

Global trends in multidimensional poverty and horizontal inequalities in poverty

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1. Introduction

The Sustainable Development Goal (SDG) 1 of the 2030 Agenda focuses on poverty eradication. Specifically, the Target 1.1 calls for a reduction in extreme *income* poverty, while Target 1.2 for a reduction in “poverty in all its dimensions”. While we have a substantial body of knowledge regarding the trends in income poverty over the last decades, we know much less about the trends in multidimensional poverty. This paper aims at contributing to this little explored question.

Most of the evidence available so far concentrates on individual countries (Tran et al., 2015; Andrianarison et al., 2022; Hanandita and Tampubolon, 2016; Fransman and Yu, 2019), or specific regions (Santos and Villatoro, 2018). These studies employ indices of multidimensional poverty that do not allow cross-country comparisons, thus making impossible to have a global picture of the changes over time in multidimensional poverty.

Only few studies have tried to assess trends for a large number of countries from different world regions. One of them used the global Multidimensional Poverty Index (MPI) – a composite index incorporating three dimensions: education, health, and standard of living - used to examine poverty changes in 34 countries after 2000 (Alkire et al., 2017). This study concludes that poverty has declined in all countries, except for Madagascar. In a more recent work, Alkire et al. (2020) assess changes in the global MPI for a larger sample of countries, 80. They find that multidimensional poverty declined significantly in 67 countries, with Sierra Leone and Mauritania having the largest (annualized) *absolute* reduction in poverty, while North Macedonia and China the largest (annualized) *relative* reduction in poverty. The remaining 13 countries saw no statistically significant change in the MPI: thus, no country experienced an increase in poverty.

A recent paper by Burchi et al. (2022) looks at trends in multidimensional poverty for 54 countries during the period of the Millennium Development Goals (MDGs). It relies on two individual-level indices of multidimensional poverty, called global CSPI (G-CSPI) and global M0 (G-Mo), which encompass three dimensions: education, health and work. Compared to the previous cross-country papers, this paper can exploit a much larger availability of poverty estimates, looks only at changes over a minimum period of five years and employs different choices that ensure higher comparability across years and across countries.² The picture that emerges is somehow less positive than the one provided by Alkire et al. (2020). The authors find that multidimensional poverty has declined in about 82% of the countries examined, but this reduction has been substantially lower than the one

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² Among others, these include: similar starting year for all countries, at least partial overlap in the time-frame for all countries, use of exactly the same number and typology of indicators for all countries and years.

detected for income poverty. Another key finding is that improvements were marginal in sub-Saharan Africa: indeed, one third of the countries examined in this region actually experienced an increase in multidimensional poverty.

The present paper expands the previous work of Burchi et al. (2022) to look at even longer-term trends – between mid-1990s and 2018 - and to focus on a larger sample of countries, 85. Given this very high country coverage and the availability of almost 500 point estimates, it is possible to carry out a more exhaustive analysis of the aggregate trends for low- and middle-income countries. Moreover, by using the two indices of multidimensional poverty, which differ with regard to the poverty measure, we can make a more robust assessment. Indeed, the G-CSPI has the important feature of incorporating the inequality among the poor, but cannot be fully decomposed to detect the contribution of each dimension. The opposite occurs for the G-M0, which is factor decomposable, but not distribution-sensitive (Burchi et al., 2021, 2022).

Consistent with the overarching principle of the 2030 Agenda – Leaving No One Behind – and the specific focus of SDG 1 on different societal groups, the paper also investigates horizontal inequalities in poverty. In particular, we empirically examine the *rural-urban* disparities in multidimensional poverty and their evolution over time, and review the most recent literature on *gender* disparities in poverty.

The paper is structured as follows. Section 2 explains our indices of multidimensional poverty. Section 3 describes the country sample and the methodology. Section 4 illustrates the results on the trends in multidimensional poverty, while Section 5 those on horizontal inequality in poverty. Section 6 presents the concluding remarks.




2. Measuring multidimensional poverty

In line with Burchi et al. (2022), we use two indices of multidimensional poverty: the G-CSPI and the G-M0. Unlike the income-based measures of poverty and the global MPI, which are constructed at the household level, they are individual-level indices. Specifically, they focus on individuals between 15 and 65 years of age, given that for children and the elderly the measurement of multidimensional poverty should rely on a different set of dimensions and indicators (Abdu and Delamonica, 2018; Domínguez-Serrano et al., 2019; Gopinath, 2018). People in the 15-65 years age-group account for nearly 64% of the entire population of low- and middle-income countries.

Table 1 presents all the main features of both indices. They cover three key dimensions of poverty: work, education and health, all carrying the same weight. Each dimension is measured by one indicator or a combination of indicators. In the specific case of education, the main indicator is literacy: only when information on literacy is not available for at least 2/3 of the sample, education is measured through years of schooling or, finally, educational level. Health, instead, is proxied by access to drinkable water and adequate sanitation given that the lack of access to these facilities is responsible for large health deprivations in low- and middle-income countries (Checkley et al, 2004; Fink et al, 2011; Fogden, 2009).³ All additional details can be found in Burchi et al. (2021; 2022).

³ While information on education and work is collected at the individual level, information on access to water and sanitation is collected at the household level. In accordance with previous studies (Vijaya et al., 2014; Espinoza-Delgado and Klasen, 2018), we treat these services as true public goods (non-rival and non-excludable).

Table 1: main characteristics of the G-CSPI and the G-M0

Dimension	Weight	Indicators	Deprived if...
Fulfilling work	1/3	Labour status, type of employment	Individual is unemployed & seeking a job, or is employed in a low-pay/low-quality sector
Adequate education	1/3	Literacy 	Individual is unable to read, to write or both
		Years of education 	Individual has less than 4 years of schooling
		Educational level 	Individual has no education
Access to water & sanitation (health)	1/3	Access to safe drinkable water and adequate sanitation	Individual has no access to drinkable water and no access to adequate sanitation

The difference between the G-CSPI and the G-M0 lies in the poverty measure. The former uses the Correlation Sensitive Poverty Index (CSPI), which is a particular case of the family of multidimensional poverty measures proposed by Rippin (2014; 2017) for ordinal/binary data. This measure implicitly uses the union identification: an individual is considered multidimensionally poor if they are deprived in any of the dimensions considered. The advantage of this measure is that it accounts for all three components of poverty: incidence, intensity and inequality among the poor. The direct consequence is that any transfer from a poor to a less poor person causes, as one would expect, an increase in multidimensional poverty, while the opposite occurs in the case of a progressive transfer. Moreover, the CSPI can be decomposed in the product of the three components (Burchi et al., 2022). This unique feature, however, comes at a cost: the CSPI cannot be fully decomposed to directly assess the relative contribution of each *dimension* to overall poverty.

On the contrary, the G-M0 adopts the “adjusted headcount ratio” (or M0), which is part of the family of measures proposed by Alkire and Foster (2011) and the main measure used in the MPI (Alkire and Santos, 2014). To generate the adjusted headcount ratio, it is necessary to set a cut-off (k) to identify who are the multidimensionally poor. In line with the MPI, the G-M0 uses an intermediate cut-off: any individual deprived in two or three dimensions is considered poor ($k=2$). The M0 accounts for poverty incidence and intensity, but not for the inequality among the poor. Therefore, in case of a progressive (regressive) transfer, poverty based on this measure would not change or even increase (decrease). This disadvantage compared to the CSPI, is somehow compensated by the fact that the M0 measure can be fully decomposed by dimension. For these reasons, we use both indices to examine the trends in multidimensional poverty.

3. Data, sample and methods

The above indices of multidimensional poverty were calculated for several countries and in different points in time by using the International Income Distribution Database (I2D2), a worldwide database established by the World Bank, containing a standardized set of socio-economic and demographic variables for nationally representative household surveys.

To analyze the trends in multidimensional poverty, first we decided to disregard countries where the last poverty estimate was too old, namely before 2005. Then, to ensure more comparability across countries, we decided to exclude poverty estimates for years before 1996. Therefore, we initially considered the sample of countries with poverty estimates for at least two points in time in the period between 1996 and 2018. In a final stage, as we are interested in longer-term trends and not short-

term variations/fluctuations, we retained only those countries where the difference between the last year (endline) and the first year (baseline) was at least equal to five years.

The final sample consists of 85 countries, all categorized by the World Bank as low-income, lower middle-income or upper middle-income countries in 2000. The region more represented is sub-Saharan Africa (SSA), with 33 countries, followed by Latin America & the Caribbean (LAC, 18) and Europe and Central Asia (ECA, 15). On average, 5.72 poverty estimates are available per country, with a minimum of 2 in countries like Nigeria and Senegal and a maximum of 21 in Argentina and Peru.

In the empirical analysis, we report information on trends using all available year estimates, but interpret mostly the changes between the baseline and the endline years. In particular, we compute the *absolute* differences in the values of the poverty indices between the endline and the baseline, as well as the changes *relative* to the value at the baseline. Both absolute and relative changes are annualized to make figures comparable across countries.

Rural-urban disparities in poverty, instead, are measured through the rural/urban multidimensional poverty (G-CSPI and G-M0) ratios: a ratio higher (lower) than 1 indicates that rural poverty is higher (lower) than urban poverty. In a second step, we compute the annualized absolute and relative changes in the rural/urban poverty ratio between baseline and endline to assess changes in rural-urban disparities over time. For this specific analysis, we rely on a sample of 74 countries.

4. Multidimensional poverty trends

We start by analyzing country-level poverty trajectories. Table 2 shows that 84.7% of the countries (71 out of 85) succeeded in reducing poverty based on the G-CSPI, while 82.4% based on the G-M0. In all world regions, this percentage is higher than 82.4% - with the best performance detected in South Asia (SAS) where all 5 countries experienced poverty alleviation. In contrast, the G-CSPI declined in only 75.8% of the countries in SSA: indeed, 8 countries – Benin, Ethiopia, Ghana, Niger, Nigeria, South Sudan, Sudan, and Zimbabwe – witnessed an increase in multidimensional poverty. One additional country in this region experienced an increase in poverty using the G-M0, Mozambique. Also in one of the only two countries from the Middle East and North Africa (MNA) region – Jordan - poverty increased.

Table 2: Number and percentage of countries reducing poverty, by poverty index and region

	G-CSPI		G-M0 (k=2)	
	No. countries reducing poverty	% reducing poverty	No. countries reducing poverty	% reducing poverty
Total sample	72	84.7	70	82.4
East Asia & Pacific (EAP)	11	91.7	10	83.3
Europe & Central Asia (ECA)	13	86.7	13	86.7
Latin America & Caribbean (LAC)	17	94.4	17	94.4
Middle East & North Africa (MNA)	1	50	1	50
South Asia (SAS)	5	100	5	100
Sub-Saharan Africa (SSA)	25	75.8	24	72.7

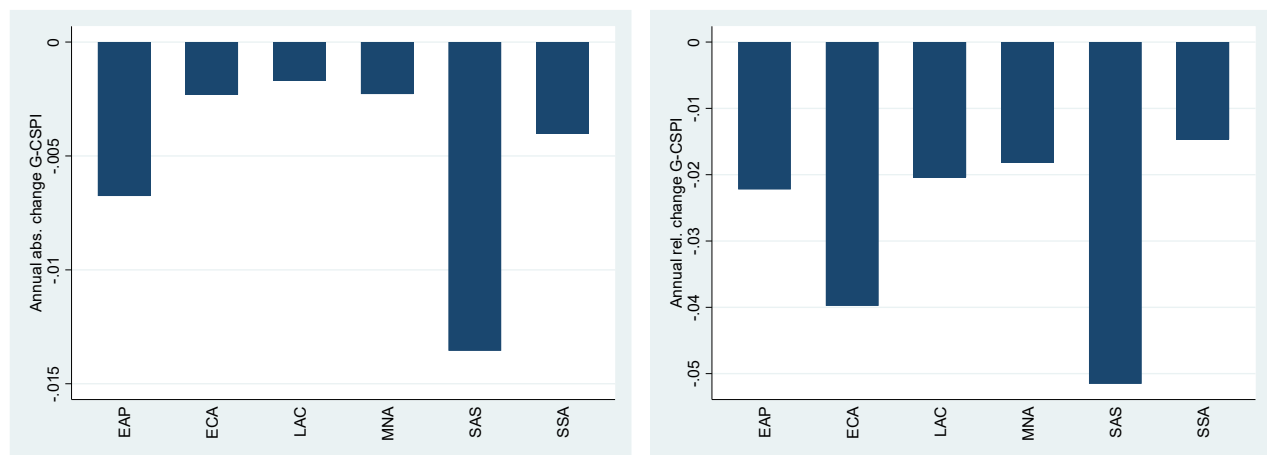
Concentrating on the intensity of the change between baseline and endline year, the aggregate (unweighted) mean annualized *absolute* change is equal to -0.41 percentage points with the G-CSPI

and -0.51 percentage points with the G-M0 (not reported). The countries that in absolute terms reduced multidimensional poverty the most are Bhutan and the Comoros, while those that experienced the largest increase are South Sudan and Sudan. There is high heterogeneity across regions, with South Asia clearly witnessing the fastest absolute decline in poverty (-1.35 percentage points annually, on average). In contrast, ECA and especially LAC were the regions with the slowest absolute reduction in poverty (Figure 1).

The picture changes when we focus on the *relative* changes in poverty, which is perhaps even more important given that previously the MDG 1 and now the SDG 1 set specific targets for poverty reduction in relative terms. At the aggregate level, on average, multidimensional poverty declined annually by 2.4% based on the G-CSPI and by 3.8% based on the G-M0. South Asia is clearly the region with the fastest relative decline in poverty (-5.2% in G-CSPI and -6.6% in G-M0 annually). To the opposite, SSA saw the lowest progress, with an average annual relative decline in the G-CSPI of 1.47% (and 1.76% in the G-M0). The gap between SSA and the other regions becomes substantially larger when we look at the population-weighted changes since countries like Nigeria, Ethiopia and Sudan experience an increase in poverty (result not reported). These results echoes the previous findings of Burchi et al. (2022) on a smaller sample.

In Appendix A1, we report the full country-level trends in the G-CSPI, using all data points. In those countries (66) where poverty estimates are available for more than two years, we notice a gradual change in poverty. In the vast majority of these countries, poverty has constantly declined, with very few temporary small increases especially in countries with lower levels of poverty (e.g., in LAC).

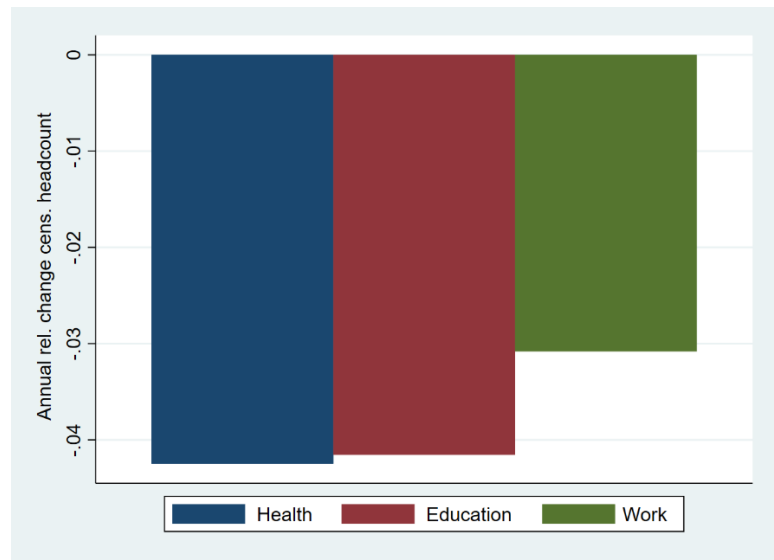
Figure 1: annual absolute and relative changes in the G-CSPI, by region



4.1 Trends by poverty dimension

Given that only the G-M0 is fully decomposable by dimension, to analyze the trends by dimension we employ the G-M0 and its headcount ratios (or censored headcount ratios). Nearly 68% of the countries (58) reduced the censored headcount ratios for all three dimensions: health, employment and education. Other 13 countries experienced a decline in the deprivations in two dimensions, and the remaining 14 witnessed a decline in the deprivation in one dimension. Surprisingly, 5 countries – Micronesia, Kyrgyz Republic, Bulgaria, Jordan and Niger - experienced an increase in the censored headcount ratios for all three dimensions.

Figure 2: aggregate annual relative changes in the censored headcount ratios for the three dimensions



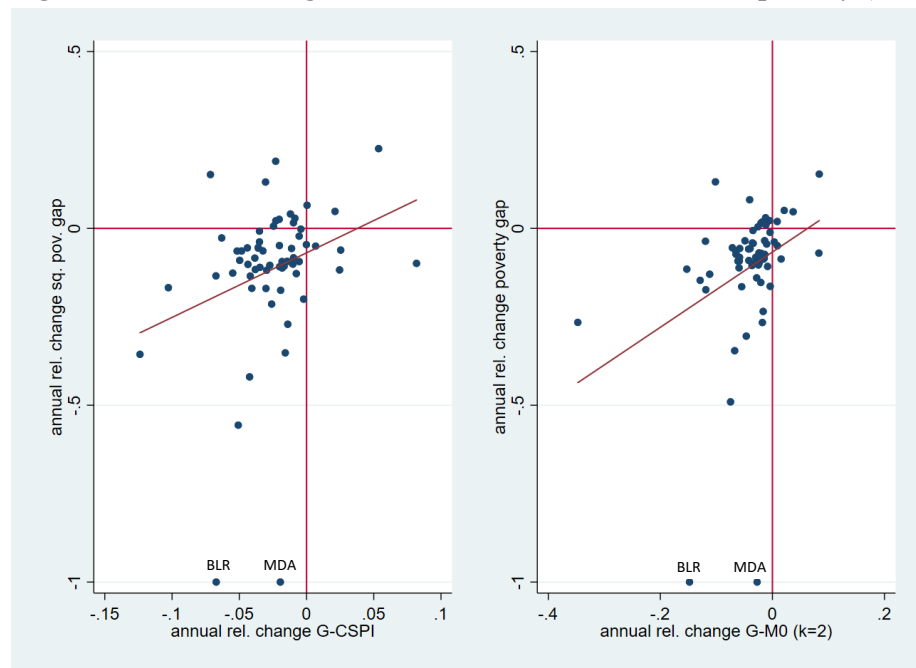
The censored headcount ratio for health was the one with the largest average annualized reduction (-4.25%) immediately followed by education (-4.16%). The decline for employment was slightly lower (-3.08%): this may be partly due to the fact that access to decent employment is more responsive to external shocks than the other two dimensions. Indeed, this is also the indicator that fluctuates the most between baseline and endline.

4.2 Comparing trends in income and multidimensional poverty and the role of growth

Was the reduction in multidimensional poverty higher or lower than the one in income poverty? Relying on a sample of 63 countries, we compare trends in the G-CSPI with those in the squared (income) poverty gap index as they both are distribution-sensitive poverty measures, and those in the G-M0 with those in the poverty gap index as both account for poverty incidence and intensity (Burchi et al., 2022). For income poverty, we use the extreme international poverty line of US\$ 2.15 adjusted for purchasing power parity. Figure 3 shows that in both cases the two forms of poverty often moved in the same direction: in fact, in 47 countries both multidimensional and income poverty declined and in other 3 (4 with the G-M0) both increased. However, in a non-negligible number of countries (20% of the sample) the two forms of poverty moved in opposite directions, with income poverty rising more often. In addition, the strength of the relationship is not high, as the correlation is 0.28 in the first case and 0.33 in the second case. This correlation only slightly increases if we exclude two outliers: Belarus and Moldova.

What is even more striking is the difference in the intensity of the changes: the annualized relative change was -11.3% with the squared poverty gap index against only -2.4% for the G-CSPI, and -11% against -4% for the G-M0. This means that the progress in poverty reduction was much faster for income poverty, specifically 4.7 times and 2.7 times faster than for multidimensional poverty. A recent study (Balasubramanian et al., 2023) using similar data found that economic growth is an important driver of poverty reduction for both income and multidimensional poverty, but substantially more for the former. Their econometric results point to an elasticity of income-based poverty to growth 5-8 times higher than that of multidimensional poverty.

Figure 3: Relative changes in multidimensional and income poverty (63 countries)



5. Horizontal inequalities in poverty

5.1 Rural-urban inequalities in poverty

The first type of horizontal inequality we focus on, is that between people living in urban and rural areas. Historically, in many countries governments have allocated disproportionately more resources to urban areas than rural areas for both economic and political reasons (Lipton, 1977). The consequence was that standards of living were substantially worse, and poverty levels substantially higher, in rural areas. Has this gap reduced over the last years?

Looking at income poverty, we cannot provide a clear answer, as there are no official statistics on urban and rural poverty based on the international poverty lines due to methodological challenges in comparing the costs of living in the two areas (World Bank, 2020). As this is less problematical for multidimensional poverty, here we try to assess the rural-urban gap using the G-CSPI for a sample of 74 countries.

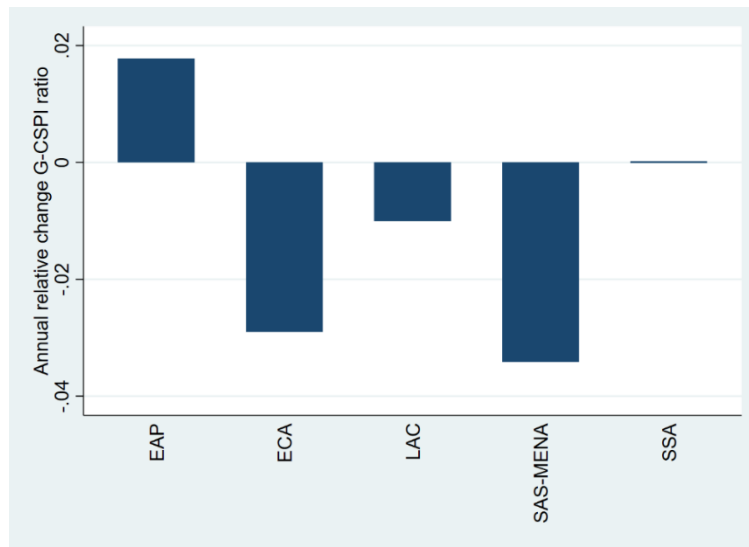
First, we find that rural poverty declined in more countries (65) than urban poverty (52). Fifty countries managed to reduce poverty in both areas, 15 only in rural areas and merely 2 only in urban areas. The overall increase in poverty in 7 countries was due to a rise in both urban and rural poverty. Then, we focus on the rural/urban G-CSPI ratio to investigate directly the rural-urban poverty gap. In the baseline year – which differs from country to country – the mean G-CSPI ratio was 3.09, which means that rural poverty was more than three times higher than urban poverty. This mean ratio fell over time to 2.7 at the endline, therefore marking a 12.5% reduction.

Figure 4 shows that three regions managed to reduce the rural/urban disparities in poverty: in particular, the combined SAS-MNA region⁴ and ECA region witnessed an average yearly reduction

⁴ For this analysis there is only one country from MNA, therefore we combined the two regions.

by 3.4% and 2.9%, respectively. Instead, there was no change in SSA and, even an increase in the ratio in East Asia and Pacific (EAP).

Figure 4: annual relative change in the rural/urban G-CSPI ratio, by region



5.2 Gender inequalities in poverty

Assessing gender disparities in poverty has always been a major challenge due to lack of gender-disaggregated poverty statistics. Income poverty is measured at the household level, so the only ways to measure gender differences consist in comparing female-headed with male-headed households or in counting men and women living in income-poor households. Both these approaches are highly problematical and tend to underestimate gender disparities in poverty (Castañeda et al., 2018; Klasen et al., 2015; Munoz Boudet et al., 2018).

We do not know much about gender differences in multidimensional poverty either as the global MPI is constructed at the household level, too. The only exception is the recent study of Burchi and Malerba (2023). Using a revised version of the G-CSPI and the G-M0 employed in this paper and recent data from 76 low- and middle-income countries, the authors find that in 72 of them female poverty is higher than male poverty. On average, multidimensional poverty is nearly 60% higher among women as compared to men. The largest gender disparities were detected in the MNA region and in South Asia. These results provide new information, which can support the work of policy-makers for example in the targeting of policy interventions. Future research should also look at whether this disparity has really increased over time, as often stated, giving rise to the phenomenon of the *feminization of poverty* (Chant, 2008).

6. Concluding remarks

The paper is one of the first attempts to assess trends in multidimensional poverty for a large number of countries. Using two innovative indices of poverty on a sample of 85 countries, it shows that 85% of them made a progress in multidimensional poverty alleviation. On average, multidimensional poverty declined annually by 0.41 percentage points in absolute terms, and by 2.4% in relative terms based on the G-CSPI: this change was even higher with the G-M0 (0.51 pp. and 3.8%). In most of the countries, the trend was constant over time.

However, progress has been uneven across regions. In particular, a non-negligible share of countries in SSA (around 25%) experienced an increase in poverty. SSA was also the region with the slowest relative reduction in poverty (-1.47% per year). SAS and ECA, instead, reduced poverty in relative terms significantly more than the other regions.

A comparative analysis of income and multidimensional poverty trends reveals that the two forms of poverty, despite a general positive correlation, may even move in opposite directions and that multidimensional poverty has declined substantially less (about 3-4 times) than income poverty.

Multidimensional poverty alleviation was driven especially by improvements in education and health, and by the performance of rural areas. In fact, rural poverty reduction exceeded urban poverty reduction, contributing to narrow down the rural-urban poverty ratio, which fell from 3.1 to 2.7. Gender disparities in multidimensional poverty, based on new evidence, are still large, with female poverty being about 60% higher than male poverty.

In conclusion, this paper shows that - once we consider non-monetary dimensions - the progress in poverty eradication has not been as remarkable as believed and calls for stronger efforts in tackling the different forms of poverty. Indeed, interventions succeeding in alleviating income poverty are not necessarily effective in reducing multidimensional poverty (and vice versa): in particular, empirical evidence points to a limited effect of economic growth. Finally, economic and social policies should primarily focus on SSA, women and on ensuring decent jobs. Despite the reduction in the rural-urban gap, poverty continues being predominantly a rural phenomenon: therefore, a considerable part of poverty-alleviating efforts should still target rural people.

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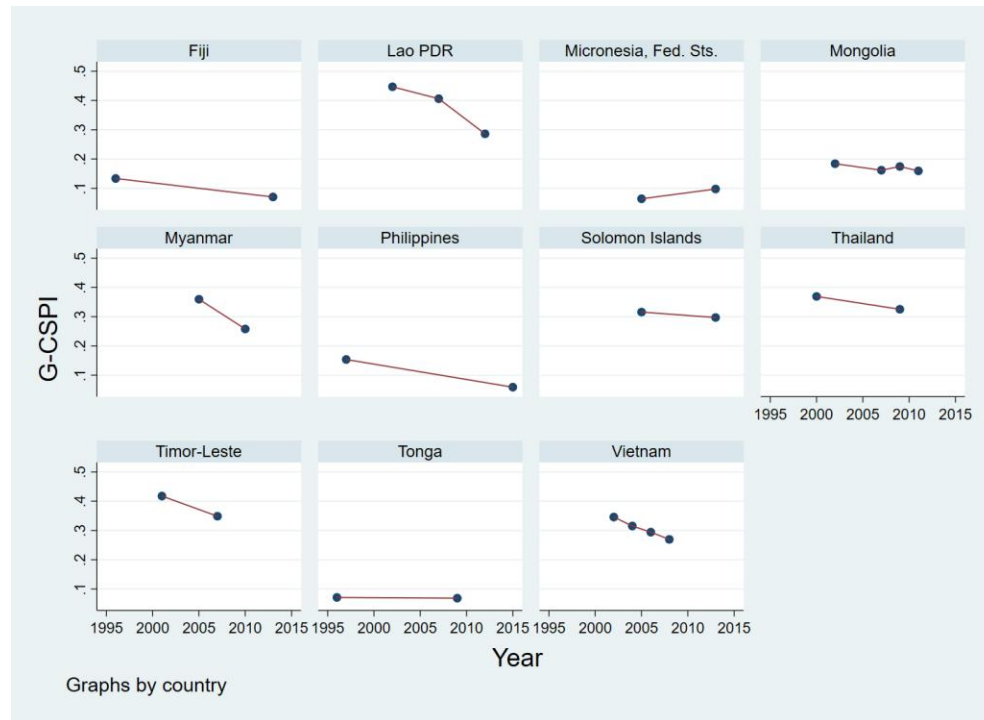
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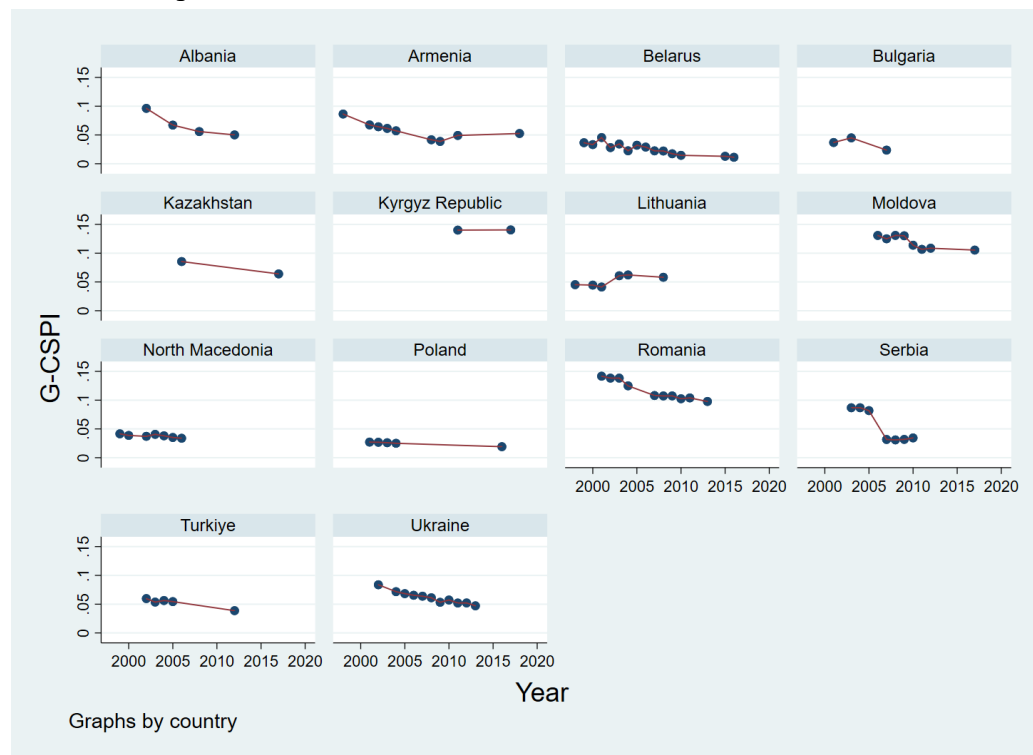
APPENDIX

Figure A1: country-level trends (all data points), by region

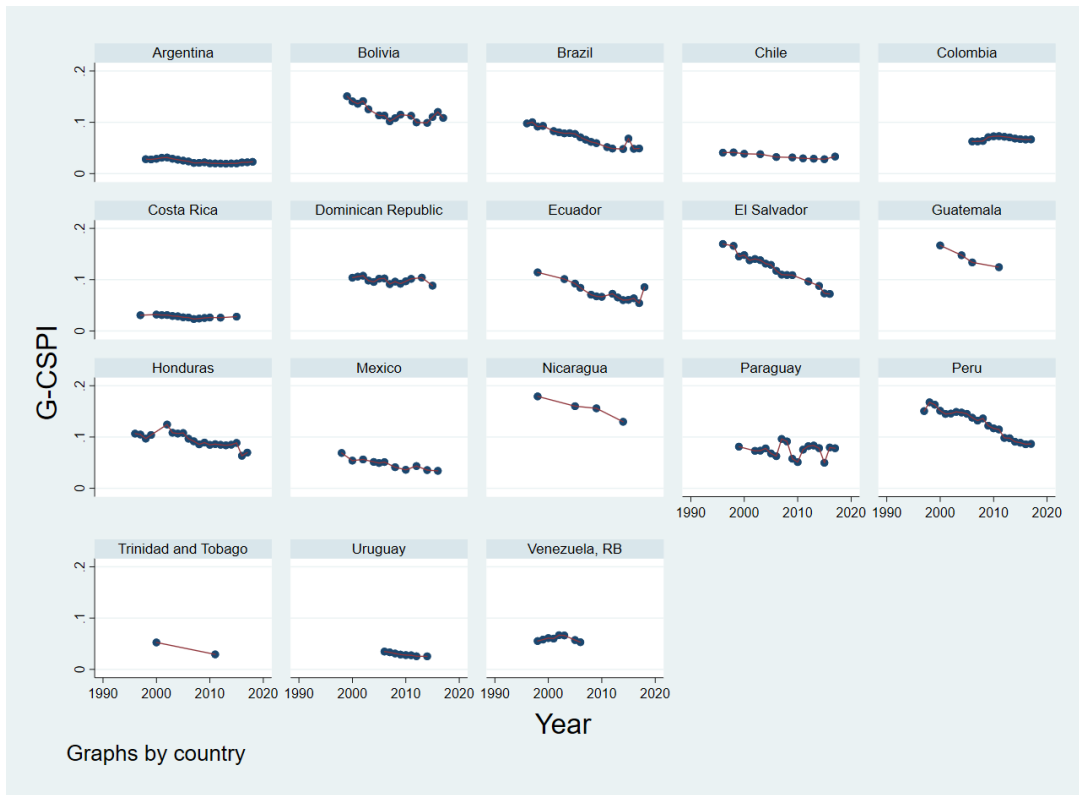
East Asia and Pacific



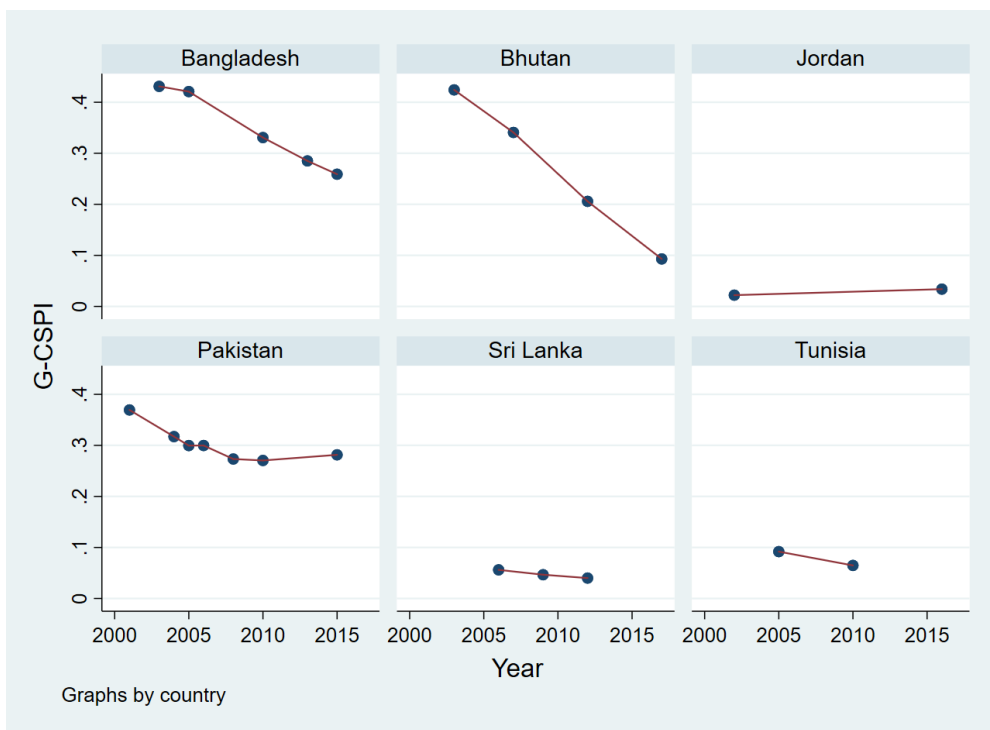
Eastern Europe and Central Asia



Latin American and the Caribbean



Middle East and North Africa and South Asia



Sub-Saharan Africa

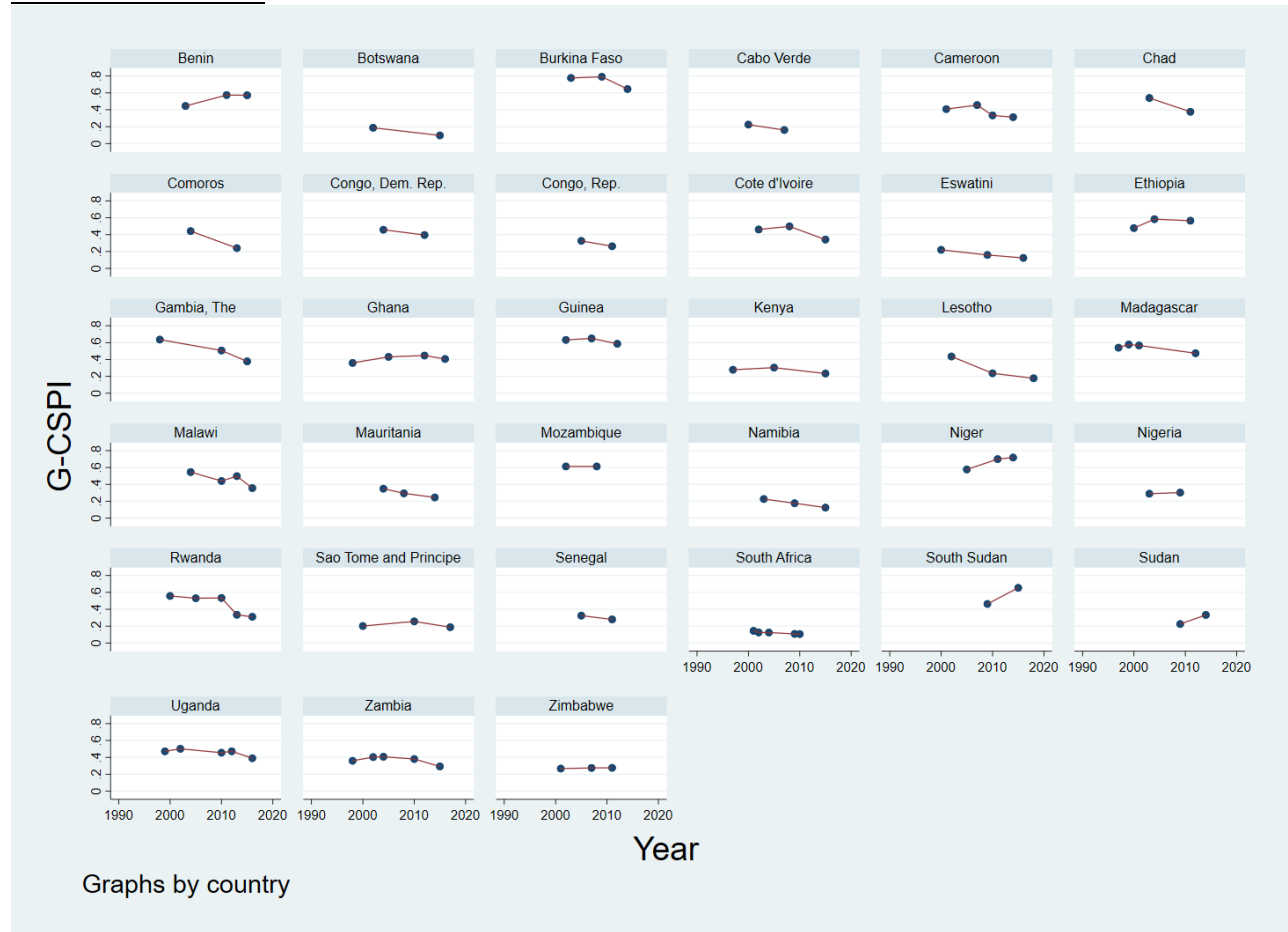


Figure A2: annual absolute changes in the G-CSPI, by country

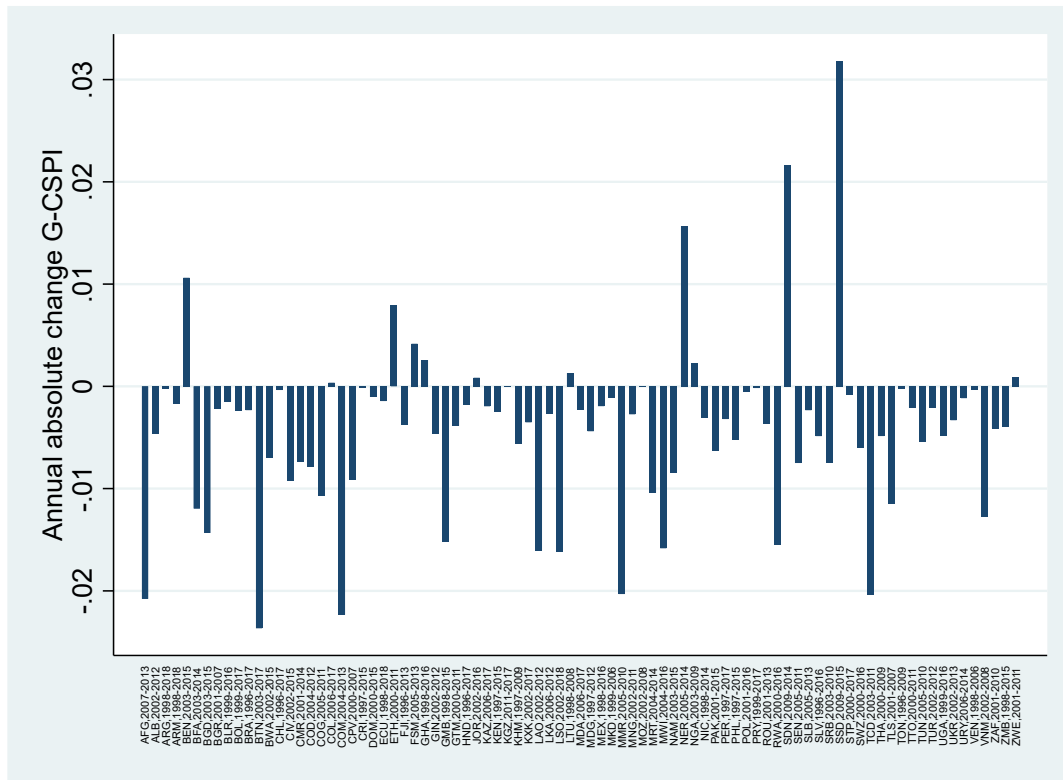


Figure A3: annual relative changes in the G-CSPI, by country

