) in 2004 [10]. The value of the tax wedge in Hungary was the third highest value (51.7%) among member OECD countries. The lowest tax burden as a percentage of labour cost was in Chile (7%) and Mexico (17.9%).

The main features of personal income tax system and para-fiscal contributions have changed in Hungary over the examined period (between 2004 and 2013). The progressive taxation on labour income was replaced by the flat income tax rate (16%) in 2011. The tax burden on labour income did not decrease significantly with the

introduction of proportional taxation. The amounts of taxes on labour income, and tax wedges have remained relatively high mostly due to higher employee social security contributions and employer social contribution tax. The value of the tax wedge in Hungary was the fourth largest (49%) among OECD member countries in 2013 [11]. The largest tax wedge occurred in Belgium (55.8%), Germany (49.3%) and Austria (49.1%) in 2013. The lowest tax burden as a percentage of labour cost could be found in Chile (7%) and New Zealand (16.9%) in 2013.

We calculated tax liabilities for single individual without children at the income level of the average worker. Post-tax earnings, as actually realized value by the individual, are taken into account for earnings surplus when calculating the marginal net earning rate on education. The value of marginal net earning rate on education increases by educational level. The largest value occurred for individuals with university qualification, the MNER was 34 664 HUF in 2013, as shown in Fig. 5 and Fig 6. The market value of university qualification is very high, and it is accordance with the private rates of return to tertiary education. The private internal rate of return for a man attaining tertiary education was the highest in Hungary (25.6%) among OECD member states in 2009 [12]. The OECD average of private returns to tertiary education was 13% [12]. The private rates of returns for individuals with tertiary education completed in Hungary were the second highest among OECD member countries in 2010 (28.5% for men and 24.6% for women) [13]. The largest private rate of return occurred in Ireland (29.9% for men) and Estonia (29.7 for women) [13].

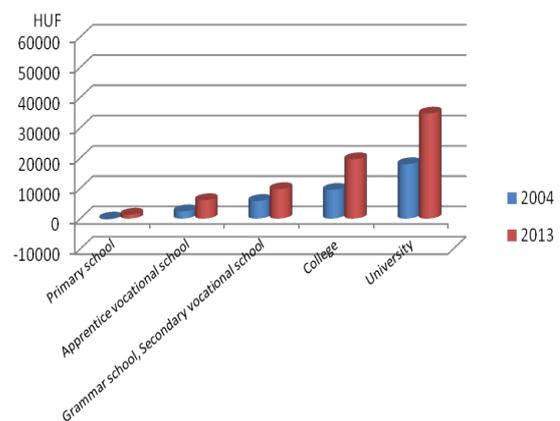


Fig 5. The change in marginal net earning rate on education by educational level in Hungary, in 2004 and 2013

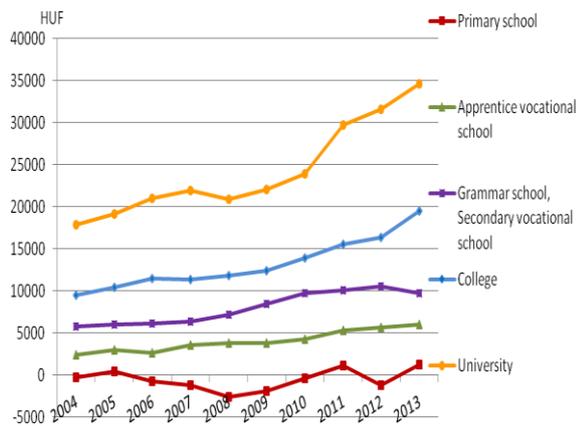


Fig 6. Marginal net earning rate on education by educational level in Hungary, between 2004 and 2013

The college education is less lucrative in Hungary, compared to the university education, which is due to the lower earnings surplus of individual who has college educational level compared to the individual who has the next lower level educational attainment (Fig. 5, Fig 6).

Negative values of MNER can be observed for individuals with primary school qualification (Fig. 6.). Negative MNER occurred in 2004 and between 2006 and 2013 because the earnings of those with primary school qualification lagged behind to the earnings of those with lower than primary school qualification as shown in Fig. 1. and Fig 6. Consequently the private rates of return on primary education is probably negative, the earnings surplus is negative which cannot produce returns in a way that it cannot compensate the education costs compared to wages in the labour market.

#### IV. CONCLUSION

Our aim was primarily to gain insight into how the market values the knowledge and skills of individuals with given educational qualification. We examined the change in gross earnings and net earnings caused by attaining one year of school at different educational level. We defined and analysed the marginal net earning rate and marginal gross earning rate on education.

The earning surplus shows the benefit that individuals can realise following their human capital investment in the labour market. According to our results, the earning surplus of individual who has  $j$ -th educational level is compared to the individual who has  $(j-1)$ -th educational increased over the 2004 - 2013 period. The marginal earning rate on education shows the change in individual's average earning as an individual's educational attainment increases. Both gross marginal earnings rates and net earnings rates on education increased in Hungary between 2004 and 2013. The marginal earning rates rose by educational level. This means that higher education as a human capital investment brings great returns for the individual in Hungary. The calculation of marginal earning rates can be improved with the correction of probability of

unemployment. This means that we have to take into account the unemployment rates by educational level. Moreover the examination of calculation of marginal earning rates can be extended to take into account the earnings broken down by age.

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