REGIONAL AND GEOGRAPHIC FEATURES OF PRO-POOR GROWTH IN AFRICA

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Abstract: The paper focuses on regional and geographic features of pro-poor growth in African countries. The concept of pro-poor growth interconnects and examines mutual relationships between income growth, income poverty and income inequality. Using the World Bank's income data, we calculate and interpret indicators of pro-poor growth for individual African countries. Then we analyze the results in terms of African regionalization and we investigate possible associations between pro-poor growth categories and selected geographic factors such as location, population size or population density. We show that higher pro-poorness of growth is typical for countries of Northern and Western Africa. The results also indicate that some of the geographic factors are significantly associated with pro-poor growth across African countries.

Key words: pro-poor growth, poverty, Africa, geography and growth

INTRODUCTION

Economic growth is one possibility for the poor people in developing countries to escape poverty. However, growth is often unequally distributed across households or individuals in societies. From this reason, the average growth rates presented in statistical databases do not usually tell the whole story. We should pay more attention to how much or whether the poor people benefit from growth (Kakwani & Pernia, 2000). This is exactly what the concept of pro-poor growth does. It helps researchers to evaluate the impacts of growth on different parts of a society, or in other words, to examine how growth affects poverty and inequality (Lopez, 2004).

This paper is focused on pro-poor growth in Africa and its main objective is to find out whether the pro-poorness of growth is to any extent associated with geographic factors such as location, population size, population density and others. To achieve that, we start with the definition of pro-poor growth, its measurements and interpretations. Then we describe the geographic variables we work with. Subsequently, we conduct the analysis of associations between pro-poor growth and geographic variables and we present the results, findings and conclusions.

PRO-POOR GROWTH: DEFINITIONS, MEASUREMENTS

Pro-poor growth is defined as economic growth that benefits the poor population of a country. According to the *weak absolute approach*, growth is pro-poor if incomes of the poor grow. Since increasing incomes of the poor always lead to poverty reduction, this approach is also called poverty reducing growth. However, if incomes of the poor grow less than incomes of the non-poor, inequality rises. The *relative approach* focuses on the (relative) inequality between the poor and the non-poor. For growth to be pro-poor, it requires that incomes of the poor grow relatively more or decline relatively less than incomes of the non-poor, i.e. that the inequality falls. Note however, that in the latter scenario the poor become absolutely poorer (i.e. poverty increases) because their incomes decrease, which is not plausible under the weak absolute approach. Therefore, a stricter version of the relative approach requires both (relative) inequality and poverty to decrease. The *strong absolute approach* to pro-poor growth is the strictest since it requires that incomes of the poor increase more in *absolute terms* than incomes of the non-poor, i.e. that the differences in incomes (absolute inequality) fall. However, this rarely happens with incomes and therefore, the last definition is used more frequently with other than income dimensions of pro-poor growth (the approaches are discussed more for example in Klasen, 2004 or in Lopez, 2004).

Based on the changes of incomes, poverty and inequality, it is possible to distinguish six categories of (pro-poor) growth to more accurately classify and interpret the three fundamental approaches. Moreover, these six categories can be ranked according to the benefits they bring to the poor population, thereby creating an ordinal variable, which can be used in more detailed analyses of pro-poor growth. The following combinations of changes in incomes, poverty and inequality can occur:

1. While incomes of the poor grow, the mean income of an economy declines. Both poverty and (absolute) inequality decrease, which corresponds to the strong absolute approach. This category is called *strong pro-poor growth*.
2. Incomes of the poor grow relatively faster than the mean income. Both poverty and (relative) inequality decrease, which corresponds to the relative approach. We denote this category as *relative pro-poor growth*.
3. Incomes of the poor grow, but less than the mean income. This leads to poverty reduction, while inequality increases. This is the *trickle-down growth* that corresponds to the weak absolute approach.
4. Incomes of the poor decrease, but less than the mean income. While poverty increases, inequality declines. This category is called *pro-poor decline*, because the relative situation of the poor improves (even though they are poorer in absolute terms).
5. Incomes of the poor decrease more than the mean income. Both poverty and relative inequality increase. We denote this situation as *anti-poor decline*.
6. Incomes of the poor decrease, while the mean income increases. Therefore, the (absolute) inequality increases and so does the poverty rate. This is called *immiserizing growth*.

Because the six categories are ordinal, it holds that while only the first category meets the requirements of the strong absolute approach, both categories 1 and 2 satisfy the stricter version of the relative approach (the softer version is satisfied also by the fourth category). Similarly, all three categories 1, 2 and 3 meet the requirements of the weak absolute approach. On the other hand, categories 4, 5 and 6 are anti-poor in substance as they always imply increase in poverty.

The classification and interpretation derived above is applicable to all indicators of pro-poor growth, which are used to operationalize and measure the concept. There are at least six indicators that have been frequently used in pro-poor growth literature: (i) pro-poor growth index (Kakwani & Pernia, 2000), (ii) poverty equivalent growth rate (Kakwani & Son, 2008), (iii) poverty growth curve (Son, 2004), (iv) average growth rate of incomes of the poor (Kraay, 2006), (v) growth incidence curve (Ravallion & Chen, 2003), and (vi) rate of pro-poor growth (Ravallion & Chen, 2003). These indicators are discussed and compared in detail in Harmáček et al. (2017) or in Deutsch and Silber (2011).

In this paper, we work only with the poverty equivalent growth rate (PEGR). This indicator is derived from the multiplication of the mean income in an economy and the pro-poor growth index, which is computed as a ratio of the total elasticity of poverty and the growth elasticity of poverty. The total elasticity of poverty (with respect to growth) is interpreted as the percentage change of poverty when the mean income changes by one percent. The growth elasticity of poverty is defined as the proportional change in poverty when the mean income changes by one percent while inequality remains constant. Both elasticities and therefore also the pro-poor growth index as well as the PEGR can be calculated from the distributional data on income.

PEGR is interpreted as the rate of growth that has the same effect on poverty as the actual growth rate, provided that the growth process had not been accompanied by any change in inequality (Kakwani & Son, 2008). In other words, it is the rate of growth if everyone in the society had received the same proportional benefits of growth. PEGR addresses both the magnitude of growth and the benefits of growth for the poor population. It also satisfies the basic monotonicity condition: the proportional reduction in poverty is a monotonically increasing function of PEGR. It means that the larger is the PEGR, the greater is the reduction in poverty, i.e. maximization of PEGR implies a maximum reduction in poverty (Kakwani & Son, 2003). PEGR can take any value and its interpretation depends on its comparison with the growth rate of the mean income (g) and with the value of zero (see the second column of Table 1 below).

To calculate the PEGR for an individual country, we start with data on aggregate income distribution. Such data are available in the World Bank's PovcalNet database (World Bank, 2018a). Using a specialized statistical software (Araar & Duclos, 2007), we first disaggregate the data to a households' level and then we multiply the disaggregated data by the corresponding mean income. Thus, we estimate the actual income distribution for one particular country in one particular point in time (year). To calculate PEGR for a country, we need to know the income distribution for at least two different points in time (years). Then we can estimate the PEGR using our software (this procedure is described in a more detail in Harmáček et al., 2016).

The time-period between the two years is called a growth spell (for example Kraay, 2006). Here we construct the long growth spells meaning that we take only the first year and the last year with available data for an individual country.[3] This also limits our sample to African countries with at least two available data points in the PovalNet database. Such a condition is satisfied for 47 out 54 African countries: data are entirely missing for Equatorial Guinea, Eritrea, Libya and Somalia; only one data point is available for Sudan, South Sudan and Zimbabwe.

Table 1 summarizes the possible interpretations of PEGR as well as the results for African countries. Out of the 47 growth spells (countries), only two are not statistically significant. This means that the 95% confidence interval of the PEGR-estimate and the 95% confidence interval of the g-estimate overlap. Therefore, it is not possible to decide the growth category for such spells. The results further indicate that most of the spells belong to the relative pro-poor growth category, closely followed by the trickle-down growth. Eleven spells are denoted as anti-poor because poverty increases (consisting of categories of pro-poor decline, anti-poor decline and immiserizing growth). From the perspective of the weak absolute approach, 34 spells are evaluated as pro-poor because

3 It is obvious that the span of the growth spells varies a lot. While the largest span is 25 years (for Egypt 1990-2015), the shortest ones are 6 years (e.g. Cape Verde 2001–2007). While the length of the growth spells could matter in general, it is not a substantial issue in our paper because most of the geographic variables do not change much over time, and moreover, we are only interested in the simple bilateral associations.

poverty decreases. These correspond to the strong pro-poor growth, relative pro-poor growth and trickle-down growth categories. Finally, the stricter version of the relative approach is observed in 19 spells, for which both poverty and inequality decline (the strong pro-poor growth and relative pro-poor growth categories).

Tab. 1: Interpretations and results of PEGR

Ordinal categories of (pro-poor) growth	Interpretation	Counts (%)
1. Strong pro-poor growth	PEGR > 0 > g	1 (02.13%)
2. Relative pro-poor growth	PEGR > g > 0	18 (38.30%)
3. Trickle-down growth	g > PEGR > 0	15 (31.91%)
4. Pro-poor decline	0 > PEGR > g	5 (10.64%)
5. Anti-poor decline	0 > g > PEGR	1 (02.13%)
6. Immiserizing growth	g > 0 > PEGR	5 (10.64%)
Results not significant		2 (04.26%)
Total		47 (100.0%)
Weak absolute interpretation (categories 1+2+3): 34 (72.34%)		
Strict relative interpretation (categories 1+2): 19 (40.43%)		

Source: Authors. Note: The calculations of PEGR have been performed for the poverty headcount (incidence of poverty) as the relevant poverty measure.

The three interpretations above also define our 'dependent' variables that we use in our analysis of associations with geographic features. For the weak absolute and the (strict) relative pro-poor growth across African countries, we create binary variables that are equal to one in cases of pro-poor growth. For the ordinal interpretation we create an ordinal variable consisting of six categories. This variable is also used in Figure 1 that illustrates how African countries fared over their long growth spells in terms of pro-poor growth.

AFRICAN REGIONS AND GEOGRAPHY VARIABLES

The World Bank (2018b) divides Africa into only two parts: the Sub-Saharan part contains 48 countries (including Sudan or Mauritania), while the five North African countries plus Djibouti are included into the MENA (Middle East and North Africa) region. A more common approach divides Africa into five sub-regions: Southern, Central, Eastern, Western and Northern Africa. However, the definitions of these regions differ substantially as well. According to African Development Bank (2018), Southern Africa is an extensive region that embraces also Angola and São Tomé and Príncipe. Conversely, the UN approach (UN, 2019) defines Eastern Africa as a large area that spreads from Sudan to Zambia, Zimbabwe and Mozambique, thereby making Southern Africa region much smaller. Moreover, besides the competing definitions, there are regional integration groupings in Africa that further obfuscate the delineation of regions. To solve this confusion and to be

able to project the pro-poor growth results into African regions, we have decided to work with the UN approach to regionalization of Africa (see Figure 1).[4]

The issue of geography and its influence on economic growth and development has been present in development economics (and development studies) for a long time (Sachs, 2003; Naudé, 2007). Therefore, it is interesting to look at the possible associations between some selected geographic features and pro-poor growth across African countries. We examine whether the following variables have some effect on pro-poor growth in Africa: (i) total land area (km^2), (ii) population size, (iii) population density (pop/km^2), (iv) country is landlocked (excluding islands), (v) country is an island or belongs to a group of the Small Island Developing States (SIDS), (vi) the closest air distance to a major port (km), (vii) proportion of land within 100 km from coast (%), (viii) proportion of population within 100 km from coast (%), (ix) proportion of land in geographical tropics (%), (x) proportion of population in geographical tropics (%). While data for the first three variables (i-iii) have been obtained from the World Bank (2018c), data for the last five variables (vi-x) are from Gallup et al. (2001).

GEOGRAPHY AND PRO-POOR GROWTH IN AFRICA

Figure 1 illustrates the distribution of pro-poor growth across African countries (for the long spells). We have emphasized the borders of different regions according to the UN approach discussed above. Shades of green are used for the weak absolute pro-poor growth, while shades of red are used for the anti-poor growth. It can be seen from the figure that higher pro-poorness of growth is concentrated in Northern and Western Africa. For example in the Western Africa region, 11 out of 16 spells are strict relative pro-poor growth and two more are trickle-down growth. Only in Benin and Guinea-Bissau the growth is immiserizing. In Northern Africa, 3 out of 5 spells are strict relative pro-poor growth and one more is trickle-down (there are no data for Libya). In Central and Southern Africa, the trickle-down growth prevails. The worst results have been observed for Eastern Africa, for which also the highest proportion of observations is missing.

4 According to UN approach, there are 5 countries in Northern Africa, 16 in Western Africa, 9 in Central Africa, 19 in Eastern Africa and 5 in Southern Africa.

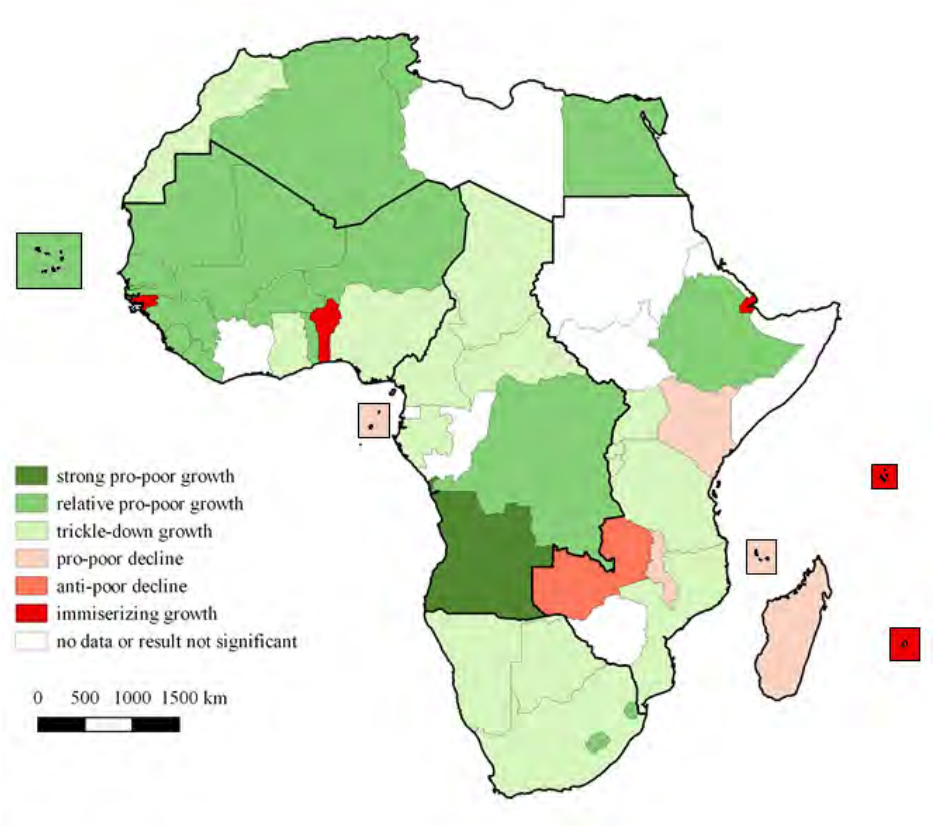

Fig. 1: Pro-poor growth in African countries and regions

Source: Authors.

To investigate the associations between pro-poor growth and selected geographic features, we work separately with three pro-poor growth variables. For the weak absolute and the (strict) relative pro-poor growth we use the binary variables defined above. They act as our 'dependent' variables in the simple logit regression framework, which we employ to examine the associations with geographic features. The six categories of (pro-poor) growth are used as our ordinal 'dependent' variable in the last set of regressions, which we perform under the (simple) ordinal logit models. The word simple refers to the fact that there is always only one 'independent' variable in each model. In all these simple regressions we are interested only in the significance of the bilateral associations between the pro-poor growth variables and the geographic variables. The results are presented in Table 2.

Tab. 2: Associations between pro-poor growth and geography in Africa

PPG Variables ⟶ Geographic variables ⟶	Number of obs.	Weak absolute PPG	Strict relative PPG	PPG: six ordinal categories
land area	45	2.24**	1.50#	-2.60***
population	45	1.48#	0.22	-0.91
population density	45	-2.01**	-2.07**	3.41***
country is landlocked (excl. island countries)	38	-0.15	-0.42	0.45
country is an island (or belongs to SIDS)	45	-3.08***	-1.48#	2.95***
closest air distance to a major port	39	-2.03**	-2.14**	2.41**
% of land within 100 km from the coast	45	-2.93***	-1.08	2.48**
% of population within 100 km from the coast	45	-2.32**	-0.24	1.57#
% land in geographical tropics	45	-1.53#	-1.39	1.94*
% of population in geographical tropics	39	0.13	-0.64	0.21

Source: Authors.

*Notes: Since we are interested only in statistical significances of associations, only values of the z-tests for logit and ordinal logit regression coefficients are presented. The following signs are used to indicate statistical significance (***) at the 1% level, (**) at the 5% level, (*) at the 10% level and (#) at the 15% level.*

Firstly, it is apparent that there are significant associations between pro-poor growth and some geographic attributes, which presumably correlate less with the strict relative pro-poor growth. However, this could be a consequence of the fact that there are less relative pro-poor growth spells when compared to the weak absolute approach. Secondly, in all but one case, the geographic factors maintain the same direction of the relationships across the regressions. The seeming contradiction of the ordinal regression is just artificial. It is the consequence of the lowest number (1) being assigned to the best category (strong pro-poor growth) and vice versa. Thirdly, we did not have complete data for some geographic variables (the closest air distance to a major port and the proportion of population in the geographical tropics), and therefore some observation could not enter our regressions.

The results indicate that a higher probability of achieving pro-poor growth and reaching a higher pro-poor growth category (in terms of benefits for the poor) is associated with a larger land area, lower population density, lower distance to a major port, lower proportion of land and population within 100 km from coast, lower proportion of land in the geographic tropics and with being a non-insular country. Surprisingly, being a landlocked

country and also the proportion of population in the geographical tropics are never significant. While most of the associations follow theoretical expectations, a more thorough analysis should be performed, in which also socio-economic and other factors are controlled in a more elaborate multiple regression framework.

CONCLUSIONS

In this paper, we have focused on the concept of pro-poor growth and its regional and geographic features in Africa. We have presented three possible universal interpretations of pro-poor growth and illustrated their use on the poverty equivalent growth rate (PEGR). We have shown that in terms of African regions a higher pro-poorness of growth is concentrated in Northern and Western Africa. We have also examined associations of pro-poor growth with selected geographic variables and found out that a larger land area, lower population density, lower distance to a major port, lower proportions of land and population within 100 km from coast, lower proportion of land in the geographic tropics and being a non-insular country are associated with pro-poor growth.

While these results are certainly informative, a more elaborate framework needs to be applied to test the possible associations of pro-poor growth properly. Firstly, more variables that approximate not only geographic factors, but especially socio-economic, institutional (Rodrik & Subramanian, 2003) development aid allocation (Opršal et al., 2017) or even environmental aid allocation factors need to be employed.[5] Secondly, a more advanced multiple regression framework must be used to properly examine the causality in associations between these variables and pro-poor growth. Thirdly, focusing on short growth spells instead of long ones would mean more observations and it would also bring variability over time within countries. While such an analysis would be much more time-demanding, it is certainly feasible. And lastly, in this paper we have worked only with one indicator of pro-poor growth (PEGR). As shown, there are at least five or six other indicators, which have been frequently used. These could also be employed within similar analytical and interpretational frameworks. This would allow researchers to directly compare the outcomes of the different indicators as well as to test the robustness of regression results.

References

African Development Bank: Countries. (2018). African Develepment Bank. Retrieved from https://www.afdb.org/en/countries/

Araar, A., & Duclos, J. (2007). *DASP: Distributive Analysis Stata Package*. PEP, World Bank, UNDP, Université Laval. Retrieved from http://dasp.ecn.ulaval.ca/

Deutsch, J., & Silber, J. (2011). On Various Ways of Measuring Pro-Poor Growth. *Open-Assessment E-Journal 5*(2011-13), 1–59. https://doi.org/10.5018/economics-ejournal.ja.2011-13

5 More in depth information about this approach to territorial aid allocations can be found for example in Opršal and Harmáček (2019a) or in Opršal and Harmáček (2019b).

Gallup, J. L., Sachs, J. D., & Mellinger, A. D. (2001). Geography and Economic Development – Data. *CID Working Paper no. 1.* Retrieved from http://fmwww.bc.edu/ec-p/data/inst/geodata.dta>

Harmáček, J., Syrovátka, M., & Dušková, L. (2017). Pro-poor growth in East Africa. *The Quarterly Review of Economics and Finance, 64*(C), 82–93. https://doi.org/10.1016/j.qref.2016.07.002

Harmáček, J., Syrovátka, M., Schlossarek, M., & Pavlík, P. (2016). Jak měřit prospěšnost růstu pro chudé? Analýza ukazatelů a jejich komparace na případu Bangladéše. *Politická ekonomie, 64*(8), 988–1005. https://doi.org/10.18267/j.polek.1098

Kakwani, N., Pernia, E. (2000). What is Pro-Poor Growth? *Asian Development Review, 18*(1), 1–16.

Kakwani, N., & Son, H. H. (2003). Pro-poor Growth: Concepts and Measurement with Country Case Studies. *The Pakistan Development Review, 42*(4), 417–444. https://doi.org/10.30541/v42i4Ipp.417-444

Kakwani, N., & Son, H. H. (2008). Poverty Equivalent Growth Rate. *The Review of Income and Wealth, 54*(4), 643–655. https://doi.org/10.1111/j.1475-4991.2008.00293.x

Klasen, S. (2004). In search of the holy grail: How to achieve pro-poor growth. In B. Tungodden, N. Stern, & I. Kolstad (Eds.), *Toward pro-poor policies: Aid, institutions, and globalization, Proceedings from the annual World Bank conference on development economics*. Washington, DC: The World Bank.

Kraay, A. (2006). When is growth pro-poor? Evidence from a panel of countries. *Journal of Development Economics, 80*(1), 198–227. https://doi.org/10.1016/j.jdeveco.2005.02.004

Lopez, H. (2004). *Pro-poor growth: a review of what we know (and of what we don't)*. Washington, DC: The World Bank.

Naudé, W. (2007). Geography and Development in Africa: Overview and Implications for Regional Cooperation. *UNU-WIDER Discussion Paper No. 2007/03*. Helsinki: UNU-WIDER.

Opršal, Z., & Harmáček, J.(2019a). Clean Aid or Dirty Aid? The Environmentalization of Czech Foreign Aid. *Journal of Cleaner Production* 224, 167–74. https://doi.org/10.1016/j.jclepro.2019.03.198

Opršal, Z., & Harmáček, J. (2019b). Is Foreign Aid Responsive to Environmental Needs and Performance of Developing Countries? Case Study of the Czech Republic. *Sustainability, 11*(2), 401. https://doi.org/10.3390/su11020401

Opršal, Z., Harmáček, J., & Syrovátka, M. (2017). Geography of Czech Aid: Where and Why Czechia Promotes Development? *Geografie, 122*(2), 169–189. https://doi.org/10.37040/geografie2017122020169

Ravallion, M., & Chen, S. (2003). Measuring pro-poor growth. *Economics Letters, 78*(1), 93–99. https://doi.org/10.1016/S0165-1765(02)00205-7

Rodrik, D., & Subramanian, A. (2003). The Primacy of Institutions (and what this does or does not mean). *Finance and Development,* 40(2), 31–34.

Sachs, J. D. (2003). Institutions Matter, But Not For Everything. *Finance and Development, 40*(2), 38–41.

Son, H. H. (2004). A Note on Pro-Poor Growth. *Economics Letters, 82*(3), 307–314. https://doi.org/10.1016/j.econlet.2003.08.003

UN (United Nations). 2019. *Methodology – Standard country or area codes for statistical use (M49): Geographic regions*. Retrieved from https://unstats.un.org/unsd/methodology/m49/

WORLD BANK. 2018a. *PovcalNet: the on-line tool for poverty measurement developer by the Development Research Group of the World Bank*. Retrieved from http://iresearch.worldbank.org/PovcalNet/

WORLD BANK. 2018b. *World Bank Country and Lending Groups*. Retrieved from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bankcountry-and-lending-groups

WORLD BANK. 2018c. *World Development Indicators*. Retrieved from https://databank.worldbank.org/data/source/world-development-indicators

Shrnutí

Koncept pro-poor růstu, který lze do češtiny přeložit jako růst přínosný pro chudé, se zaměřuje na analýzu vzájemných vztahů mezi růstem, chudobou a nerovností. Nejčastěji bývá aplikován na příjmovou dimenzi, ale lze jej použít také na analýzu nepříjmových ukazatelů. Předkládaný článek se zabývá regionálními a geografickými souvislostmi příjmového pro-poor růstu v afrických zemích. Za použití příjmových dat Světové banky byla nejdříve odhadnuta rozdělení příjmů v jednotlivých afrických zemích vždy pro první a poslední rok s dostupnými daty (tzv. dlouhá růstová období). Následně byl pro tato období pro jednotlivé státy Afriky vypočítán vybraný indikátor pro-poor růstu (chudobě ekvivalentní míra růstu, PEGR), který byl interpretován za použití tradiční i nově zavedené univerzální klasifikace. Získané výsledky byly poté analyzovány z hlediska regionalizace Afriky a vybraných geografických proměnných. Bylo zjištěno, že vyšší míra prospěšnosti růstu pro chudé je vlastní zejména zemím západní a severní Afriky. Výsledky dále naznačily, že vyšší pravděpodobnost relativního i (slabého) absolutního pro-poor růstu a současně také vyšší míra prospěšnosti růstu pro chudé jsou asociovány s některými geografickými faktory, například s větší rozlohou území, nižší hustotou populace, nižším podílem území v geografických tropech či neostrovním charakterem země. Naopak vnitrozemskost zemí nehraje z hlediska pro-poor růstu významnou roli. Uvedené vztahy však nelze považovat za kauzální – k potvrzení kauzality je totiž nutné pracovat s více proměnnými a s pokročilejšími metodami vícenásobné regresní analýzy.