SDG 1: The Last 3%

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1. Introduction

At the time of writing (in mid-2020), COVID-19 is wreaking havoc on the lives and livelihoods of people across the globe. This paper asks whether a return to "business-as-usual," post-COVID-19 will suffice to put the world on track in its efforts to reduce poverty.

The most widely used measure of global poverty is the proportion of people living below the World Bank's $1.90 a day line ($1.25 in 2005 ICP prices). The Bank's stated goal is to bring this poverty rate to 3% by 2030 (Ravallion 2013; World Bank 2015). In the subsequent process of formulating the UN's Sustainable Development Goals, the first of those goals (SDG 1) was deemed to be the "eradication" of extreme poverty by 2030, as judged by the Bank's international line.

Some observers have argued that the $1.90 line is too low. Another (related) concern is that we should allow for relative poverty. There are also other important factors missing from these measures, such as intra-household inequality and access to non-market goods and services. While acknowledging these points, surely nobody would doubt the attraction of finally living in a world in which nobody is as poor as the 40% of the world's population that lived below $1.90 a day 40 years ago. This would be undeniable progress even if it falls short of attaining other valued goals.

The paper focuses on the challenge of reaching the last 3% living below $1.90 a day. Some calculations are optimistic about our prospects of reducing the share of the world's population living below $1.90 a day to 3% or lower by 2030. Putting aside the shocks of the Global Financial Crisis and the COVID-19 pandemic, the new millennium has seen an appreciably higher rate of aggregate economic growth in the developing world. As Ravallion (2013) observed, if all income levels in the developing world as a whole were to grow (on average) at this new rate—leaving overall relative inequality unchanged—then the Bank's 3% target for the poverty rate would be reached by 2030.

That is consistent with a simple projection of the time series data for global poverty, which even suggests that (prior to the pandemic) we were on track to attaining the UN's more ambitious SDG 1. Figure 1 plots the latest available time series, for both the world as a whole and for developing countries (the world less the

high-income countries). The annual rate of decline in the poverty rate for the world is almost exactly 1.0% points per year (the regression coefficient of the poverty rate, as a %, on time in years is 0.96 with a standard error of 0.04).[1] Projecting forward linearly, the global poverty rate reaches zero in 2026, with a 95% confidence interval of (2024, 2028).

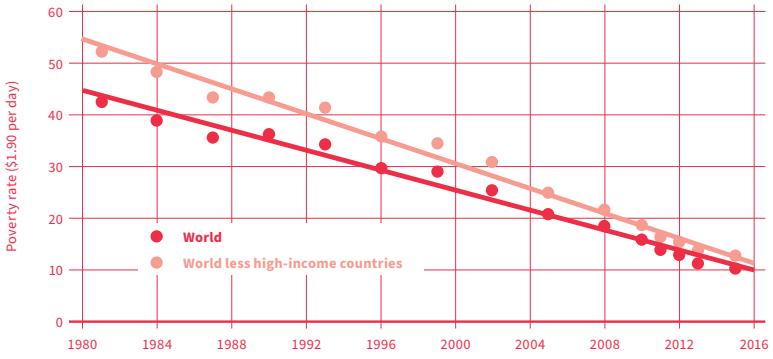

Figure 1. Global poverty rate, 1981–2016. Source: *PovcalNet*.

The 2020 pandemic has clearly increased global poverty rates, though how much is likely to depend heavily on the impacts on inequality. One careful estimate, based on the World Bank's mid-2020 growth projections for developing countries, suggests that an extra 60 million people in 2020 are living below the Bank's $1.90 line due to the pandemic (Lakner et al. 2020).[2] These calculations assume that the "COVID-contraction" is distribution-neutral. However, inequality could rise within many countries, given that poorer households are less able to maintain their earnings and consumption during the pandemic. As Lakner et al. (2020) also point out, even a seemingly modest increase in inequality within developing countries could push the COVID impact on poverty by 50% or more. Of course, this also comes with an even more worrying health-risk to poor people from this life-threatening disease.[3] Here, the focus is on the implications for income poverty.

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1 Here and elsewhere, the standard error only reflects the inter-temporal variability in the series of poverty measures, and not the sampling variability in those measures. Note, however, that the sample sizes are quite large (well over one million households sampled in recent years).

2 Downward revisions to the growth forecasts by the IMF can roughly double this estimate (Yonzan et al. 2020).

3 See, for example, the results of Brown et al. (2020) indicating that the vast majority of the developing world's poor will have little realistic hope of protecting themselves well from the virus.

Consider the lower estimate by Lakner et al. of an extra 60 million people living below $1.90 a day (which adds 0.8% points to the global poverty rate for $1.90 a day). Let us assume that this lasts for two years and that we return to the prior rate of decline of 1% point per year after that time. Then, the expected value of the global poverty rate would reach zero in 2029 (with a 95% confidence interval of 2026, 2032).[4] A less optimistic scenario would use the 90 million and assume that this lasts for three years; even then, the SDG is expected to be attained in 2030 (with a confidence interval of 2028, 2032). An even less optimistic case would entail an extra 120 million people living below $1.90 a day and a crisis lasting four years; then, the expected value of the $1.90 poverty rate reaches zero in 2032 (with confidence interval 2029, 2035). Thus, while there will be a substantial impact on poverty, one might be optimistic about the scope for a post-COVID "business as usual" strategy to attain the Bank's 3% goal and even the more ambitious SDG 1.

However, these calculations may well be deceptive. Even prior to the pandemic, a serious concern was emerging, given the signs of both a slowdown in rates of economic growth in the developing world and rising income inequality in many countries. There is a sign of a slowdown in the last year of Figure 1 (2015), with the rate of global poverty reduction falling to −0.61% points per year.[5] Of course, this is only one year, and slowdowns have happened before (2008, 1999, 1993, 1990), but they did not last.[6] Projections for growth and distributional changes over the coming decade have also suggested a slowdown in the pace of poverty reduction.[7] Even prior to the pandemic, the IMF's growth forecasts were being revised downward, implying slower progress for the poor, although Laborde and Martin (2018) argue that this effect is unlikely to be large. Of course, growth rates go through cycles, and a slow period need not last.

Another concern, that will persist post-COVID, is that the poorest few percent may be harder to reach with current development policies. In other words, the past

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4 Given that this calculation assumes that the pre-crisis annual rate of change is restored at the end of the two years, the revised data for reaching a zero poverty rate in expectation are obtained by simply shifting up the intercept by the amount of the increment to the poverty rate attributed to the crisis plus the 1% per years loss of poverty reduction over the two years.

5 The decline is −0.73% for the developing world as a whole. This global slowdown in the pace of poverty reduction is noted by World Bank (2018).

6 For the purpose of this calculation, I defined a "slowdown" as a rate of poverty reduction that is more than three standard errors below the trend rate over the period as a whole.

7 See, for example, World Bank (2015); Bluhm et al. (2018) and Lakner et al. (2020).

trend rate of decline will not be maintained. A number of possible reasons for this can be identified:[8]

- It is well known that there is transient poverty—people flow in and out of poverty in any time period, reflecting the imperfections of risk markets and the institutions (including governmental) for social protection. Insisting on "eradicating" poverty may then be a much harder goal than 3%;
- The crisis may have a lasting effect beyond the end of the pandemic, due to lower investments by poor families (including in their children's education) during the pandemic. School closures alone point to this possibility;
- Some of the poorest live in remote places with characteristics, such as poor infrastructure and/or natural conditions, that lower the productivity of their labor and capital. Thus, they may be caught in geographic poverty traps, whereby a poor location has a causal role in retarding the prospects of escaping poverty. The crisis may well have made escaping poverty even harder post-crisis;
- There may be social, political and/or economic constraints facing the poorest, associated with their identity and the discrimination they face in specific social contexts. Standard policies that work well for the majority may fail for these groups. Relatedly, refugees, undocumented migrants and stateless people may be harder to reach, and are probably both poorer than average and undercounted in our survey data used to monitor poverty;[9]
- The poorest may be caught in low-level attractors—a "dynamic poverty trap"—such that large idiosyncratic gains are needed to get onto a sustainable path out of poverty. Small gains will not succeed in assuring sustained poverty reduction. The crisis may well leave many households who were not poor previously in a dynamic poverty trap;
- Exposure to theft and violence associated with weak legal enforcement and other deficiencies in state capacity may create extra hurdles to escaping poverty, with reduced efficacy of standard policy packages for reaching the poorest.

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[8] There is literature on each of these arguments. On geographic poverty traps, see Jalan and Ravallion (2002). On poverty traps associated with income dynamics and group memberships, see the collection of papers in Bowles, Durlauf and Hoff (Bowles et al. 2006). On the prospect for a poor-institutions trap, see Ravallion (2016b, chp. 9).

[9] Indeed, when a poor person migrates but stays poor, and is not counted in the survey data for the destination, the measured global poverty count falls even though the true value is unchanged.

If any of these arguments are correct, then our progress in reducing numbers of poor may not come with much progress in reaching the poorest globally, even when a country reaches the last 3%. We can call this the "poorest left behind hypothesis".

Where might we look for evidence for or against this hypothesis? The present paper looks to the past performance of developing countries. There could be no surprise if countries that have not done well against poverty also had a harder time reaching their poorest. (For example, a number of observers have pointed to the challenges facing many countries in Sub-Saharan Africa in attaining SDG 1.[10]) The more interesting place to look is the set of countries that have made substantial progress against poverty. How well have they done in reaching the last few percent? Is attaining SDG 1 largely a matter of assuring that the countries that are not doing so well start to do as well as the relatively good performers?

An interesting example is Malaysia—one of the most successful countries in reducing poverty (Ravallion 2020). Based on *PovcalNet*, Malaysia's "$1.90 a day" poverty rate reached 3% (strictly 2.9%) in 1984. However, 32 years later, it was still not quite zero (0.1%). The last 3% took more than three decades! Possibly, the world's last 3% could take a similar time, even if other developing countries were as successful as Malaysia has been in reducing poverty.

Motivated by the example of Malaysia, the paper examines the records of countries that have been successful in getting their "$1.90 a day" poverty rate down to 3% or lower. One region of the developing world stands out in this respect, namely East Asia, where the poverty rate (by this measure) fell below 3% in 2015, having been around 40% at the turn of the Millennium, and over 80% around 1980.[11] There have also been some specific countries across the world that have been successful in this respect. The paper studies the record of the 18 developing countries across the world that have been successful in reducing the World Bank's $1.90 a day poverty rate from over 10% (the current global mean) to under 3%. The aim here is to see if there is any sign of a slowdown in progress against poverty once the last 3% is reached.

Two measures are used. The first is the familiar headcount index—the share of people living in households with consumption or income per person below $1.90 a day. The second is a measure of the "floor" to living standards, defined as a weighted mean of consumption or income below a threshold no less than $1.90 a day, with the

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[10] See Ravallion (2013); World Bank (2015, 2016); Bluhm et al. (2018) and Laborde and Martin (2018).

[11] Note that the $1.90 a day poverty rate in 2015 is also below 3% for Eastern Europe and Central Asia. However, the rate has been below 10% for all prior years in the *PovcalNet* series (though survey coverage is weak prior to 1990).

highest weight on the poorest (Ravallion 2016a). If poverty has been eliminated, then the floor will have reached $1.90 a day.

The paper finds that, for both East Asia as a whole and on average for the 18 countries that have been relatively successful against poverty over the longer-term, there was a slowdown in the pace of progress for the last 3%, even prior to the pandemic. The poverty rate was falling more slowly, and the floor was not rising much, if at all. This suggests that a return to "business as usual"—even by the standards of countries doing well against poverty—will not be sufficient to eliminate this form of extreme poverty post-COVID.

2. Measures and Data

The inadequacies of the standard headcount index of poverty are widely recognized in the literature, though less so in monitoring and policy making. An important limitation of the headcount index is its inability to reflect inframarginal changes in living standards among the poor, including the poorest.[12] Even among those deemed to live in "extreme poverty", some are much poorer than others. This has led to greater attention to the "ultra-poor" (a now popular term first coined by Lipton 1988).

Successfully reaching the poorest through economic development implies that the floor of living standards has risen over time (and clearly this can happen without any change in the headcount index). Focusing on the floor is interpretable as a Rawlsian approach to poverty monitoring, distinct from the traditional "counting" approach that focuses on numbers of people (unweighted or with higher weight on poorer people) below the poverty line.

There are limits to how well we could ever hope to measure the floor from standard surveys. The sampling frame is typically those who live in some form of dwelling, so homeless people and those living in institutions (such as worker dormitories or prisons) are under-represented or even excluded, and they could well be concentrated among the poorest stratum. For example, recent rural migrants living in urban dormitories or slums could well be under-represented. There has been progress in the design and analysis of survey designs that can better represent the homeless. However, practice using such methods has lagged.

One candidate for the floor is the empirical lower bound of the consumption levels measured in a survey. One might think of this as the limiting case of the

[12] For a survey of the literature on poverty measures, see Ravallion (2016b, chp. 5).

Foster, Greer and Thorbecke (FGT) (Foster et al. 1984) class of measures, as the FGT inequality-aversion parameter (α) goes to infinity. However, this would not be satisfactory since there are almost certainly measurement errors and ignorable transient effects in the survey data. For example, all the members of one sampled household may have been sick during the (often short) recall period used by the survey, and therefore consumed very little in that period. However, one would be loath to say that such a sample point should define the floor. More generally, there are likely to be various transient effects in the data, whereby observed incomes (or consumption expenditures) in a survey fall temporarily below the floor, but recover soon after. We must also recognize the existence of measurement errors in the cross-sectional survey data available for most countries. Given the measurement errors and transient factors, we cannot be certain that the lowest observed consumption or income is, in fact, the floor. There is a non-negligible chance that the observed consumption or income of potentially anyone within some stratum of low observed values could, in fact, be the level of the floor. Some form of averaging is clearly necessary.

Ideally, one would use something like the lower bound of time–mean household consumption or income, measured accurately over a longer period than is typically measured with survey data. If we were to know the true consumption observed over a long enough period in panel data for a large-enough sample, we could reliably estimate the floor directly as this time–mean, loosely interpretable as "permanent income." However, this is not included in the normally available data.

This paper follows the approach to measuring the floor using the cross-sectional data proposed in Ravallion (2016a). That approach does not require panel data, but can be implemented with cross-sectional surveys, while recognizing the uncertainty as to whether the lowest observed consumption or income in such a survey is, in fact, the floor. Following Ravallion (2016a), I postulate that any observed income level within a stratum of poor people has some positive probability of being the floor. These probabilities are not data, but there are some defensible assumptions we can make in lieu of the missing data. While we are uncertain as to whether the lowest observed value is the floor, it is reasonable to assume that this value has the highest probability of being the floor—that our data are sufficiently good to believe that the probability is highest for the person who appears to be the worst off. It also seems reasonable to assume that the probability of being the poorest household declines (or at least does not increase) as the observed measure of income rises. Beyond some level of observed consumption or income—call this threshold level z—there is presumably no chance of finding the true floor.

The key parameter (α) of this measure is allowed to take two possible values. In the first, the probability declines linearly ($\alpha = 1$) until the observed income reaches z, while in the second the probability is equal across all incomes below z (implying that $\alpha = 0$). I do not consider the latter case to be plausible, but it is a natural benchmark for testing robustness. Results are provided for both parameter values. Ravallion (2016a) shows that when $\alpha = 1$, the floor can be written as $\left(1 - \frac{SPG}{PG}\right)z$, where *SPG* is the squared poverty gap index proposed by Foster et al. (1984) and *PG* is the poverty gap index. When $\alpha = 0$, the floor can be written as $\left(1 - \frac{PG}{H}\right)z$, which is the equally weighted mean income of those with income below the poverty line, where H denotes the headcount index.

Notice that the parameter z is not a "poverty line," as usually interpreted, but rather it is a threshold, above which the probability of being the poorest person is taken to be zero. This paper will take \$1.90 a day as the value of z. However, sensitivity to this choice is a potential concern, and a higher value of \$2.50 will also be considered.

The dataset I have constructed for this paper is entirely derived from the World Bank's *PovcalNet* interactive data site. I use the Bank's \$1.90 a day poverty line (Ferreira et al. 2016), which is an update to 2011 local prices of the \$1.25 a day line proposed by Ravallion et al. (2009). The methods used by *PovcalNet* are explained in Chen and Ravallion (2010). Since the data and methods are well known, they are not described further here. As discussed in the Introduction, I focus on both East Asia and a selected sub-sample of countries, namely those that have fewer than 3% living below \$1.90 a day in the latest available survey (in most cases, 2017). The sample is further selected according to whether, at a prior date in the *PovcalNet* series, the poverty rate was at least 10%. Therefore, the focus is on countries that have had, in the past, at least the current global poverty rate, but were successful in getting the rate down to 3% or lower.

3. Results

By way of background, it is of interest to first see how the floor has evolved in the world as a whole. For various parameter values, I find that the developing world has, to date, had very little success at raising the floor above something close to the biological level, despite the progress in reducing the number of people living near the floor. The world's poorest have gained disappointingly little over the last 30 years. To elaborate, Figure 2 compares my estimate of the floor in 2011 ICP prices (setting z = \$1.90) with the overall mean consumption in the developing world. We see that the overall mean has been on a new, steeper, trajectory since 2000. However,

this has done very little to lift the floor. The level of the floor at 2011 PPP is about $1.00, or $0.65 in 2005 ICP prices, which is almost exactly Lindgren's (2015) estimate of the biological floor. There is a (statistically significant) positive slope over time to how the floor has evolved, but the slope is very small. At this rate of progress, extreme poverty will not be eliminated until the year 2278 (with a 95% confidence interval of 2169 to 2387).

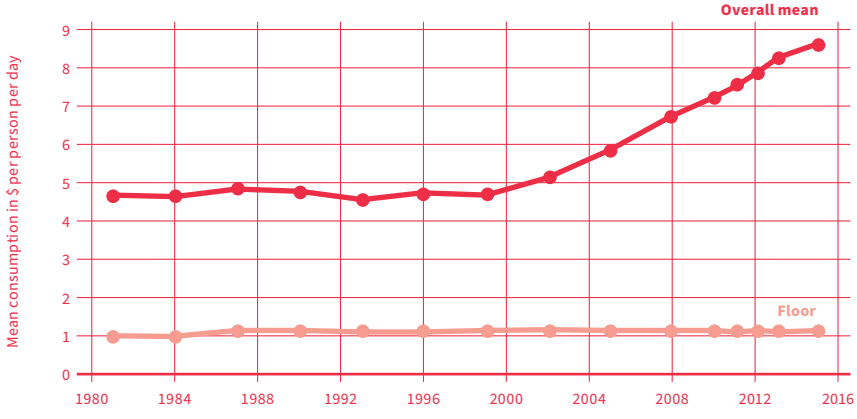

Figure 2. Consumption floor for the developing world. Source: Author's calculations (updating Ravallion 2016a).

From this perspective, we are way off-target to eliminating extreme poverty by 2030, as called for by SDG 1. The reason for this is clear: the developing world is not making enough progress in reaching the poorest—those living well below $1.90. Thus, we can reasonably say that the world's poorest are being left behind, or close to it.

The progress we see over time in reducing the incidence of poverty in Figure 1 stands in marked contrast to Figure 2. In short, the success of the developing world in recent decades has been to reduce the counts of people living near the floor, rather than to raise the floor.

Of course, one cannot rule out the possibility that, at some future point, the floor will move to a new and much steeper (positive) trajectory as the poverty rate moves toward zero. The global rate is well above zero now. Figure 2 might not be indicative of the future evolution of the level of the floor. It may be more instructive to look instead at the countries that have been relatively successful in reducing their poverty rate to under 3%.

As noted in the Introduction, the last 3% in Malaysia took over 30 years, and poverty (assessed by the $1.90 line) is still not fully "eradicated." Figure 3 plots the country's $1.90 a day poverty rate and the corresponding estimate of the floor ($\alpha = 1$). The floor has been rising since at least 2004, and reached $1.60 in 2016, and it will reach $1.90 when the last poor person reaches this level.

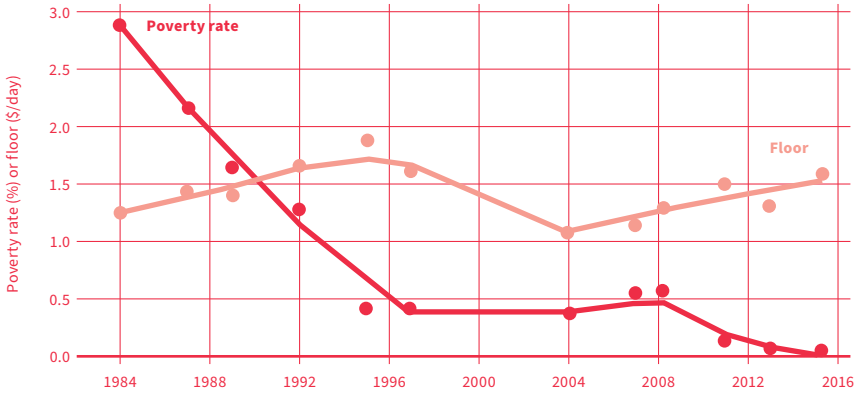

Figure 3. Poverty rate and floor ($1.90 a day) in Malaysia, 1984–2016.

Next, consider East Asia as a whole, which (as is well known) has made enormous progress against absolute poverty by the World Bank's measures.[13] Figure 4 plots East Asia's headcount index for $1.90 a day over the period 1981–2015. In 1981 (the earliest year in the *PovcalNet* series), 80.5% of the region's population lived below $1.90 a day; the latest estimate indicates that this is only true of 2.3% in 2015. That was the first year the East Asia poverty rate had fallen below 3%; in 2013, the rate was 3.6%.

However, this last period of poverty reduction witnessed a decline in the pace of progress in reducing the poverty rate or lifting the floor. Indeed, we even see a slight decline in the floor for East Asia, which fell from $1.26 in 2013 to $1.24 in 2015 (using $\alpha = 1$ and z = $1.90; Figure 4 gives the floor). Clearly, one should not make too much of a decline of only one cent per year, but it does suggest a levelling off in progress in lifting the floor in East Asia once the last 3% was reached. By contrast, the floor in 1981 was $0.83, i.e., over the period 1981–2015 the floor rose by 1.3 cents per year on average.

[13] See the evidence and further discussion in Chen and Ravallion (2010).

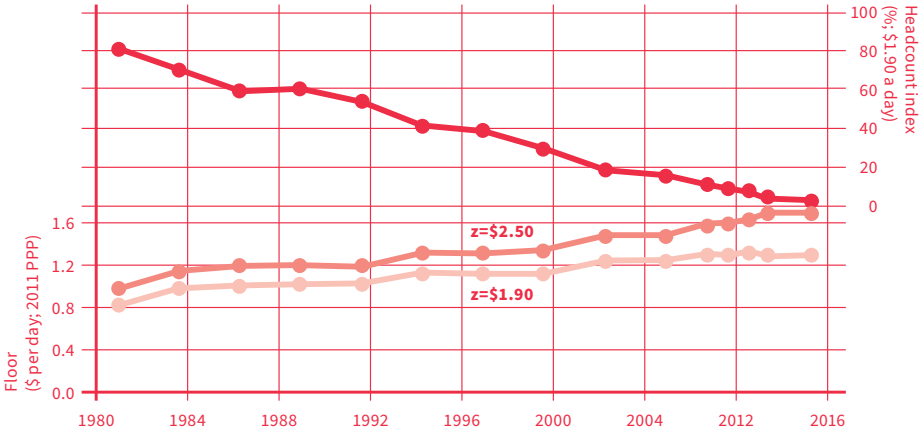

Figure 4. Poverty rate and floor for East Asia. Source: *PovcalNet*.

These calculations assume that the probability of living at the floor is zero above $1.90. To test sensitivity to this assumption, I also used a higher threshold of $2.50. The same pattern is evident, indicating a stabilization in East Asia's floor in recent years. Using $2.50, the floor again falls slightly in the most recent years, from $1.65 in 2013 to $1.64 in 2015, although it had been lower in 1981, at $0.93; Figure 4 also gives the floor for this higher threshold.

Given that economic growth has been so important for East Asia's long-term progress against poverty, it might be conjectured that a growth slowdown is the reason for these findings.[14] However, that is not what we see in the data. East Asia's recent slowdown in poverty reduction is not due to a lower growth rate in household income per capita. Indeed, the growth rate over 2013–2015 of 6.2% per annum is above the long-term trend, which is 5.4% (based on a regression of the log mean of year, the standard error is 0.2%). Rather, the cause is clearly the incidence of growth, which has not reached the poorest.

While these observations are suggestive, they put a high weight on just a couple of recent estimates for East Asia in *PovcalNet*. Maybe, a downward trend will reemerge soon. Further insights can be found if we turn to the country data. Again, it is the relative successes that we are interested in. Table 1 provides poverty measures for all the countries in the *PovcalNet* database that have a $1.90 poverty rate below 3% in the latest survey, but had a rate of at least 10% prior to that. There are 18 countries

[14] Overviews of the literature on growth and poverty reduction can be found in Ferreira and Ravallion (2009) and Ravallion (2016b, chp. 8).

satisfying these criteria. Table 1 provides the poverty measures referred to above—*H*, *PG* and *SPG*—as well as some basic data on the surveys used. Table 2 provides the estimated floor and mean consumption or income.

Table 1. Poverty measures for countries that reduced poverty rate from over 10% to under 3%.

	Earliest Year above 10%					Closest Year to 3% Headcount Index					Latest Year				
	Year		H	PG	SPG	Year		H	PG	SPG	Year		H	PG	SPG
Armenia	1999	c	16.88	4.07	1.49	2006	c	3.22	0.57	0.16	2017	c	1.35	0.24	0.07
Bhutan	2003	c	17.64	3.27	0.91	2012	c	2.17	0.41	0.11	2017	c	1.49	0.24	0.07
Chile	1987	i	11.67	4.05	2.23	2009	i	2.59	1.29	0.95	2017	i	0.75	0.43	0.33
China	1981	I	88.07	42.67	24.31	2013	C	1.86	0.35	0.13	2015	C	0.73	0.16	0.07
Costa Rica	1981	I	24.70	10.76	6.23	2005	i	3.14	1.1	0.63	2017	i	0.99	0.36	0.23
Dominic. R.	1989	I	13.38	3.36	1.16	2001	i	3.92	1.11	0.49	2016	i	1.64	0.45	0.25
El Salvador	1991	i	20.65	10.34	7.31	2014	i	2.97	0.64	0.23	2017	i	1.87	0.4	0.13
Kazakhstan	2001	c	10.30	2.54	0.96	2004	c	2.26	0.37	0.10	2017	c	0.02	0.01	0.00
Kyrgyz Rep.	1998	c	30.59	11.58	6.24	2012	c	2.92	0.74	0.30	2017	c	1.47	0.28	0.08
Mexico	1996	c	11.23	3.37	1.50	2006	c	3.41	0.84	0.31	2016	c	2.48	0.58	0.21
Moldova	1997	c	15.67	4.65	2.12	2006	c	2.41	0.59	0.25	2017	c	0.06	0.00	0.00
Morocco	1984.5	C	11.07	2.35	0.68	2006.9	c	3.12	0.6	0.19	2013.5	c	1.02	0.18	0.05
Panama	1989	i	23.92	16.32	13.71	2011	i	3.04	0.88	0.4	2017	i	2.52	0.93	0.54
Paraguay	1995	i	12.40	5.25	3.09	2012	i	3.28	0.92	0.37	2017	i	1.23	0.23	0.07
Sri Lanka	1985	C	13.27	2.55	0.78	2009.5	c	2.41	0.41	0.11	2016	c	0.83	0.09	0.02
Thailand	1981	C	19.58	5.02	1.73	1994	c	3.22	0.53	0.14	2017	c	0.03	0.00	0.00
Tunisia	1985	C	14.98	3.81	1.43	2005.3	c	3.33	0.71	0.24	2015.4	c	0.26	0.04	0.01
Vietnam	1992.71	c	52.90	16.55	6.97	2012	c	2.80	0.48	0.13	2016	c	1.97	0.39	0.12

Note: These are the countries in *PovcalNet* for which the latest year has a $1.90 a day poverty rate under 3%, for which an earlier year had a rate over 10%. The first main column gives the data for the earliest year in *PovcalNet* with a poverty rate over 10%. The middle column gives the survey year for which the poverty rate was closest to 3%. The third column gives the latest year in *PovcalNet*. C: grouped consumption data; I: grouped income data; i: unit-record income data; c: unit-record consumption data. Source: *PovcalNet*.

Table 2. Floor and overall mean in countries that reduced poverty rate from over 10% to under 3%.

	Earliest Year above 10%				Closest Year to 3%				Latest Year			
	Year	Floor (α=1)	Floor (α=0)	Mean	Year	Floor (α=1)	Floor (α=0)	Mean	Year	Floor (α=1)	Floor (α=0)	Mean
Armenia	1999	1.20	1.44	4.02	2006	1.37	1.56	5.44	2017	1.35	1.56	6.94
Bhutan	2003	1.37	1.55	4.88	2012	1.39	1.54	8.08	2017	1.35	1.59	8.78
Chile	1987	0.85	1.24	9.84	2009	0.50	0.95	15.69	2017	0.44	0.81	23.91
China	1981	0.82	0.98	1.15	2013	1.19	1.54	9.47	2015	1.07	1.48	10.92
Costa Rica	1981	0.80	1.07	5.47	2005	0.81	1.23	16.39	2017	0.69	1.21	24.06
Dom. Rep.	1989	1.24	1.42	7.98	2001	1.06	1.36	13.63	2016	0.84	1.38	15.51
El Salvador	1991	0.56	0.95	7.33	2014	1.22	1.49	9.86	2017	1.28	1.49	10.25
Kazakhstan	2001	1.18	1.43	5.37	2004	1.39	1.59	6.46	2017	1.90	0.95	11.20
Kyrgyz R.	1998	0.88	1.18	4.25	2012	1.13	1.42	5.12	2017	1.36	1.54	5.32
Mexico	1996	1.05	1.33	7.80	2006	1.20	1.43	11.62	2016	1.21	1.46	10.25
Moldova	1997	1.03	1.34	4.52	2006	1.09	1.43	7.97	2017	1.90	1.90	9.42
Morocco	1984.5	1.35	1.50	5.49	2006.9	1.30	1.53	7.85	2013.5	1.37	1.56	10.03
Panama	1989	0.30	0.60	9.48	2011	1.04	1.35	20.43	2017	0.80	1.20	24.56
Paraguay	1995	0.78	1.10	13.19	2012	1.14	1.37	14.92	2017	1.32	1.54	17.11
Sri Lanka	1985	1.32	1.53	4.16	2009.5	1.39	1.58	6.72	2016	1.48	1.69	8.82
Thailand	1981	1.25	1.41	5.46	1994	1.40	1.59	8.08	2017	1.90	1.90	15.68
Tunisia	1985	1.19	1.42	5.69	2005.3	1.26	1.49	8.12	2015.4	1.43	1.61	10.99
Vietnam	1992.71	1.10	1.31	2.41	2012	1.39	1.57	7.83	2016	1.32	1.52	9.44

Comparing Tables 1 and 2, one point of note is that countries with higher growth rates tended to see faster rates of reduction in the headcount index; the correlation coefficient (r) is 0.69, and it is significant at the 1% level. This pattern in the data is consistent with past studies (as reviewed in Ravallion 2016b, chp. 8). Another observation from Table 2 is that the two measures of the floor (for $\alpha = 0$ and $\alpha = 1$) are highly correlated; r = 0.98 for both the first and second survey years, though the correlation coefficient falls to 0.62 by the third year.

Table 3 provides a summary of the differences between the two time periods, based on Tables 1 and 2. The average growth rate in mean household consumption or income per person is about 3% per annum, and this is similar between the two periods (only slightly lower in the "last 3%" period). As in East Asia, slower growth is not a plausible explanation for the slowdown.

However, progress in reducing poverty is very different between these two periods. Table 3 gives the mean rate of change in the headcount index. In the first period (prior to the poverty rate falling to about 3%), the rate of decline in the index was 1.26% points per annum, which is very close to the mean rate for the developing

world as a whole (Introduction). This dropped dramatically when countries reached the last 3%, to a mean rate of 0.24% points per annum. Given that the poverty rate is bounded below by zero, it is not too surprising that the rate of progress in reducing that rate declines, though it is still notable how much it declines by.

Table 3. Comparison of the two periods averaged over the 18 countries.

		Mean	Median	Max	Min	St. Dev.
Growth rate in mean (% per annum)	Whole period	3.08	2.95	6.62	1.18	1.57
	1st period	3.63	3.74	6.59	0.73	1.99
	2nd period (last 3%)	2.84	2.94	7.13	−1.26	1.93
Annualized change in poverty rate (% point per annum)	Whole period	−0.85	−0.61	−0.35	−2.57	0.63
	1st period	−1.26	−0.92	−0.35	−2.69	0.82
	2nd period (last 3%)	−0.24	−0.21	−0.09	−0.57	0.12
Annualized change in floor ($\alpha = 1$; cents per annum)	Whole period	1.18	0.79	4.49	−1.48	1.67
	1st period	1.25	1.18	6.82	−1.60	1.91
	2nd period (last 3%)	0.66	0.63	7.32	−6.28	3.20
Annualized change in floor ($\alpha = 0$; cents per annum)	Whole period	0.74	0.65	2.82	−3.01	1.37
	1st period	1.22	1.22	5.25	−1.30	1.48
	2nd period (last 3%)	0.15	0.17	4.23	−4.91	2.27
Growth rate in the floor ($\alpha = 1$; % per annum)	Whole period	1.00	0.73	3.44	−2.20	1.59
	1st period	1.21	1.04	5.58	−2.43	1.99
	2nd period (last 3%)	0.21	0.47	5.01	−5.55	2.65
Growth rate in the floor ($\alpha = 0$; % per annum)	Whole period	0.54	0.45	2.45	−2.56	1.16
	1st period	0.94	0.84	3.66	−1.20	1.20
	2nd period (last 3%)	−0.02	0.12	2.55	−3.96	1.65

Turning to the floor (for $\alpha = 1$), we also see a marked decline in the rate of progress in lifting the floor when these countries reached the second period, starting with a poverty rate of around 3%. The annualized growth rate in the floor falls dramatically, from 1.22% per annum to 0.15% per annum. However, as can be seen from Table 3 and the scatter plot in Figure 5, there is a large variance in progress in lifting the floor in the second period. A number of countries actually experienced a drop in the floor, while five countries were able to lift the floor by more than 10% in the "last 3%" period (namely Kazakhstan, Kyrgyz Republic, Paraguay, Thailand and Tunisia). There is little correlation between the pace of progress in lifting the floor prior to reaching the last 3% with progress after that date (r = 0.21 for the scatter plot in Figure 5). Statistically, one cannot reject the null hypothesis that the floor was unchanged in the second period. The standard error for the change in the floor in the

second period is 0.75 cents per day (t = 0.87; prob. = 0.40) while the standard error for the first period is 0.45 (t = 2.77; prob. = 1.3%).

As was found for East Asia, the pattern is similar using a higher threshold of z = \$2.50 (though keeping the poverty line the same, at \$1.90). Using the higher threshold, the rate of increase in the floor for the "last 3%" period is higher, at 0.64 cents per year, though less than half of the rate in the first period, which was 1.72 cents. Using z = \$2.50, the (proportionate) rate of growth is 0.23% per year in the second period, as compared to 1.31% for the first.

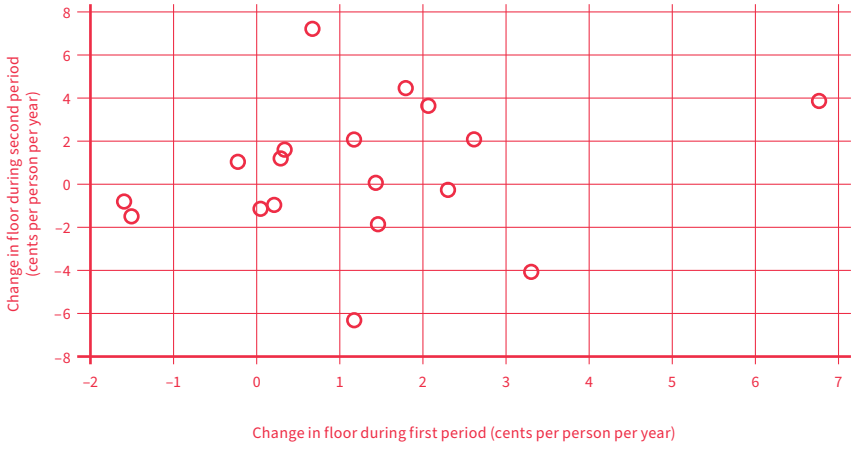

Figure 5. Comparison of changes in the floor between the two periods.

Two caveats to these results should be noted. First, the estimated floor is naturally bounded above by the threshold, which is set at the poverty line, \$1.90 a day, for the main calculations. Mechanically, progress in lifting the floor will go to zero when one reaches \$1.90. However, that is not what is happening here. We can see from Table 2 that the floor at the end of the study period is well below \$1.90 a day in most countries. The mean floor at the end of the period is \$1.28 (with a standard deviation of \$0.40).

Second, the "last 3%" period in the dataset tends to be shorter than the first; the mean gap between the second survey year and the first is 17.0 years, while it is 8.7 years between the last year and the second. The wider spread of estimates in the second period may reflect greater measurement error. One cannot do much about measurement error in this context. However, there is no sign of a higher variance in the growth rates of the overall mean in the second period than the first (Table 3). Measurement error may well be greater for changes in the floor than in the

mean, given that the floor estimate (for $\alpha = 1$) uses the squared poverty gap, which may be more contaminated by measurement error since it reflects the variance of incomes below $1.90. However (against this conjecture), essentially the same pattern is evident if one uses the equally weighted mean (the floor for $\alpha = 0$, which does not require SPG); Table 3 also gives the results for this measure.

The floor can be lifted by economic growth alone, without a change in inequality. However, the evident stickiness in the floor revealed by the above results is likely to reflect how inequality is changing—the incidence of economic growth. We see a pattern consistent with this conjecture in the data assembled here. Figure 6 plots the change in the floor (for $\alpha = 1$) against the change in the Gini index over the whole period; the correlation coefficient is −0.56, which is significant at the 1.5% level. (If one adds a control for the change in the (log) mean, the partial correlation is significant at the 0.7% level.) In the "last 3%" period, the correlation is even stronger; r = −0.66 (significant at the 0.3% level). As one can also see from Figure 6, inequality rose more often that it fell; indeed, the Gini index rose over the whole period in 14 of the 18 countries. This rise in overall inequality slowed progress in lifting the floor.

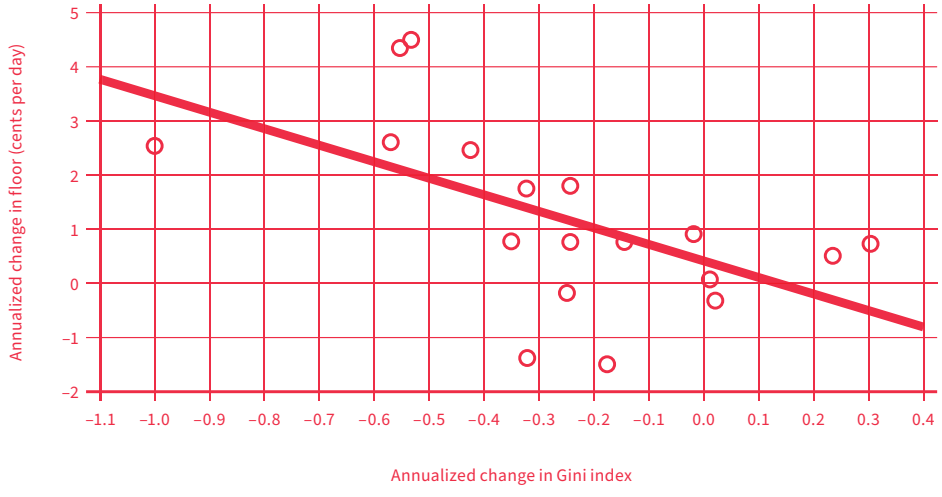

Figure 6. Changes in the floor plotted against changes in the Gini index of inequality.

4. Conclusions

Data have been yet another victim of the new Coronavirus, with many likely interruptions to household surveying and data processing. It may well be some time before we know with confidence how much the pandemic has increased poverty, but an increase is highly likely. There is still much hope that recovery from the crisis

will bring a return to the prior trajectory of poverty reduction, and even eventual success in attaining the first of the UN's Sustainable Development Goals, namely to eliminate extreme poverty, as judged by the World Bank's (frugal) $1.90 a day line.

Nobody could seriously claim that attaining SDG 1 suffices to "end poverty"; indeed, a great many of those people who escape the $1.90 poverty are still poor by the standards expected in the country they live in (Ravallion and Chen 2019). However, it would be undeniable progress for everyone to have reached a level of living that was not attained by 40% of the world's population 40 years ago.

The key issue is whether it will be possible to return to the pre-COVID trend rate of poverty reduction once the pandemic is over. A close look at the data does not suggest that we were on track to reaching SDG 1 even prior to the COVID crisis. Indeed, while the data (even pre-COVID) are far from ideal, they do provide some support for the "poorest left behind hypothesis." Prior to the pandemic, the floor to global living standards was rising, but very slowly, and at a rate well below the growth rate in the overall mean. There is little sign from the data assembled here that the new, markedly higher, growth rates we have seen in the developing world as a whole in the new millennium have been passed onto the world's poorest.

The paper has found that progress in reaching the poorest often slows considerably once a developing country reaches the (roughly) last 3% of the population living in poverty using the $1.90 line. Malaysia—one of the most successful developing countries in reducing absolute poverty—took over 30 years to get the $1.90 poverty rate from 3% to (nearly) zero. A slowdown for the last 3% was also happening in East Asia prior to the pandemic. The paper has also studied the 18 countries that had succeeded in getting their poverty rate below 3%, while it was over 10% previously (within the period covered by the *PovcalNet* series). For those countries, average progress in raising the floor has been close to zero once the last 3% was reached (and not statistically different from zero). However, this reflects a high variance in country performance, with some countries able to assure continuing progress in lifting the floor, while others saw a decline. Measurement error is a concern, but it does not (as best as can be determined) credibly explain these findings. Rising inequality is a plausible factor.

The results suggest that, for many developing countries, success in eliminating poverty post-COVID will not be attained by a "business as usual" approach that relies on past patterns of economic growth. While growth has come with huge progress in reducing counts of poor people in the developing world, it appears that eliminating extreme poverty will require that the future growth process in market incomes is more deeply pro-poor—reaching the poorest—and/or that the growth process in

market incomes is accompanied by more active, and effective, redistributive efforts. How that would be achieved remains an open question, and the answer almost certainly differs from country to country.

Although this paper has not said anything about the role of social policies, the findings of Margitic and Ravallion (2019) are relevant. Here, too, the message does not suggest that "business as usual"—though now referring to social protection policies—will be adequate. Across all developing countries (for which the required data are available), Margitic and Ravallion find that public spending on social protection did help lift the floor, but it was social insurance (mainly public pensions) that did the "heavy lifting". Social assistance—which is mainly cash-transfers targeted towards the poor—lifted the floor by only 1.5 cents per day on average, which is less than 10% of mean spending on social assistance.

Therefore, this is not an optimistic picture. By either channel—pro-poor growth in market incomes or pro-poor social policies—a change in development policy appears to be warranted if we are serious in aiming to eradicate extreme poverty over the coming decade. That change is likely to come at a cost, at least in the short-term.

The same reasons that it is harder to reach the poorest can generate ethically challenging trade-offs. That is indicated if success in truly eradicating extreme poverty were to slow progress for others, who are poor, but not as poor. This trade-off may well arise in some circumstances. However, there is surely ample scope for largely avoiding such a trade-off, notably through efforts to assure that it is the rich who carry the bulk of the extra cost. The rise in market-income inequality that appears to underly the slowdown in progress for the poorest, even pre-COVID, suggests that there is even more scope for such financing in today's world.

Acknowledgments: The paper was largely written while the author was visiting the Ungku Aziz Centre in the Faculty of Economics, University of Malaya in January 2020. The author is grateful to the university for its hospitality. For their comments, the author also thanks Pedro Conceicao, Finn Tarp, Dominique van de Walle, and participants at presentations at the World Bank, Manchester University and the University of Copenhagen.

Conflicts of Interest: The author declares no conflict of interest.

References

Bluhm, Richard, Denis de Crombrugghe, and Adam Szirmai. 2018. Poverty accounting. *European Economic Review* 104: 237–255. [CrossRef]

Bowles, Samuel, Steven Durlauf, and Karla Hoff, eds. 2006. *Poverty Traps*. Princeton: Princeton University Press.

Brown, Caitlin, Martin Ravallion, and Dominique van de Walle. 2020. Can the World's Poor Protect Themselves from the New Coronavirus? NBER Working Paper 27200.

Chen, Shaohua, and Martin Ravallion. 2010. The Developing World is Poorer than we Thought, but no less Successful in the Fight Against Poverty. *Quarterly Journal of Economics* 125: 1577–1625. [CrossRef]

Ferreira, Francisco H. G., Shaohua Chen, Andrew Dabalen, Yuri Dikhanov, Nada Hamadeh, Dean Jolliffe, Ambar Narayan, Espen Beer Prydz, Ana Revenga, Prem Sangraula, and et al. 2016. A Global Count of the Extreme Poor in 2012: Data Issues, Methodology and Initial Results. *Journal of Economic Inequality* 14: 141–172. [CrossRef]

Ferreira, Francisco, and Martin Ravallion. 2009. Poverty and Inequality: The Global Context. In *The Oxford Handbook of Economic Inequality*. Edited by Wiemer Salverda, Brian Nolan and Tim Smeeding. Oxford: Oxford University Press.

Foster, James, Joel Greer, and Erik Thorbecke. 1984. A Class of Decomposable Poverty Measures. *Econometrica* 52: 761–65. [CrossRef]

Jalan, Jyotsna, and Martin Ravallion. 2002. Geographic Poverty Traps? A Micro Model of Consumption Growth in Rural China. *Journal of Applied Econometrics* 17: 329–46. [CrossRef]

Laborde, David, and Will Martin. 2018. Implications of the Global Growth Slowdown for Rural Poverty. *Agricultural Economics* 49: 325–38. [CrossRef]

Lakner, Christoph, Daniel Gerszon Mahler, Mario Negre, and Espen Beer Prydz. 2020. *How Much Does Reducing Inequality Matter for Global Poverty?* Global Poverty Technical Note 13. Washington: World Bank.

Lindgren, Mattias. 2015. *The Elusive Quest for the Subsistence Line. How Much Does the Cost of Survival Vary between Populations?* Comparative Institutional Analysis Working Paper 2015:1. Lund: Lund University.

Lipton, Michael. 1988. *The Poor and the Poorest. Some Interim Findings*. World Bank Discussion Paper 25. Washington: World Bank.

Margitic, Juan, and Martin Ravallion. 2019. Lifting the Floor? Economic Development, Social Protection and the Developing World's Poorest. *Journal of Development Economics* 139: 97–108. [CrossRef]

Ravallion, Martin. 2013. How Long Will It Take to Lift One Billion People Out of Poverty? *World Bank Research Observer* 28: 139–58. [CrossRef]

Ravallion, Martin. 2016a. Are the World's Poorest Being Left Behind? *Journal of Economic Growth* 21: 139–64. [CrossRef]

Ravallion, Martin. 2016b. *Economics of Poverty: History, Measurement and Policy*. New York: Oxford University Press.

Ravallion, Martin. 2020. Ethnic Inequality and Poverty in Malaysia since May 1969. Part 2: Poverty. *World Development*. 134(October).

Ravallion, Martin, and Shaohua Chen. 2019. Global Poverty Measurement when Relative Income Matters. *Journal of Public Economics* 177: 1–13. [CrossRef]

Ravallion, Martin, Shaohua Chen, and Prem Sangraula. 2009. Dollar a Day Revisited. *World Bank Economic Review* 23: 163–84. [CrossRef]

World Bank. 2015. *A Measured Approach to Ending Poverty and Boosting Shared Prosperity*. Washington: World Bank.

World Bank. 2016. *Taking on Inequality*. Washington: World Bank.

World Bank. 2018. *Poverty and Shared Prosperity. Piecing together the Poverty Puzzle*. Washington: World Bank.

Yonzan, Nishant, Christoph Lakner, Daniel Gerszon Mahler, R. Andres Castaneda Aguilar, and Haoyu Wu. 2020. The Impact of COVID-19 on Global Poverty under Worsening Growth and Inequality. *World Bank Blog Post*, November 9.