The End of Global Poverty:

Is the UN Sustainable Development Goal 1 (Still) Achievable?

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1. ENDING POVERTY (KIND OF)

In this paper we ask whether the UN Sustainable Development Goal (SDG) to eradicate poverty is achievable in the aftermath of the COVID-19 pandemic. SDG 1 aims to end poverty in all its forms everywhere by 2030 (see UNDESA, 2020). Target 1.1 outlines the poverty indicator as the international poverty line developed by the World Bank, referred to as the 'extreme poverty' line and revised from $1.25 in 2005 PPP to $1.90 per day in 2011 PPP (see Ferreira et al., 2016 for history, methodology, and revisions; and critique of Reddy and Lahoti, 2015). The $1.90 international poverty line is the median average of the national poverty lines of low-income countries in 2011 PPP and sits alongside higher poverty lines of $3.20 and $5.50 per day, which are respectively the median averages of the national poverty lines of lower- and upper-middle income countries (LMICs and UMICs, respectively) (see Jolliffe and Prydz, 2016).[1]

Projections of poverty levels at the extreme poverty line in 2030 were, prior to the COVID-19 pandemic, generally positive about the plausibility of reducing extreme poverty to low levels (see in 2005 PPP, Chandy et al., 2013; Dercon and Lea, 2012; Ncube et al., 2014; Ravallion, 2012, 2013 and in 2011 PPP, Lakner, Mahler et al., 2020). Previous studies have though tended to project future levels of poverty based on a set of assumptions about inequality that have limited reference to developing countries' empirical experience.[2] Furthermore,

[1] Unless otherwise stated, all monetary amounts in this paper are expressed in international dollars at 2011 purchasing power parity (PPP) exchange rates. A new series of 2017 PPP exchange rates was published in May 2020 and thus these poverty lines will in due course be revised upwards to $2.10, $4.00, $6.30 a day, respectively (see Atamanov et al., 2020).

[2] For example, Lakner, Mahler et al. (2020) simulate a set of scenarios for global poverty in 2030 with differing assumptions on growth and distribution for each scenario. They find that if within-country inequality is static and IMF GDP growth projections are utilised, poverty (at the $1.90 a day line) remains above 500m or 6.5 percent of the global population in 2030. However, a one percent per year decrease in the Gini Index would reduce poverty by a further 100m people.

studies have often focused on the lowest – extreme – poverty line whereas debates about the value of international poverty lines have indicated that the reduction of education, health, and nutrition poverty is more evident at the higher income poverty lines of $3.20 and $5.50 a day (see Reddy and Pogge, 2002; Reddy and Lahoti, 2015).

In light of the above, the objective of our paper is to ask whether SDG 1 – the SDG to end poverty – is achievable in the ongoing COVID-19 pandemic or it's aftermath. We discuss various estimates of the poverty impact of the pandemic itself. We then consider the differing empirical growth-poverty-inequality pathways observed in developing countries over the last 25 years. We identify two stylised pathways as a basis to extrapolate potential scenarios for poverty levels in 2030: a most equitable growth pathway (growth of mean household income/consumption expenditure accompanied by the largest falls in inequality) and a least equitable growth pathway (mean household income/consumption expenditure growth per capita with the largest rises in inequality). Our main finding is that the SDG to end poverty is achievable if the income poverty impact of the pandemic is addressed and countries are able to follow the most equitable growth pathway. In short, the greatest poverty reduction, and greatest likelihood of approaching the SDG poverty reduction goals, will occur if economic growth is combined with inequality reduction. Furthermore, we find that although the received wisdom – based on an interpretation of Kuznets (1955) – is that inequality generally rises with growth, we find there have been episodes in a number of developing countries where the opposite has been true.[3]

[3] This is consistent with Deininger and Squire (1998) who found evidence of the Kuznets Curve in some countries but not others. Earlier empirical studies in the 1970s supported the Kuznets hypothesis (e.g., Ahluwalia, 1976a, 1976b). A set of studies in the 1980s and 1990s questioned or rejected the Kuznets hypothesis (e.g., Anand and Kanbur (1993a, 1993b). Later support came from Barro (2000). However, it is important to note that Kuznets' concern was with the relationship between structural change and inequality rather than growth and inequality (see discussion of Baymul and Sen, 2020).

Our concluding discussion argues given that any income/consumption expenditure growth per capita will be challenging post-pandemic due to debt over-hang and on-going COVID-19 costs, unprecedented national and global redistribution via public policy will be needed to meet the SDG and to end extreme poverty as well as poverty at higher poverty lines. This will require growth in richer and poorer countries to sustain aid budgets in the former and sustain political support for redistribution in the latter, developing countries. Inequality reducing measures are politically difficult and unlikely in the absence of economic growth.

The intended contribution of our paper is three-fold. First, we consider the impact of the pandemic on global extreme poverty by reviewing existing studies. Second, we differentiate growth-poverty-inequality pathways and their average characteristics based on empirical patterns observed in developing countries over the last 25 years. Third, we make a new set of projections for poverty scenarios in 2030 based on two stylised pathways.

The paper is structured as follows. In section 2 we discuss various estimates of the poverty impact of the COVID-19 pandemic. In section 3 we present our methodology and discuss different stylised growth-poverty-inequality pathways. In section 4 we extrapolate poverty levels in 2030 using two stylised pathways. Section 5 concludes.

2. ESTIMATES OF THE POVERTY IMPACT OF THE PANDEMIC

In order to assess whether the SDG to end poverty is achievable, we need to understand the impact of the pandemic on income poverty. There are various estimates of this impact. One important question is whether the economic impact will be as significant for poverty effects as the health-related aspects of the pandemic. Developing countries generally have a lower proportion of people at higher risk in terms of age (>70 years). That said, health systems in developing countries tend to be much weaker than those in advanced countries. Furthermore,

higher COVID-19 morbidity and mortality rates have been linked to hypertension and diabetes as well as to poverty, pollution, and malnutrition, which could make populations of developing countries more vulnerable to the COVID-19 morbidity and mortality (see, for discussion, Schellekens and Sourrouille, 2020). There are also unclear links between COVID-19 and other illnesses such as TB, HIV/AIDS, chronic malaria, and respiratory problems due to indoor cooking. It has been estimated that approximately 470m people globally are at high risk of contracting COVID-19 as a result of pre-existing conditions of poverty – notably malnutrition, lack of access to safe drinking water, and indoor air pollution through the use of noxious cooking fuel (Alkire et al., 2020).

Moreover, lockdowns have often been a primary policy to contain the virus which entail an income loss for those who cannot work from home. In fact, Dingel and Neiman (2020) estimate that the share of jobs that could be performed at home is less than 25 percent for many developing countries – lower than the 40 percent in, for instance, the US – and as low as five percent in low-income countries such Mozambique. Consequently, there is a clear need for a range of social safety net policies which already exist in many developing countries but whose coverage and funding need to be expanded substantially as part of 'pay-to-stay home' or 'pay-to-test' schemes (see discussion of Gentilini et al., 2020).

Estimates of the income poverty impact of the pandemic thus, not surprisingly, remain tentative as they are based either on GDP growth forecasts – the IMF World Economic Outlook (April or October 2020) or the World Bank's Global Economic Prospects (June 2020) and Macro Poverty Outlook (October 2020) – which are all highly tentative, or on estimates of the number of people close to the poverty line and different income shocks. All studies of the global poverty impact of the pandemic reviewed here use the World Bank's PovcalNet dataset.

As Table 1 below shows, despite differing methodologies, the results of these studies are in general consistent in orders of magnitude of the impact of the pandemic on $1.90 a day

poverty, though depending on when the estimate was made. Early 2020 (April) estimates projected 61.9-72.0m additional people living in extreme poverty (under $1.90 per day) based on growth forecasts at that time. Later estimates in 2020 (June and October) were higher and in the range of 80.1-171.5m additional people in extreme poverty (under $1.90 per day). The later World Bank estimates all sit within the range of scenarios based on a five or 10 percent income shock across all developing countries of Sumner et al. (2020).

We can see that World Bank estimates more than doubled in terms of the additional people in poverty from 61.9m (April 2020 IMF growth forecasts) to 124.9-130.6m (respectively, World Bank October 2020 and IMF October 2020 growth forecasts). This means that the earlier forecasts by the World Bank of just 0.8 percentage points added to global extreme poverty rose to 1.6-1.7 percentage points.

When comparing the incidence and absolute changes in these studies, one should note differences in methodology and baselines. Estimates cited here are all distribution-neutral, which in itself is likely a problematic assumption given the differential impact of lockdowns on informal sector workers versus formal sector workers. Lakner, Yonzan et al. (2020) do present further scenarios based on if each country's Gini Index were to rise one, two, five or 10 percent and/or GDP growth rates were weaker, though there is no solid basis to know which of these scenarios is more likely and all are universal scenarios (i.e., applied to all developing countries at the same level).

Table 1. Estimates of the impact of COVID-19 on global extreme poverty ($1.90 poverty line)

Study	Lea (2020)	Valensisi (2020)	Mahler et al. (2020)	Lakner, Yonzan et al. (2020)	Yonzan et al. (2020)		Sumner et al. (2020)	
Shock assumed	IMF growth forecasts, April 2020	IMF growth forecasts, April 2020	IMF growth forecasts, April 2020	World Bank baseline growth forecasts, June 2020	World Bank growth forecasts, October 2020	IMF growth forecasts, October 2020	5 percent income shock	10 percent income shock
Methodology	Growth elasticity	Augmented poverty line	Extrapola-tion of	Extrapola-tion of	Extrapolation of welfare aggregates		Augmented poverty line	

	of poverty change		welfare aggregates	welfare aggregates				
Baseline (pre-crisis)								
Headcount rate	8.6%	8.2%	7.8%	7.9%	7.9%	7.9%	9.9%	9.9%
Millions	670.0	642.3	603.1	615.0	615.0	615.0	727.3	727.3
Forecasts taking COVID-19 into account								
Headcount rate	9.6%	9.1%	8.6%	9.1%	9.5%	9.6%	11.0%	12.2%
Millions	742.0	710.8	665.0	703.0	739.9	745.6	807.5	898.8
Changes relative to status quo								
in millions of poor	72.0	68.6	61.9	88.0	124.9	130.6	80.1	171.5
in headcount rate (percentage points)	1.0	0.9	0.8	1.2	1.6	1.7	1.1	2.3

Source: Authors' based on references listed.

The studies also differ considerably in the baselines for pre-crisis poverty incidence. Lea's (2020) baseline is 670m people that was projected to be the total number of poor by end-2020 in the absence of the pandemic – according to a model based on the partial growth elasticity of poverty changes using PovcalNet's poverty headcounts and the IMF's pre-crisis per capita growth forecast. In contrast, Mahler et al. (2020), Lakner, Yonzan et al. (2020), and Yonzan et al. (2020) use a baseline of 603.1m rising to 615.0m (because the PovcalNet dataset itself was updated with more surveys during the pandemic period). Sumner et al. (2020) used a higher baseline of 727.3m because this is the last published, official World Bank poverty headcount (for 2018).

The plausibility of any of the estimates based on GDP growth forecasts used by many of the studies is open to question given that historically, the accuracy of IMF and World Bank growth estimates has been mixed and furthermore tends to be weaker during crises (see the formal assessment of forecasts versus actual growth data by IMF, 2014; see also Heinisch and Lindner, 2019). Moreover, there is no global model or underlying methodology for the growth forecasts by either the IMF nor the World Bank. Rather, the estimates are made by desk staff in country offices. Sandefur and Subramanian (2020, pp. 3-4) put it thus with reference to IMF estimates, "growth forecasts are a black box… forecasts are an aggregation of subjective

judgements made by the various area units… subject to consistency checks by the research department". In short, instead of a global model accounting for interdependency between countries or multiple concurrent recessions in developed economies, country-level forecasts are made on an individual basis and with methodologies that vary from country to country and series to series. These features could also lead to inconsistencies when some country-level forecasts are compared to other country-level forecasts. For instance, the IMF (2020a [April]) forecasts a GDP per capita contraction of 2.9 and 0.5 percent in Malaysia and Indonesia in 2020, respectively, whereas the World Bank's (2020) projection (made at around the same time as the IMF's April 2020 forecasts) for the countries of East Asia and the Pacific forecast deeper declines: contractions of 4.6 and 3.5 percent, respectively. The time delay for actual GDP data to reach global databases is typically two years meaning real data for 2020 will be available in 2022.

Moreover, there is also the issue of how closely GDP per capita declines are correlated to a household per capita welfare contraction; and that the 'pass-through' is unlikely to act symmetrically during positive and negative GDP growth (see discussion in Valensisi, 2020). It is also worth noting that although financial market crises tend to hit GDP figures worse than household welfare, economy-wide shutdowns may actually impact household welfare more. In contrast, the use of a set of universal income contractions across all developing countries (as used by Sumner et al.) is best viewed as a set of 'what if' scenarios rather than an estimate of the poverty impact of the crisis per se.

In sum, it is important to note that all the above estimates are a range of potential outcomes. In reality none take account of policy interventions and consequentially the depth and severity of the crisis. The final poverty outcome will be determined by what governments do, the duration of the crisis, and the precise income shock in each country and how it distributes across the different sectors, regions, and sub-groups of the population. All estimates

are indications of magnitude and should not be read as predictions but as a range of potential outcomes. Moreover, all estimates make the simplifying assumption that the effects of contractions in household per capita incomes or consumption expenditure are distribution-neutral. However, there are good reasons – i.e., the working from home estimates noted above – to believe that the poor and near poor in developing countries will be disproportionally affected since their share among those working in the informal sector, which is particularly impacted by lockdowns, is significant and interacts with absent or deficient social protection systems.

Finally, there are crucial non-monetary poverty impacts in the dimensions of health, education, and living conditions that are *not* captured in any income poverty estimates. There are pernicious impacts of the crisis beyond changes in welfare levels that could have long-lasting effects on human development and capabilities, chiefly health, education, and nutrition. For instance, UNDP (2020) estimates a global decline in a COVID-19-adjusted version of the Human Development Index mostly driven by the education dimension, which could mark the first decline since the inception of the index in 1990. Those impacts on human development and capabilities are *not* captured in any estimates. Neither do any estimates include the policy changes to social protection programmes that governments of many developing countries have or are planning to, introduce, adapt and/or expand, in response to the pandemic. Such programmes are extensive across middle-income developing countries were most of global poverty is concentrated (see Gentilini et al., 2020).

In sum, estimates of the poverty impact of the pandemic remain tentative and will do so until actual GDP growth data and a new household survey data become available for a large set of developing countries in 2-3 years or more particularly the twenty or so very populous developing countries.

3. GROWTH-POVERTY-INEQUALITY PATHWAYS

3a. Existing Debates

In order to assess whether the SDG to end poverty is achievable, we also need to understand different empirical pathways of growth-inequality-poverty in developing countries. There is a long running debate on just how good growth is for the poor and the importance (or otherwise) of inequality reduction alongside growth. The prior literature has largely been polarised between the alternatives of either growth alone is sufficient to reduce poverty (e.g., Dollar and Kraay, 2002; Dollar et al., 2013) or poverty reduction requires greater attention to inequality and (re)distribution with growth (e.g., Chenery et al., 1974; Shorrocks and van der Hoeven, 2004). Almost fifty years ago, Chenery et al. (1974) argued that a then new approach of 'Redistribution with Growth' was needed to reduce poverty in the developing world. The case for a redistributive approach fell into the background in subsequent decades as it was argued that on average growth is distribution-neutral (see Dollar and Kraay, 2002 and critiques such as Amman et al., 2006 and more recently, Dollar et al., 2013). As such, focusing on growth alone was viewed to be good enough for poverty reduction. Kraay's (2006) detailed analysis based on growth spells across 185 countries indicated the contribution of growth to poverty reduction to be between 43 and 70 percent, pointing towards the fact that changes in inequality should not be dismissed.[4] In short, growth is important for poverty reduction but changes in

[4] Kraay (2006) provided a decomposition analysis of the change in poverty between household surveys using data of 41 countries with long-run growth spells. He found that when measuring poverty by headcounts, 80 percent of poverty reduction was due to changes in average income. However, when considering the poverty gap or the poverty headcount times the poverty gap, respectively, only 70 and 60 percent of the changes were due to changes in average income, suggesting that changes in distribution do matter. Further analyses based on growth spells across 185 countries, indicated the contribution of growth to poverty reduction to be between 43 and 70 percent cited here.

distribution matter as well. In the late 1990s and 2000s there was a closely related debate on 'pro-poor growth' (see for example, Besley and Cord, 2006; Grimm et al., 2007; Shorrocks and van der Hoeven, 2004). Pro-poor growth implied redistribution as the incomes of the poor were to grow faster than those of the non-poor, at least in relative pro-poor growth iteration (see Ravallion, 2004). An absolute pro-poor episode however would imply simply that poverty falls or the incomes of the poor rise (Ravallion, 2004; see also Bourguignon, 2003; Kakwani and Pernia, 2000). Pro-poor growth was in turn superseded in the late 2000s by the term 'inclusive growth' (see Ali and Zhang, 2007; Klasen, 2010; McKinley, 2010; Rauniyar and Kanbur, 2010) which expanded the discussions beyond incomes of the poor to include capabilities and employment. Thus, a focus on decreasing inequality of opportunity was introduced and hence potentially also reducing future inequality of outcomes.

Recent contributions, such as the edited volume of country case studies in Shaffer, Kanbur, and Sandbrook (2019), have revisited the debate noting that in up to a third of growth episodes, poverty rates may not fall (based on the dataset used by Adams, 2004). Even in Dollar and Kraay's (2002) dataset, the incomes of the poorest quintile declined during positive mean survey income growth in 15 percent of growth episodes (Donaldson, 2008). Sen (2014, 2019) concurs with these studies, finding that a surprising number of growth episodes did not result in falling poverty. In fact, Sen finds the average relationship between growth and poverty reduction during an episode characterised as 'growth acceleration' to be negative for the poorest quintile (and, on average, accompanied by a rise in the Gini coefficient), resulting in the poorest 20 percent being worse off after the growth episode in a range of countries including Bangladesh, China, and Nigeria, each home to large numbers of the world's poorest.[5]

[5] Sen distinguishes between two types of growth episodes, namely 'growth acceleration' and 'growth maintenance' and finds that the latter is much more likely to benefit the poor than the former. Sen argues that this is because the institutional factors that lead to growth acceleration differ from those that induce growth maintenance.

3b. Stylised Pathways of Growth-Inequality-Poverty

To consider the associations between growth, inequality, and poverty, we empirically revisit all episodes of income/consumption expenditure growth per capita in the developing world since 1980. We use the same World Bank PovcalNet database as for the estimates of the poverty impact of the pandemic in the discussion above. This database contains comparable household survey data for 164 countries since 1980.[6] We use this dataset to assess the frequency and intensity of the different types of growth-inequality-poverty pathways and their respective average empirical characteristics. We remove high-income countries and those developing countries (low- and middle-income countries) that have inadequate data for our purposes (e.g., they do not have two surveys at least five years apart). We also remove two small countries with less than one million inhabitants (Solomon Islands and Cape Verde). We take the *consistent* growth episodes, defined as periods of time during which, according to the World Bank's PovcalNet data, a country experienced positive (survey-based) income/consumption expenditure growth per capita that lasted for more than five years *and* simultaneously the Gini Index either consistently increased or decreased. We thus exclude those episodes with briefer changes in average income/consumption expenditure per capita and/or inequality (i.e., that last five years or less) or where no data exists. Overall, we are able to identify 118 consistent growth episodes (i.e., lasting for more than five years during which inequality consistently increased or decreased) in the dataset. We find 38 of these consistent growth episodes involved negative growth while the other 80 were positive. The 80 positive growth episodes occurred in 66 developing countries. We find that in 45 of the 80 episodes,

[6] The World Bank bases its estimates of global poverty on PovcalNet. It is furthermore the platform through which progress towards the poverty and inequality SDGs are tracked.

inequality *decreased* with income/consumption expenditure growth per capita, counter to the idea that inequality generally rises during economic growth.

Table 2 categorises the 80 episodes *with positive income/consumption expenditure growth per capita* in the survey mean into three groups by inequality trends: the most equitable growth (the top quartile of all episodes by falls in inequality), the least equitable growth (the bottom quartile of all episodes by falls in inequality; in fact, with rises in inequality), and those episodes that are in between. Table 2 shows the annual average income/consumption expenditure growth rate per capita in survey means, the change in the Gini Index (measured in percentage points and as percentage), and the annual average income/consumption expenditure growth rate per capita of the poorest two quintiles of the population. The most equitable growth episodes entailed a fall in the Gini Index more than ten times greater than the median average (1.13 percentage points compared to the median average 0.10 percentage points) and a growth rate above the median average (5.12 percent compared to the median average of 3.82 percent). The least equitable growth episodes had a growth rate similar to the mean average (4.45 percent compared to 4.40 percent) while inequality – on average –increased.

Table 2. Growth-inequality-poverty pathways in developing countries since 1980 by changes in the Gini (pp and %)

	Average Annual			
	Survey mean income/ consumption growth rate per capita	**Change in Gini (percentage point)**	**Change in Gini (%)**	**Income/ Consumption Mean growth rate of poorest 40 percent of population per capita**
Stylised pathways				
Most equitable growth episodes (top quartile of qualifying episodes)	5.12%	-1.13	-2.60%	8.80%
Middle 50% of qualifying episodes	4.01%	0.13	0.30%	4.57%
Least equitable growth episodes (bottom quartile of qualifying episodes)	4.45%	0.69	1.90%	2.75%

All episodes (N=80)				
Mean	4.40%	-0.18	-0.35%	5.17%
Median	3.82%	-0.10	-0.25%	3.82%
Minimum	0.17%	1.80	5.10%	-0.41%
Maximum	16.74%	-2.51	-6.70%	19.56%

Note: Growth refers to the growth of mean household final income/consumption expenditure per capita. Source: Authors' estimates based on World Bank PovcalNet database.

If we examine the most equitable growth episodes more closely (Figure 1 below shows the annualised reduction in the Gini Index and the annualised average income/consumption expenditure growth rate per capita of the poorest two quintiles), we find that in eight of the 20 growth episodes in the sub-set, the Gini Index fell by over one percentage point a year. Specifically, in Armenia (1996-2002), Niger (2005-2011), Haiti (2001-2012), Paraguay (2002-2008), Bolivia (2002-2011), Argentina (2002-2013), Mali (1994-2010), and Ecuador (1999-2011). In six of the growth episodes with a Gini fall of more than 1 percentage point, the income/consumption expenditure growth rate per capita of the poorest two quintiles was over 10 percent a year. Specifically, Armenia (1996-2002), Niger (2005-2011), Haiti (2001-2012), Paraguay (2002-2008), Bolivia (2002-2011), and Argentina (2002-2013).[7] It is important to

[7] Cases where consistent growth episodes lasted for more than 10 years with annual growth above four percent and Gini Index reductions of more than one percentage point a year have occurred in Ecuador (1999-2011), Argentina (2002-2013), and also in Mali (1994-2010). Nevertheless, in the case of Ecuador and Argentina, these countries experienced significantly rising inequality in the decade prior to the positive growth episodes, thus the net change in inequality since the mid-1980s is close to zero.

say here that we are not claiming causation between policies and falls in inequality. Indeed, we have not supplied evidence that redistributive polices were behind inequality declines in these cases. There are studies of others that link redistributive polices within countries in Latin America with changes in inequality (see notably, Cornia, 2014; Gasparini and Lustig, 2012; Lopez-Calva and Lustig, 2010; Lustig et al., 2013). In studies related to countries in Africa, changes in inequality are much more complex and heterogenous in terms of causes (see detailed studies in Odusola et al., 2017). In Asia, debate has been concerned about drivers of rising inequality with growth and policy (e.g. see Kanbur et al., 2014; UNESCAP, 2018).

If we examine the least equitable growth episodes (Figure 2 below shows the annualised change in the Gini Index and the annualised average income/consumption expenditure growth per capita rate of the poorest two quintiles), we find that in all of these episodes, inequality increased. In three cases, the Gini Index rose by more than one percentage point a year. Specifically, Macedonia (1998-2008), Jamaica (1993-2002), and Mauritania (1987-1993). Half of these episodes had an income/consumption expenditure growth rate per capita of the poorest two quintiles below 2.5 percent and in three cases, Ethiopia (2005-2011), Georgia (2002-2010) and Dominican Republic (1996-2002) the income/consumption expenditure growth rate per capita of the poorest two quintiles was actually negative (even though the mean income/consumption expenditure was positive).

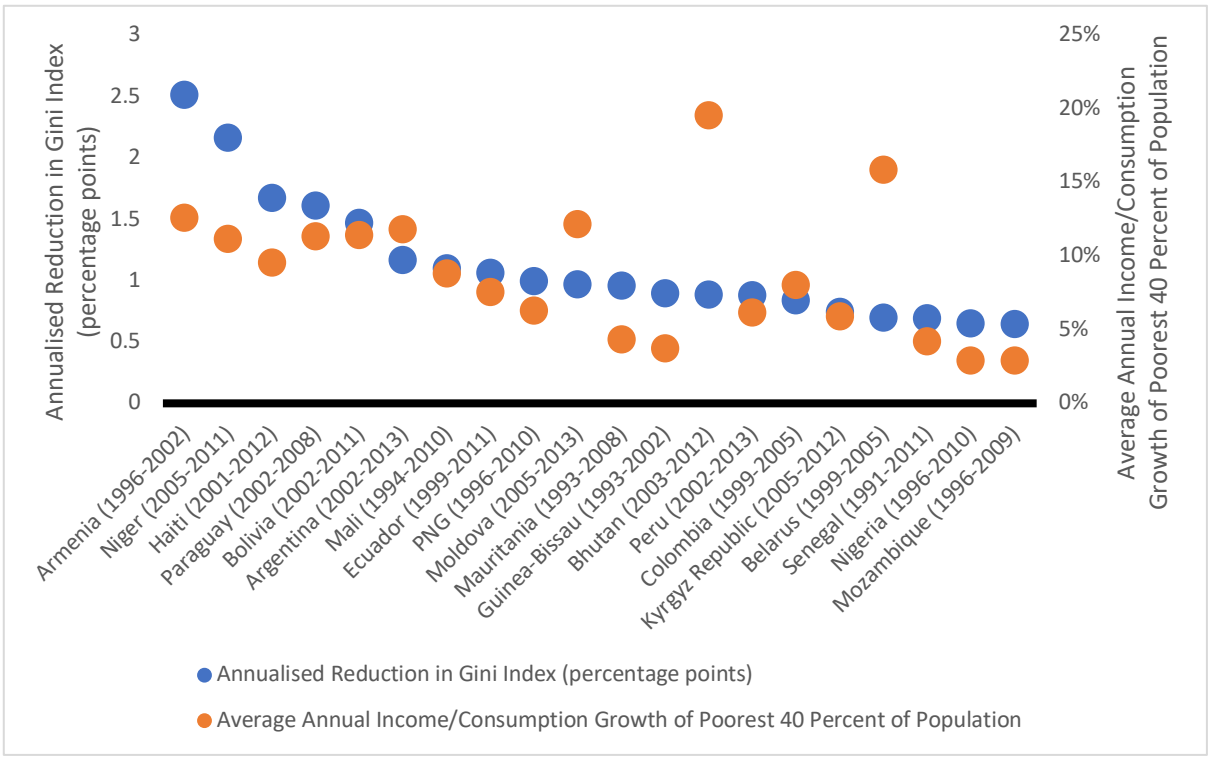

Figure 1. Most equitable growth growth episodes (top quintile of 80 growth episodes).
Source: Authors' estimates based on World Bank PovcalNet database.

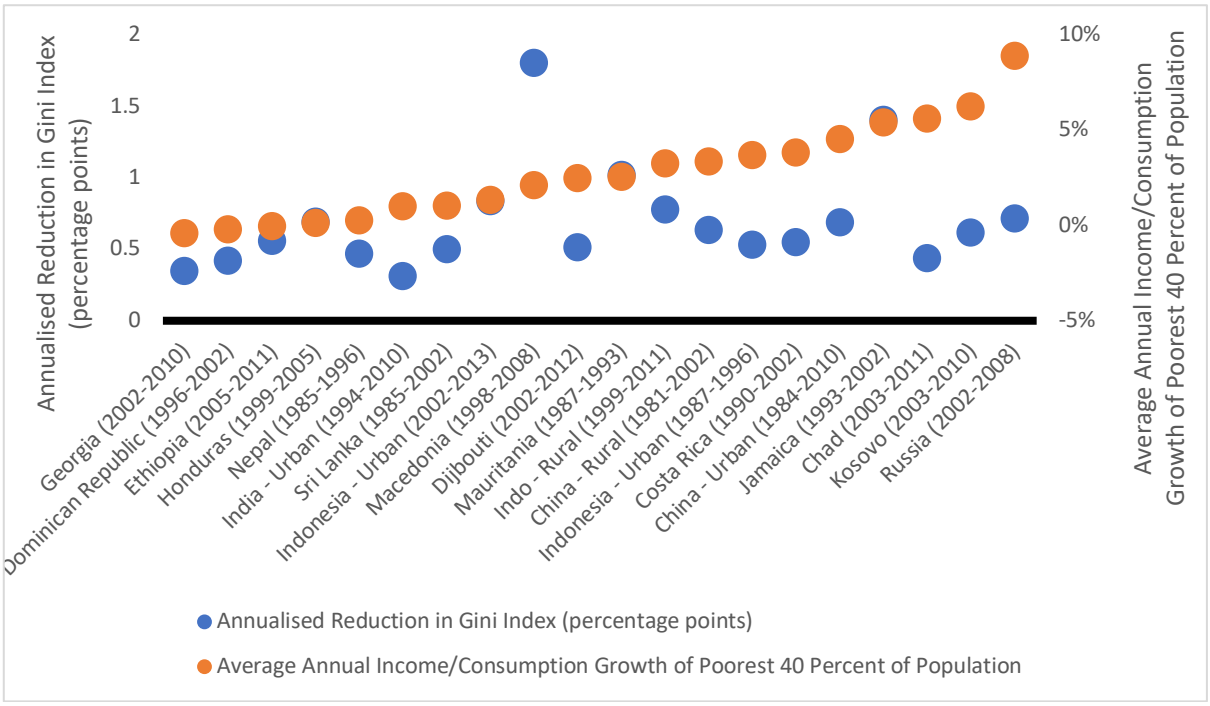

Figure 2. Least equitable growth growth episodes (bottom quintile of 80 growth episodes).
Source: Authors' estimates based on World Bank PovcalNet database.

In sum, based on the 80 episodes of growth we identified in the dataset, we can present stylised pathways with empirical characteristics based on the average of each pathway and the countries in that sub-group. Specifically, growth with falling inequality ('most equitable growth') and growth with rising inequality ('least equitable growth'). Next, we use these two stylised pathways to assess whether the SDG to end of poverty is achievable.

4. IS THE SDG TO END POVERTY ACHIEVABLE?

To answer the question whether the SDG to end poverty is achievable, we need to decide on a baseline for poverty and an extrapolation approach for future scenarios. Given that there are numerous estimates of the poverty impact of the pandemic and all are tentative until a sufficient number of household survey data becomes available, one approach for future scenarios is to simply make *conservative* estimates of poverty levels in 2030 by assuming the poverty impact of the pandemic is reversed by social and economic policy interventions (or that the poverty impact is temporary). Such an approach might not seem sensible in light of the enormity of the pandemic; however, the point is this: If countries cannot meet the poverty SDG making such an assumption, then those countries cannot meet the goal if the poverty impact of COVID-19 is substantial. In short, we can at least be confident that if scenarios for 2030 show poverty cannot be eliminated by 2030, this will most likely be true in the post-COVID-19 world where rates of poverty and levels of inequality could be above the baseline used. Furthermore, as discussed in-depth by Addison et al., (2020) the macroeconomic impacts and GDP growth will be challenging post COVID-19 due to potentially higher foreign debt service (depending on exchange rate movements) and on-going pandemic management costs to developing and developed country governments.

We take the full set of 80 growth episodes and extrapolate how countries would fair if they replicated the most and least equitable growth pathways outlined previously. We estimate the average year in which poverty would end for each of the major geographical regions in the developing world. Table 3 shows the mean year poverty at $1.90, $3.20 and $5.50 would end in each region of the developing world. The estimates show that in all regions the mean year to end extreme poverty is before 2030 if the most equitable growth episodes were replicated. In fact, many regions have a mean year to end extreme poverty before 2021 as the baseline we use is 2013. Further, the average national Gini Index would fall below 30 in each region of the developing world by 2030, which is a reduction by around one-third of current levels. On the other hand, if all countries were to replicate the least equitable growth episodes, our estimates show that the average Gini Index in each region would increase dramatically by 2030. The mean year to end extreme poverty would be 10-21 years later than in the most equitable growth episodes.

The estimates of the mean year to end poverty above, however, entail a tail of countries that would take longer. If we instead estimate the share of global poverty which would be eliminated under each scenario and for each of the poverty lines ($1.90, $3.20, and $5.50 a day) we find that over 95 percent of global poverty at $1.90 a day (and 72 percent at $3.20 per day) would be eliminated if all countries were able to replicate the most equitable growth episodes. In contrast, only 40.4 percent of $1.90 poverty would be eradicated if the least equitable growth episodes were replicated (Table 4). A real difference emerges at the higher poverty lines, as replicating the most equitable growth episodes would only eliminate less than 10 percent of poverty at $5.50 a day.

In sum, our findings are as follows. First, the SDG to end $1.90 poverty could be largely met under the most equitable growth pathway scenario. Furthermore, over 70 percent of $3.20 poverty could be ended as well. Second, the least equitable growth pathway scenario would

mean only 40 percent of $1.90 poverty could be eliminated by 2030. Third, even the most equitable growth pathway would make little difference to the higher poverty line of $5.50, which alludes to the fact that ending *all* poverty by 2030 – hence, also poverty at higher income lines – is not plausible even in an optimistic scenario. We conclude with a discussion of the implications of our findings.

Of course, global, and national redistributive measures, and inequality reduction, would be very unlikely in the absence of growth in both OECD and developing countries. Reasonable growth will be needed in richer countries to sustain aid budget support; and similarly, reasonable growth will be needed in developing countries because inequality reducing measures are politically difficult and very unlikely in the absence of economic growth. In short, we are taking an *optimistic* assumption of the rapid resumption of growth. In reality, growth may be challenging in the 2020s due to on-going pandemic or its aftermath. We discuss this further in our concluding discussion below). What we are flagging here is that we are not making a case that redistributive policies are politically feasible under a stagnant growth scenario in rich or poor countries.

Table 3. What if all countries replicated the most and least equitable growth episodes?

	***Gini* Index**		**Mean year poverty would end**		
Region	**2013**	**2030**	**$1.90 line**	**$3.20 line**	**$5.50 line**
If replication of most equitable growth episodes					
East Asia and the Pacific	0.39	0.24	2018	2025	2032
Eastern Europe and Central Asia	0.31	0.20	2020	2026	2033
Latin America and the Caribbean	0.47	0.30	2024	2031	2037
Middle East and North Africa	0.35	0.22	2018	2025	2031
South Asia	0.36	0.23	2017	2024	2031
Sub-Saharan Africa	0.44	0.28	2021	2028	2035
Mean	0.38	0.24	2021	2027	2034
Median	0.37	0.24	2020	2026	2033
Minimum	0.17	0.11	2015	2022	2028

Maximum	0.61	0.39	2047	2054	2060
If replication of least equitable growth episodes					
East Asia and the Pacific	0.39	0.53	2028	2048	2068
Eastern Europe and Central Asia	0.31	0.43	2033	2052	2072
Latin America and the Caribbean	0.47	0.65	2045	2064	2084
Middle East and North Africa	0.35	0.48	2028	2047	2067
South Asia	0.36	0.49	2025	2045	2064
Sub-Saharan Africa	0.44	0.61	2037	2057	2077
Mean	0.38	0.52	2036	2055	2075
Median	0.37	0.51	2033	5052	2072
Minimum	0.17	0.23	2019	2038	2058
Maximum	0.61	0.87	2112	2131	2151

Source: Authors' estimates based on World Bank PovcalNet database.

Table 4. Share of global poverty eliminated under each scenario in 2030

	$1.90	***$3.20***	***$5.50***
Most equitable growth episodes	95.32%	72.00%	9.80%
Least equitable growth episodes	40.42%	0.00%	0.00%

Source: Authors' estimates based on World Bank PovcalNet database.

5. CONCLUDING DISCUSSION

We asked whether the UN SDG to end extreme ($1.90 per day) poverty is achievable. The answer we find is yes *if* the poverty impact of the pandemic is temporary or curtailed with policy responses and all countries pursue the most equitable growth pathway we identified. In contrast, the answer is likely to be no if the poverty impact of the pandemic is not addressed or is permanent and countries fail to purse the most equitable growth pathway. In short, our main finding is that the goal to end $1.90 poverty and a large proportion of $3.20 poverty is achievable in principle.

What does this finding imply? Given that in the on-going pandemic and its aftermath developing countries will face challenges to achieving both growth and reduced inequality due

to foreign debt servicing and the on-going costs of the COVID-19 pandemic (including vaccine procurement), the findings of this paper imply that national and global redistribution will be needed to meet the SDG to end poverty. The findings suggest this is a timely moment to revisit Chenery et al.'s (1974) call for 'Redistribution with Growth' which advocated for a specific and detailed agenda of (i) asset redistribution, (ii) income transfers, (iii) the redirecting of public investments to focus on productive capacity, and (iv) raising the incomes of the poor alongside – importantly – (v) the conscious adoption of the twin objectives of both redistribution and growth. Furthermore, Chenery et al. advocated the development of new measures of economic growth to assess redistribution with growth including and beyond simply measuring the incomes of the poorest. This has the potential to be applied at the global level too in actions such as debt relief, for example. Indeed, it is becoming more evident over time that international redistribution in the form of greater concessional finance and/or relief from debt servicing will be needed for many developing countries in the coming years to ensure scope for social spending to continue or increase and vaccination programme costs. Our findings point towards the importance of a renaissance of these kinds of redistributive agendas. Looking ahead this implies on the one hand the case study of those countries that have achieved growth with falling inequality and on the other hand a deeper consideration or advocacy of the set of policies Chenery et al. outlined, such as asset redistribution, income transfers, and public investments at a large scale. This is the most likely pathway to achieving the poverty SDG by 2030. It is important to emphasise that this is not just redistribution but redistribution *and* growth. In this sense our findings imply an optimistic assumption. Specifically, the resumption, post-pandemic of good growth in the rich and poorer countries. In the absence of growth, redistributive measures - globally or nationally – will be politically impossible to enact or sustain.

One of the most important determinants of growth and poverty reduction in the 2020s is likely to be the coverage and efficacy of vaccination programmes in developing countries. Such programmes may need to be annual and are vulnerable to the emergence of variants in terms of both severity of symptoms and infection rates. If vaccines are not widespread, a stop/start economic growth seems likely since infections proceed in waves. This implies disrupted economic activity and squeeze on social spending given that governments may have to use resources for vaccine programmes and pandemic management that could otherwise be used for poverty reduction. Similarly, individuals may be pushed (deeper) into poverty due to additional health costs or lost income during ill-health. COVAX will—hopefully—reach twenty per cent of the population of developing countries, depending on disruptions to production which place a question mark over the timeline. China is well placed and has donated substantial numbers of vaccines to date (as has India) to developing countries, though the efficacy rates of some are reported at lower levels than other vaccines. Another approach could be to waive the WTO intellectual property (IP) provisions. This is supported by a large number of countries. In the absence of widespread vaccination programmes with high coverage and high efficacy, it seems possoble that vaccine/immunity passports are used to control infection levels alongside sporadic national and local lockdowns. This is likely to curtail the mobility and thus employment opportunities of those who are un-vaccinated, which may disproportionately be the poorer parts of society.

There is cause for some optimism at least on social policy. Responses to the crisis look promising, though the question remains whether they will be enough to reduce the on-going waves of poverty, especially so given most people work in the informal sector so likely heavily hit by lockdowns as well as health costs of the pandemic falling on governments and households. Gentilini et al. (2021) note the very dramatic—exponential—growth of the number

of countries enacting social protection measures. However, spending on social protection per capita varies enormously between countries.

In short, the trends for the growth and poverty in the 2020s are closely related to how widespread vaccination becomes, how effective the specific vaccines used are, who gets the vaccine and who does not (eventually possibly culminating in the question of who pays for annual vaccination programmes), and the time needed to roll out the vaccine if it is available. There are signs of a commodity boom, but its occurrence is not guaranteed nor is its impact on extreme poverty. Without widespread vaccine coverage, stop/start growth seems likely, which in turn is associated with rising/falling poverty and people moving out of the latter, falling back, moving out again, falling back in a repetitive pattern.

It is thus clear that in absence of widespread vaccination, the pandemic could shape the next ten or more years for many developing countries to some degree through multiple and on-going waves of infection. There are also the questions of morbidity related to long COVID and its impact. Whether SDG 1 is met or not to a significant extent is likely to be related to vaccinations, and these related factors as these will play an important role in determining levels of growth and poverty over the next decade.

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