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Economic Growth, Inequality and Poverty in the EU

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Abstract   A country's poverty rate is influenced by numerous factors, including economic growth and the distribution of its effects. This article aims to classify European Union (EU) member states in terms of their ability to handle the economic challenges of the past decade. A country's ability to negotiate global challenges in conjunction with their respective social and economic growth, as well as that of the EU, represents a key classification attribute. In this article, classification is based on an analysis of changes in economic growth, inequality and poverty across all 28 EU member states. The classification emerges from monitoring trends in economic growth and inequality, and their interconnections with poverty across the different countries. In order to analyse these interactions, this investigates uses the Bourguignon model (Poverty-Growth-Inequality Triangle–PGI) and the Growth Incidence Curve. The article reveals that economic growth is connected with a decrease in poverty. However, as inequalities in income increase, poverty also increases. Nevertheless, rates of development differ across countries. Four broad categories of country sharing similar attributes are defined, and an additional, special category assigned to Greece owing to its distinctive attributes. These partial classifications facilitated the complex classification of the EU member states, by which different development tendencies across the countries in the period 2005–2015 might be deciphered. By analysing the relationships between gross domestic product, income distribution and poverty rates, and by developing a system by which to classify countries, essential information regarding individual countries' economic and social development is revealed, with implications for their distinctive challenges in reducing inequality and poverty. The article also highlights considerable diversity in countries' relative abilities to handle a range of unfavourable global trends, such as the recent global financial crisis. In general, countries with strong economies are better able to weather challenges such as inequality and poverty during a period of crisis.

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1 Introduction

Increased inequality instigates many significant issues that affect every country and their populations. Global wealth disparities are increased when money is disproportionately concentrated in the hands of a small number of people. Furthermore, such issues lead to many problems among various demographic groups and segments of the population, not only in the developing world but also in the world's richer countries. The same tendency might be seen at both micro and macro scale within the European Union (EU), given the inequalities that exist between and within the countries that constitute the organisation. A high level of inequality in conjunction with economic growth in some EU countries may lead to greater levels and occurrences of relative poverty. As such, reducing the number of people who live below the at-risk-of-poverty threshold represents one of the main goals of the Europe 2020 Strategy (European Commission 2010). Moreover, on a long-term basis, challenging both poverty and social exclusion represents one of the principal aims of the European Cohesion Policy (European Commission 2011), and has been included in the current programming period 2014–2020. Objectives to reduce poverty and to equalise differences both between and within countries are also included in the economic, social and regional policies of the EU and its individual nations. In some countries, issues related to the growth of poverty are predominantly influenced by economic development and the rise of inequalities. Familiar and scientifically verified theories and models of economic growth, inequality and poverty do not generally need to be valid for all countries. Therefore, further research exploring economic development strategies is required to identify the impacts of economic growth on inequality and poverty levels within individual countries.

The aim of this article is to analyse the interrelationships that exist between these phenomena. The article investigates the changes of economic growth and inequality on poverty levels within the EU member states. It scrutinises the upcoming EU research topics set for the next stage of the Horizon 2020 programme[1] in 2018. Consequently, the article seeks to ascertain the consequences of economic growth for inequality and poverty rates amongst EU member states. The analyses presented here monitor the changes of economic growth, expressed by real gross domestic product (GDP) and inequality rate (or more precisely *income inequality*) on relative poverty reduction in all 28 EU member states from 2005 to 2015. This represented a particularly dynamic period in the EU's history, marked by the admission of three relatively poor Balkan countries,[2] the worldwide economic and financial crisis and the large-scale immigration of refugees and asylum seekers. These events, among others, provide suitable conditions to monitor changes in economic growth, inequality and poverty.

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[1] A survey was conducted at the end of 2016 in 30 European countries to identify future directions for research in Europe. The topic of 'Inequalities' was deemed the second most important. Following its adoption by the European Commission it should become one of the priority research topics funded in the next stage of the Horizon 2020 programme (cf. Citizen and Multi-Actor Consultation on Horizon 2020, 2016).

[2] Furthermore, in the year before the study period (2004), the EU was enlarged by 10 countries, affecting its global development in the monitored period as well as economic development in its constituent countries.

We assume that individual countries react in different ways to such challenges, impinging on the various systematic/development formula of the relationships between economic growth, inequality and poverty. Therefore, three hypotheses have been formulated. Their acceptance or rejection may have significant implications for development strategies, redistribution policies, regional development and most importantly poverty reduction. The first two hypotheses come from a postulation that economic growth and the rise of inequality significantly affect poverty. The third hypothesis is derived from a supposition that this connection is rather varied and has a different intensity in different contexts. Similar historical conditions of political-economic development and an analogous level of economic growth help determine the existence of a joint systematic formula that is valid for various countries.

Hypotheses:

1. The EU's positive economic growth stimulates a reduction in poverty.
2. Increased inequality stimulates an increase in poverty.
3. A common systematic/development formula exists that can classify EU member states into categories of similar attributes.

The classification of countries based on similar development attributes provides a logical means of facilitating analysis of these phenomena. The aim of the article is to reveal the relationships between the economic development of individual EU countries and their levels of inequality and poverty. This includes a pro-poor economic growth concept that monitors the impacts of economic growth on the poor (Duclos 2009; Azpitarte 2014; Tebaldi and Kim 2015; Zaman and Shamsuddin 2017).

The knowledge and conclusions that can be garnered from this research offer a wide range of uses. For instance, they offer the potential to be used in EU member states' economic policy development, and hence optimise actions and programmes aimed at economic growth and distribution. A significant and proven differentiated connection between economic growth, inequality and poverty provides the main argument accounting for the importance of the research topic.

2 Theoretical Background

The connection between economic growth, inequality and poverty represents one of the most contested and discussed topics in world economics. The key question can be summarised as: to what extent is economic growth related to the rate of inequality, and how can this be measured? Several empirical studies have revealed that the relationship is inconsistent by country (Funke and Strulik 1999; Dollar and Kraay 2002; Adams 2004; Iradian 2005; Khan et al. 2013; Leitner and Stehrer 2014). Previous research and literature regarding these issues highlight that the answer is however of considerable importance for countries' development strategies, distribution policies, and, especially, poverty reduction. Theoretical discourse and empirical research aimed at discovering the relationship between economic growth and inequality, and their influence on poverty, has led to the creation of various models. An important example is the Bourguignon Triangle (Poverty-Growth-Inequality Triangle). This model emphasises the interaction between economic growth and distribution in connection with poverty reduction. The model is based on the understanding that high levels of economic growth under specific conditions, such as regarding the
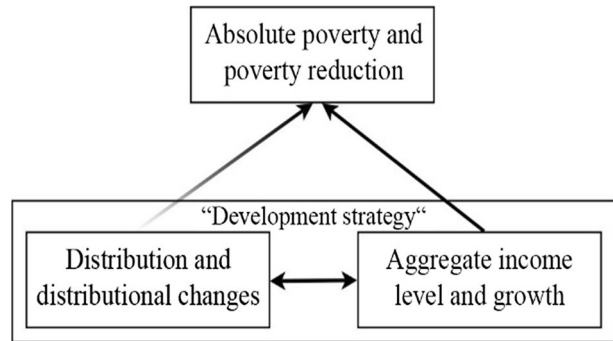
incorrect distribution of gained results (growth effects), can lead to an increase in inequality and consequently to an increase in poverty. To a considerable extent, fluctuations in poverty levels might be influenced by changes in income levels and inequality. According to the model, a development strategy should be based on the increase of income or wealth and the decline of their disparities. The model can be illustrated as a triangle, in which the upper part represents *poverty*, or its reduction (Fig. 1). This can be expressed in various ways depending on the manner of measurement. In the bottom-left corner lies *inequality*, or its distribution. This is related to income differences within the population as a whole. The bottom-right corner of the triangle depicts *growth*, expressed by aggregated population income level and rate of economic growth, typically by GDP. The arrows heading towards poverty express the two aforementioned phenomena and their relationships with poverty. In this model, both inequality and growth influence each other, and at the same time, both inequality and growth affect poverty.

Bourguignon defines changes in poverty level as a function of growth and inequality distribution:

$$\Delta \text{ poverty } = F \text{ (growth, distribution or changes of distribution)}.$$

An important advantage of the model is that it does not view growth and inequality as two individual and isolated poverty phenomena or factors, but rather monitors the interactions between them. Bourguignon considers both phenomena (and their connections) as determinants of a 'development strategy'. In addition, he claims that a strategy to reduce poverty requires the synthesis of nationwide policies aimed at growth, and the decline of inequality. He argues that development strategies that attend only to one of these phenomena are incapable of reducing poverty. The model also shows that a change in income distribution (in favour of decreased inequality) leads to accelerated poverty reduction for a given growth. The consequence is that growth policies that disregard the income distribution will be unable to fulfil the objective of reducing poverty.

Bourguignon's Triangle has aroused considerable debate. Critics often argue that the model is overly simplistic, overlooking the processes that create phenomena. They also claim that it ignores significant factors that determine poverty (e.g. Chemli and Smida 2013), and that the analysis of poverty requires an individual-behaviour-research context too (e.g. Ferreira 2012).

3 Data and Methodology

The Growth Incidence Curve (GIC) founded and applied by Ravallion and Chen (2001) was selected in order to analyse the phenomena and their connections. The GIC captures income increase and decrease within every population segment across the desired period of time, and visually highlights trends (Bourguignon 2004). At the same time, it facilitates analysis of the interactions between income growth, inequality and poverty decrease in a segment of the population. Mathematically, the GIC illustrates the income growth rate during two time-periods for every percentile of income distribution. It compares two dates (*t-1* and *t*), and thus the income growth rate of every quintile. The value of the *p*th quintile is therefore expressed as follows:

$$g_t(p) = \frac{y_t(p)}{y_{t-1}(p)} - 1$$

Let *p* be in [0, 1]; $g_t(p)$ is an outlined GIC. For example, at the 50th percentile, the value indicates the growth rate of a median income. If there is no change in inequality, $g_t(p)$ equates to an average growth rate of an average income for any *p*. If $g_t(p)$ is a decreasing function for any *p*, then all measured inequalities fall over time (and vice versa) and meet the Pigou-Dalton transfer principle. If $g_t(p) > 0$ (GIC is above 0) for any *p*, then a *t* distribution prevails the *t-1* distribution. If GIC is above the 0 axis in all positions until the *p*th percentile, then poverty will fall in every indicator until *p*. The extent and level of poverty are determined by two factors: the growth of average real incomes/assets and the inequality rate of income distribution.

As a tool for analysing and assessing the significance and impact of the economic growth process for the poor (that is, the extent to which economic growth affects the level of poverty reduction), GIC has been successfully applied in many countries, including China (Ravallion and Chen 2001).

To classify EU countries based on economic growth, income distribution and poverty, EU-SILC survey data were used: specifically, GDP per capita as an economic growth index, quintile share ratio as an inequality index, and proportion of inhabitants living below the poverty line as a poverty measure. All of the current 28 EU member states were monitored in the period 2005–2015.

4 Research Background at a National Level

In order to validate the chosen model and identify the Growth Incidence Curve at the national level of EU member states, it was necessary to undertake research into various issues. First it was necessary to apply the PGI triangle for specific EU conditions. Several investigations based on specific empirical results proved that in spite of economic growth, inequality within the EU is on the rise.[3] Recent economic growth has led to an improvement in numerous forms of economic and social condition and quality of life, but its distribution at the national level has been highly uneven. In extreme cases, inequalities can be seen in the form of increased poverty, whether conceptualised in terms of prevalence,

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[3] However, the EU also includes countries whose trends are in the opposite direction, i.e. levels of inequality are on the decrease; moreover, this might vary in terms of scale or time period.

level or depth. This indicates that the relationship between economic growth, inequality and poverty in EU member states is varied. It is also important to acknowledge that such discrepancies depend upon the specific conditions of individual countries, including the predominant factors that help to determine the relationship. The diverse levels of poverty in individual countries are affected not only by overall economic growth and its distribution, but also by several other factors whose effects diverge considerably. The intention of the article is to identify the current landscape of economic growth, poverty and inequality within the EU, including each member state's development placement within the organisation.

5 Increased Economic Growth, Inequality and Poverty in EU Countries

The EU currently consists of 28 countries, and is inhabited by more than half a billion people. The EU has historically included countries whose economic strength varies rather considerably (Michálek and Podolák 2004). The less economically developed countries have tended to record the most significant economic growth, owing in large part to their relatively cheap labour force and low economic 'start' position. In general, a positive correlation exists between location in the East and relative GDP growth per capita. From 2005 until 2015, few countries recorded a growth of more than 100 per cent. These were mainly countries with a very low GDP per capita[4] in the start year (2005) and which joined the EU in 2004 or later, for instance Romania (113 per cent), Lithuania (105 per cent), Bulgaria (103 per cent) and Latvia (102 per cent), followed by Slovakia (99 per cent) and Estonia (86 per cent). On the other hand, the lowest GDP growth was primarily recorded in Southern European (Mediterranean) countries: Cyprus (2 per cent), Italy (5 per cent), Spain (9 per cent), as well as Portugal (15 per cent), France (17 per cent) and the United Kingdom (UK) (19 per cent). Greece even recorded an economic regression during the monitored period, with its GDP per capita falling by 11 per cent (Fig. 2). The average GDP growth within the EU was 24 per cent during this period.

Figure 3 shows that the spatial differentiation of income inequality is not as clear as that of GDP growth. An interesting finding is that the highest rates of inequality might be seen in the countries with both, very high and very low (or even negative) GDP growth. The highest quintile share ratio was recorded in Romania in 2015 (8.3).[5] High values were also recorded in 2015 in Lithuania (7.5), Bulgaria (7.1), Spain (6.9), Latvia and Greece (both 6.5), Estonia (6.2), Portugal (6.0) and Italy (5.8). In contrast, the lowest values in 2015 were recorded in the Czech Republic and Slovakia (both 3.5), Finland and Slovenia (both 3.6), and Belgium, the Netherlands and Sweden (3.8 each). Slovakia was distinctive in recording both a very high GDP growth and the lowest income inequality across the EU.

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[4] Many factors help explain the higher GDP growth rate in Central and Eastern European countries, including: high levels of foreign direct investment (FDI); increasing household consumption; improvements to labour markets; the possibility of accessing euro funds; increased exports; the high potential of debt stocks; development of company-based loans; increased public investments; stronger private investments for development such as highways, constructions and the property sector; improvements to economic structure; the development of services (Finweb 2016; Pravda 2017).

[5] This was the highest value recorded by the EU SILC survey, which began monitoring Romania in 2007. The value in 2007 reached 8.1 and has since tended to diminish; it is possible that the values surpassed 8.3 in 2005 and 2006 but those data are unavailable.
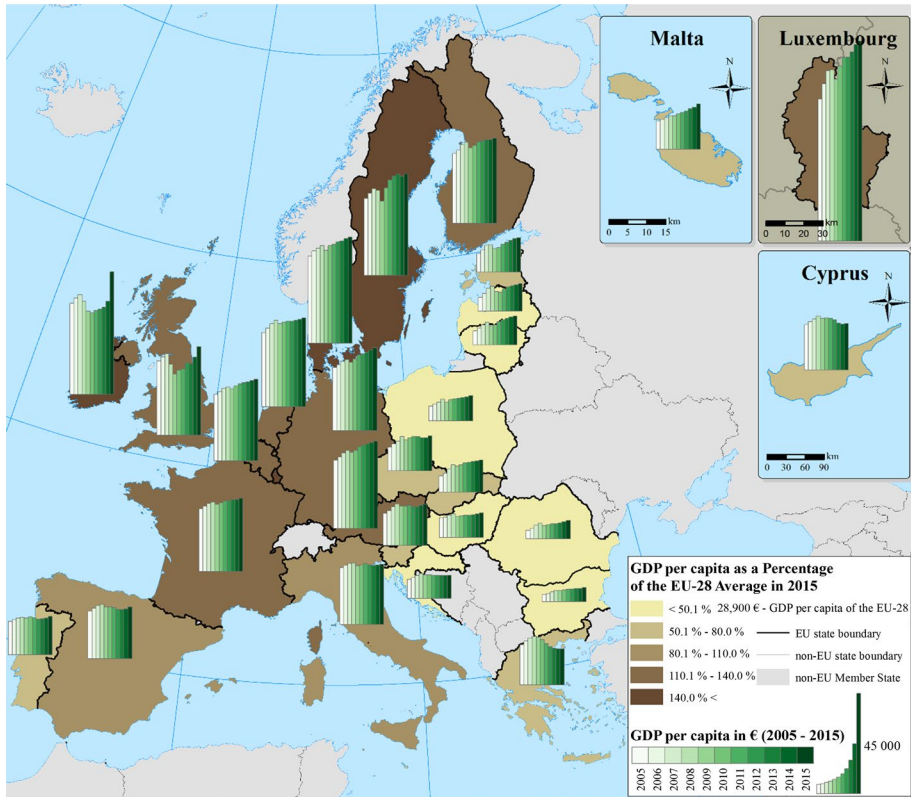
Fig. 2 GDP per capita across EU member states. *Source*: Eurostat (2017)—Main GDP aggregates per capita; authors' calculations. (Color figure online)

Data representing the share of the EU population living below the at-risk-of-poverty threshold are alarming as they have generally increased since 2009, and have risen from 16.4 per cent to 17.3 per cent during the researched period.[6] This indicates that almost 88 million EU inhabitants did not possess a disposable income that reached the at-risk-of-poverty threshold in 2015 (Eurostat 2017). It also highlights that 'the poor' have increased in population by almost 6 million since 2009, despite the fact that the Europe 2020 Strategy's objective was to reduce this population by 20 million from 2010 to 2020 (European Commission 2010). Figure 4 highlights the most troubled countries, which are predominantly those with high rates of inequality (cf. Figure 3). Countries where at least 18 per cent of the population live below the at-risk-of-poverty threshold comprise Romania (25.4 per cent), Latvia (22.5 per cent), Lithuania (22.2 per cent), Spain (22.1 per cent), Bulgaria (22.0 per cent), Estonia (21.6 per cent), Greece (21.4 per cent), Croatia (20.0 per cent), Italy (19.9 per cent) and Portugal (19.5 per cent).

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[6] The increase of both amount and share of EU inhabitants living below at-risk-of-poverty threshold was significantly caused by the EU enlargements of poor countries with a high share of the poor. The sixth enlargement (in 2007) involved both Romania and Bulgaria and during the seventh, in 2013, Croatia joined the EU.
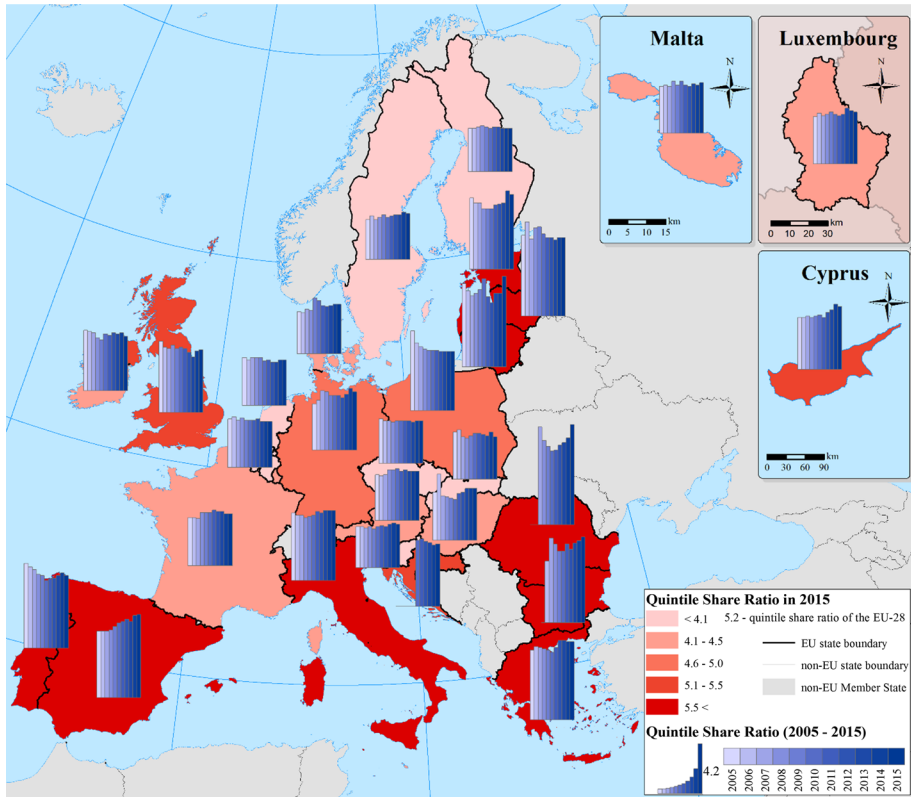
Fig. 3 Quintile share ratio in EU member states. *Source:* Eurostat (2017)—S80/S20 income quintile share ratio by sex and selected age group. (Color figure online)

5.1 Classification of EU Member States by Economic Growth, Inequality and Poverty Indicators

The considerable diversity of economic growth, inequality and poverty across the EU necessitates a classification system according to these indicators. Indeed, at a national level, economic growth is highly varied. Four basic economic growth models can be identified within the EU (Table 1; Fig. 5). The countries were divided into four groups based on average GDP growth during the researched period. The most frequently occurring type consists of the 'progressive' model (14 countries), followed by 'extremely progressive' (8 countries). These countries are typically characterised by significant growth in GDP during the entirety of the study period, apart from one or two crisis years.[7] These categories differ only in terms of the intensity of their economic growth, with 'extremely progressive' countries achieving a growth in GDP of more than 50 per cent (Table 1).

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[7] In some countries within the progressive model, the period of depression/stagnation lasted a little longer and eventually, a second growth slow-down might have occurred once the economy had restarted.
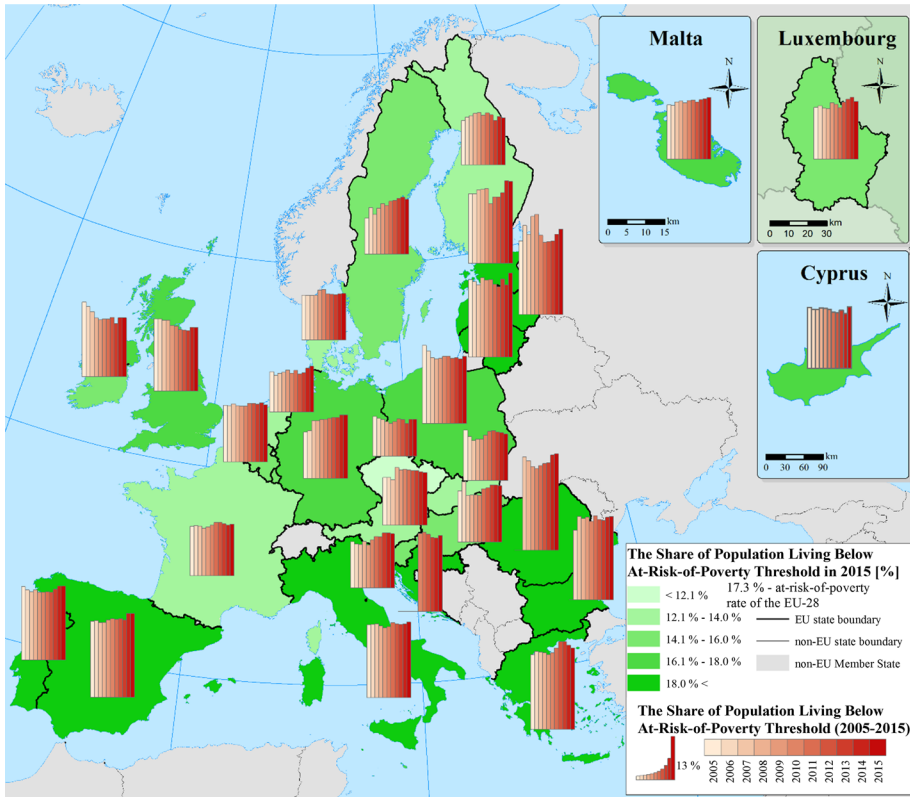
Fig. 4 Share of population living below at-risk-of-poverty rate in EU member states. *Source*: Eurostat (2017) – At-risk-of-poverty rate. (Color figure online)

Similarly, inequality rates vary considerably across member states. In order to measure inequalities, we chose the S80/S20 income quintile share ratio. Yet again, we divided countries into four groups (Table 1; Fig. 6), the most frequently occurring of which were defined as 'divergent' (12 countries) and 'convergent' (9 countries). These models are characterised by a rise/fall of inequalities during the entire period of study, while the overall rise/fall must reach more than 5 per cent (and in the case of the 'divergent' type, a maximum of 15 per cent).

Uneven levels of economic growth and inequality influence the various poverty levels within the EU. Based on the share of inhabitants living below the at-risk-of-poverty threshold,[8] four poverty groups were defined, of which the largest can be described as 'growing' (11 countries) and '(un-)stable' (7 countries). The 'growing' group includes countries where the at-risk-of-poverty rate rose by more than 15 per cent, and a rising tendency during the whole researched period. The '(un-)stable' model reveals a minimal rise/fall of the at-risk-of-poverty rate during the whole studied period. This group also consists of countries with rather varied levels of being at-risk-of-poverty (Table 1; Fig. 7).

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[8] The Index is then to referred as at-risk-of-poverty rate.

Table 1 Economic growth, inequalities and poverty trends. *Source*: the authors

No.	Model	Model criteria
Economic growth models (trends)		
1	Extremely progressive	Significant GDP increase (more than 50 per cent).
2	Progressive	Higher GDP increase (between 15 per cent and 50 per cent).
3	Stagnate	Lower GDP increase (less than 15 per cent).
4	Regressive	A decrease of GDP.
Inequality models (trends)		
1	Extremely divergent	Inequalities rose in every interval[a] with a cumulative rise of more than 15 per cent.
2	Divergent	Inequalities rose in every interval, or the total increase was between 5 and 15 per cent.
3	(Un-)Stable	Either stable (a rise/fall of less than 5 per cent) or unstable (no specific trend) development of inequality.
4	Convergent	Either a decrease of inequalities in individual intervals or a cumulative decrease of more than 5 per cent was recorded.
Poverty models (trends)		
1	Extremely growing	Poverty rose in every interval with a cumulative rise of more than 15 per cent.
2	Growing	Poverty rose in every interval or the total increase was between 5 and 15 per cent.
3	(Un-)Stable	Either stable (a rise/fall of less than 5 per cent) or unstable (no specific trend) development of poverty.
4	Falling	Either a decrease of poverty in individual intervals was recorded or a cumulative decrease of more than 5 per cent occurred.

[a]When defining inequality and poverty trends, the studied period (2005–2015) was divided into three intervals (2005–2008, 2009–2011 and 2012–2015) within which values were averaged. However, early data from countries that entered the EU after the EU-SILC was adopted (Bulgaria, Romania, Croatia) were unavailable, leading to a modification of intervals
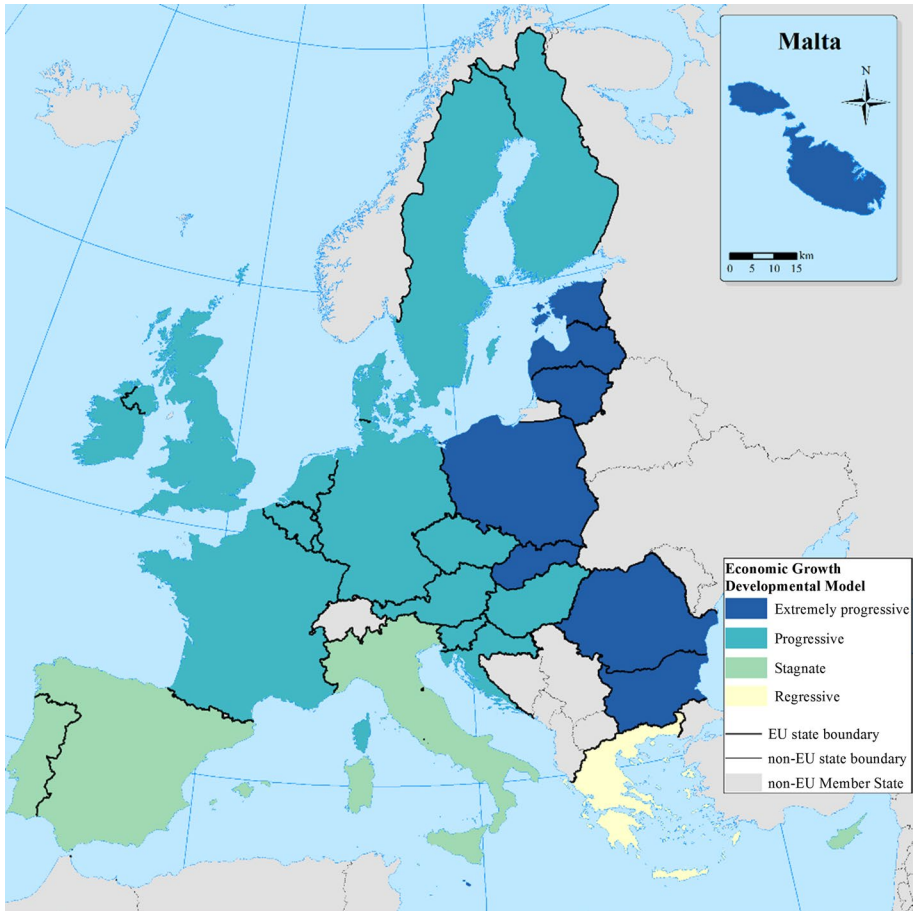
Fig. 5 The classification of EU member states by economic growth model. *Source*: the authors. (Color figure online)

5.2 Spatial Distribution of Defined Country Types

Eastern European countries are dominated by the 'extremely progressive' GDP growth model. Most of these countries were historically part of the Eastern Bloc. Other models reveal a spatial pattern, too. The 'progressive' type is particularly common in Northern and Western Europe, while Southern European countries are dominated by the 'stagnant' type and a very low GDP increase. Greece even experienced a decrease in GDP during the study period, a characteristic of the 'regressive' type.

The spatial differentiation of inequality trends is more difficult to interpret. The 'divergent' and 'extremely divergent' models are primarily observed in Mediterranean countries
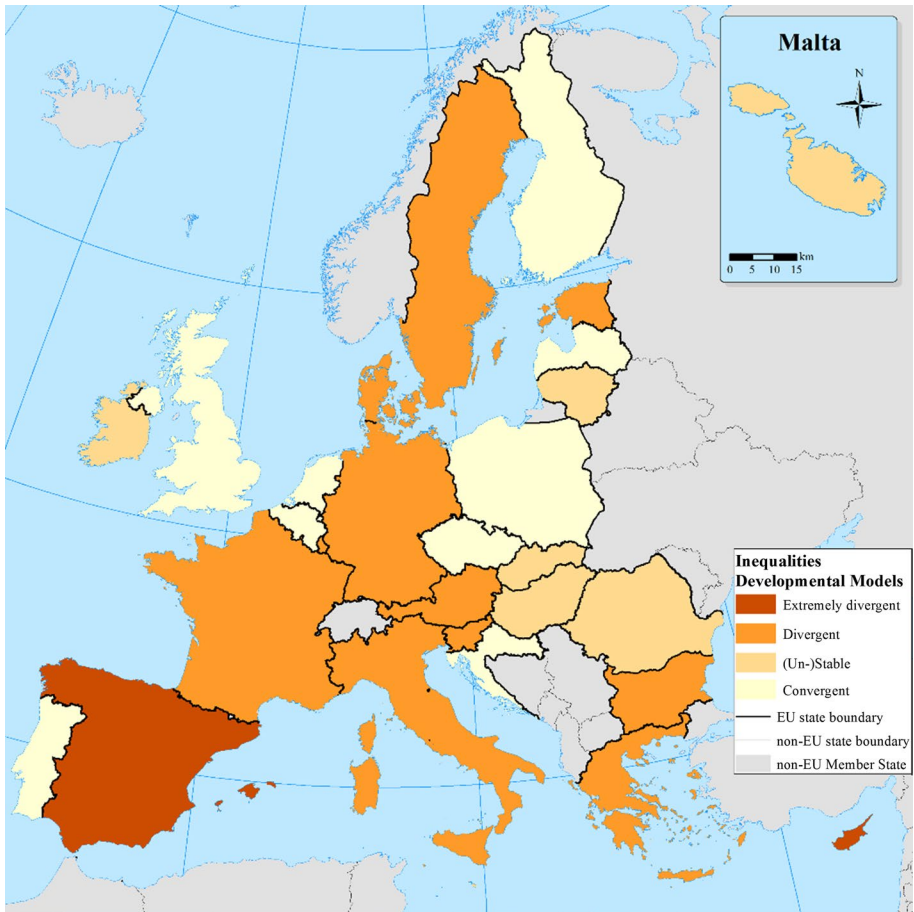
Fig. 6 Classification of EU member states by inequalities models. *Source*: the authors. (Color figure online)

with low rates of GDP growth and a strong tourism tradition,[9] for instance Cyprus, France, Greece, Spain and Italy. The 'divergent' category also incorporates Central and Northern European countries with a high net immigration rate (e.g. Luxembourg, Germany and Sweden) as well as countries with low but rapidly increasing GDP rates (Bulgaria and Estonia). The '(un-)stable' group consists of countries with low levels of change in inequalities. It is also represented by states where a rather significant fall in inequalities up until 2010 is followed by their increase (e.g. Romania). This trend is specific to 'extremely-progressive' countries experiencing GDP growth, with the exception of the Republic of Ireland whose GDP growth occurs at a lower rate than its counterparts within the category. The 'convergent' type of inequalities is, however, quite spatially heterogeneous.

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[9] Tourism has been one of the economic sectors most affected by the economic crisis, and so probably represents one of the reasons for rising inequality these countries.
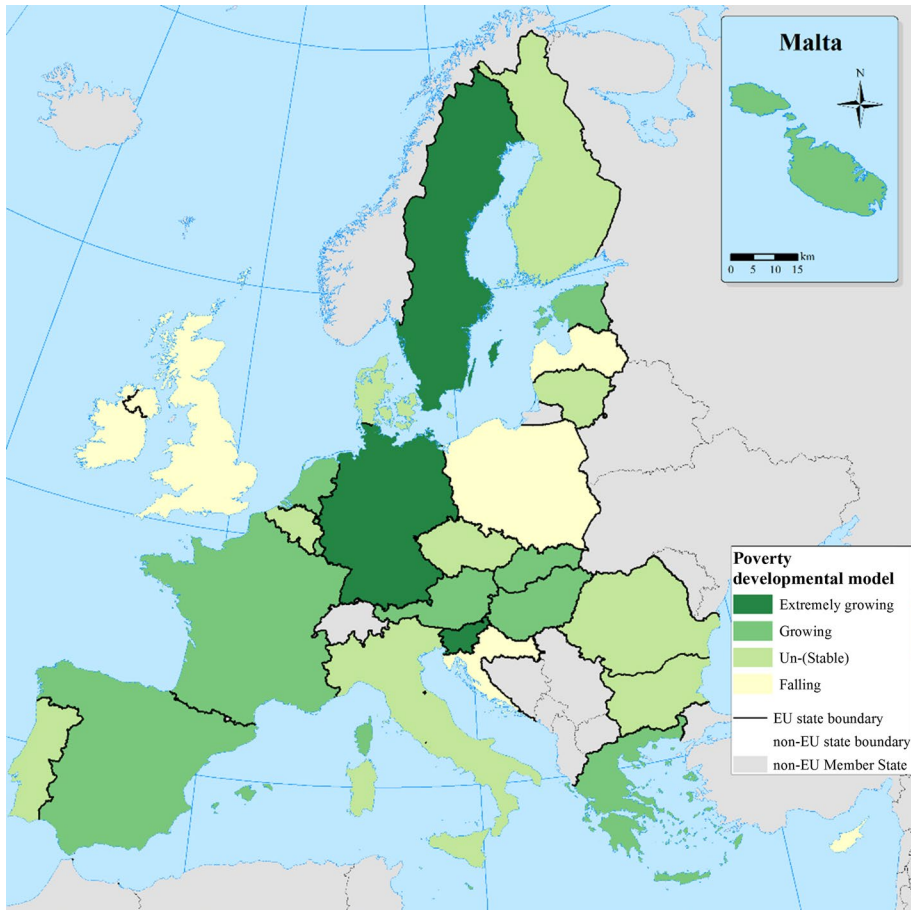
Fig. 7 The classification of EU member states by poverty models. *Source*: the authors. (Color figure online)

In general, a high level of increase in inequalities is associated with a high level of increase in poverty. As can be seen in Fig. 7, this applies to most EU countries,[10] and only a few countries record increased poverty and decreased inequalities and vice versa.

By investigating changes in GDP, inequality and poverty, it was possible to classify countries in terms of individual indices (Fig. 8). The map illustrates, among other things, the development of economic growth and inequality within countries with high relative GDP growth and a decrease of inequalities and poverty. These are the seven countries that epitomise '*the most positive*' development of these three phenomena (dark green colour/ type 1 if greyscale). They predominantly consist of former Eastern Bloc countries, but also the UK and Republic of Ireland. Nevertheless, the levels of increase of inequality differ

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[10] Our next intention is to correctly express this statement through the analysis of statistical connection.

Fig. 8 The complex classification of EU member states by the three indices. *Source*: the authors. (Color figure online)

across countries. Whereas Latvia records fluctuations in its development,[11] the UK is relatively stable, with values gradually decreasing from 5.9 in 2005 to 4.6 in 2013.

5.3 Examination of the Interrelationships Between these Phenomena Via the GIC Analysis

This part of the article aims to analyse income distribution within three of the countries through the GIC (Ravallion and Chen 2001). The selected countries can be considered representatives of the depicted models. They are suitable for demonstrating development changes in income distribution and poverty rate.

The country representing the model with an increase of all three indices is Germany. A representative of GDP increase and a decrease of inequalities and poverty is Ireland.

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[11] This fluctuation is typical for all three Baltic countries: Estonia, Latvia and Lithuania.
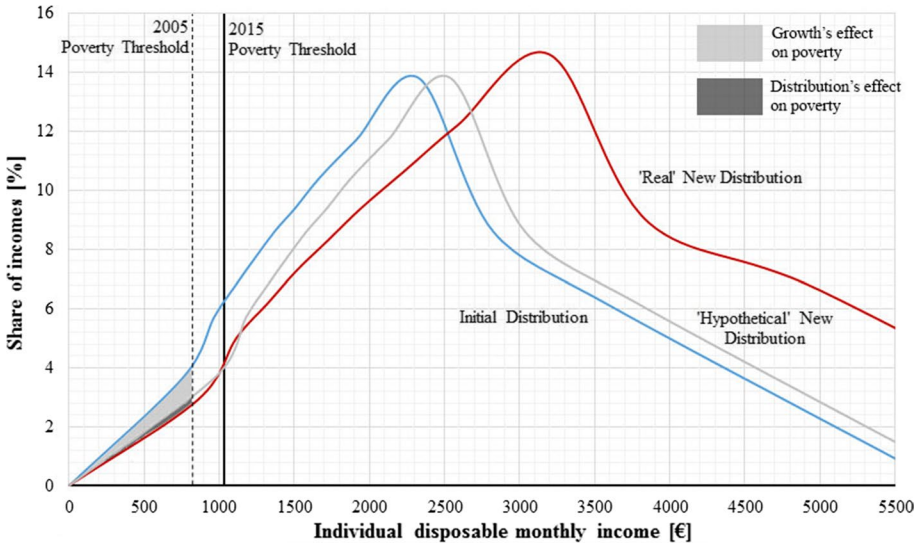
Fig. 9 Changes in income distribution in Germany, and the effects of economic growth and distribution on poverty. *Source*: Eurostat (2017)—Distribution of income by quantiles; At-risk-of-poverty thresholds. (Color figure online)

Fig. 10 Changes in income distribution in Greece, and the effects of economic growth and distribution on poverty. *Source*: Eurostat (2017)—Distribution of income by quantiles; At-risk-of-poverty thresholds. (Color figure online)
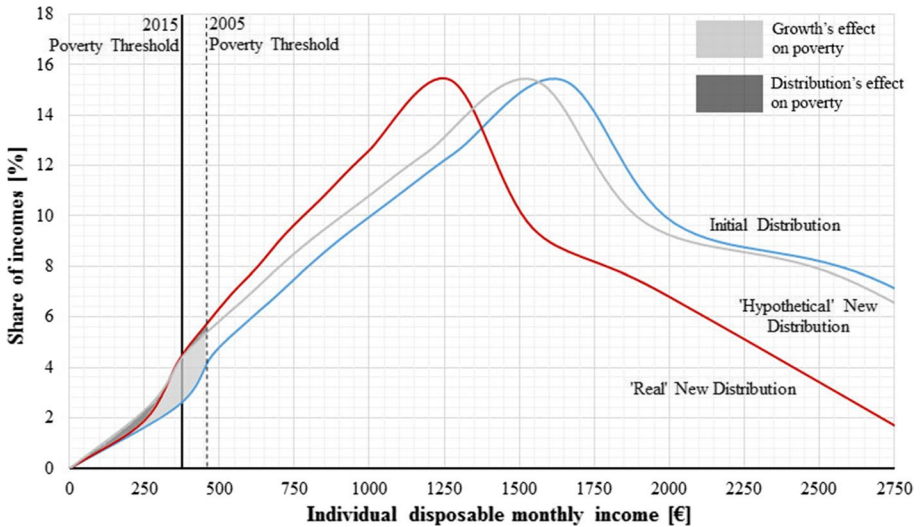
Fig. 11 Changes in income distribution in the Republic of Ireland, and the effects of economic growth and distribution on poverty. *Source*: Eurostat (2017)—Distribution of income by quantiles; At-risk-of-poverty thresholds. (Color figure online)
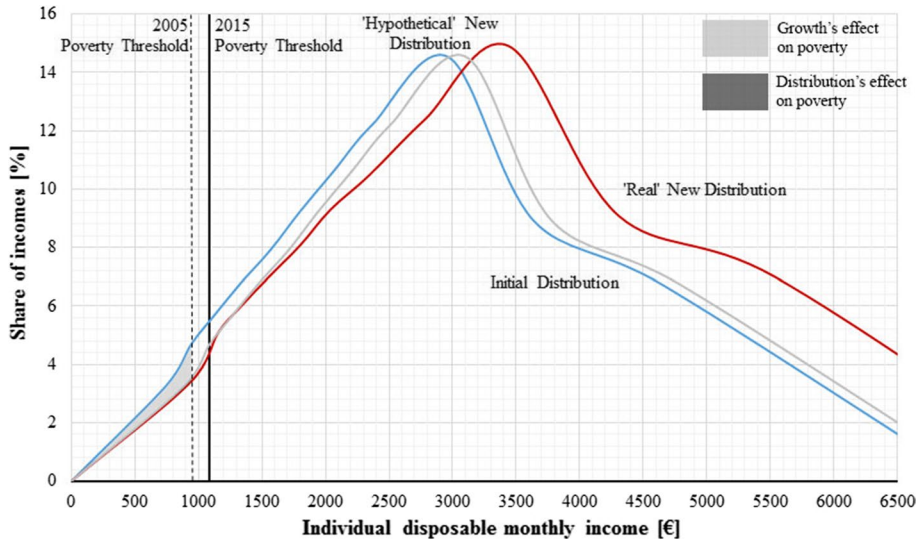
An inverted development is illustrated by Greece, as it demonstrates GDP decrease and an increase of both inequality and poverty. The intention is to illustrate the variedness of income distribution and its differing impacts on the fall or rise of poverty within the defined country types.

In order to create charts depicting the relationship between economic growth and poverty and income distribution (Figs. 9, 10, 11), the following steps were taken:

1. The X axis represents an upper interval value (top cut-off point) of individual disposable monthly income retrieved from the EU SILC 2005 (X curve) and 2015 (Y axis) surveys. The Z curve illustrates the theoretical (abstract) 2015 distribution acquired by adding the values from 2005 and the difference between the at-risk-of-poverty thresholds in 2015 and 2005. Finally, the at-risk-of-poverty thresholds for both years were marked at the X axis[12];
2. The Y axis represents the share of income by quantiles (deciles) of the EU population, while a top decile was divided into three groups[13];
3. The light grey (economic growth's effect on poverty) and dark grey areas (income distribution's effect on poverty) were marked based on the GIC. In general, the larger the area, the bigger the impact of the phenomenon.

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[12] Figure 10 displays the income distribution of Greece. The 2015 at-risk-of-poverty threshold lies on the left compared to the 2005 threshold. This is caused by the fact that the threshold fell from €471 per month in 2005 to €376 per month in 2015.

[13] The first group is represented by data for the 91st to 95th percentiles, the second for the 96th to 98th percentiles, and the third for the 99th and 100th percentiles. The main reason for this divide is the limited availability of data, as well as the relatively large share of top income decile on income distribution.
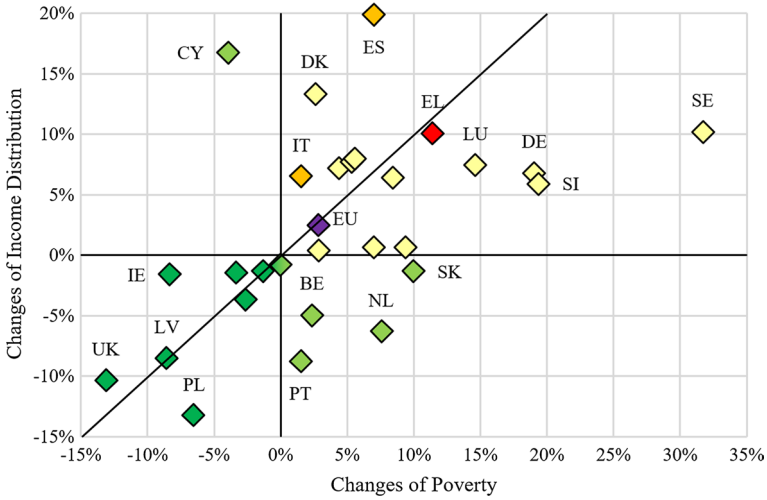
Fig. 12 The interaction between the rise/fall of poverty and inequalities from 2005 to 2015. *Source*: Eurostat (2017)—At-risk-of-poverty rate; S80/S20 income quintile share ratio. (Color figure online)

Figure 9 shows Germany's results. The light grey area depicts the impact of economic growth on poverty. Based on a theoretical distribution, an equivalent increase of incomes primarily amongst the population with lower disposable incomes should appear. Nevertheless, the curves show that a strengthening of the high-income group occurred. This led to the weakening of the bottom and middle-income groups and hence an increase of income inequality and the number of inhabitants living below the at-risk-of-poverty threshold. The dark grey areas show distribution's impact on poverty. Evidently, the relationship is weak: it only seems to be positive in the case of the poorest social groups. Thus, the real overall income distribution in 2015 affected poverty in a rather negative fashion.

The distribution's relationship with poverty in Greece makes interesting reading, revealing several similarities with Germany in spite of their very different levels of economic development (Fig. 10; cf. Fig. 2). Nevertheless, economic depression affects poverty in a distinctive manner. The light grey areas show that in spite of an increase in income amongst the middle-income group, and a small decrease within the upper-income group, the incomes of the bottom group descended rather significantly: while 10 per cent of the population with the lowest incomes earned 2.5 per cent of all incomes in 2005, this proportion decreased to 1.9 per cent in 2015.

A chart displaying Ireland (Fig. 11) indicates that the 2015 income distribution development of low-income groups mirrors the development of hypothetical distribution. This implies that the growth reduced the at-risk-of-poverty and inequality rates. A minimal divergent tendency might be seen within the higher-income groups.

Figure 12 illustrates the relationship between poverty and inequality from 2005 to 2015 in EU member states. The X axis represents the rise/fall of the at-risk-of-poverty rate and the Y axis the rise/fall of inequality rate. The rise/fall is expressed as a comparison between the first and the last interval, as defined above. As displayed on the chart, the values form an imaginary line in the direction of inequalities/poverty decrease and inequalities/poverty increase. The majority (15) of the countries are located within the upper-right quadrant

with an increase of both inequality and poverty. Individual models (based on Fig. 8) were distinguished by colours (capital letters if greyscale).

6 Conclusion

This article has explored development issues within the EU, with specific attention to three important socio-economic indicators that extensively affect the quality of inhabitants' lives. These have been analysed within the period 2005–2015, a dynamic period that saw the enlargement of the EU by three relatively poor Balkan countries, the onset of the global economic and financial crisis, and the large-scale immigration of refugees and asylum seekers, among other events. Collectively, these events and issues provided valuable conditions for monitoring the relationships between the above phenomena. Individual countries have been affected in a wide range of ways. Some countries enjoyed relative success, using their growing aggregate wealth to reduce inequalities and poverty. However, in most EU countries, only a minority of people benefited from economic growth, resulting in increased inequalities and poverty. Greece represented a unique case, as the only EU country to experience a decline in GDP as well as increased inequality and poverty rates. The analysis presented here has confirmed the first two hypotheses: that economic growth stimulates a reduction in poverty, and that an increase in inequalities stimulates an increase in poverty.

Confirmation of these hypotheses strengthens the relevance of economic growth and inequality as crucial parameters. They should be considered in the creation of policies regarding economic growth and regional and social development. To date, economic growth has represented a cornerstone of these policies, yet inequality and its determinants have rarely been considered.

As long as these policies overlook both the observation and analysis of inequality, or consider them only marginally at best, efforts at solving such problems will be ineffective. Indeed, it will be difficult to tackle key issues regarding standards of living and the prevalence of poverty.

Therefore, it is essential that inequality is rendered a priority area for research and policy development. Inequality issues must be included in policies in countries where inequality and poverty are both on the rise in spite of economic growth. As shown in the analyses presented here, half of the EU member states face these challenges. Their economic growth has not been accompanied by a reduction in inequality levels; rather, these issues have risen, resulting in a growing prevalence of poverty. Such dynamics highlight how economic growth needs to be managed more effectively, so that the benefits can be distributed more widely. Regarding this context, the 'pro-poor growth' concept of growth that benefits the poor looks optimistic.

A wide spectrum of approaches and understandings must become fundamental to distributive policy, which more specifically should consist of a just and effective redistribution of regional and social policies aimed at the equalisation of horizontal and vertical differences due to an unbalanced utilisation of interests and benefits of economic growth. The results of this article's classification system confirmed the third hypothesis regarding the existence of common systematic/development formulas that are applicable to every EU country. The categorisations identified here, created on the basis of common development formulas, show that there are seven countries within the EU whose development has been positive, consisting of increased GDP and a decline in inequality and poverty. However, the

opposite, extreme negative development, is represented by four Mediterranean countries, where GDP increase has been low (or, in Greece's case, it has decreased), and inequality and poverty have significantly increased. Most EU countries, however, recorded fluctuations during the research period. Based on the analyses of growth and income distribution through the GIC in three chosen countries, it was recognised that changes in growth and income distribution affect poverty rates in different ways.

The results clearly show that economic growth and the distribution of its effects will continue to substantially affect the prevalence and level of poverty in EU member states. We assume that individual countries will react differently to these challenges and the other incentives that accompany development, whether within the EU (such as Brexit, a creation of the common market, a coalition of persons interested in development, higher efficiency of chosen areas, the sharing of labour force, faster progress, or the enforcement of a positive reform program such as *New Beginning Europe!* (European Commission 2017)) or globally. This highlights the importance of continual research exploring the connections between these issues, in order to inform the different systematic/development formulas of countries in the future. An understanding of various formulas might help us when analysing pro-poor growth and creating development strategies or distribution policies based on poverty reduction and other challenges.

References

Adams, R. H. (2004). Economic growth, inequality and poverty: Estimating the growth elasticity of poverty. *World Development, 32*(12), 1989–2014.

Azpitarte, F. (2014). Was pro-poor economic growth in Australia for the income-poor? And for the multidimensionally-poor? *Social Indicators Research, 117*(3), 71–905.

Bourguignon, F. (2004). The poverty-growth-inequality triangle. The World Bank Policy Research Working Paper (28102). http://siteresources.worldbank.org/INTPGI/Resources/342674-1206111890151/15185_ICRIER_paper-final.pdf. Accessed 21 November 2016.

Chemli, L., & Smida, M. (2013). Interaction between poverty, growth, and inequality during the crisis: A panel data study. *International Journal of Economics and Finance, 5*(5), 120–130.

Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth, 7*(3), 195–225.

Duclos, J. Y. (2009) What is "pro-poor"? Social Choice and Welfare. https://doi.org/10.1007/s00355-008-0308-x Accessed 26 January 2018.

European Commission (2010). Communication from the Commission—Europe 2020: A strategy for smart, sustainable and inclusive growth. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=en. Accessed 16 January 2017.

European Commission (2011). Cohesion Policy 2014–2020— Investing in growth and jobs. http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2014/proposals/regulation2014_leaflet.pdf. Accessed 16 January 2017.

European Commission (2017). Commission presents White Paper on the Future of Europe. Brussels. https://ec.europa.eu/commission/news/commission-presents-white-paper-future-europe-2017-mar-01_en. Accessed 9 October 2017.

Eurostat (2017). Database. http://ec.europa.eu/eurostat/data/ database. Accessed 9 February 2017.

Ferreira, F. (2012). Distributions in motion: Economic growth, inequality, and poverty dynamics. In P. N. Jefferson (Ed.), *The Oxford Handbook of the Economics of Poverty* (pp. 427–462). Oxford: Oxford University Press.

Finweb (2016). Ekonomiky strednej a východnej Európy čaká rast (The economies of Central and Eastern Europe are expecting a growth). http://finweb.hnonline.sk/financie-a-burzy/661337-ekonomiky-strednej-a-vychodnej-europy-caka-rast. Accessed 6 October 2017.

Funke, M., & Strulik, H. (1999). Regional growth in West Germany: Convergence or divergence? *Economic Modelling, 16*(4), 489–502.

Iradian, G. (2005). Inequality, poverty, and growth: Cross-country evidence. https://www.imf.org/external/pubs/ft/wp/2005/wp0528.pdf. Accessed 9 October 2017.

Khan, M. A., Khan, M. Z., Zaman, K., & Hassan, U. (2013). Global estimates of Growth-Inequality-Poverty (GIP) Triangle: Evidence from the World Bank's classification countries. *Quality & Quantity, 48*(5), 2631–2646.

Leitner, S., & Stehrer, R. (2014). Drivers of inequality and poverty in the CEE and other EU member states. A Shapley value decomposition analysis. https://www.wiiw.ac.at/drivers-of-inequality-and-poverty-in-the-cee-and-other-eu-member-states-dlp-3431.pdf. Accessed 10 October 2017.

Michálek, A., & Podolák, P. (2004). Enlargement of the EU: Comparison of the member and accession countries from the point of view of selected demographic and socio-economic characteristics. *Problemi na geografijata, 3–4,* 3–21.

Pravda (2017). Slovensko si udržiava vysoký rast nad tromi percentami (Slovakia keeps a high growth of more than three percent). https://spravy.pravda.sk/ekonomika/clanok/438439-slovensko-si-udrziava-rychly-rast-nad-tromi-percentami/. Accessed 6 October 2017.

Ravallion, M., & Chen, S. (2001). Measuring pro-poor growth. http://documents.worldbank.org/curated/en/747531468746709289/pdf/multi0page.pdf. Accessed 22 November 2016.

Tebaldi, E., & Kim, J. (2015). Is income growth in the United States pro-poor? *A state-level analysis. Eastern Economic Journal, 41*(2), 251–272.

Zeman, K., & Shamsuddin, S. (2017). Linear and non-linear relationships between growth, inequality, and poverty in a panel of Latin America and the Caribbean countries: A new evidence of pro-poor growth. *Social Indicators Research*. https://doi.org/10.1007/s11205-017-1581-9.