

**INCOME INEQUALITY, YOUTH UNEMPLOYMENT  
AND THE EXPANSION OF BULGARIA'S HIGHER  
EDUCATION IN THE NEW MILLENNIUM**

**Lubomir Stoytchev**

**Abstract.** The influence of income inequality and youth unemployment on the expansion of the higher education in Bulgaria is analysed and interpreted. Bivariate and multivariate linear regression models are calculated and discussed. Quantitative evidence about an association between income inequality and the growing percentage of higher education graduates is presented. The youth unemployment perspective to higher education is also modelled and explored as a context and as a predictor. Data analyses confirm the theoretical assumption that increasing income inequality in society can lead to more higher education graduates, especially among the 25-64 age group. Youth unemployment proves to be an important contextual setting for the income inequality – higher education relationship.

**Key words:** income inequality, S80/S20 income quintile, youth unemployment, tertiary education/higher education

**Introduction**

A myriad of studies discuss various aspects of higher education (HE) such as funding, the expansion of HE in the past forty years, the quality of teaching methods, inequality among students (educational inequalities), the curricula, etc. The vast majority of these studies are conducted within the paradigms of education studies (pedagogy) and sociology of education. Other studies resort to economic approaches focusing on the relationships between HE and the labour market, the economic growth, the productivity, etc.

This article was designed to contribute to the research of higher education from a different economic approach. It is aimed at exploring tertiary education<sup>1</sup>

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<sup>1</sup> The terms (academic) higher education and tertiary education are used throughout this paper interchangeably.

from perspectives, which have not been topical among Bulgarian researchers so far, i.e. **the income inequality and youth unemployment perspectives.**<sup>2</sup>

There is a sound reasoning why this research topic has not been popular. Before the fall of the Berlin Wall and the concomitant 1989 political changes in Bulgaria, income inequality and youth employment were practically unknown phenomena. The communist regime in the People's Republic of Bulgaria was acknowledged to have suffered a number of faults and shortcomings – especially from the rights and freedoms point of view – but its society can be arguably referred to as strongly egalitarian, and its labour force was employed at almost 100%.

Since 1989 the situation has rapidly changed. In few years time, poverty, unemployment and income inequality were transformed from (mostly) theoretical concepts into crucial factors driving the lives of millions of Bulgarians. Nevertheless, the researchers of tertiary education in Bulgaria continued to avoid the economic approaches from the perspective of income inequality (and unemployment, incl. youth unemployment). For various reasons such as the momentum from the past, the preferred research topics by sponsors and funding organisations, and the great deal of paradigms related to democracy and the market economy, the approach and perspectives used in this study were left outside the major HE topics in the scholarly debate. But these days – as the situation is drastically changed and inequality and youth unemployment are now amongst the most topical issues – research on higher education from these perspectives seems inevitable.

The major research question, also a primary aim of this study, is to figure out an answer if the expansion of Bulgaria's tertiary education, in terms of larger proportion of people who pursue and graduate from college/university, is related to and to what extent it is affected by income inequality and youth unemployment. The period examined in this study – referred to as the *New Millennium* – starts in January, 2000 and ends in December, 2015 (latest data available to date).

### **Briefly on the expansion of Bulgaria's higher education**

According to the National Statistical Institute (NSI) census data, about 7.9% of Bulgaria's population held a college/university degree in 1992. In 2001, this percentage increased to 9.6. Ten years later, in 2011, the HE graduates soared to an unprecedented 19.6% of the population.<sup>3</sup> The trend behind these exhaus-

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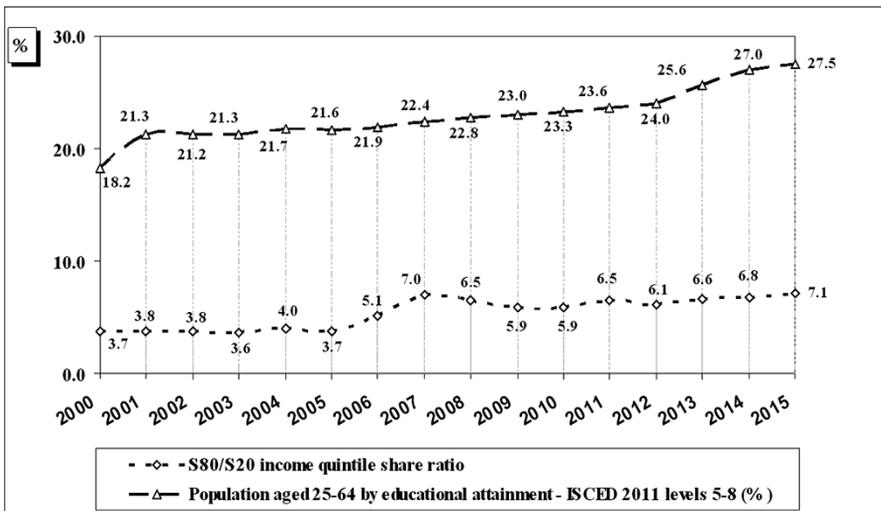
<sup>2</sup> Generally, a similar statement can be argued regarding the rest of the European and American researchers. A desk research I conducted in June, 2016 could not detect any publications dedicated on relationships, discussed in this paper, though some stratification and educational inequality publications [Shavit, Y. & Blossfeld, H, 1993; Stiglitz, 1973], at times, either briefly discuss or note similar issues.

<sup>3</sup> Author's calculations based on published census data [National Statistical Institute, 2012: 86]. This indicator should not be accepted as the most accurate one, though it clearly delineates a tendency. The problem is that its base is the population aged 7+ whose education was declared in the census. As it is impossible to have graduated from tertiary education prior to age 21-22, one should take into account that the above percentages are actually shrunk from the perspective of real proportions. For a more precise indicator, see table 1.

tive snapshot data seems to be consistent with the overall European context. For instance, an EQUINET Consortium report generalises that “the developments and changes of the late 20<sup>th</sup> century caused expansion... beyond the small groups that were traditionally expected to be prepared for the ruling elite” [EQUINET, 2010: 8]. In the mid 1970s, the number of university graduates in Bulgaria was about 312 thousand people, i.e. under 5% of the adult population.

Figure 1 provides additional evidence (the New Millennium annual data) on Bulgaria’s HE expansion. For a period of sixteen years, the percentage of university/college graduates among those aged 25-64 has increased by 9.3 percentage points and it makes sense to project that by 2020 proportion of higher education graduates would surpass 30%. The HE expansion is in a favourable social-economic environment that can be well described via endogenous social-demographic, economic and policy factors such as the fertility patterns in a shrinking population, the increasing share of the knowledge-based economy and the respective changes in the labour market, the EU cohesion policies, etc. (see Fig. 1).

Taking into consideration the presented data, it can be argued that **there is a clear trend of expansion of the tertiary education in Bulgaria, especially in the New Millennium** (accompanied by an increase of the income inequality among population). In addition to the favourable social-economic environment, the higher education *per se* is definitely among the strong factors that



**Fig. 1.** Income Inequality and Tertiary Educational Attainment<sup>4</sup> in the New Millennium  
 Source: Eurostat, (<http://ec.europa.eu/eurostat/data/database>)  
 Last update: 29.06.2016. [Accessed: 30.06.2016].

<sup>4</sup> For details concerning International Standard Classification of Education 201, [see UN-ESCO Institute for Statistics, 2012].

influence the expansion. To date, there are 51 accredited HE institutions (universities, colleges and academies)<sup>5</sup> in Bulgaria. According to Eurostat, the number of enrolled in tertiary education in 2013 and 2014 exceeded 280 thousand students.<sup>6</sup> A report<sup>7</sup> by the Union of Scientists in Bulgaria discloses that, in 1990, the same indicator was about 151 thousand students, and, in 2000, it surged up to a little more than 232 thousand. In the analysis below, I am not going to ignore or underestimate the importance of tertiary education *per se* as a factor for expansion. But taking it into account, I shall focus the analysis on income inequality and youth unemployment. The trends in these indicators reflect the effects of a score of social, demographic, societal and economic processes. They influence the lives of the vast majority of those who apply, pursue and graduate from higher educational institutions and are likely to have a good potential to partly determine the expansion of tertiary education.

### **Theoretical grounds for the income inequality and tertiary education relationship**

Whether the HE expansion was positive, neutral or negative from the standpoint of its quality shall not be discussed here. In that case, this analysis would go beyond the limits set by the aim of the study. Yet, it is important to note that the expansion of the share of people who graduated from college/university has practically improved their employment opportunities for a number of governmental<sup>8</sup> and many well-paid and highly-paid jobs for which tertiary education is an obligatory requirement. L. Antonucci argues that “universities have become massed systems for young people looking for better jobs prospects ... (and) transformed from providers of academic knowledge to enhancers of employability” [Antonucci, 2014: 64-65]. In addition, through such occupational chances (associated with high income and access to influential social capital), upward social mobility is facilitated which creates favourable options for stratification changes.

Available data (see Fig. 1 and Fig. 2) provide grounds to argue that not a few Bulgarians should have realised (or were made to realise) that the above theoretical explanation actually works and, they have accordingly modified their tertiary education aspirations. I argue that understanding (consciously) and/or perceiving (intuitively) the effects of income inequality, in the context of a dynamic labour market, influence(s) more Bulgarians to apply for and subsequently graduate from academic (HE) institutions, so that they have better chances to avoid the lower incomequintiles. Tertiary education is seen and un-

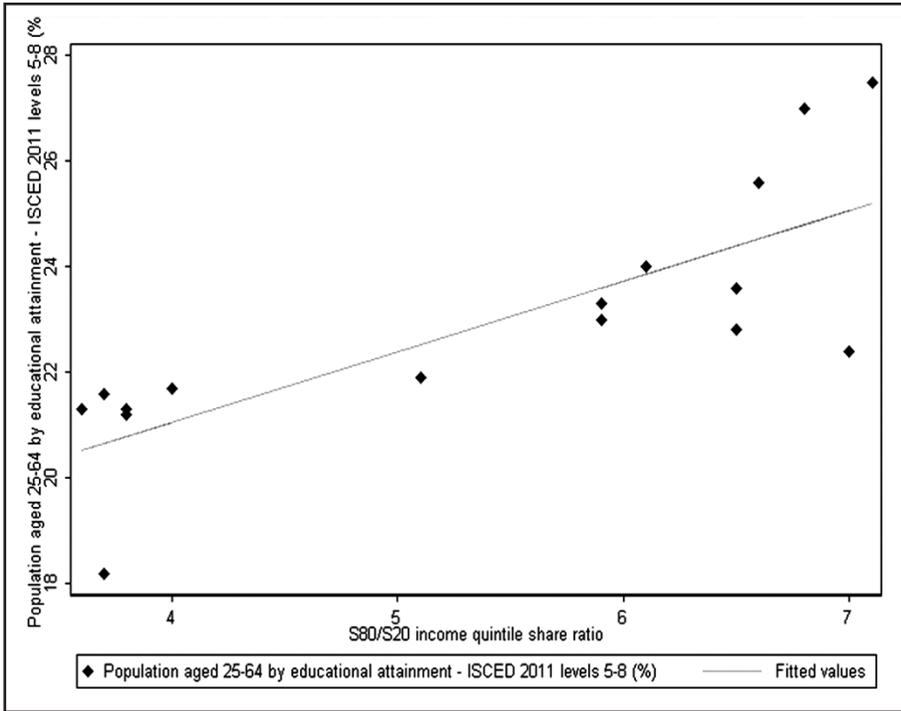
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<sup>5</sup> Source: Ministry of Education and Science, <http://www.mon.bg/?go=page&pageId=8&subpageId=167> [accessed: 8 July 2016].

<sup>6</sup> For details, see <http://ec.europa.eu/eurostat/data/database>.

<sup>7</sup> This report is not available for access but the cited figures were widely covered by the press in 2001, e.g. see [Petrova, 2001].

<sup>8</sup> In early July, 2016, Bulgaria's National Assembly voted legislative changes in the Administration Act that regulates the educational requirements for all senior administrative posts. The employees on these positions are now required to have at least a master's degree.



**Fig. 2.** Income Inequality vs. Educational Attainment ISCED 2011 Levels 5-8  
 Source: Author's Calculations, Eurostat data, (<http://ec.europa.eu/eurostat/data/database>  
 Last update: 29.06.2016. [Accessed: 30.06.2016]).

derstood as an instrument or a necessary step towards the highest and second highest income quintiles. It is a rational choice, a non-deviant way for climbing up the stratification ladder, a label that enhances the effectiveness of work and efforts. It also increases the social status of an individual. Unemployment (and particularly the youth unemployment) on the other hand, should be perceived as a situation that leads to “lack of means for existence” and “reinforces of the feeling for social marginalisation” [Atanasov, 1994: 174]. The same is also valid for income inequality with regard to those attached to the lower income quintiles.

The distribution on fig. 2 clearly shows that there are enough grounds to consider the relationship between income inequality and the expansion of tertiary education a linear one. In the observed period of sixteen years, larger S80/S20 values – the indicator used to measure income inequality – are associated with larger values of the indicator for HE expansion, i.e. the percentage of those aged 25-64 who graduated from college/university. In short, **the percentage of graduates gradually increases as income inequality deepens**. The question to figure out is whether the fig. 2 quantitative relationship is spurious or real from statistical point of view. I shall get back to that after the concise methodology notes that follow.

## On method

In terms of *data collection*, this study counts on the Eurostat database. All used variables and definitions are annual time series data produced by Eurostat. Observations have not been modified or adjusted for methodological reasons. Yet, it is necessary to note that these data may change over time as a result of the routine Eurostat data updates. Usually, it takes up to 10 years and quite a few changes before most Eurostat data are finally updated. Even though, I suggest that the variables used in the statistical analysis shall not significantly vary and the conclusions based on the conducted calculations shall substantively remain unchanged.

In terms of *statistical analyses*, this study relies on the analytical powers of (bivariate and) multivariate linear regression models and analysis [Agresti & Finlay, 2009: 255-268; 441-482]. All statistical calculations are computed through the statistical application STATA, version 9.2. The models presented in the results section (and appendix I) of this article are tested<sup>9</sup> for serial correlation (autocorrelation) [Breusch, 1978; Godfrey, 1988; Durbin, 1970], heteroskedasticity [Breusch & Pagan, 1979; Cook & Weisberg, 1982] and multicollinearity [Chatterjee & Hadi, 2012]. In addition to the cited books and articles, interpretation of results was facilitated by applied statistics teaching materials (unpublished) prepared by Prof J. Tilley and Dr M. Jackson.

Four out of sixteen variables (plus a contextual variable, strongly related to income inequality, used mainly as a tool for comparison: the monetary poverty) were narrowed down for the statistical analyses. The criteria for selection were 1) quality of the data, i.e. no (or minimum) breaks in the time series, 2) length of the available time series data, i.e. the longer the period, the better, and 3) relevance of the variable to the topic of research and analytical framework. When more than one variable met all three criteria, variables were selected on the basis of their stationarity and those that fitted best for linear regression and performed well during the post-estimation tests were chosen. The variables and their definitions are:

- **The tertiary education variable: abbrev. TRTEDU** = percentage of population aged 25-64 having completed ISCED11's (International Standard Classification of Education) levels 5-8 (tertiary education graduates).

- **The income inequality variable: abbrev. S80/S20** = inequality of income distribution (income quintile share ratio). It is calculated as the ratio of total income received by the 20% of the population with the highest income (the top quintile) to that received by the 20% of the population with the lowest income (the bottom quintile).

- **The unemployment/youth unemployment variable: abbrev. U25UNEMPL** = percentage of the unemployed aged 15-24 of the total population aged 15-24 (youth unemployment variable).

- **The monetary poverty variable: abbrev. PVRTRT** = percentage of total population at risk of poverty (cut-off point: 60% of median equivalised income after social transfers).

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<sup>9</sup> For details concerning syntax and output of postestimation tools for regression see: <http://www.stata.com/manuals13/rregresspostestimationtimeseries.pdf> & <http://www.stata.com/manuals13/rregresspostestimation.pdf> [accessed: 8 July, 2016].

- A lagged tertiary education variable, used to remove serial correlation and control for the effects of tertiary education *per se*: abbrev. LITRTEDU = Lag 1 of the TRTEDU variable.

The above briefly covers all major methodological issues with regard to modelling and analysis.

### Results: interpretation and comments

Statistical analyses are presented in table 1 and appendix I. Three bivariate linear regression models were initially calculated: Inequality Model (A), Poverty Model (B) and Youth Unemployment Model (C). As these models present mostly preliminary calculations, the detailed results are presented in appendix I.

**Table 1**  
Inequality Linear Regression Models

Dependent Variable = TRTEDU	Inequality Model (A)	Revised Inequality Model (1)	Inequality-Unemployment Model (2)	Revised Inequality-Unemployment Model (3)	Inequality-Unemployment-Poverty Model (4)
Constant	15.71** (10.19)	4.25 (1.50)	12.87** (4.48)	1.72 (.73)	1.45 (.42)
S80S20	1.34** (4.81)	.28 (1.13)	1.55** (4.70)	.54* (2.54)	.46 (.66)
U25UNEMPL			.07 (1.16)	.08* (2.97)	.08* (2.83)
PVRTRT					.03 (.12)
LITRTEDU		.77** (4.70)		.73** (5.73)	.74** (5.00)
R <sup>2</sup>	.62	.86	.66	.92	.92
Adj. R <sup>2</sup>	.60	.83	.61	.90	.89
F-statistic	23.10**	35.88**	12.51**	42.39**	28.95**
B-G LM [χ (1)]	4.37(p<.05)	1.36 (p>.05)	2.93 (p>.05)	.003 (p>.05)	.02 (p>.05)
D [χ (1)]	4.88 (p<.05)	1.10 (p>.05)	2.69 (p>.05)	.002 (p>.05)	.01 (p>.05)
Mean VIF	Not applicable	2.29	1.44	2.13	12.97
B-P/C-W [χ (1)]	1.64 (p>.05)	4.93 (p>.05)	.13 (p>.05)	7.73 (p>.05)	7.58 (p>.05)
N	16 (2000-2015)	15 (2001-2015)	16 (2000-2015)	15 (2001-2015)	15 (2001-2015)

Source: Author's Calculations with Eurostat data, (<http://ec.europa.eu/eurostat/data/database>  
Last update: 29.06.2016. [Accessed on: 30.06.2016]).

<p><b>Figures in parenthesis are t-ratios;</b> * = statistical significance at the .05 level, two-tail test; ** = statistical significance at the .01 level two-tail test.  <b>R<sup>2</sup></b> = the coefficient of multiple determination; <b>Adj. R<sup>2</sup></b> = the coefficient of multiple determination adjusted for degrees of freedom; <b>N</b> = sample size (annual data observations from 2000-2015)</p>	
<p><b>B-G LM</b> = Breusch-Godfrey LM test for autocorrelation</p> <p><b>D</b> = Durbin's alternative test for autocorrelation</p>	<p><b>No serial correlation hypothesis [H0] rejected</b>  <b>[serial correlation present]</b></p>
<p><b>B-P/C-W</b> = Breusch-Pagan / Cook-Weisberg test for heteroskedasticity</p>	<p><b>Constant variance hypothesis [H0] cannot be rejected</b>  <b>[heteroskedasticity present]</b></p>
<p><b>VIF</b> = Variance Inflation Factor`</p>	<p><b>VIF &gt; 15</b>  <b>[multicollinearity present]</b></p>

Four multivariate linear regression models based on the Inequality Model (A) – the core models for analysis and interpretation – are presented in table 1. All abbreviations and symbols are briefly explained under the tables of results.

The three bivariate models A-C (see **App. I**) test the hypotheses if income inequality, poverty or youth unemployment – each variable taken alone – influences (or the dynamics of the observations in the variables can explain) the expansion of tertiary education. Results show that the three models suffer from serial correlation (see the results from the Breusch-Godfrey LM and Durbin's alternative tests for autocorrelation); thus, it does not make much sense to comment in detail on the rest of the coefficients and statistics. Nevertheless, the bivariate models suggest that it would be **reasonable and productive to attempt to explain the changes in the HE variable via multivariate models with the income inequality indicator S80/S20**.

Model A has the highest R<sup>2</sup> and adjusted R<sup>2</sup> coefficients and the highest statistically significant F-statistic. Model B is similar in terms of explicative powers, but worse than model A. From the substantive theoretical standpoint (the above presented arguments), it is a better solution to drop the poverty variable in further modelling and concentrate on income inequality models. The income inequality and poverty variables are closely related and keeping both of them in a model is likely to generate multicollinearity problems (e.g., see **Table 2, Model 4**). Model C is the worst, i.e. no statistical grounds to explain the expansion of HE via the changes in youth unemployment indicator *per se*. Yet, this does not mean that this variable should be excluded from further multivariate linear regression models, mostly for substantive reasons. The vast majority of the people who apply, pursue and graduate from HE are between 18 and 24 years old. At the age of 15 (the beginning of the upper secondary education), juveniles usually start thinking about what their preferred career/employment will be and how tertiary education could help them materialise their goals. The youth un-

employment indicator provides information about unemployed persons in the age group 15-24 and, in my opinion, has strong influence on the way youths perceive unemployment in general because their most intensive communication is with peers from the same age group. For these substantive reasons, it makes sense to keep the youth unemployment variable in the multivariate models.

Models 1-4 are revised income inequality models. They demonstrate how adding or subtracting a particular perspective (through the respective variable) can improve or deteriorate the statistical significance and explicative powers of the models (see **Table 2**). Model 1 is a revised version of model A – adding the lag 1 of the dependent tertiary education variable solves the serial correlation problem, which accounted for the statement that the relationship between income inequality and HE expansion could be a spurious one. Actually, it turns out that an analytical perspective that considers the influence of the tertiary education expansion process *per se* along with S80/S20 produces an acceptable model with 50% of the independent variables statistically significant, high  $R^2$  and adjusted  $R^2$ , and statistically significant F-statistic values. Further, this model is not problematic in terms of multicollinearity and heteroskedasticity. The fact that the intercept is not statistically significant could be ignored since, in reality, it is very unlikely (even impossible) that S80/S20 and the lag 1 of the tertiary education expansion variables to get equal to zero. That S80/S20 is not statistically significant seems problematic at first, but the statistically significant F-statistic is sufficient evidence that both variables – lag 1 of the expansion of higher education and S80/S20 – jointly influence the HE expansion. In addition, the coefficient for multiple determination adjusted for degrees of freedom shows that about 83% in the variation of the percentage of population who have graduated from college/university can be explained via the joint influence of the S80/S20 and the lag 1 of the tertiary education expansion variables.

Model 2 is a working version of model 3 which deserves the most attention with regard to the final conclusions of this analysis. There is one thing that should be noted here and it is that model 3 provides another statistical argument that income inequality has impact on the expansion of higher education.

There are few possible explanations how this impact works. Option one is that there is **another (unknown, hidden) factor (or set of factors) which influences the HE expansion through the income inequality**. Such a factor (or factors) can be anything that affects income inequality: economic, monetary or other policies that have impact on income inequality are the flat-rate taxation, the lack of measures towards possessions and property that are illegally acquired, and so forth. Option two is that **income inequality affects HE expansion through another unknown/hidden factor**. Such factors could be the media, the societal values, the cultural groups and communities, etc. that cherish tertiary education as a social mobility tool and a respected way for higher income. Via their societal functions and the socially constructed *ideal types* concerning the potential of HE, the aforementioned factors make sizeable parts of the society believe and act accordingly, i.e. more and more people to have HE aspirations. Option three is that, on societal level, both options function simultaneously.

Statistically speaking, option three seems to be the best explanation. For instance, adding the youth unemployment perspective (see models 2 and 3) can

either decrease or increase the influence of income inequality on HE expansion depending on the rest of the variables in the model. If the impact of income inequality were only to decrease (which is obviously not the case), then option two would be the correct explanation as each new statistically significant variable in the equation would decrease the coefficient of S80/S20.

Taking into account all models, model 3 seems to be the best one. The reasons for that are both statistical and theoretically substantive. First of all, all statistical coefficients (except for the intercept) are statistically significant at the .05 level. Secondly, the model has the highest F-statistic, which means that **all variables acting together influence the expansion of tertiary education and the conclusions could be extended beyond the sampled period of sixteen years**. Thirdly, about 90% of the variation of the expansion of tertiary education variable can be explained with the dynamics of the income inequality, youth unemployment and the momentum of the expansion process *per se*. And last but not least, the model fits well with regard to all postestimation tests concerning serial correlation, multicollinearity, etc.

From theoretical point of view, the model produces strong statistical evidence that **income inequality influences to a certain extent the expansion of higher education** in the New Millennium. It also provides sound arguments that **youth unemployment plays an important contextual role** in the relationship between the expansion of higher education and income inequality. Doubtless that the higher education institutions *per se* also play an important part in the process of expansion via their specific way of development in Bulgaria.

In conclusion of this section, it is necessary to briefly comment on **the extent to which income inequality exerts on the tertiary education expansion**, i.e. to present a few figures that shed light on how and to what extent the percentage of graduates (and of course, their number) is influenced when the income inequality rises. Model 3 – the best model in terms of explanatory powers – was used to construct a scenario for 2015 in which income inequality ratio would have risen by 1.9 units to 8.7 (in reality, it rose from 6.8 to 7.1); a 1.9 units increase had been observed in 2007.<sup>10</sup> All other variables – the youth unemployment and the lag 1 of higher education expansion – remain the same as actually observed in 2015.<sup>11</sup> For such a simulation and a clearer example, we need to accept a particular number for the tertiary education graduates aged 25-64; say, that number is 1.4 million persons.<sup>12</sup> The scenario results predict that the percentage of the tertiary education graduates among the population aged 25-64 would have increased by approximately .36% percentage points; in absolute numbers, that would be little less than 5 thousand persons.

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<sup>10</sup> In 2006, S80S20 income inequality indicator was 5.1; in 2007, it soared to 7.

<sup>11</sup> In 2015, the youth unemployment in Bulgaria was 21.6% and S80S20 income inequality indicator was 7.1. The lag value for the higher education expansion variable was 27.

<sup>12</sup> This number is not a real number. It is just a reasonably selected number as there is no officially published age-specific data about size of the group of those students graduate in a particular year plus those who graduated in previous years but will turn 25 in the simulated year. Further, the number of graduates who will turn 65 is also unknown. We know that the number of people who graduated from tertiary education exceeded 1.3 million in 2011 census.

Given that simulated scenario, it can be argued that **income inequality has a limited but at the same time important influence on the expansion of higher education**. It has the potential to additionally stimulate the appearance of up to 5 thousand more university/college graduates who can either enter the job market (and generate economic growth via improved productivity) or drain their brains abroad or in the country taking jobs that do not require tertiary education skills and expertise. Thus, from labour market and education policies perspectives, it seems of crucial importance that government follows the trends and regulate the developments in income inequality so that no unwanted consequences happen, e.g. large number of highly educated working on secondary education jobs. Thus, government policies which stimulate the creation and development of complex jobs in the respective industries such as the IT sector, biotechnologies, medical services, etc. are needed.

### **Conclusion**

In the wake of the political changes that took place in 1989 and the early 1990s, the Bulgarian society had to undergo a great deal of difficulties. Among the changes, there were quite a few phenomena that were almost unknown in the communist society. Few of them were discussed in this article - the appearance of significant income inequality, poverty, and youth unemployment. These hardships are associated with the so called “cost of the transition” from totalitarian government and command economy to representative democracy and market economy.

The transition though, was not only hardships and adversities. Pluralism, rights (fundamental, social) and freedoms (of speech, movement, etc.), the appearance of diversity and so forth were also part of this complicated process and of which the Bulgarian society could take advantage of. The expansion of higher education was among the good news from the transition period regardless of concomitant problems such as the deteriorating quality of tertiary education, the corruption among the faculty, the persistence of educational inequalities, etc. As a matter of fact, the origins of these defects and shortcomings can be traced from the very beginning of the tertiary education in Bulgaria in the end of the nineteenth century.

Since the start of the New Millennium, we have witnessed a clear trend of expansion of the tertiary education in Bulgaria. At the same time, an increase of the income inequality in society has been observed. Data show that while the percentage of HE graduates gradually increases, the income inequality deepens. Statistical analyses and substantive theoretical explanations suggest that it makes sense to study how the expansion of higher education has been influenced by the income inequality. Furthermore, calculations, not included in this analysis, show that although income inequality influences the expansion of higher education, the vice-versa is not likely to be true. The reasons for that should be carefully examined in future because, theoretically speaking, it is not an impossible kind of relationship. The statistical analyses demonstrate that income inequality and youth unemployment jointly influence the expansion of tertiary education. The influence is positive, i.e. the higher the inequality, the larger the propor-

tion of people graduate from university/college, and despite the fact that the impact is limited in scope, it is quite important in terms of the number of people who can be affected since this number might increase to thousands of people. Living in a society that stands behind slogans claiming that everyone matters and taking into account employment and education policies, the government and its agencies should realise the importance of the discussed relationship and closely follow the trends and manage the developments in income inequality so that as few as possible graduates are left behind to waste their human capital.

Appendix I

**Bivariate Linear Regression Models**

<b>Dependent Variable = TRTEDU</b>	<b>Inequality Model (A)</b>	<b>Poverty Model (B)</b>	<b>Youth Unemployment Model (C)</b>
<b>Constant</b>	<b>15.71** (10.19)</b>	<b>13.69** (4.14)</b>	<b>24.99 (12.38)</b>
<b>S80S20</b>	<b>1.34** (4.81)</b>		
<b>PVRTRT</b>		<b>.49** (6.05)</b>	
<b>U25UNEMPL</b>			<b>-.09 (-1.08)</b>
<b>R<sup>2</sup></b>	<b>.62</b>	<b>.55</b>	<b>.08</b>
<b>Adj. R<sup>2</sup></b>	<b>.60</b>	<b>.52</b>	<b>.01</b>
<b>F-statistic</b>	<b>23.10**</b>	<b>17.12**</b>	<b>1.17</b>
<b>B-G LM [χ (1)]</b>	<b>4.37(p&lt;.05)</b>	<b>7.18 (p&lt;.05)</b>	<b>9.26 (p&lt;.05)</b>
<b>D [χ (1)]</b>	<b>4.88 (p&lt;.05)</b>	<b>10.60 (p&lt;.05)</b>	<b>17.87 (p&lt;.05)</b>
<b>B-P/C-W [χ (1)]</b>	<b>1.64 (p&gt;.05)</b>	<b>1.19 (p&gt;.05)</b>	<b>.20 (p&gt;.05)</b>
<b>N</b>	<b>16 (2000-2015)</b>	<b>16 (2000-2015)</b>	<b>16 (2000-2015)</b>

**Figures in parenthesis are t-ratios;** \* = statistical significance at the .05 level, two-tail test; \*\* = statistical significance at the .01 level two-tail test.

**R<sup>2</sup>** = the coefficient of multiple determination; **Adj. R<sup>2</sup>** = the coefficient of multiple determination adjusted for degrees of freedom; **N** = sample size (annual data observations from 2000-2015)

**B-G LM** = Breusch-Godfrey LM test for autocorrelation  
**D** = Durbin's alternative test for autocorrelation

**B-P/C-W** = Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

**No serial correlation hypothesis  
[H<sub>0</sub>] rejected  
[serial correlation present]**

**Constant variance hypothesis [H<sub>0</sub>]  
cannot be rejected  
[heteroskedasticity present]**

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### Correspondence address

**Lubomir Stoytchev**, Senior Assistant Professor, PhD  
Institute for Population and Human Studies,  
Bulgarian Academy of Sciences  
Acad. Georgi Bonchev Str., Bl. 6, Fl. 6  
1113 Sofia, Bulgaria  
E-mail: [l.stoytchev@iphs.eu](mailto:l.stoytchev@iphs.eu)