Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Master Thesis

Economic development and poverty alleviation

Bc. Lina Khoroshun

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

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Economics Policy and Administration
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Thesis title

Economic Development and Poverty aleviation

Objectives of thesis

The aim of the thesis is to identify the effect of economic development on the poverty in a country. Specifically, to clarify if economic growth affects poverty differently in more and less developed countries. To do this, the regression models will be applied where poverty measures are regressed on the economic development indicators, such as GDP per capita of a country.

Methodology

The thesis will be divided into three parts.

The first part is a theoretical one and is based on literature search. It defines the current state of knowledge in the field of economic development and poverty alleviation. In this part, articles, books, researches and different electronic resources will be used to provide information. Methodologically, this part of the thesis will be the analysis of documents.

The second part will rely on the theoretical part and it is the key component of the thesis. Methods of quantitative research such as statistical and mathematical methods will be used in this part. The analysis will be done on more and less developed countries.

The final part concludes the results of the previous parts and discusses it with another author.

The proposed extent of the thesis

60- 80 pages

Keywords

Poverty gap, GDP per capita, poverty hedcount ratio, developing countries.

Recommended information sources

Anjoy, P., Chandra, H., Basak, P. (2019) Estimation of disaggregate-level poverty incidence in Odisha under area-level hierarchical bayes small area model. Social Indicators Research, 144, 251-273.

Cingano, F. (2014). Trends in income inequality and its impact on economic growth (OECD Social, Employment and Migration Working Papers No. 163). Paris: OECD Publishing.

Jauch, S., and Watzka, S. (2016). Financial development and income inequality: a panel data approach. Empirical Economics, 51(1), 291-314.

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Soava, G., Mehedintu. A., Sterpu, M. (2020) Relations between income inequality, economic growth and poverty threshold: New evidences from EU countries panels. Technological and Economic Development of Economy, 26(2), 290-310.

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The Diploma Thesis Supervisor

doc. Ing. Irena Benešová, Ph.D.

Supervising department

Department of Economics

Electronic approval: 26. 11. 2022

prof. Ing. Lukáš Čechura, Ph.D.

Head of department

Electronic approval: 28. 11. 2022

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 29. 11. 2022

Declaration

I declare that I have worked on my master thesis titled "Economic development and poverty alleviation" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 30.11.2022 _____

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Economic development and poverty alleviation

Abstract

Poverty alleviation is set as a number-one goal by the United Nations "2030 Agenda for Sustainable Development". There are different opinions how economic development facilitates the reduction of poverty, which makes it difficult to choose the appropriate government policy. In this thesis we analyse the effect of economic growth on the poverty indicators, including poverty headcounts ratio and poverty gap. We find that the economic growth has a diminishing effect on poverty, with the strongest impact for the less developed countries and almost no effect for the relatively rich countries. We suggest that governments should use different policy measures in order to reduce poverty in the respective countries.

Keywords: poverty, poverty gap, GDP per capita, poverty headcount ratio, economic development, developing countries

Hospodářský rozvoj a zmírňování chudoby

Abstrakt

Zmírnění chudoby je stanoveno jako první cíl „Agenda pro udržitelný rozvoj 2030“ OSN. Existují různé názory, jak ekonomický rozvoj usnadňuje snižování chudoby, což ztěžuje výběr vhodné vládní politiky. V této práci analyzujeme vliv ekonomického růstu na ukazatele chudoby, včetně poměru počtu chudoby a rozdílu chudoby. Zjistili jsme, že ekonomický růst má klesající vliv na chudobu, s nejsilnějším dopadem na méně rozvinuté země a téměř bez vlivu na relativně bohaté země. Navrhujeme, aby vlády používaly různá politická opatření ke snížení chudoby v příslušných zemích.

Klíčová slova: chudoba, mezera chudoby, HDP na obyvatele, poměr počtu chudoby, ekonomický rozvoj, rozvojové země

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GDP – gross domestic product
OLS – ordinary least squares
PPP – purchasing power parity
WDI – world development indicators

1. Introduction

Despite the long-run efforts, poverty is still the relevant problem for the world population. According to the World Bank, more than half of the world population live for less than $5.5 a day, and 10% of the world population earn less than $1.9 a day.

In September 2015 the United Nations General Assembly adopted the document named “Transforming our world: the 2030 Agenda for Sustainable Development”. This document contains the list of 17 goals, of which goal 1 reads “End poverty in all its forms everywhere” (United Nations, 2015). Several sustainable development goals are closely related to poverty alleviation.

The European Union adopted a set of documents, including “Next steps for a sustainable European future: European action for sustainability” in November 2016 (European Commission, 2016) and a reflection paper “Towards a Sustainable Europe by 2030” in January 2019 (European Commission, 2019), where poverty alleviation is among the most important goals also.

Thus, poverty is recognized as an important problem if the world population which must be overtaken.

The causes of poverty are numerous and, in addition to economic conditions, can also be related to the family situation, gender, nationality or lack of state security payments. One of the most serious consequences of poverty are the adverse health effects. This includes aspects such as unhealthy diet, exercise, management of health risks, etc.

Among the means of poverty alleviation one of the most obvious is economic development, which suggests that more developed countries with higher income per citizen, must have lower degree of poverty. On the other hand, there are poor and homeless people even in the rich and developed countries, including the United States or the United Kingdom.

In this thesis the main research question is, to which extend economic development is able to facilitate the poverty alleviation and how this effect changes with the increase in economic growth. This question is relevant to the economic policy that governments may implement in order to achieve the sustainable development goal #1 of poverty alleviation. Depending in the level of economic development, governments may need different tools while fighting the poverty.

This thesis includes three parts: literature review, poverty data analysis, and results and discussion.

In the literature review the main research results in the field are presented and compared. With the help of literature review we establish the set of indicators and their relations that are studied in the subsequent chapters.

The data analysis part includes the description of the poverty data and regressions of poverty indicators on GDP per capita.

The results and discussion section includes the summary of the main findings and their relevance to the current research and economic policy measures.

2. Objectives and Methodology

2.1. Objectives

The aim of the thesis is to identify the effect of economic development on the poverty in a country. Specifically, we want to clarify if the economic growth affects poverty differently in more and less developed countries.

2.2. Methodology

This thesis conducts non-experimental research and is based on the observational data. This specific requires to be careful with the causal interpretation of the results. Whenever possible we support the causal interpretation with the logical arguments.

Following similar studies on the topic (Fosu, 2010; Lee and Perera, 2013; Stevans and Sessions, 2008) we choose a multiple regression as the main tool of the analysis. In order to apply the regression, we collect the data on GDP per capita and poverty measures for all countries in the world over the period of 1990-2018, apply the descriptive statistics methods and simple correlation analysis which helps to establish the shape of the relationship between GDP and poverty.

The regression analysis allows measuring the statistical significance of the effect that GDP has on poverty and estimate the marginal effect of economic growth on poverty which appears to be diminishing.

The thesis proceeds with the section “Literature review”. Initially the definition of poverty is given and the complexity of this concept is highlighted. Next, the investigation of the existing studies in economic development and poverty alleviation is done, in order to show the current state of the research and blind spots in the field. The section concludes with the measurement of poverty needed to collect the data for the empirical section of the thesis.

The empirical section of the thesis starts with the overview of countries and regions with respect to their poverty situation and economic growth. The top and bottom countries and regions are identified. Next, the dynamics of poverty and economic development indicators is analyzed to illustrate the changing situations in the field. Finally, the multiple regression analysis is applied to reveal the connection between economic development and poverty alleviation.

The ”Results and discussion” section highlights the most important findings of this study and discusses the possible limitations. The findings are used to establish the guidelines

for the potential government policies in various countries aimed towards the poverty alleviation. Given the fact that the least developed countries are more concerned with the absolute poverty while the more developed countries primarily have to fight the inequality, the government policies should be tailored for each particular case.

The thesis contributes the research on economic development causes of poverty alleviation and enriches the existing discussion on this topic. The findings can be used in the construction of the government policies targeted to poverty alleviation.

3. Literature Review

3.1. The concept of poverty

When is someone considered poor? Various concepts of poverty provide an answer to this question. The purpose of this section is to provide an overview of the concepts and key determinants of poverty.

The concepts of absolute and relative poverty are among the better known definitions of poverty. They explicitly set a value above which a person is considered poor.

According to the World Bank, the absolute poverty line is $1.90 a day. People live in absolute poverty when their physical survival is threatened. They lack of basic goods such as food, water, clothing, housing and medical care (Worldbank, 2021).

Absolute poverty is that form of poverty that manifests itself in the fact that people essential needs are not met. The definition of absolute poverty is based on the idea of a subsistence level. When measuring the absolute poverty, a certain monetary value is set as the subsistence level. This represents the limit of poverty. All those people who do not meet the minimum are considered poor.

The main assumption of the absolute poverty is that the subsistence level is universally applicable. In practice, the subsistence level depends on the location, because it is a minimum requirement defined for survival only and that depends on the economy and society.

The concept of relative poverty defines falling below a fixed poverty line, which is in relation to the respective (or average) living conditions of a society (Worldbank, 2021).

For example, the income of people leaving in relative poverty in the Czech Republic and in the United States might differ and not necessarily be $1.90 a day.

Poverty concepts can be used to explain what is individually and socially considered as poverty. In research, there are mainly three approaches to the relative poverty used: the resource approach, the standard of living approach and the capability approach.

The resource approach relies on the availability of resources within a household. This approach interprets poverty as a lack of both material and immaterial resources. Poverty from the resource-oriented point of view, occurs when people do not purchase goods and services they consider necessary due to insufficient financial resources. The concept of relative poverty developed from this approach.

This approach has the advantage that, in the case of empirical research activities, it only has one indicator - the household income – to be collected. The most used indicators for the resource approach are relative income poverty, and the social assistance threshold.

The standard of living approach can be used to assess people's living conditions. This is a list of indicators that depicts the standard of living of the average population and enable social and societal participation (Europe 2020 indicators). According to this approach, people who cannot afford a certain number of indicators are considered poor or materially deprived.

A situation in life consists of material and intangible dimensions such as satisfaction. The focus is on the actual supply situation. Poverty here is not just income poverty, but an accumulation of several factors of undersupply. Poor people here are the parts of a socially disadvantaged group whose living situation is very close to the social subsistence level. The subsistence level is determined by social opinion and includes the still just reasonable living situation.

In contrast to the resource approach, this approach is difficult to operationalize because the weighting of the individual factors does not follow a universal logic. Another difficulty is the question of whether a possible oversupply in one area undersupply in another.

A more comprehensive perspective on the concept of poverty is offered by the opportunity approach, also known as the capability approach. This extends actual living conditions to include potential factors and choices. According to this approach, people are considered poor if they have no or few freedoms of choice in lifestyle and therefore few options with regard to the job, leisure opportunities, etc.

The capability approach is about those resources that are necessary to overcome a situation of poverty. In this concept, poverty is a physical, social and psychic abilities. These include individual factors such as age, illness, the gender or the respective level of education.

For this approach the three key indicators are required:

a) goods and services available to a person

b) the person's 'capability set', i.e. the extent to which the person is free above those determined by life

c) the 'functionings', i.e. the life that the person is currently leading.

The 'functionings' mean the current everyday life of the person, i.e. what the person is doing. Public action should not be the 'functionings' focus. Rather, public action should focus on the 'capabilities', i.e. the potential that a person has.

In addition to the three approaches above, some authors (Moser and Schenk, 2011) propose the exclusion approaches that define poverty through social integration and the realization of social rights (e.g. equal opportunities). A low level of integration into society can lead to an inadequate material suppl. In return, material undersupply can promote exclusion processes. With the help of the exclusion approach, the importance of social interactions in determining poverty becomes clear.

Poverty is a social construct. Attributes of poverty depend on the socio-economic framework conditions and the prevailing values, on the social position and in the ideological, religious or political position of the respective viewer. Moreover, poverty is often defined by those people who are not affected by poverty: journalists, scientists, social experts, civil servants and politicians (Moser and Schenk, 2011).

On the one hand, the poverty is often defined by people who have not experienced poverty through their conceptions of normality. In research, the determination of poverty by outsiders and experts without whom referred to as “objective poverty” People living in poverty have to meet society-defined physical appearance criteria to be considered “poor”.

Authors such as Moser and Schenk (2011) attribute this image of poverty to the widespread concept of absolute poverty, more often found in the developing countries. Poverty in the EU countries is not obvious at first glance, but rather a hidden phenomenon.

On the other hand, it can be assumed that attributions and ideas about poverty by people who are not affected by poverty most likely do not reflect the living situation of people affected by poverty. It turns out hence the question to what extent poverty concepts can grasp the complexity of poverty.

People who do not deal with poverty can blame those who are in poverty for their living situation (Moser and Schenk, 2011). They are met with prejudices such as “lazy”, “drink” or “can’t handle money” or “social parasites”. Poverty is thus individualized, i.e. it is labelled as an individual problem made by a human. In reality, however, poverty is “a social and structural problem” and “an expression of social and economic conditions” (Moser and Schenk, 2011).

3.2 The causes of poverty

Before starting the discussion about the relationship between economic development and poverty we need to understand, why poverty exists, what are the reasons that people become poor? Blank (2003) categorizes these into six theoretical frameworks:

1. Poverty is clue to economic under development
2. Poverty occurs because some individuals within market economies are either unprepared or unable to participate in them productively
3. The market is inherently dysfunctional and creates poverty
4. Poverty is due to social and political processes that occur outside the market
5. Poverty is the result of individual behavioral characteristics and choices
6. Poverty is caused by efforts to alleviate poverty

In this section we briefly describe each of these causes.

The first cause comes from the idea that the most severe poverty is present in countries with weak markets and economies. Thus, it is logical to assume that the absence of markets leads to the poverty. And the proposed solution for the poverty problem is an introduction of markets in the undeveloped regions of the world (Blank, 2003). This might be reasonable, unless the poverty in the developed market economies would not exist. In contrast, the very fact that the poor people exist even in the richest countries, suggest that there are other causes of poverty.

The second cause suggests that in the market economies part of the population is unable to participate in the markets. For example, children, disabled people, old people – they are not able to participate in labor force and in the absence of caring relatives these people have a high risk of becoming poor. Less productive workers can be also poor just because their income is not enough to cover their essential needs (Blank, 2003). This cause highly depends on the country under consideration because the living cost in developed and developing countries is very different and the same individual might be poor in the developed countries while in the developing countries with the lower cost of living this person would not be poor.

The third cause assumes that the market economy itself has a potential to produce poverty. This claim is based on several ideas, evolving from the Shumpeter's "creative destruction" hypothesis. A rapid technological development leads to the displacement of workers from the old industries. If these workers are not able to learn new skills necessary for the new technological industries, they can end up in poverty (Davis et al, 1996).

Moreover, as Berger and Piore (1980) suggest, the economic cycles create unemployment among the workers from secondary sectors of economy because of the less importance of their industries.

The fourth cause of poverty listed by Blank (2003) is the social and political processes. This view is based on theories of Becker (1971) and mostly suggests that poverty exists due to the racial and ethnic discrimination attitudes. The unemployment and poverty exist in larger shares among minorities due to the different access to the labor market, education, medicine and other social goods. Also, the political conflicts lead to the growth in poverty (Dreze and Sen, 1989).

Individual choice is the fifth potential cause of poverty. This is based on the idea that people themselves choose their own lifestyles, which may lead them to poverty. This differs to the second cause, where people are not able to participate in the market due to illness or their age. Here people act themselves in such a way, that they become poor. For example, alcohol or drug consumption increases individual's risk of poverty (Blank, 2003).

The behavioral problems can persist over the long intervals of time and impede the poverty alleviation. Some theories even suggest that behavioral preferences are transferred over generations within families, which lead to the effect that "poverty begets poverty" (Gottschalk, 1992). It seems that market and economic growth do not relevant to the alleviation of this type of poverty.

The last cause of poverty listed by Blank (2003) is an idea that poverty alleviation policy creates poverty. The explanation of this seemingly perverse logic is quite simple: helping poor creates incentives for them to stay poor. Although, in the short-run the anti-poverty policies can have a positive effect, in the long run poor people become more relaxed and poverty persists.

As it might be seen from the diverse nature of poverty, not causes of poverty can be affected by the economic development. Most likely that the economic development ca facilitate poverty alleviation through such channels as: the creation of markets, provision of equal access to the medicine and education, protection of vulnerable groups of society. At the same time, the change of the individual behavior and the mitigation of the anti-poverty policies adverse effects are not closely related to the economic development.

3.3. Economic development and poverty

3.3.1. Economic growth and poverty

One of the early works on the relationship between economic growth and poverty reduction was Anderson's (1964) seminal paper. In the 1960s, it was widely believed that economic growth is able to fight poverty completely. President John F. Kennedy in 1963 claimed that a 'rising tide lifts all boats', or in other words, the long-run growth should virtually eliminate poverty (Kennedy, 1963).

Anderson (1964) argued that over time growth would become less effective in diminishing poverty in America. Because of this expected trend Anderson argued that new transfer policies would be required to supplement family incomes of vulnerable population subgroups and the nonworking poor.

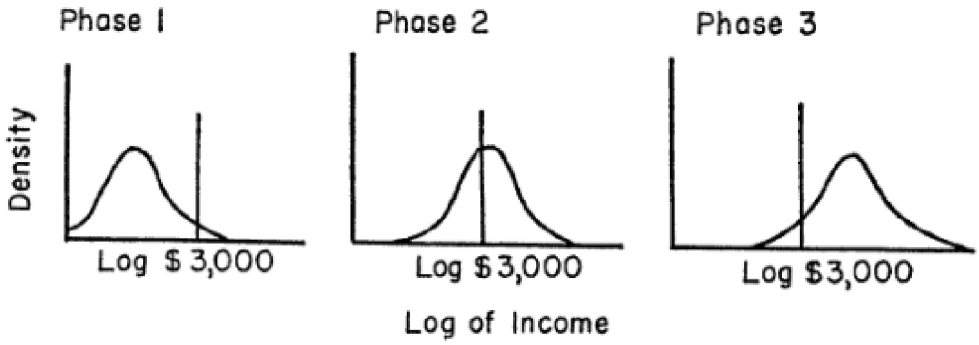


Figure 3.1. Income distribution at various stages of economic growth (Anderson, 1964)

Figure 3.1 illustrates the idea of Anderson (1964) and suggests that at the lower stage of economic growth the majority of population is located below the poverty threshold, which means a positive effect of even small economic development at the poverty reduction. As income grows (Phase 2), largest part of people passes the threshold and the effect on poverty diminishes, while at the Phase 3 the small fraction of the population remains poor and the further growth has relatively small effect on poverty.

After the Anderson's work, several studies (Gallaway, 1971; Thornton et al, 1978; Hirsch, 1985) tried to empirically estimate the effects of economic growth on poverty. These papers indicated that unemployment rates have a strong positive effect on poverty, which confirms an initial idea that job creation and destruction through the economic cycle phases has an important impact on poverty. In addition, empirical studies showed that long-run

economic growth benefits mostly white, male-headed households while for non-white and female-headed households economic growth has less stronger effects.

Nonlinear effect of economic growth on poverty (specifically on income inequality) has been shown even earlier in by Kuznets (1955). He showed the so-called “inverse U-shape” relationship which means that on the early stages of economic growth income inequality increases, then at some point it reaches its maximum and then with a subsequent increase in economic development the income inequality decreases. The relationship is illustrated on the figure 3.2.

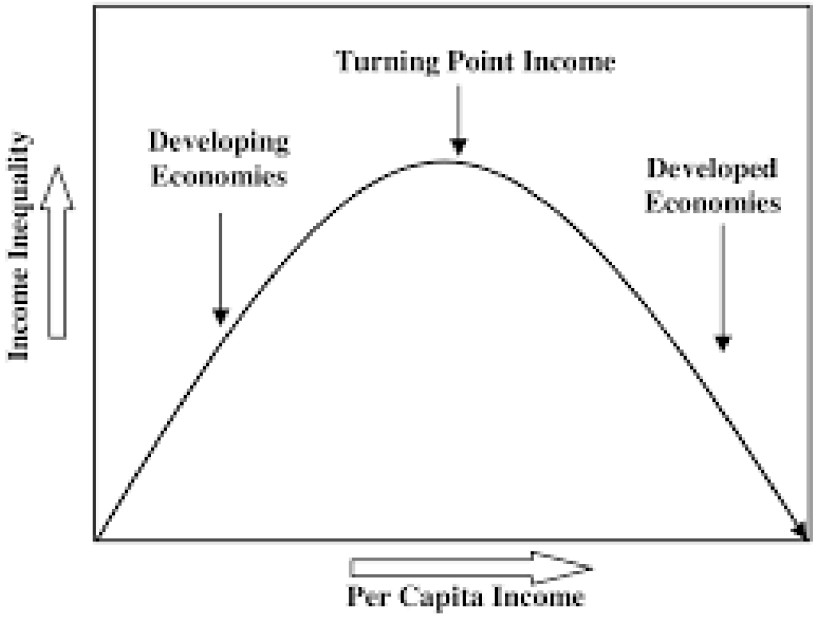


Figure 3.2. Inverse U-shape Kuznets curve (Misra & Ghadai, 2016)

Several studies confirmed the diminishing effect of economic growth on poverty over time. For example, Thornton et al. (1978) using data for the period from 1947 to 1974 time period, estimated weaker effects of macroeconomic growth on poverty reduction after 1963.

Cutler and Katz (1991) find the diminishing effects of economic growth after 1983, which is illustrated on figure 3.3, where the poverty rate tend to decrease slower than predicted since 1983. In addition, Blank (1991) document lower responsiveness of poverty to growth in the 1980s compared to the previous periods.

In more recent study, Leblanc (2001) covers the period 1961 to 1998 and finds that across time the poverty-reducing effect of growth weakens.

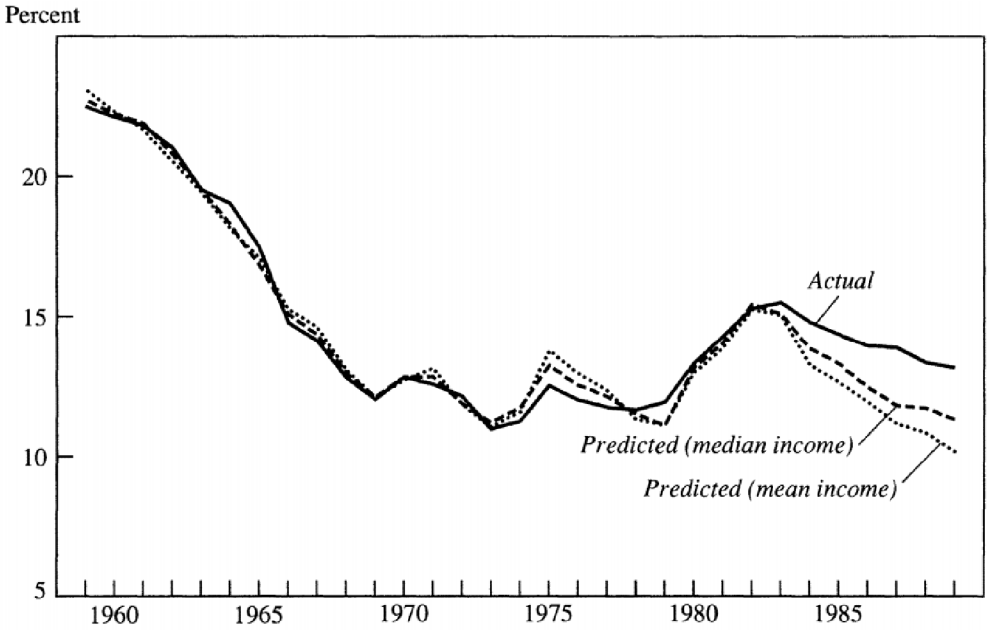


Figure 3.3. Diminishing effects of economic growth (Cutler and Katz, 1991)

Further, Formby et al. (2001, 2004) use headcount and distribution-sensitive poverty measures to show that the growth during the 1980s and the first half of the 1990s did not have the same anti-poverty impact as growth during the 1970s.

These studies confirm the initial idea of Anderson (1964) that the economic growth is not a sufficient tool to reduce poverty in the long periods of time. Johnson et al (2011) suggest that in addition to economic growth, government can use transfers as a necessary supplement to fight the poverty.

In the recent time several published papers suggested the growing strength of the relationship between economic growth and poverty reduction in 1990s. For example, Blank (2000) and Haveman and Schwabish (2000) approved that despite the weak effect of growth on poverty reduction in 1970s and 1980s, the high growth period of the 1990s resulted in a strong poverty reduction.

Freeman (2003) using different methodology comes to similar conclusion that the poverty–growth relationship strengthened during the period of 1993 to 1999.

Most of these results were obtained based on the cash income headcount measures of poverty, while Formby et al. (2001, 2004) use Sen indexes of poverty and find no evidence that poverty was more responsive to growth during the first half of the 1990s compared with the 1980s.

3.2.2. Income inequality and poverty

There is a strand of research which establishes the poverty-growth relationship in the opposite direction. Specifically, they base the research in the idea that poverty and income inequality may hinder the economic growth. Income inequality is an uneven distribution of income across the population. When largest portion of income is held by a small fraction of population, then there is a high risk of poverty, because less income is available to the largest potion of population.

Recent studies analysed the relationship between income inequality and economic growth using different country samples and time periods. Though, the results of these studies are different. Zagorski et al (2014) use the cross-section of 28 EU countries in 2003 and found no relationship between inequality measures and overall well-being, financial quality of life, and health. Cingano (2014) analyse the data from OECD countries over 30-years period and report the significant negative impact of income inequality on subsequent growth. This paper claims that the gap between low income households and the rest of the population is the most important factor influencing the economic growth, while the gap between high income households does not matter for growth.

Inyong (2012) concludes that both signs (positive and negative) are possible. If initially inequality is higher, it delays the economic growth, but on the higher levels of economic development inequality accelerates growth. Binatli (2012) reports negative effect on inequality in 1970s and positive effect in 1990s.

Of course, income inequality is not the only factor affecting economic growth. That is why authors make their analysis taking into account other important factors, including additional foreign direct investment and export indicators (Halmos, 2011), or financial development (Jauch and Watzka, 2016).

Thus, income inequality and poverty have two-way relationship both direct and indirect through economic growth. Economic growth may reduce poverty through increase in income, through more concentrated income distribution or through changes in government policies (Laurinavičius and Galinienė, 2013).

3.2.3. Financial development and poverty

Another important factor of both economic growth and poverty reduction is the country's financial development. "When financial market and institutions works well, they

provide opportunities for all market participants to take advantage of effective investments by using funds to more productive avenues, hence boosting economic growth. It may be expected that this effort would reduce income inequality and poverty" (Sehravat and Giri, 2018).

The role of financial market development in economic growth promotion and poverty reduction was examined in recent studies extensively.

Banerjee and Newman (1993) and Galor and Zeira (1993) claim that financial market imperfections can create barriers for households and entrepreneurs to borrow funds for profitable investments. Only rich firms and households can pass those barriers which widens the gap between poor and rich affecting the income inequality.

Based on the sample of 26 countries Jalilian and Kirkpatrick (2002) analysed the relationship between financial development and poverty. They estimated that a 1 percent change in financial development measure increases income growth of poor households in developing countries by almost 0.4 percent.

Beck et al. (2004) base their research on data from 52 developing and developed countries over the period 1960–1999. They find that in countries with better financial development income growth of the poorest 20 percent is higher than the average GDP growth in those countries.

Jeanneney and Kpodar (2011) use a sample of developing countries for the period 1966 to 2000 and argue that the direct effect of financial development on poverty reduction is stronger than the indirect effect through economic growth channel. Poor people get more benefits from better banking transactions, wider savings opportunities but the effect of credit availability is not that beneficial. In addition, financial instability offsets the benefits of financial development through hurting poor part of the population.

3.3. Measures of poverty

The appropriate poverty measure is necessary for different reasons. Government should track if the goal of poverty alleviation is reached, researchers want a suitable indicator to study the determinants of poverty and the effects of poverty on the economic and financial development, international institutions can figure out which countries need an additional help in poverty reduction. Thus, measuring poverty is important for different fields.

Researchers use two types of poverty: relative poverty, when income is lower than average income by a certain percentage, and absolute poverty, when income is below the minimum necessary to ensure a minimum standard of living. In this sense, relative poverty is similar to the concept of income inequality. While income inequality refers to the whole income distribution among the population, relative poverty specifically concentrates on the bottom of income distribution (Soava et al, 2020).

Absolute poverty supposes that the person struggles for the physical existence. This might be the attribute of developing countries primarily. This extreme form of poverty occurs when there is a lack of care and access to essential means and resources.

The relative concept of poverty assumes the socio-economic imbalance between the social groups. There is a comparison between the standard of living of poor people and the average standard of living of society.

Based on the seminal paper by Foster, Joel, and Thorbecke (1984), the poverty incidence, poverty gap, and poverty depth measures have become useful tools in assessing important points at the bottom of the income distribution (Foster–Greer–Thorbecke indices).

The poverty incidence is defined as the proportion of households with income below the poverty line, also referred as head count ratio (HCR). The HCR is a poverty indicator which measures the frequency of households under poverty line (Anjoy et al, 2019).

The World Bank defines poverty headcount ratio as "the percentage of the population living on less than a level" (The World Bank, 2021). In their statistics, the World Bank uses three levels to calculate the poverty headcount ratios: $1.9, $3.2 and $5.5. In order to facilitate the international comparability, the income is measured in constant prices adjusted for the purchasing power parity.

Poverty gap is defined as the average over the total population of the difference between the standard of living of the poor and the poverty line expressed as a ratio of the poverty threshold. The aggregate of poverty gap shows the cost of eliminating poverty by making perfectly targeted transfers to the poor (Fatima, 2015).

The World Bank defines the poverty gap as "the mean shortfall in income or consumption from the poverty line (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line. This measure reflects the depth of poverty as well as its incidence" (The World Bank, 2021).

Poverty depth index combines measures of poverty and income inequality and serves as a popular choice within development economics.

A popular measure of income inequality, related to poverty, is the Gini coefficient which determines the extent to which the distribution of income among individuals (households) in a country's economy deviates from a perfectly equal distribution.

The Gini coefficient is calculated as twice the area between the equality line and the Lorenz curve in the unit box (Mirzaei et al, 2017).

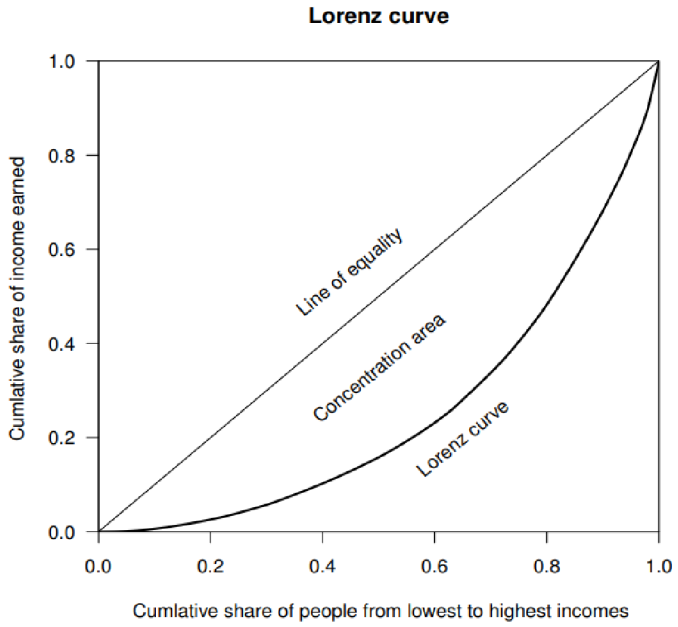


Figure 3.4. The illustration of Gini coefficient calculation

Figure 3.4 shows the graph of cumulative share of people from lowest to highest income against the cumulative share of income. The straight line represents the situation when the income is distributed equally among all people in the country. If some part of people has higher income than the other part, this line bends down and becomes convex. This is a Lorenz curve. With the increase in inequality, the Lorenz curve becomes more convex and the area between the straight line and the Lorenz curve enlarges. At the extremum this area becomes a triangle with the area of 1/2. For the sake of normalization, the area is multiplied by two.

The Gini coefficient varies from one country to another and, for the same country, over time. The higher its value, the disposable income of the population is distributed more unequally (OECD, 2014).

Besides the financial definition of poverty, there are also other concepts. For example, social exclusion can also highlight poverty from a specific point. The holistic approach

suggest that a person does not care about financial resources only, but also needs some skills, perceptions, preferences and these must be considered when defining poverty (Nussbaum, 2011). This approach is based on an idea that the good life quality includes necessary aspects without which life would no longer be considered normal for a human.

Quality of life can be broadly defined with the following list of indicators:

1. Life: being able to live a human life of normal length; no premature death, or such restrictions that it is no longer worth living.

2. Physical health: maintaining a good health, including reproductive health; to be adequately fed and has adequate accommodation.

3. Physical integrity: being free from violence, sexual assaults and domestic violence.

4. Senses, imagination, thought: being able to use the senses, to imagine, to think and to argue - and all this on "real human" way, i.e. shaped and cultivated by an adequate education, literacy and basic knowledge of mathematics and science.

5. Emotions: being able to love those who love you and who care about you; being able to be saddened in their absence; being able to experience righteous anger;

6. Practical reason: to be able to form an idea of the good and to think critically about one's own life planning (this includes freedom of conscience and freedom of worship);

7. Affiliation: being able to live with and for others, engaging in multiple forms of social interactions; put yourself in someone else's position to empathize (to protect this ability means to protect institutions who create and nurture such forms of belonging, to protect freedom of assembly and freedom of political speech

8. Other species: being able to respect animals, plants and nature;

9. Play: to be able to laugh, play and enjoy leisure activities.

10. Control over one's environment: being able to participate in political decision-making processes that determine one's own life; having the right to participate in politics, the protection of free speech and to enjoy freedom of assembly (Nussbaum, 2011).

The debate on poverty in Europe repeatedly points the concept of social exclusion (Bak and Larsen, 2014; Boon and Farnsworth, 2011; Madanipour and Weck, 2015). This is usually understood as a concept that reflects a lack of economic, social, cultural and/or political opportunities for participation. Some population groups are affected by the social exclusion (European Commission, 2010).

Piachaud (1987) emphasizes that setting a minimum standard of living is based on lack of objectivity and will always remain vulnerable. The author explains this in a fact that a

poverty line is not sufficiently documented. Because of the plurality of lifestyles, it is very unlikely to set a clear threshold value between the poor and the rest of society (Piachaud, 1987).

Piachaud (1987) also emphasizes the importance of more versatile definitions of poverty. There is a need to identify social and personal spheres of action, of which the poor are often excluded. Social exclusion and income poverty do not necessarily have to go hand in hand (e.g. students), but there is a strong connection, according to which people with a high income also have greater opportunities for social participation (Piachaud, 1987).

Employment gives something beyond having an income: employed people are involved in the social acceptance and societal integration, while unemployment weakens the social relationships and networks and leads to the social exclusion.

3.5. Government policy and poverty alleviation

Anderson (1961) argued that the developed countries must employ government policy in order to further reduce poverty, because the economic growth itself has a diminishing effect. In this section we will study the evidence on the government policy toward poverty alleviation.

The empirical studies have contradictory results regarding the relationship between poverty and government spending. Mosley, Hudson and Verschoor (2004) report a negative effect of "pro-poor" government spending on the poverty headcount, which suggests that the government spending reduces poverty. Moreover, Kwon and Kim (2014) found that health expenditures of government are able to facilitate poverty alleviation.

On the other hand, there is an evidence from Kraay (2006) that the government expenditures on consumption positively related to the poverty headcount, meaning that poverty increases with the government expenditures on consumption.

This suggests that the relationship between poverty and government spending is not straightforward and depends on different factors. As suggested by the evidence, the nature of government spending affects this relationship. Government can spend money on transfers and subsidies, which reduces poverty directly by the increasing income of poor.

The existing literature has a debate over the effectiveness of the effectiveness of transfers. One point of view, called "institutionalist view" (Yip, Peng, and Wong, 2020) claims that transfers are able to reduce poverty and help people out of the disadvantaged groups (Esser, 2009). The evidence from Honk Kong (Yip et al, 2020) proves that

government transfers motivate people to join the labor force and earn enough to leave the group of poor.

Additional evidence that government transfers are able to reduce poverty is based on the facts that transfers lead to better nutrition, health and education, which increases the quality of human capital and allows people to earn more money from their labor (Anderson et al, 2018).

Another group of researchers, called "welfare skeptical" think that transfers are not helpful in poverty reduction (Heinemann, 2008). The criticism is mainly based on the idea that transfers make the poor less motivated to work and they form a "dependency culture" (Lindbeck and Nyberg, 2006) and in the long run transfers preserve poverty on the same level.

Besides the direct transfers, government can spend on health, education, road, water sanitation and other services. Theory suggests that these expenditures can reduce poverty through a positive effect on households' productivity (McKay 2004). This type of government expenditures is considered as very important in poverty reduction because of its "pro-poor" nature (Mosley et al, 2004).

A strong concern of among the researchers is about the targeting of the government transfers and infrastructure expenditures. For example, the evidence from Indonesia shows that almost 80% of gasoline subsidies targeted for poor people, end up in the top half of the income distribution (Rhee at al, 2014). Same problem emerges with the subsidies on health and education, which instead of the poor go to the middle-class (Davoodi, Tiongson, and Asawanuchit, 2010). So, even if in theory, government transfers are able to reduce poverty, in practice the real effect can vary depending on the inefficiencies of the redistribution.

The things become even more complicated, when it comes to the source of funding of the government expenditures. McKay (2004) claims that the direct income taxes reduction have almost no impact on poverty, because poor usually either do not have a taxable income or they are subject to tax exempts. Indirect taxes, including VAT, can make a problem of poverty even worse, as suggested by (Goni, Lopez, and Serven, 2011). Printing additional money can also have an adverse effect on poverty due to the inflation. (Easterly and Fischer, 2001).

Anderson et al (2018) suggest that the impact of government spending can differ depending in the time period of the analysis, because direct transfer can have an immediate

effect, while spending on health and education would have an impact on poverty in the middle to long run.

Thus, in undertaking specific policies towards poverty alleviation, governments should carefully consider their potential effects and efficiency, because not every policy is able to facilitate the reduction of poverty and, in contrast sometimes can lead to the adverse effects.

4. Analysis of poverty and economic development

4.1. The dynamics of poverty indicators in the World

4.1.1. Data sources and descriptive statistics

The data on poverty and economic development indicators are obtained from the World Development Indicators database and includes the following indicators:

–Number of poor at $1.90 ($3.20, $5.50) a day (2011 PPP). This is the number of people (in millions), who live on less than $1.90 ($3.20, $5.50) a day.

–Poverty headcount ratio at $1.90 ($3.20, $5.50) a day (2011 PPP). This indicator measures the percentage of population living on less than $1.90 ($3.20, $5.50) a day at 2011 international prices.

–Poverty gap at $1.90 ($3.20, $5.50) a day (2011 PPP). This indicator measures the mean shortfall in income or consumption from the poverty line $1.90 ($3.20, $5.50) a day counted as a percentage of the poverty line. Practically, this measures the depth of poverty, how far people are from the poverty line.

In order to facilitate the international comparison, all poverty indicators are taken at their 2011 PPP values,

As the measure of economic development, we use GDP per capita based on purchasing power parity converted into constant 2017 international dollars.

The dataset covers the period over 1990-2018 years and includes the available data on all countries around the world.

Table 4.1. Descriptive statistics for the number of poor at $1.9 a day, in millions

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	138	36.96	112.25	0	752.3
Europe & Central Asia	725	0.29	1.18	0	15.7
Latin America & Caribbean	373	2.38	4.74	0	32.1
Middle East & North Africa	79	0.73	1.21	0	4.9
North America	19	1.22	1.3	0.1	3.2
South Asia	38	56.2	121.85	0	450.4
Sub-Saharan Africa	179	9.59	14.29	0	89.4
World	1551	1409.01	424.93	689.1	1936.5

Source: WDI database, own calculations

The data are highly unbalanced and has many missed observations. The data for at most 84 countries are available for every year, which makes it problematic to make a

disaggregated analysis. Thus, all countries are aggregated into the geographic regions and the descriptive statistics for each indicator are displayed and analysed below.

The largest number of observations is available for the Europe and Central Asia region: 725 country-year observations in the dataset. The least number of observations is given for the North America and South Asia: 19 and 38 respectively.

The largest average number of poor people has South Asia: 56.2 million people, while the lowest is in Europe and Central Asia: 0.29 million people. Also, the maximum number of poor people, who live on less than $1.9 is in East Asia and Pacific: 752.3 million poor people were in China, 1990. South Asia follows with 450.4 million people were India, 2004. The maximum number of poor people in the World over 1990-2019 accounted for almost 2 billion people in 1990-1992 and then started to decrease.

As for the variability between countries, the most diverse region is South Asia with the standard deviation of 121.85 million people, the next is East Asia and Pacific. Such large variability may be attributed to the presence of two countries with the largest population in the world: India and China respectively.

The ranking of countries by the average number of poor over the period 2010-2020 for the top-20 countries is displayed on the figure 4.1.

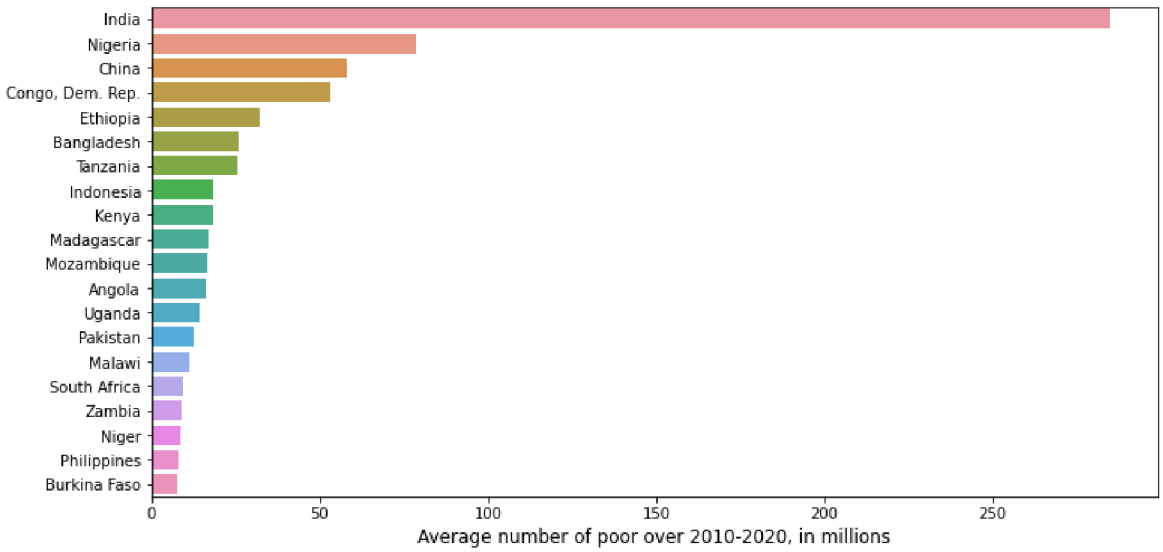


Figure 4.1. Average number of poor over 2010-2020, in millions

Largest number of poor lives in India, more than 250 million on average. Next with the huge gap goes Nigeria with less than 100 million poor on average. China, the most populated country in the world, has slightly more than 50 million poor on average. Most of

the other countries are located in Africa and (Congo, Ethiopua, Tanzania and other) and in Asia (Bangladesh, Indonesia, Pakistan and other). Among the top countries by the number of poor there are no European or American countries, which considered as the most economically developed.

The number of poor people is not a good indicator to compare countries because it is not related to the population of those countries. It is clear that the population in Asia is much larger than the population of Europe. Thus, the poverty headcount ratio is more appropriate to compare geographic regions.

Table 4.2. Descriptive statistics for the poverty headcount ratio at $1.9 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	11.71	15.99	0	66.3
Europe & Central Asia	769	2.09	6.21	0	61.6
Latin America & Caribbean	386	8.49	7.63	0.1	45
Middle East & North Africa	85	2.89	4.86	0	22.3
North America	42	0.65	0.35	0.2	1.2
South Asia	39	18.98	17.36	0	66
Sub-Saharan Africa	182	46.87	22.56	0.2	94.3
World	1648	22.95	8.89	9.3	36.2

Source: WDI database, own calculations

As for the poverty headcount ratio, the largest average ratio is for Sub-Saharan Africa, where 46.87% of population live in less than $1.9 a day. The maximum poverty ratio of 94.3% is also in this region and possessed by the Democratic Republic of Congo in 2004.

The country with the largest poverty headcount ratio in the East and Pacific region is China in 1990 with 66.3% of the population living on less than $1.9. In Europe and Central Asia, the leading country by this indicator is Uzbekistan in 2003 with 61.6%.

Largest variability is also in Sub-Saharan Africa with the standard deviation of 22.56% followed by South Asia (17.36%) and East Asia and Pacific (15.99%). Relatively low variability is in North America, Europe and the Middle East.

Figure 4.2 shows the top-10 and bottom-10 countries by the average value of poverty headcount ratio at $1.9 a day.

Most of the countries with the lowest average poverty headcount ratio are from Europe, except for United Arab Emirates and Lebanon where zero poverty headcount is reported. The largest average value of poverty headcount ratio has Democratic Republic of Congo

with more than 80% people living at $1.9 a day or less. Other countries from the bottom 10 list are least developed Sub-Saharan countries.

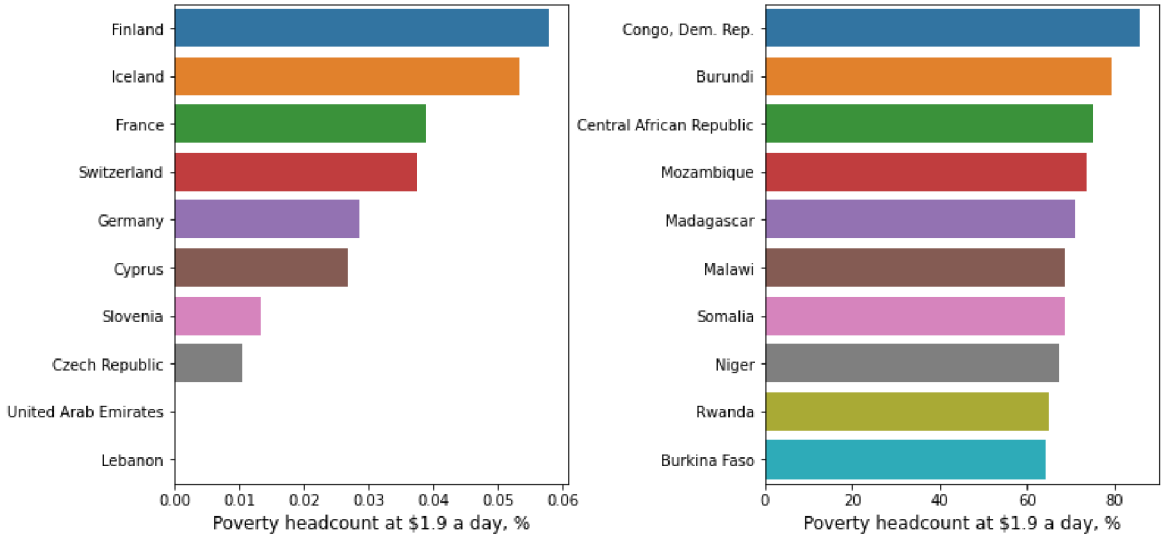


Figure 4.2. Top and bottom countries by average poverty headcount ratio, %

The "depth" of poverty measured by the indicator of poverty gap. The descriptive statistics of this indicator are displayed in table 4.3. The largest poverty gap is in Sub-Saharan Africa and on average it accounts for 19.8% of the poverty level of $1.9. The country with the largest poverty gap is also Democratic Republic of Congo in 2004. The average poverty gap for other regions is much lower: 4.59% for South Asia, 3.55% for Latin America and Caribbean, 3.16% for East Asia and Pacific.

Table 4.3. Descriptive statistics for the poverty gap at $1.9 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	3.16	5.1	0	24.1
Europe & Central Asia	769	0.71	2.05	0	22.8
Latin America & Caribbean	386	3.55	3.68	0	21.2
Middle East & North Africa	85	0.72	1.51	0	7.8
North America	42	0.5	0.32	0.1	1
South Asia	39	4.59	5.7	0	23.7
Sub-Saharan Africa	182	19.8	13.33	0	64.1
World	1648	7.51	3.31	2.9	12.9

Source: WDI database, own calculations

The distribution of countries according to the poverty gap at $1.9 looks similar to the one of poverty headcount ratio. The countries with the smallest average poverty gap are high-income European countries and UAE with Lebanon (see the left panel of a figure 4.3).

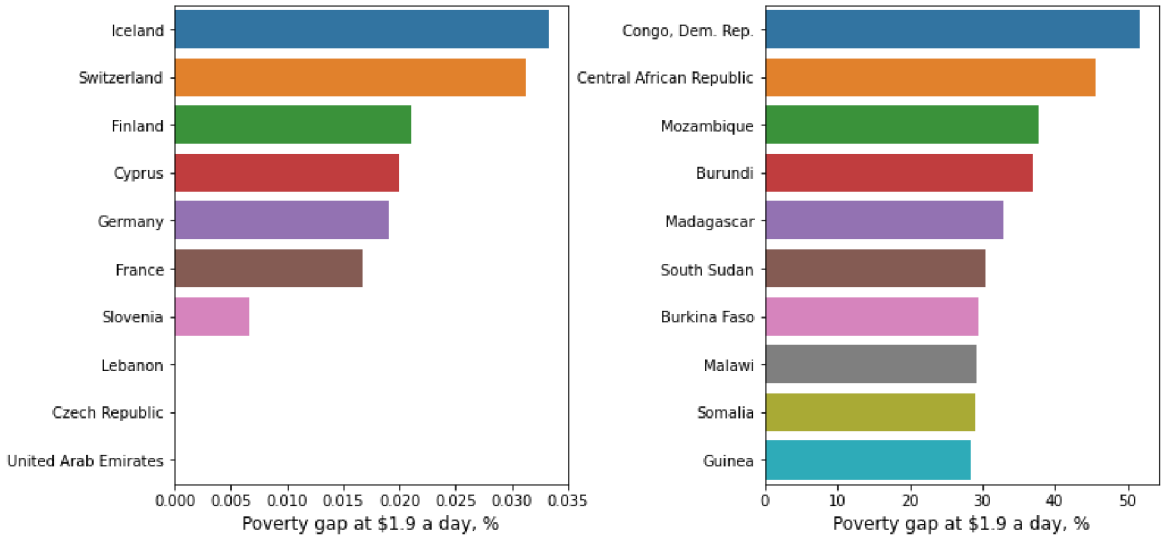


Figure 4.3. Top and bottom countries by average poverty gap, %

On the right panel of figure 4.3 the bottom 10 countries by poverty gap are displayed. The largest average poverty gap, almost 50%, has Democratic Republic of Congo. Mostly this list matches the list of bottom-10 by poverty headcount ratio.

Considering the descriptive statistics, the relatively poor region of the world is Sub-Saharan Africa, while the lowest poverty is in North America, and Europe and Central Asia.

As for the poverty ratio, the largest variability of poverty gap is in Sub-Saharan Africa (13.33%). All other regions possess relatively low variability of this indicator: from 0.32% in the North America to 4.56% in the South Asia. The variability in the poverty gap may suggest the deep inequality even among the poor.

Additional tables with the descriptive statistics for the poverty indicators at $3.2 and $5.5 are given in the appendix to the thesis. Overall comparison of the regions by those indicators is similar to what is shown in this paragraph.

Since the poverty changes over time, we move to the analysis of the dynamics of the poverty indicators.

4.1.2. The dynamics of the world poverty indicators

We start the analysis with the dynamics of the world GDP per capita over 1990-2018. As figure 4.4 suggests, there is a steady growth of the world GDP per capita over the analyzed period with a short break in 2008-2009 due to the Global Financial Crisis.

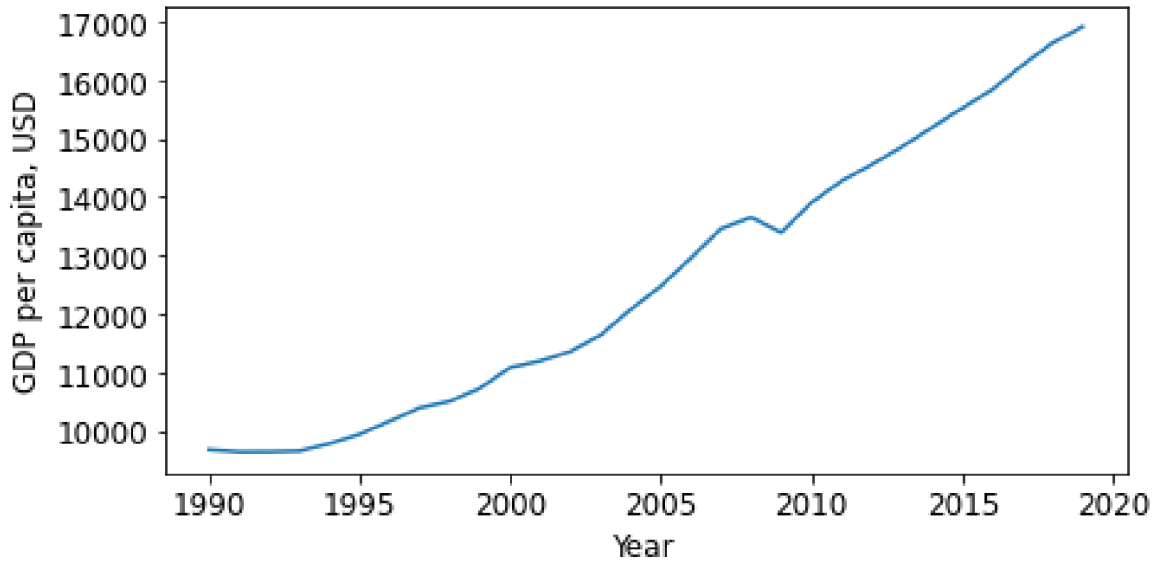


Figure 4.4. The world GDP per capita in 2017 PPP USD

To visualize the diversity of the world regions, on figure 4.5. the dynamics of average GDP per capita for each geographic region is displayed.

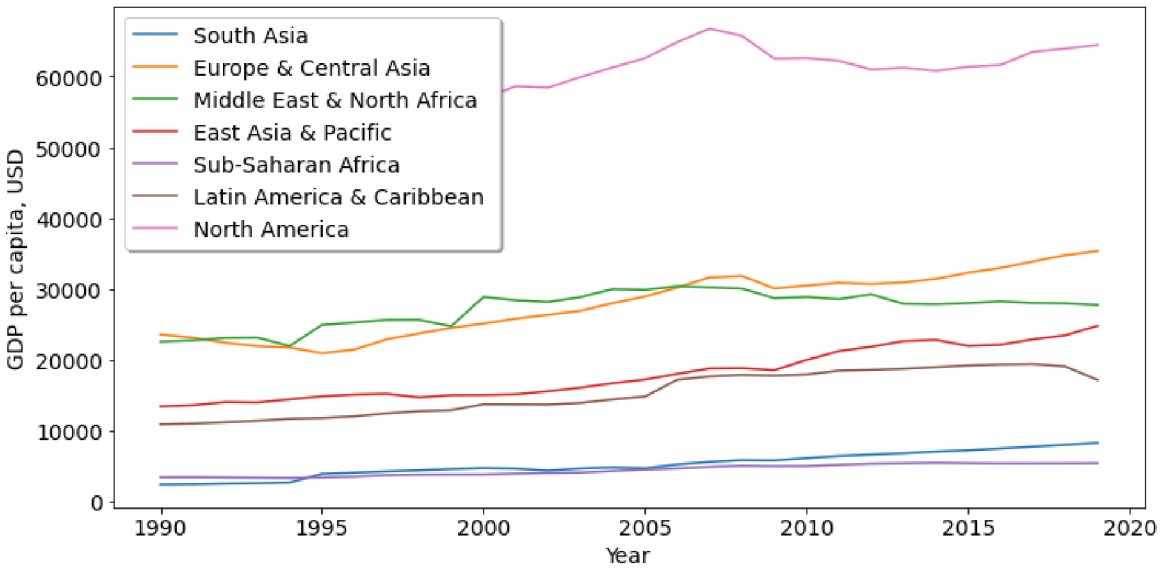


Figure 4.5. GDP per capita for the geographic regions

The most prosperous region by GDP per capita if the North America, where on average this indicator reaches the level above 60000 USD. Middle East and Europe compete for the second place on average accounting for around 25000-30000 USD. While the Middle East stagnates since 2008, GDP per capita in Europe slightly increases. The poorest regions in the world in terms of GDP per capita are South Asia and Sub-Saharan Africa, where GDP per capita do not reach 10000 USD on average.

Next, we move to the dynamics of poverty indicators. Figure 4.6 displays the number of poor at $1.9 a day over the analysed period.

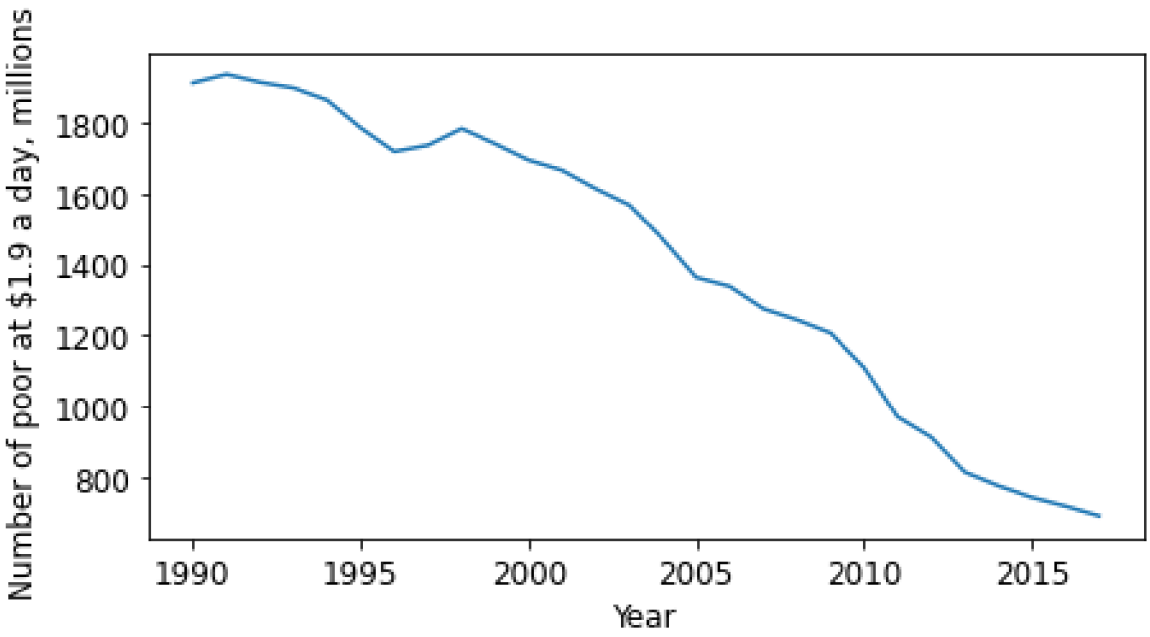


Figure 4.6. Number of poor at $1.9 a day for the world, in millions

The number of poor decreased significantly, falling from almost 2 billion people in 1990 to less than 800 million in 2017. Short jump occurred in 1998 with the Asian financial crisis, and then the decline has continued.

Due to the fact that the data on poverty is not collected by the Worldbank on the annual basis, it is problematic to aggregate the data on the number of poor by the geographic regions. We applied the linear interpolation to fill the missing data, which is simply the calculation of the linear average between two observed point. Although, this method is not strong enough to provide the correct data, it lets us to analyse the dynamics of this indicator across the geographic regions. This is displayed on figure 4.7.

A major comment needs to be clarified before we start the analysis of the graph. Due to the automatic procedure of the extrapolation the sharp increase in the number of poor for the Latin America and Caribbean occurred and we need to discard it as not reliable. In reality, the number of poor for this region declined.

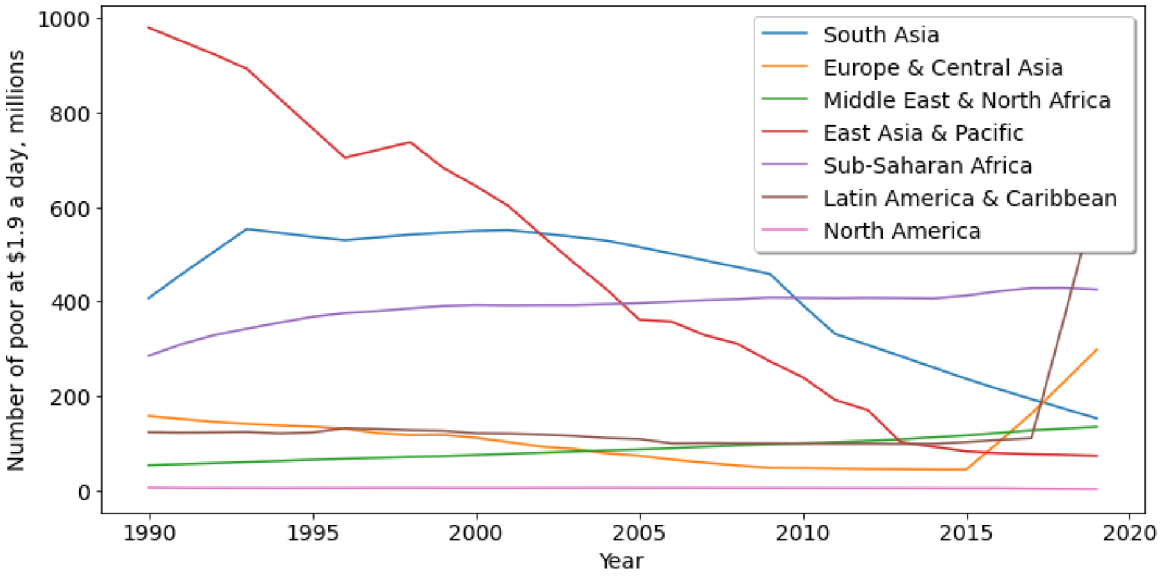


Figure 4.7. Number of poor at $1.9 a day for the geographic regions, in millions

Now, we see that the major improvement in the poverty alleviation occurred in the East Asia & Pacific region. More specifically, these dynamics are due to China, which reduced the number of poor from 752.3 million in 1990 to 7.2 million in 2016. This, of course, contributed to the decrease in overall world poverty and in poverty in the region.

The region of South Asia also demonstrates significant reduction in the number of poor mainly due to India and Bangladesh.

For Sub-Saharan Africa the situation is such that the indicator is available for a small number of periods, for the most of the countries only 2-3 years, and the growth is the number of poor is mainly attributed to the interpolation of the previous dynamics. But based on the available data it seems very likely that the number of poor in Sub-Saharan Africa increases.

Other geographic regions demonstrate almost constant number of poor over time.

In the appendix there are two additional plots (Figure A.1) for the number of poor at $3.2 and $5.5 a day. Both of them have an inverse U-shape, which suggests the transition of poor from the bottom group to the higher ones. The interesting fact that in 2000 the number of poor at $5.5 a day reached more than 4 billion people, or more that the half of the world

population. So, as the most severe poverty reduces, the less dramatic poverty still exists and must be addressed.

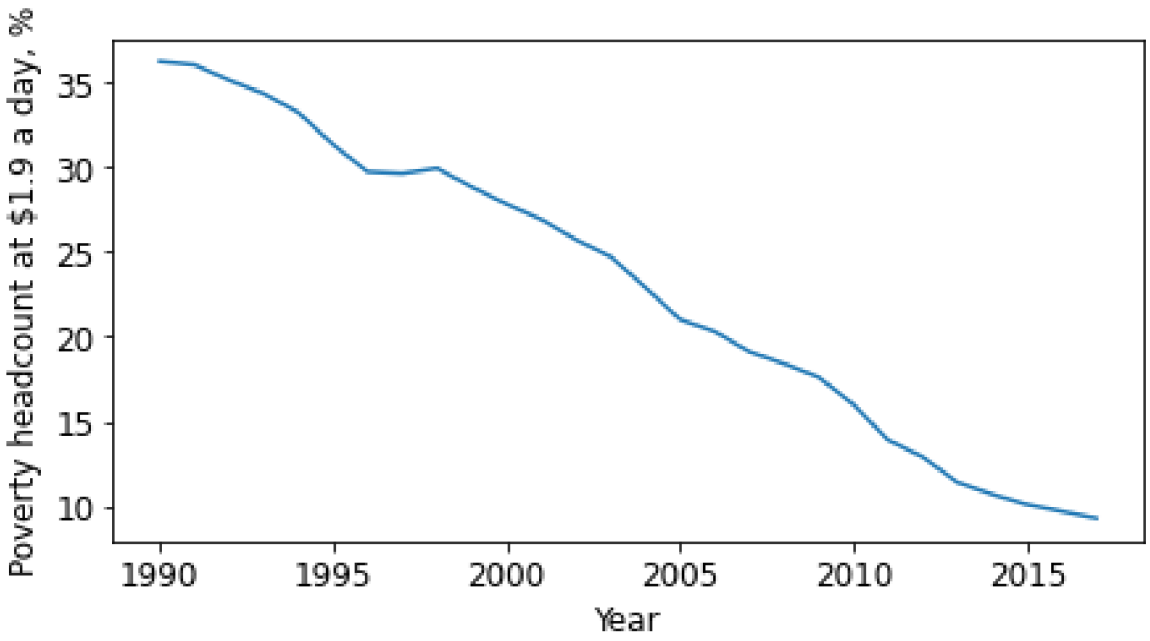


Figure 4.8. Poverty headcount ratio at $1.9 a day for the world, in %

As it was stated before, the number of poor is an important indicator, but it does not allow the international comparison because it is not related to the population of countries and regions. Thus, on figure 4.8 we plot the dynamics of the average headcount ration for the world.

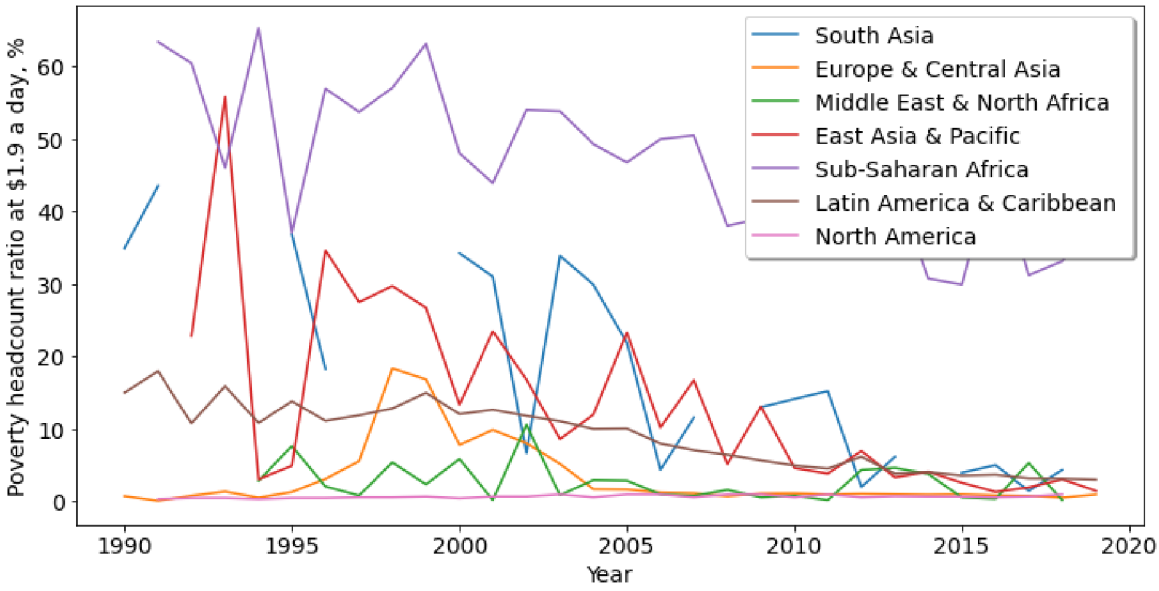


Figure 4.9. Poverty headcount ratio at $1.9 a day for the geographic regions, in %

As for the number of poor, the indicators of poverty headcount at other levels: $3.2 and $5.5 on the Appendix (Figure A.2) demonstrate an inverted U-shape, especially the last one. Again, this is explained by the structural shift in the poverty from the lowest level to the higher ones.

Relative to the world population, the number of poor reduced significantly, from more than 35% on 1990 to less than 10% in 2017. This is a significant improvement and potentially can be attributed to the economic development.

Figure 4.9 shows the average poverty headcount ratio for the geographic regions. Due to the missing values, the graphs are not smooth and demonstrate frequent jumps and falls, but in general we can capture the ranking of different regions. The largest poverty headcount ration with the tendency to decline is in Sub-Saharan Africa (as opposed to the number of poor. Next go South Asia and East Asia& Pacific. For the other regions the poverty ratio does not exceed 20% in 1990 and reduces to less than 5% in 2017.

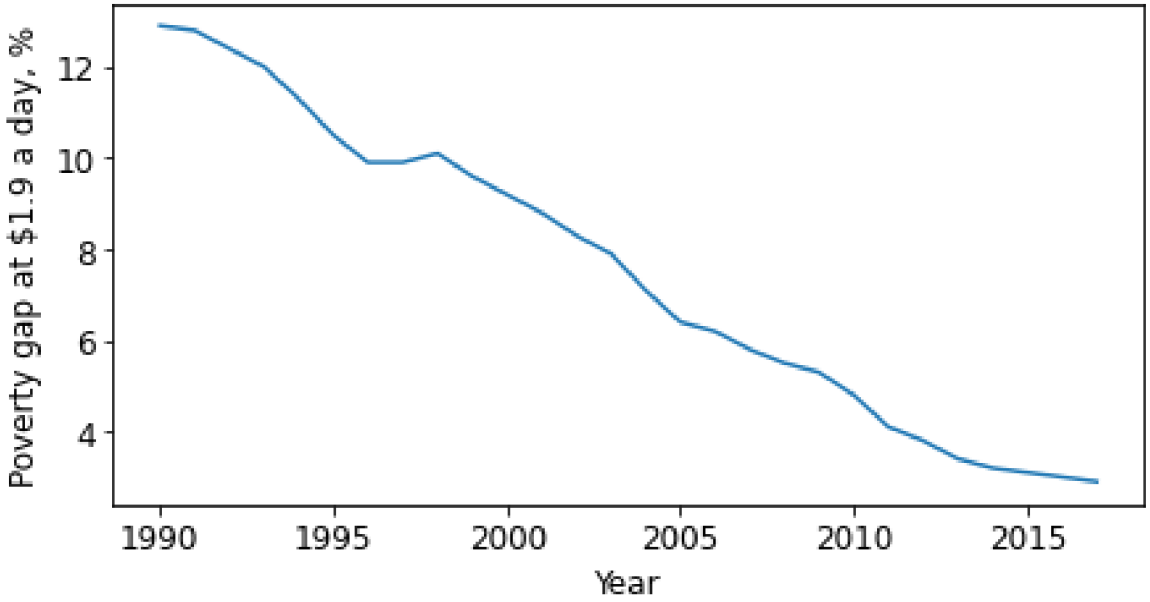
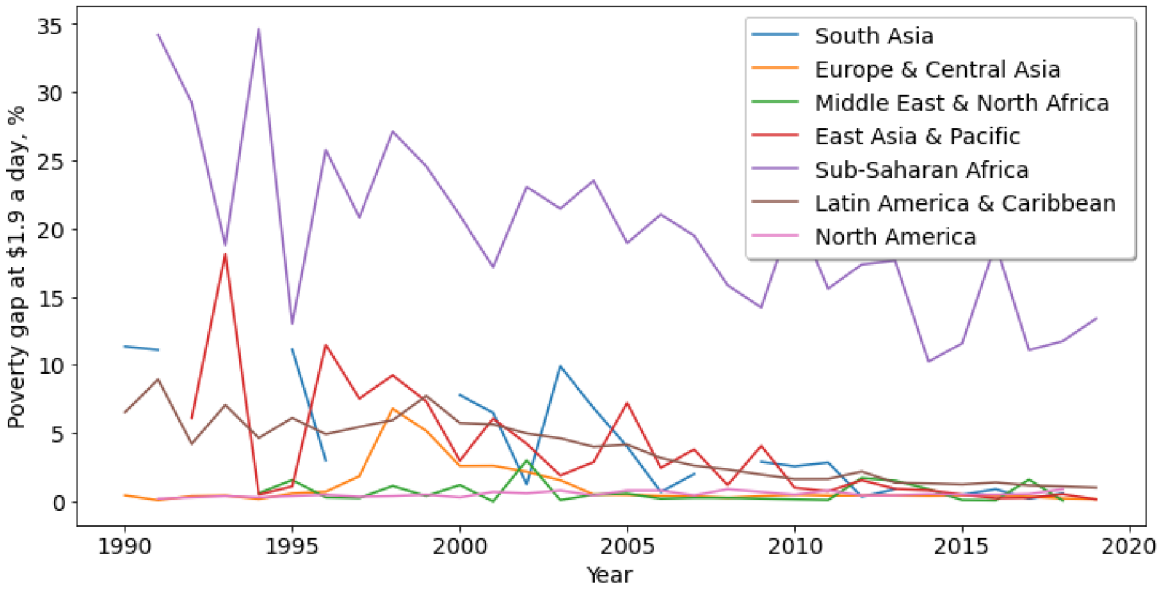


Figure 4.10. Poverty gap at $1.9 a day for the world, in %

Finally, we analyse the dynamics of the poverty gap which measures the average distance of people's income below the level of poverty ($1.9 a day). As figure 4.10 demonstrates, the poverty gap at $1.9 reduces over the analysed period by more than 6 times. At the beginning of the period, it exceeded 12%, while at the end of the period it is almost 2%. Which suggests that the distribution of income of the poor narrowed down and became concentrated at the boundary of $1.9. Regarding the other two levels – $3.2 and $5.5 we also see the strong reduction by 3 times and 2 times respectively.



4.11. Poverty gap at $1.9 a day for the geographic regions, in %

Because of the missing data, the graph of the regional distribution of poverty gap at $1.9 is not as smooth and gives only approximate sense of ranking between the geographic regions (figure 4.11). This mostly repeats the previous indicator with the leading Sub-Saharan Africa and all other regions converged to almost 0% by 2017.

The overall finding of this paragraph is that the world GDP per capita over the last 30 years significantly increased, while the main poverty indicators decreased. These dynamics can be related, but also can be influenced by some third factor, out of the scope of this analysis. In order to verify, if there is a statistical relationship between the economic development and poverty alleviation, in the next chapter we make a regression analysis for these indicators.

4.2. The relationship between economic development and poverty

4.2.1. The association between GDP and poverty indicators

We start the analysis of the relationship between economic development and poverty alleviation with the simple regressions of GDP and poverty indicators. In order to do this, for each country we calculate the average values of GDP per capita over the period and each of the poverty measures.

Figure 4.12 shows the scatterplot of log GDP per capita against the poverty headcount ratio at $1.9 with the regression line and the confidence interval.

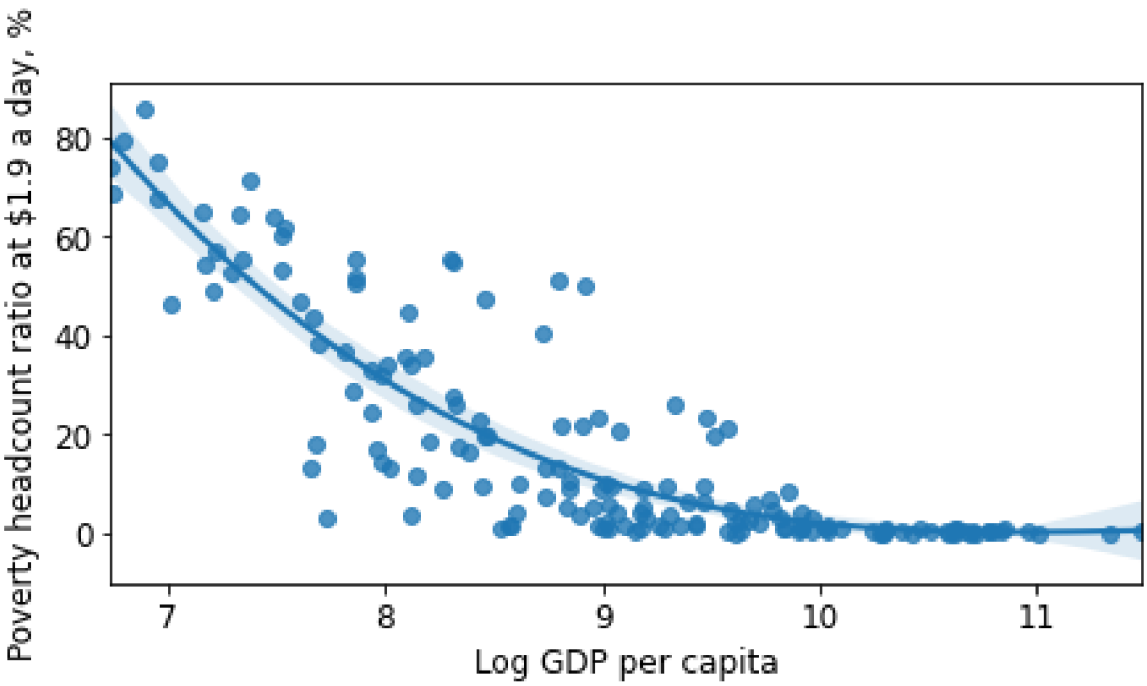


Figure 4.12. GDP per capita and poverty headcount ratio at $1.9, in %

It is apparent that the relationship between GDP per capita and poverty headcount ratio is nonlinear. The left section of the scatterplot suggests that an increase in GDP per capita leads to the strong decrease in poverty ratio. For the countries in the middle range of GDP per capita there is a less strong relationship with the wider variability of observations, and for the rich countries (the right section of the scatterplot) countries have almost zero poverty.

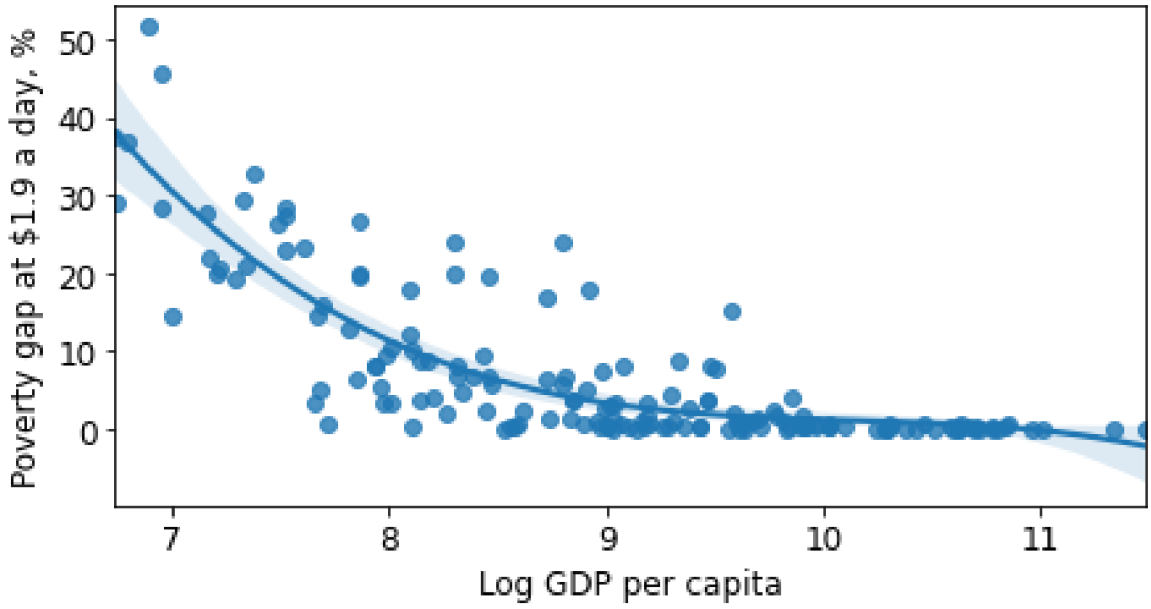


Figure 4.13. GDP per capita and poverty gap at $1.9, in %

Figure A.4 in the appendix demonstrates the similar relationship between log GDP per capita and poverty headcount ratios at $3.2 and $5.5 with the slight difference that even for the middle-income countries the decrease in poverty ratio occurs fast.

Similar relationship between GDP per capita and poverty gap is demonstrated on the figure 4.13. As for the poverty headcount ratio, for the poor countries the increase in GDP leads to the fast decrease in poverty gap, while for the middle-income countries this effect is weaker and for the rich countries poverty gap is almost zero and, therefore, the effect is also zero.

Figure A.5 demonstrates steady decrease in poverty gap for the low and middle-income countries.

Based on the comparison between three levels of poverty: $1.9, $3.2 and $5.5 we see the main difference for the middle-income countries. While the severe poverty (under $1.9 a day) is not very much relevant for them, the other two levels exist and GDP growth is strongly associated with the decrease in the poverty measures. For the rich countries the problem of poverty is almost not essential, and for the poor countries the increase in GDP per capita is associated with the strong reduction in poverty.

4.2.2. The regressions of poverty indicators on GDP

In order to estimate the relationship between GDP per capita and poverty measures numerically, we construct the following equations:

$$Pov_i = \beta_0 + \beta_1 \log(GDP_i) + \beta_2 [\log(GDP_i)]^2 + u_i \quad (4.1)$$

$$Pov_i = \beta_0 + \beta_1 \log(GDP_i) + \beta_2 [\log(GDP_i)]^2 + \beta_3 [\log(GDP_i)]^3 + u_i \quad (4.2)$$

Where Pov_i is the average of one of the poverty indicators used in the analysis for country i and $\log(GDP_i)$ is the log of average GDP per capita for country i. The polynomial specification is used to capture the nonlinear nature of the relationship shown on the scatterplots.

In table 4.4 the regression result only for the most significant specifications are reported. As we see, R^2 for all dependent variables are greater than 70%, which means that

log GDP per capita describe more than 70% of the variation in poverty headcount ratio at each level.

Table 4.4. Regression results for the poverty headcount ratio

	Dependent variable:		
	Poverty headcount at 1.9	Poverty headcount at 3.2	Poverty headcount at 5.5
logGDP	-117.295***	-102.461***	268.076***
	(11.292)	(14.173)	(59.752)
logGDP2	5.646***	4.401***	-20.814***
	(0.627)	(0.786)	(4.173)
logGDP3			0.0002***
			(0.00004)
Constant	609.060***	591.225***	-784.895***
	(50.329)	(63.169)	(220.685)
Observations	162	162	162
R^2	0.762	0.797	0.863
Adjusted R^2	0.759	0.795	0.861
F Statistic	254.538***	312.426***	332.875***
Breusch-Pagan	16.307***	17.574***	20.858***
Shapiro-Wilk	0.91701	0.95541	0.96086
Durbin-Watson	2.4526	2.4212	2.3188

Source: own calculations

Moreover, each coefficient individually is significant at 1% level and the model as a whole is also significant (based on F-statistic).

To understand the interpretation of the coefficient we need to take a derivative of $\widehat{Pov_i}$ with respect to GDP_i:

$$\frac{d\widehat{Pov_i}}{dGDP_i} = \frac{\widehat{\beta_1}}{GDP_i} + \frac{2\widehat{\beta_2}}{GDP_i}\log(GDP_i) + \frac{3\widehat{\beta_3}}{GDP_i}[\log(GDP_i)]^2$$

$$\frac{d\widehat{Pov_i}}{dGDP_i} = \frac{1}{GDP_i}\left(\widehat{\beta_1} + 2\widehat{\beta_2}\log(GDP_i) + 3\widehat{\beta_3}[\log(GDP_i)]^2\right) \quad (4.3)$$

For the indicator "Poverty headcount at $1.9" the effect of GDP is estimated as:

$$\frac{d\widehat{Pov_i}}{dGDP_i} = \frac{1}{GDP_i}(-117.295 + 2 \times 5.656 \log(GDP_i))$$

So, the effect depends on the level of GDP of the country. For example, for Mozambique the average GDP per capita is 841.22 USD (the smallest among the sample), and the effect of GDP on poverty is:

$$\frac{d\widehat{Pov}_{Mozambique}}{dGDP_{Mozambique}} = \frac{1}{841.22}(-117.295 + 2 \times 5.656 \log(841.22)) = -0.049$$

which means that the increase in GDP per capita by 100 USD will decrease poverty headcount ratio by 4.9%.

For Chile, which has approximately the average GDP per capita of the sample, 18396.23 USD, the effect is:

$$\frac{d\widehat{Pov}_{Chile}}{dGDP_{Chile}} = \frac{1}{18396.23}(-117.295 + 2 \times 5.656 \log(18396.23)) = -0.00035$$

and the increase in GDP per capita by 100 USD leads to the decrease in poverty headcount ratio by 0.035%. This illustrates the nonlinear effect of GDP per capita on poverty.

As can be seen from the equation (4.3) the effect of GDP on poverty decreases with GDP, because GDP is in the denominator, and, thus, $\frac{1}{GDP_i}$ approaches zero.

The regression diagnostic tests in the last three lines of table 4.4 suggest that the presence on heteroskedasticity (Breusch-Pagan test), normality of the residuals (Shapiro-Wilk test) and no autocorrelation of residuals (Durbin-Watson test).

The problem of heteroskedasticity is solved with the help of heteroskedasticity-robust standard errors reported in brackets under each coefficient estimate. Since we do not know the exact shape of heteroskedasticity, we cannot use weighted OLS method to obtain the estimates.

Next we move to the poverty gap indicator and its relationship with the GDP per capita.

Table 4.5. displays the regression results for the dependent variable “Poverty gap” at different levels. Similarly to the poverty headcount ratio, GDP per capita has a diminishing

marginal effect on poverty gap with the strong effect for the relatively poor countries and small effect for the relatively rich countries.

Table 4.5. Regression results for the poverty gap

	Dependent variable:		
	Poverty gap at 1.9	Poverty gap at 3.2	Poverty gap at 5.5
logGDP	-60.103***	-82.209***	-74.793***
	(5.850)	(8.285)	(10.282)
logGDP2	2.974***	3.900***	3.156***
	(0.325)	(0.460)	(0.571)
Constant	303.420***	433.317***	438.377***
	(26.076)	(36.930)	(45.826)
Observations	162	162	162
R^2	0.697	0.772	0.816
Adjusted R^2	0.693	0.769	0.814
F Statistic	183.018***	268.690***	352.595***
Breusch-Pagan	26.057***	16.272***	15.766***
Shapiro-Wilk	0.91376	0.91584	0.95343
Durbin-Watson	2.392	2.4488	2.4332

Source: own calculations

As the estimation suggest, the effect of GDP per capita on poverty gap at $1.9 if estimated as:

$$\frac{d\widehat{Pov_i}}{dGDP_i} = \frac{1}{GDP_i}(-60.103 + 2 \times 2.974 \log(GDP_i))$$

Taking again Mozambique and Chile to compare the marginal effect of GDP on the poverty gap, we can estimate:

$$\frac{d\widehat{Pov}_{Mozambique}}{dGDP_{Mozambique}} = \frac{1}{841.22}(-60.103 + 2 \times 2.974 \log(841.22)) = -0.02383$$

$$\frac{d\widehat{Pov}_{Chile}}{dGDP_{Chile}} = \frac{1}{18396.23}(-60.103 + 2 \times 2.974 \log(18396.23)) = -0.0000921$$

The first result means that the increase in GDP per capita by 100 USD leads on average to 2.383% decrease in the poverty gap at $1.9 for the poor country like Mozambique and to 0.00921% decrease in the poverty gap at $1.9 for the middle-income country like Chile.

As for the poverty headcount ratio, regression diagnostic tests suggest only the presence of heteroskedasticity which is controlled by using the robust standard errors. All other tests suggest the normality of residuals and no autocorrelation.

5. Results and Discussion

5.1. Main findings of the analysis

The preceding analysis can be summarized with the following results:

– The world region with the highest poverty ratio is Sub-Saharan Africa and at the same time this is the least economically developed region.

– The poverty measures tend to decrease with time in absolute and relative measures.

– There is a transition between poverty groups defined by the poverty thresholds of $1.9, $3.2 and $5.5 from the most severe poverty to the less severe one

– GDP per capita has the diminishing effect on poverty ratio and poverty gap, which results in stronger impact of GDP growth for the poor countries and almost no impact of GDP growth for the rich countries.

The cross-section international compression of countries by poverty indicators revealed the differences between the countries based on average values. India, Nigeria and China are the World leaders in terms on the absolute numbers of poor. When talking about poverty headcount ratio, the number of poor relative to the whole population, there are Congo, Burundi and Central African Republic who have the highest value.

The analysis of the poverty development over time (time series analysis) showed that the indicators of a strong poverty reduce over the analyzed period, but also this is followed by a transition from the severe poverty to the moderate poverty groups.

5.2. Discussion

Using the recent data on the world poverty, our results confirm the hypothesis of Anderson (1964) that economic growth is able to combat poverty. The hypothesis of the "Inverse U-shape" relationship of Kuznets (1955) does not correspond to the evidence from the current data. Our results correspond to the idea of the diminishing effect of GDP on poverty suggested by Cutler and Katz (1991), Blank (1991) and Leblanc (2001).

The main concern regarding the relationship between GDP and poverty indicators is a reverse causality. As shown by Breunig and Majeed (2020) high levels of poverty may dampen the economic growth making it a vicious circle: high level of poverty prevents economic growth, which, in turn is not able to reduce poverty.

Through our study, we sought to understand the relationship between the economic development and poverty level. We found that the countries with a poor economic

development are also the countries with the highest level of poverty. Moreover, in the majority of cases, the regions with the weakest or negative indicators are the most poor.

For the case of African countries this could be due to the various constraints, including: the instability of commodity prices, raw materials, natural disasters, drought in some countries which sometimes destroys crops, persistent conflict situations that massively push populations to move, the poor governance by leaders, etc.

Countless sources also show the growth population as a major obstacle to economic development and poverty increase simultaneously. This demographic growth could be transformed into an asset if countries provide the quality education to people. Also, governments could increase the rate of health coverage of mothers and children, rates of entry into primary then secondary schools

African countries have a significant potential for development such through a booming domestic market expansion, mineral and hydrocarbon reserves, strong agricultural potential with many cultivable lands. However, these assets are not fully exploited.

6. Recommendations

Our findings may be used to form policy recommendations for countries based on the level of their economic development. Less developed countries need some sort of government intervention to push the economic growth forward, which subsequently help to reduce poverty. For more developed countries the economic growth has a small effect on the poverty level, which mean that there is a need for complementary efforts of government in the form of income redistribution, as proposed by Anderson (1964).

Government policies to reduce poverty through the economic growth promotion must target higher employment and, consequently, higher income.

A significant improvement in the employment and income situation is not possible without economic growth. However, our analysis showed that only very few developing countries have high and stable growth rates.

Together with the promotion of the economic growth through the support of private sector, governments are required to provide additional investment in school and vocational training as well as in business start-up and knowledge transfer programs.

Poverty alleviation programs in developing countries have to provide an access for all to economic opportunities, promoting sustainable livelihoods and access to basic social services, and special efforts to improve access to opportunities and services for the disadvantaged. People living in poverty and vulnerable groups in society must be empowered to be self-determined through appropriate organization and participation in all aspects of political, economic and social life, particularly in the planning and implementation of policies affecting them, so that they are able to become true development partners.

National strategies to achieve substantial overall poverty alleviation, including measures to remove the structural barriers that make it impossible for people to lift themselves out of poverty, with specific, time-bound commitments to eradicate absolute poverty within a time limit to be set by each country to be defined in its national context.

Policies should ensure that all people have adequate economic and social security in the event of unemployment, sickness, maternity, disability and old age. An important task is to strengthen the family and contribute to its stability

In the developing countries governments should promote sustainable economic growth, in the context of sustainable development, and promote social progress, with growth being broad-based and providing equal opportunity for all.

Developed countries, on the other hand, should increasingly strive to promote sustainable economic growth and redress imbalances in a way that benefits all countries, especially developing countries can draw from it.

Another important measure that can be taken by the governments is to identify the livelihood systems, survival strategies and self-help organizations of people living in poverty and, in cooperation with these organizations, develop poverty reduction programs that build on their efforts, ensure the full participation of those affected and meet their real needs.

For the developed countries, including the EU, other measures could be recommended. Given that the developed countries do not have a problem of absolute poverty, the government policies should aim other goals, including:

- basic social security (legal guarantee of a subsistence level for everyone)
- securing an achieved standard of living through special insurance and pension systems
- securing a minimum of social equality through support measures for disadvantaged groups

The developed countries should aim for political redistribution of primary income in favor of the various groups. The extent depends on the volume of social spending and the form of financing, i.e. taxes or insurance contributions, with taxes having a stronger redistributive effect. This can take different forms. The social democratic model predominates in Scandinavian countries and is characterized by high pension benefits, the state in the form of universalistic measures and direct benefits, The “familistic welfare state” can be found in southern Europe: Italy and Spain, for example. In those countries dominates the low state support with an emphasis on the family. The neoliberal attitude is the basis of the social model in Anglo-Saxon countries.

The main concern about the high redistribution rate in European countries assumes that social redistribution undermines the economy and thus increase unemployment.

On the other hand, the idea that the public welfare system burdens the competitiveness of companies because of its cost-increasing effect cannot be unanimously accepted, because the companies would otherwise have to take care of social security themselves. At least in order to ensure stability in personnel structure and loyalty.

There is agreement in the discussion that the welfare state has weaknesses, which are particularly evident from design flaws and insufficient adjustment social security benefits to the current picture of poverty.

The subsistence assistance, originally tailored to atypical emergencies for a small number of people, has de facto become a long-term basic security benefit in European countries for a significant and growing part of the population.

7. Conclusion

Being one of the most important social-economic problems, poverty exists for a long time, and in every country tries to solve this problem using appropriate tools.

The concept of poverty is divided into a relative and an absolute perspective. The fundamental problem of defining poverty lies in that poverty is a multidimensional concept, which is why it is difficult to decide which aspects need to be included in the definition. The approach, in which poverty is understood as the lack of financial resources, harbors the problem that only the basic necessities such as food, clothing and shelter are included and thus the social context is completely neglected.

Subsistence level makes more sense, which, however, in societies with a very low standard of living can lead to problems.

In order to separate the poor from the non-poor, a certain threshold, called the poverty line, must be set. Depending on the definition of poverty, an absolute, a relative or a subjective poverty line can be estimated.

While the economic development is thought as a main tool of the poverty alleviation, there is no consensus on the strength and the homogeneity of its effect for all countries. In this thesis we tried to estimate the effect of economic growth on poverty indicators controlling for the nonlinearity of this effects.

We found that on average in less developed countries economic growth promotes strong and economically significant poverty reduction. With the increase in GDP per capita, its effect on poverty diminishes and for the middle-income and rich countries poverty is almost irresponsive to the economic growth.

According to these findings, we propose different government policies for less and more developed countries. While the relatively poor countries must seek for some economic growth triggers, which in turn lead to the poverty reduction, the governments of rich countries can implement income redistribution in order to fight poverty.

In the last two decades, indicators of economic development have increased while and poverty reduced. Progress can only be achieved with an economic policy that creates the conditions that facilitate economic growth supported by the private sector. At the same time such policies must involve population groups that have not been sufficiently integrated (socially excluded) in technological and organizational learning processes and to

functionally interweave them with competitive economic sectors that are organized according to the division of labor.

Economic growth creates jobs unless growth rates are so low that they are overcompensated by productivity gains. Growth also benefits the poor, whose incomes usually increase parallel with the rates of economic growth. Under the conditions of increasingly open markets, sustainable economic growth can only be achieved if the private sector becomes competitive. For this reason there is no conflict of objectives between a competitive orientation, full employment and poverty reduction. In addition, the advanced economies show that small companies can ensure national competitiveness and innovation and at the same time become an engine of employment.

Without support for the private sector the poverty reduction cannot be achieved. However, governments must be careful because poverty-reducing effect might not be achieved with only government support of a private sector. Governments have to target traditional small business activities where poor groups are usually involved

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9. Appendix

Table A.1. Descriptive statistics for the number of poor at $3.2 a day, in millions

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	138	77.05	182.9	0	1022
Europe & Central Asia	725	0.85	2.6	0	24.8
Latin America & Caribbean	373	5.1	9.51	0	57.2
Middle East & North Africa	79	4.33	7.3	0	28.4
North America	19	1.51	1.62	0.1	4
South Asia	38	129.02	245.24	0	876.9
Sub-Saharan Africa	179	14.3	21.11	0	142.7
World	1551	2676.67	417.41	1811.1	3065.9

Source: WDI database, own calculations

Table A.2. Descriptive statistics for the number of poor at $5.5 a day, in millions

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	138	120.95	248.16	0	1134.5
Europe & Central Asia	725	2.3	6.39	0	63.9
Latin America & Caribbean	373	9.95	17.08	0	89.5
Middle East & North Africa	79	11.37	17.89	0	71.5
North America	19	2.22	2.27	0.1	5.6
South Asia	38	173.24	310.68	0	1124.3
Sub-Saharan Africa	178	17.41	25.33	0	184.9
World	1550	3770.39	230.68	3270.9	4044.9

Source: WDI database, own calculations

Table A.3. Descriptive statistics for the poverty headcount ratio at $3.2 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	28.53	27.25	0.2	90
Europe & Central Asia	769	5.8	12.68	0	86.5
Latin America & Caribbean	386	17.89	12.48	0.4	64.9
Middle East & North Africa	85	11.96	13.94	0	51.2
North America	42	0.81	0.39	0.2	1.5
South Asia	39	49.64	24.37	0.2	88.7
Sub-Saharan Africa	182	68.7	21.76	1.1	98.5
World	1648	42.89	10.41	24.3	55.5

Source: WDI database, own calculations

Table A.4. Descriptive statistics for the poverty headcount ratio at $5.5 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	48.94	31.74	0.5	98.3
Europe & Central Asia	769	13.75	22.33	0	97.7
Latin America & Caribbean	386	34.88	16.98	2.9	85.3
Middle East & North Africa	85	30.67	27.25	0	81.8
North America	42	1.25	0.45	0.5	2
South Asia	39	76.37	20.85	3.6	97
Sub-Saharan Africa	181	84.19	17.52	5.2	100
World	1647	59.69	8.31	43.5	68.3

Source: WDI database, own calculations

Table A.5. Descriptive statistics for the poverty gap at $3.2 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	10.16	11.9	0	47.1
Europe & Central Asia	769	1.99	5	0	44.6
Latin America & Caribbean	386	7.42	6.22	0.1	35.3
Middle East & North Africa	85	3.28	4.46	0	17.9
North America	42	0.61	0.32	0.2	1.1
South Asia	39	17.04	11.97	0	46.5
Sub-Saharan Africa	182	35.78	16.51	0.4	77.4
World	1648	18.21	6.07	8.5	26.9

Source: WDI database, own calculations

Table A.6. Descriptive statistics for the poverty gap at $5.5 a day, in %

	Obs no	Mean	St.dev	Min	Max
East Asia & Pacific	145	22.45	19.25	0.2	67.3
Europe & Central Asia	769	5.24	10.02	0	64.9
Latin America & Caribbean	386	15.42	9.81	0.6	51.8
Middle East & North Africa	85	10.94	11.31	0	38.6
North America	42	0.8	0.36	0.2	1.4
South Asia	39	37.22	16.02	0.6	66.3
Sub-Saharan Africa	181	53.44	17.45	1.5	100
World	1647	32.55	7.45	19.5	41.8

Source: WDI database, own calculations

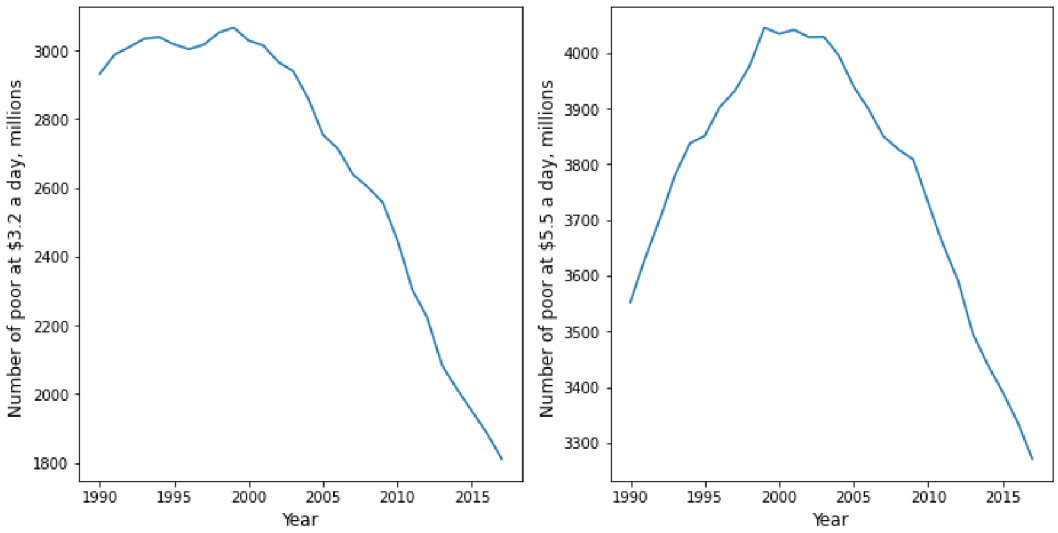

Figure A.1. Number of poor at $3.2 and $5.5 a day for the world, in millions

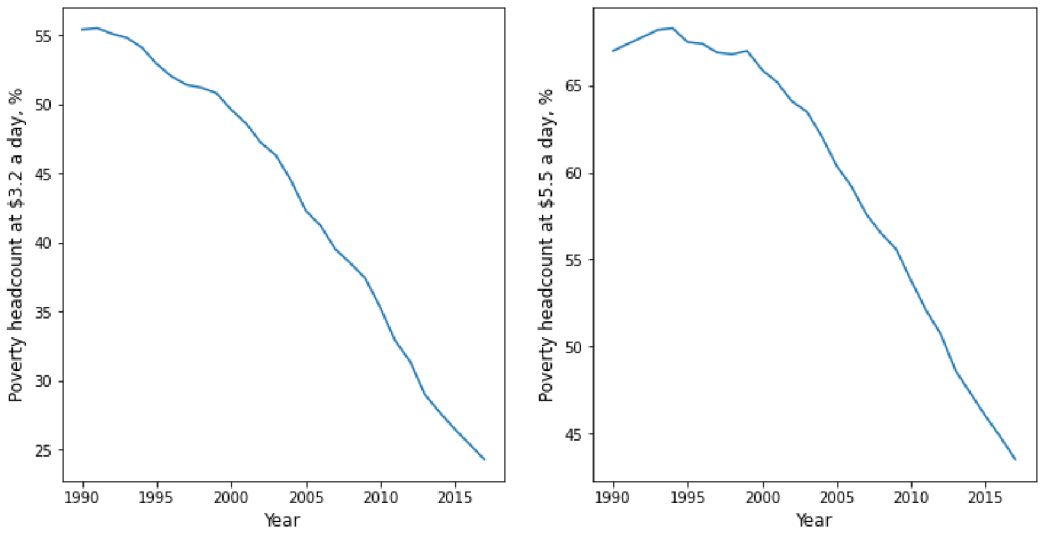

Figure A.2. Poverty headcount ratio at $3.2 and $5.5 a day for the world, in %

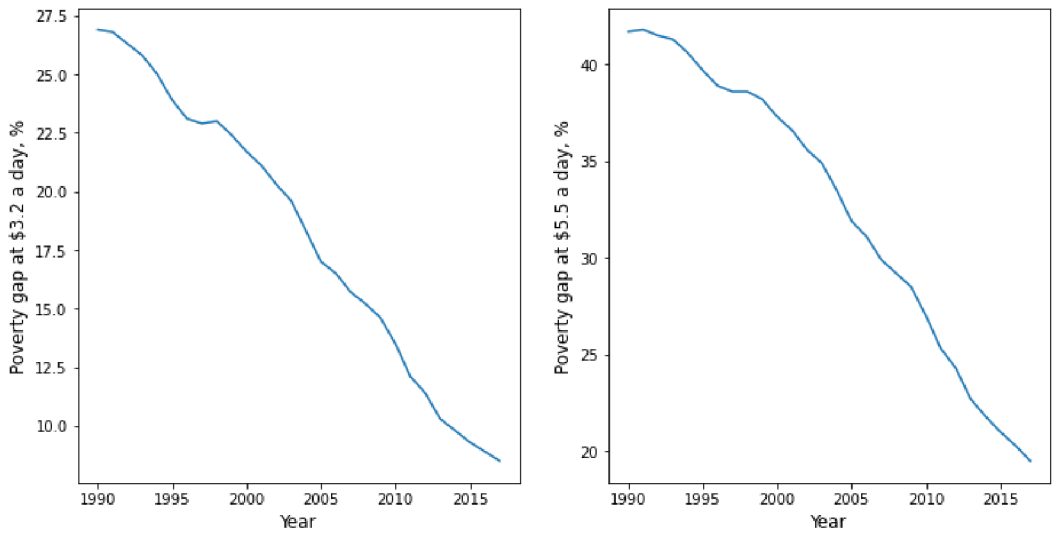

Figure A.3. Poverty gap at $3.2 and $5.5 a day for the world, in %

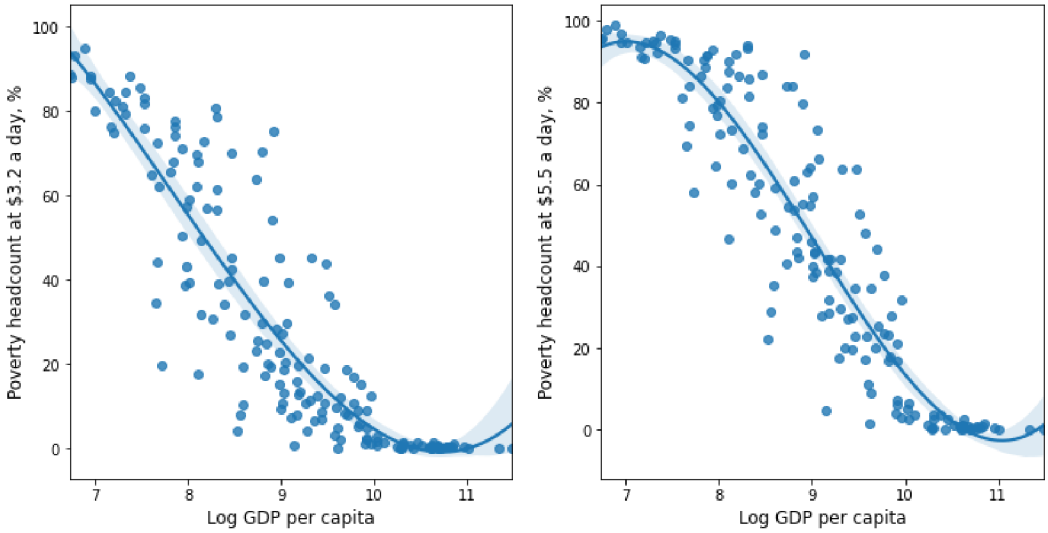

Figure A.4. GDP per capita and poverty headcount ratio at $3.2 and $5.5, in %

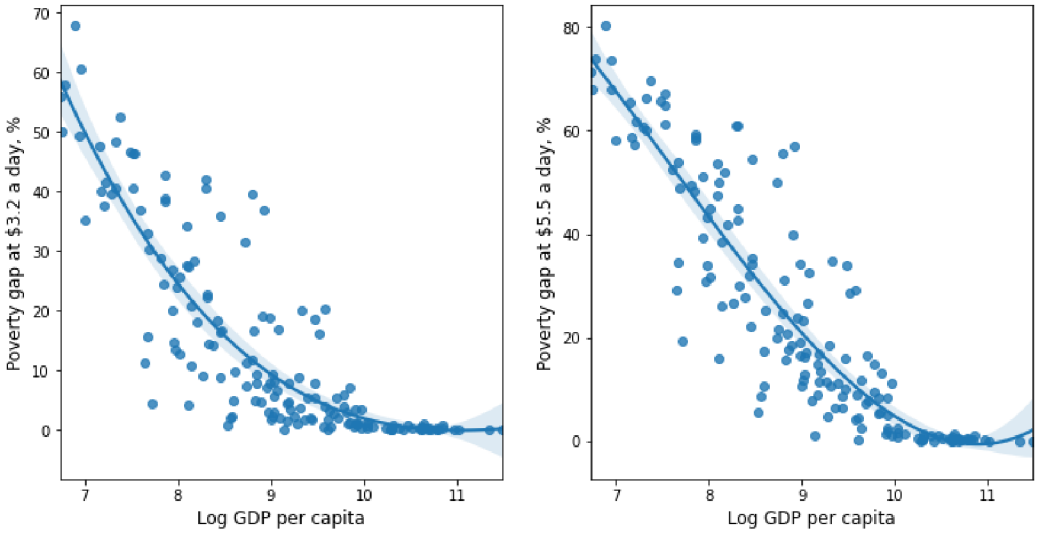

Figure A.5. GDP per capita and poverty gap at $3.2 and $5.5, in %