KUZNETS HYPOTHESIS OF INCOME INEQUALITY: EMPIRICAL EVIDENCE FROM EU

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Abstract:
The article aims at identification of the determinants of income inequality in the EU countries in the period of 2004-2013. Specifically, we test for the existence of an inverted U-shaped relationship between income inequality and the level of economic development measured by the GDP per capita, as it is predicted by the Kuznets hypothesis. The data come from Eurostat (EU-SILC), International Monetary Fund and World Bank. Our results provide evidence for a U-shaped, rather than the inverted U, relationship. We find that unemployment rate and tertiary education attainment are statistically significantly and positively related to income inequality. Also old-age dependency ratio is significant in the EU15 countries, while a share of self-employed is significant in the new member states.

Introduction and literature overview

Inequality is natural and it does not have to be a negative phenomenon. Income inequality stems mainly from unequal distribution of employment rewards of individuals and these have to differ depending on educational attainment, entrepreneurship, productivity, etc. Unequal incomes provide motivation for work, investment in education, accumulation of human capital and incentives for innovation and entrepreneurship (Dabla-Norris, 2015). Barro (2000) points out that concentration of income and wealth in the hands of few individuals can be a positive process and result in new businesses and higher investment in education, especially in the developing countries. However, income inequality can be an effect of lack of opportunity and disadvantage of particular groups in the society. Excessive inequality can cause social tensions, e.g. higher crime rates, lead to a political and economic instability and poverty. Campbell, Haveman, Sandefur and Wolfe (2005) in their study indicate that an increase in income inequality negatively affects the average years of schooling, particularly among the lower income households. In general, from the economic sciences point of view, high inequality can cause suboptimal use of resources.

The problem of high and growing income inequalities has attracted attention and resulted in scientific research and growing policy concerns by governments and international institutions. Numerous empirical studies, e.g. by OECD (2011), Salverda et al. (2014) and Franzini and Pianta (2016), indicate that since the 1980s, incomes in the developed countries have become more dispersed and they are now more concentrated in the top 1% or 0.1% of population.

One of the most debated theoretical frameworks for analyzing income inequality is the so called Kuznets hypothesis. Kuznets first published his research results on the relationship between income inequality and the economic growth in 1955 (Kuznets, 1955). The hypothesis states that, at the beginning of its development, a country experience a relatively low, but rising income (wage) inequality. The inequality will rise because the productivity of agricultural sector is considerably lower than it is in the emerging and growing industrial sector. Kuznets argued that during the later course of economic growth, after the initial rise in wage inequality, a decline in wage dispersion should be expected due to, firstly, a shift of labour from the agricultural sector towards the industry, and secondly, the progress in agriculture modernization and productivity. The resulting relationship has a shape of an inverted U which is known in economics as the Kuznets curve.

Early empirical studies on Kuznets hypothesis published in the 1970s, e.g. Paukert (1973) and Ahluwalia (1976), confirmed the concept of inverted U-shaped relationship between income inequality and economic development. Later studies based on better quality cross-sectional and panel data, and covering sample period of 1980s – by Deininger and Squire (1998), Fields and Jackubson (1994), Bruno, Ravallion, and Squire (1996) and Ram (1997) – found no proof of the existence of the Kuznets curve. The latest empirical evidence on the subject has been mixed. Barro (2000) presents the results of panel data analysis of 100 countries and concludes that Kuznets curve holds as a "clear empirical regularity" (after controlling for other factors influencing income dispersion). The author also finds that primary and secondary schooling attainment is negatively related to inequality, while higher education attainment is positively related.

Barro's findings on the Kuznets curve are confirmed by the studies of Thornton (2001) and Phahan, Upanhyay and Bhandari (2010). On the other hand, Gallup (2012) using panel data of 87 countries did not confirm Kuznets hypothesis and found the existence of anti-Kuznets curve – a statistically significant U-shaped relationship between income inequality and economic growth. A number of contemporary studies have found the evidence of the U-shaped relationship: (Fields & Jackubson, 1994), (Kiatrungwilaikun & Suriya, 2015) and (Castells-Quintana, Ramos & Royuela, 2015). Also, as Kiatrungwilaikun and Suriya (2015) point out the latest trends observed in the data seem to contradict Kuznets hypothesis – inequality tends to decline in low-income countries and increase in developed economies. Raitano (2016) suggests that the relationship between income dispersion and economic growth could have changed

during the last decade. The author reports an increase in inequality after the outbreak of the global financial crisis in 2008.

The aim of this paper is to identify the determinants of income inequality in the European Union countries and to examine whether Kuznets hypothesis is valid in the sets of EU27, EU15 and EU12 countries in the period of 2004-2013.

1. Methods and materials

The following panel data model is used to analyse the determinants of income inequality (Kim, Huang & Lin, 2011):

$$GINI_{it} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 (\ln GDP_{it})^2 + \beta'_3 Z_{it} + \mu_i + \varepsilon_{it} \quad (i = 1,...,N), (t = 1,..T), \quad (1)$$

where μ_i is an country effect, and Z_{it} is a vector of explanatory variables: the age structure of population, the degree of trade openness, educational attainment and the proxies for the labour market including the unemployment rate and the share of self-employment (table 1).

In order to prove Kuznets inverted U-curve we expect the following parameters in the equation (1): $\beta_1 > 0$ and $\beta_2 < 0$ ($|\beta_1| > |\beta_2|$). If the data cover mostly the downward part of the curve, then values of $\beta_1 < 0$ and $\beta_2 < 0$ ($|\beta_1| > |\beta_2|$) will be obtained. In this case, the inverted U-curve is asymmetric, with an elongated right tail (Galbraith & Kum, 2002). As Galbraith and Conceição (2001) point out there is the third possibility of the shape of the relationship, which is based on recent findings of rising inequality in several developed countries. The values of the parameters: $\beta_1 < 0$ and $\beta_2 > 0$, ($|\beta_1| > |\beta_2|$) describe a U-shaped relationship between income inequality and GDP per capita, which contradicts the original Kuznets hypothesis.

Numerous studies on income inequality (especially early publications on the subject) were criticized for the poor quality of income data (see Atkinson and Brandolini (2003)). In this article we use highly reliable, internationally comparable Eurostat EU-SILC data on Gini coefficients based on equivalent disposable income before social transfers. Additionally, data from International Monetary Fund (World Economic Outlook Database) and the World Bank have been used. The set of countries in our sample include: EU15 states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, and 12 new member states: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia. The choice of the data source and countries included in the analysis determined the sample period of 2004-2013. The EU-SILC data on all sample countries is only available for this time period. In the post-socialist countries of Eastern Europe which joined the European

Union in 2004 and 2007 the SILC survey started from 2005 providing data on income from 2004. The latest available EU-SILC data for all countries come from 2014 survey thus limiting our sample period to 2013.

The list of explanatory variables in our models is inspired by the study of Barro (1999). Table 1 presents the list and descriptions of all variables.

TAB. 1: Description of the variables used in equation (1)

Variable	Definition	Source
Gini	Gini coefficient of equivalised disposable income before social transfers (pensions included in social transfers)	Eurostat/ EU-SILC
GDP	GDP *per capita*: real gross domestic product *per capita* based on purchasing-power-parity (PPP) measured in 2010 international dollars	own calculations based on IMF database
Depend	Old-age dependency ratio: the ratio of the number of persons aged 65 and over to the number of persons aged between 15 and 64	Eurostat
Selfemp	Share of self-employed: the number of self-employed as a share of total number of employed	World Bank
Unemp	Unemployment rate: the number of unemployed persons as a percentage of economically active population	Eurostat
School	Tertiary education attainment: the number of persons holding tertiary education diploma as a share of population aged 15 and over	Eurostat
Open	Trade openness: (import + export)/GDP	World Bank
New	Dummy variable: 0 in a case of EU15 country, 1 for EU12 country	

Source: own elaboration.

Gini coefficient, logarithm of GDP and square of logarithm of GDP are used as the key variables necessary to test the Kuznets hypothesis. We make some important changes to the Barro's set of control variables in order to adjust it to our specific sample. Firstly, democracy and rule-of-law indices were omitted because all countries in the sample were members of the European Union and thus maintained high democratic and legal standards. Secondly, we add two variables serving as proxies for the labour market: unemployment rate and the share of self-employed in total employment.

2. Results

In the first stage of our investigation the equation (1) for all EU27 countries has been estimated. Then, in order to identify differences in income inequality determinants between old and new member states, two separate models for these sets of countries

(EU15 and EU12) were estimated as well. The statistically insignificant explanatory variables were sequentially eliminated from the equations so the final versions of the models include only statistically significant determinants of Gini coefficient. The results are presented in table 2. The parameters of the fixed and the random effects models were estimated with LSDV and GLS methods, respectively. The Wald test, and the Breusch and Pagan Lagrange Multiplier test (Greene, 2012) were applied to confirm the relevance of the decomposition of the error term and/or the constant term. For a choice between the fixed and the random effects models the Hausman test (Baltagi, 2005) was performed. A model with random effects proved most suitable for equations describing inequality in EU27 and EU15 countries, while for the country group EU12 the specification with fixed effects has been selected.

TAB. 2: Determinants of Income Inequality

Variable	EU27 (Random effects)	EU12 (Fixed effects)	EU15 (Random effects)
Const	876,238 ***	1105,34 ***	1265,44 **
	(160,781)	(345,504)	(572,463)
lnGDP	-156,496 ***	-202,085 ***	-229,899 **
	(31,612)	(69,908)	(106,282)
$(lnGDP)^2$	7,231 ***	9,579 ***	10,658 **
	(1,550)	(3,544)	(4,932)
Depend	0,483 ***	-	0,596 ***
	(0,095)	-	(0,132)
Selfemp	-	-0,217 **	-
	-	(0,102)	-
Unemp	0,285 ***	0,263 ***	0,271 ***
	(0,047)	(0,065)	(0,085)
School	0,187 ***	0,286 ***	0,226 ***
	(0,054)	(0,085)	(0,076)
New	-4,621 ***	-	-
	(1,439)	-	-
Open	-	-	-
Observations	270	120	150
Breusch and Pagan LM test	LM = 518,088 p = 0,0000	LM = 148,508 p = 0,0000	LM = 252,865 p = 0,0000
Hausman specification test	H = 6,80424 p = 0,235611	H = 25,2292 p = 0,0001258	H = 6,04063 p = 0,302286
R-squared	0,918	0,927	0,926

***,**,*: 1%, 5% and 10% statistical significance respectively.

Source: own calculations.

In all three models: EU27, EU12 and EU15 parameters β_1 and β_2 are statistically significant, and their signs $\beta_1 < 0$, $\beta_2 > 0$, ($|\beta_1| > |\beta_2|$) mean that the relationship between

income inequality and the level of economic development has a shape of U. It implies that in each country group income inequality declines and then increases with the rise of GDP per capita following a quadratic trend.

Unemployment rate and educational attainment statistically significantly and positively influence Gini coefficient. The higher unemployment rate and university educational attainment the greater income inequality is. Old-age dependency ratio is significantly related to inequality in EU27 and EU15 groups, while it is insignificant in the EU12. The share of self-employed is statistically significantly related to Gini index only in the new member states and the higher the incidence of self-employment the lower inequality. Trade openness proved insignificant in all specifications.

3. Discussion

Our results do not support Kuznets hypothesis. In fact, the anti-Kuznets U-shaped relationship between Gini index and GDP per capita has been proved in all three panel data models. Our results are consistent with the findings by Fields and Jackubson (1994), Gallup (2012) and Kiatrungwilaikun and Suriya (2015). Castells-Quintana, Ramos and Royuela, (2015) also provide the evidence on significant U-shaped relation between inequality and economic growth in a panel of EU regions at NUTS 1 level.

Kiatrungwilaikun and Suriya (2015) argue that Kuznets curve may be not valid, because the inverted U pattern can be disturbed by the emergence of the digital technologies. It is mainly the industrial sector that benefits from the new technologies. The rise in its productivity driven by the shift of more skilled labour into this sector and growth of new economy will increase wages in relation to the agricultural sector. The increase in wage disparities reverses the trend which follows from the inverted U shape. Autor, Katz and Kearney (2006) propose a similar explanation. They describe a new pattern in income inequality in the US as the "polarization" of the labour market, with employment demand (and wages) polarizing into high-wage and low-wage jobs at the expense of middle-wage work. The authors show that computerization strongly complements the non-routine, abstract, cognitive tasks of high-wage jobs, and directly substitutes for the routine tasks found in many traditional middle-wage jobs. The use of computers has little impact on non-routine manual tasks in relatively low-wage jobs. Galbraith and Conceição (2001) suggest the existence of so-called "Augmented Kuznets Curve" which predicts that inequalities in some of the most advanced countries (United States, UK and Japan) increase in response to rising internationalization.

Our results on the significant and positive influence of higher education attainment support the findings by Barro (2000) that the higher share of population holding a university diploma the greater income inequality. Statistical significance of unemployment rate as a factor determining income inequality is not controversial. Such

outcome could have been expected especially in our study which utilizes data on disposable income before social transfers.

Conclusion

The empirical evidence on the relationship between income inequality and economic growth (development) measured by GDP per capita has been mixed. Recent studies based on data from the end of the twentieth century and the beginning of the present century seem to contradict the traditional theory based on Kuznets hypothesis which predicts the inverted U-shaped relationship between the two variables. In case of many developed countries income inequality has not been declining and has not followed the trend predicted by the inverted U-curve.

We used the data from Eurostat (EU-SILC), International Monetary Fund and World Bank for the period of 2004-2013 and estimated panel data models with fixed effects and random effects. Our analysis for three sets of EU countries: EU27, EU15 and EU12, concluded that there exists a statistically significant U-shaped relationship between income inequality and economic growth. Our results contradict Kuznets hypothesis, however they confirm findings from some recent studies by other authors. There are various explanations of the phenomenon of the latest rise in income inequality in the developed counties. Some authors indicate the influence of globalization and internationalization on modern economies, effects of the global crisis after 2008, others point out to the rise of digital economy which contributes to the increase in productivity and wages of the highly skilled, substitution of middle-wage jobs by computers and the polarization of wages.

Economic growth is not the only factor influencing the dispersion of income. In all our models concerning three groups of countries unemployment rate and tertiary education attainment are statistically significantly and positively related to income inequality. The old-age dependency ratio is significant in the group of EU15 countries, while a share of self-employed in total employment proved significant in the new member states. The share of exports and imports in GDP which served as a proxy of the degree of internationalization of the economies proved statistically insignificant in all country groups.

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