Basically, economic growth *is* enough, and *only* economic growth is enough for the basics

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Abstract. We show that *any* cross-national measure of human material wellbeing that is (i) *basics* (not luxuries), (ii) *general* (uses indicators from multiple domains), and (iii) *plausible* (uses defensible choices for weights) will have a statistical relationship with country GDP per capita with four features. First, the relationship will be *strong*, with *nearly all* cross-national variation in basics associated with variation in GDPPC. Second, the relationship with be *non-linear*, with a stronger elasticity of basics to at lower than higher levels of GDPPC. Third, growth is empirically sufficient, *no* country has high levels of GDPPC and low levels of basics. Fourth, growth is empirically necessary: *no* country has high levels of the basics at (very) low levels of GDPPC. These findings significantly extends the existing literature as, while there are large literatures showing a strong connection of GDPPC to money-metric measures of wellbeing (e.g. headcount income/consumption poverty (Pritchett 2020) or inequality adjusted incomes (Dollar, Kleineberg, and Kraay 2015)), or, in individual literatures, to direct physical measures of wellbeing like health, nutrition, education, or indices like multidimensional poverty, our argument is that *all* general, plausible, measures of the basics of human material wellbeing will have a strong, non-linear, empirically sufficient and empirically necessary relationship to GDPPC.

Introduction

In 1988 Robert Lucas said "the consequences for human welfare" of differences in economic growth "are simply staggering," so much so that once one starts "it is hard to think about anything else." But something strange has happened in the field of development: the importance of sustained economic growth for human wellbeing is being actively downplayed.

In a February 2021 blog the executive director and the communication director of Abdul Lateef Jameel Poverty Action Lab (J-PAL) made the (outlandishly and obviously false) claim that: "for millions of people living in poverty, growth is not enough. Specific, targeted social programs based on rigorous empirical evidence are *equally* important to prevent people from being left behind." (emphasis added). When Bill Gates argued that anti-poverty programs providing chickens would be an important avenue for reducing poverty in Africa, Professor Chris Blattman responded not with the corrective that without sustained broad based growth such programs would do little to reduce poverty, but rather that he thought: "the *bes*t investment we could make to fight world poverty" (emphasis added) would be randomized studies comparing the efficacy of programs that transferred livestock assets like chickens versus programs that distributed cash. Even development think tanks whose *name* includes "growth" are skeptical: Rohini Pande the director of the Economic *Growth* Center at Yale University in October 2021 has a blog published by the International *Growth* Centre at LSE titled: "not by growth alone" (emphasis added, twice).

This is not just a phenomena of academic development economics but also of major development institutions.

It is too easy to show claims that economic growth is not important for income/consumption headcount poverty are wrong. Pritchett (2020) shows that growth in median incomes is strongly empirically sufficient for poverty reduction: growth *is* enough and growth *alone* does eliminate extreme poverty. The relative contributions of levels of income and targeted social programs to levels of poverty is not "equal" (50:50), it is more like 99:1 in favor of growth. It is also too easy to show that some important elements of wellbeing, like child mortality or life expectancy are strongly associated with GDPPC (Filmer and Pritchett 1999, Pritchett and Viarengo 2010). And, it is also easy to show that *some* cross-national general indicators of the basics of human wellbeing, like the Social Progress Imperative's Basic Human Needs measure, are strongly relative to GDPPC (Pritchett 2022).

In this paper we up the ante and demonstrate that the skeptics about the benefits from economic growth are not just wrong about this or that indicator, they are wrong about *everything*, or at least wrong about everything *basic to human material wellbeing* (hereafter rather than use the extended phrase or invent an acronym BHMWB we just say 'basics')[1]. At least since

[1] By "material" wellbeing we are bracketing three large and important topics. First, we are not addressing self-reported measures of subjective wellbeing, even though there is a large and interesting literature around self-reported happiness or life satisfaction. Second, we are not broaching the topic of what normatively "ought" to bring people wellbeing or what spiritual or metaphysical stances or beliefs might bring happiness or life satisfaction. Third, as noted below, by "human" wellbeing we acknowledge that we are not incorporating measures of animal wellbeing or of intrinsic, non-instrumental, measures of the natural environment.

Amartya Sen's (1985, 1999) arguments for a "capabilities" approach and the UN's Human Development 1991, many have agreed that normative measures of country development as human wellbeing should go beyond "money metric" measures and include outcomes in health, education, nutrition, access to water and sanitation, the natural environment (and others). The Sustainable Development Goals (UN 2015) include a very wide array of goals and targets. We argue the relationship between *any* general, plausible, measure of the basics of human material wellbeing and GDPPC has four characteristics.

(i) is *very* tightly correlated with GDPPC. The correlation between a very wide array of measures of basics and their "predicted" value based on GDPPC alone is typically around .9 (equivalently, an R2 around .81). The p-levels for zero on all terms in GDPPC are smaller than 10^{-37}. Even "data undermining" which does specification searchers over the space of possible measures of basics to *minimize* the correlation of basics with GDPPC still produce strong correlations.

(ii) the relationship of basics and GDPPC is strongly non-linear, and more non-linear than captured by regressing basics on natural log of GDPPC and more non-linear than regressions in double natural log form (which impose a constant elasticity). The elasticity of basics wrt to GDPPC is between twice and eight times larger at the mean of the second quintile of countries than at the mean of the fourth quintile —a feature robust to all measures of basics.

(iii) the statement "growth is not enough" is demonstrably false for basics. GDPPC is *empirically sufficient*: while at any given level of GDPPC there are countries with higher or lower values, there are no countries with high GDPPC that have low achievement on basics.

(iv) GDPPC is also empirically necessary: there are no countries with low levels of GDPPC with high levels of basics.

Policy choices for countries are much more granular that choosing "growth" versus "effective programs" versus "redistribution." There are actions governments could take that could improve the "basics" wellbeing of their citizens that could be massively cost-effective at the margin in raising the capability of their state organizations generally, increasing the efficacy of their policy designs, by reallocating expenditures from towards higher priority spending, by making their redistribution more effective (less costly per unit transferred, more reliably transferred to intended beneficiaries). Research into which exactly those actions that can give contextual and granular guidance can be important.

Conversely, there are actions that could be taken that would increase GDPPC which would not improve general wellbeing in a sustained way. Showing that GDPPC is vitally important for human wellbeing does not imply one could take GDPPC as a "sufficient statistic" for development. Much less does it imply that *any* action that raised GDPPC will raise citizen basics wellbeing. As we show below Equatorial Guinea is an example of a country that raised

GDPPC massively by exploiting its oil resources but in a way that produced very little benefit for its citizens.

But neither that there are actions that raise wellbeing conditional on GDPPC nor that some actions that raise GDPPC would not raise wellbeing should lead economists or development actors to ignore that, in general, economic growth in developing countries has a very strong association with improvements in all measures of the basics of human material wellbeing.

I) Data on GDPPC and on human material wellbeing

I.A) GDP per capita

We use a standard source for cross-nationally comparable purchasing power adjusted estimates of GDP per capita, the Penn World Tables, version 10.0 (Feenstra, Inklaar and Timmer 2015). We use the expenditure based ('rgdpe') not output based ('rgdpo') based estimates. GDP for all countries is reported in PPP adjusted 2017 US$ (henceforth "P$"). We generally use the year 2018, as that is the latest year from which all of our indicators are available. The estimates for some basics, like World Bank headcount poverty or the multi-dimensional poverty index, are based on micro survey data for only specific years. For those we match the year of the PWT10.0 GDPPC estimate to the year of the indicator.

I.B) Indicators of human material wellbeing from Legatum Prosperity Index

The Legatum Prosperity Index (LPI) is a large and sophisticated exercise to measure a wide array of aspects of countries' development. The LPI has twelve pillars, with 66 elements, based on 294 distinct indicators. The 12 pillars are: *safety and security, personal freedom, governance, social capital, investment environment, enterprise conditions, market access and infrastructure, economic quality, living conditions, health, education and natural environment.* Many of these indicators are based on ideas about the deep (governance, social capital) and proximate (market access and infrastructure, economic quality) determinants of country prosperity and are not intended as direct measures wellbeing.

We use only data on four LPI pillars that are direct measures of individual/household material well-being: *living conditions, health, education,* and *natural environment.* The aggregate for each of the four pillars are built up from 5 or 6 elements each, with the elements built from specific indicators (Table 1).

The specific indicators are of four types: (i) directly welfare relevant *outcomes*, (ii) *utilization* that (is thought to) improve wellbeing directly and indirectly, (iii) measures of *availability* and (iv) measures of household income or assets. Outcomes, like under-5 child mortality, or prevalence of stunting of children under 5 are directly measures of welfare relevant *outcomes.* These outcomes are affected by a variety of proximate determinants and are influenced by a wide variety of choices that households make subject to the constraints they face. The *utilization* indicators (often called, somewhat misleadingly "access") measure whether a household has or uses specific goods or services like electricity, cellphone, immunization, schooling, attended births, contraceptive prevalence. These again depend on household choices

subject to the constraints of physical availability, cost, efficacy, etc. (which is why we feel "access" is confusing as it is just one element of the choice of utilization). Some of the LPI indicators are whether certain things are *available* perhaps as pure public goods, for which "utilization" cannot be measured at the household level (e.g. methane emissions, freshwater withdrawal, national screening programs) or local public goods like rural roads or publicly provided services like health facilities. The *living conditions* pillar includes the measures of headcount poverty and some direct asset ownership variable, like whether the household owns a refrigerator.

We make only three modifications to the raw LPI data. One, we rescale all elements and indicators to a common scale of 1 to 100, where 1 is the value for the worst country and 100 is the value for the best country. This is *not* a transformation to an ordinal scale of ranks across countries but rather to a common cardinal scale for all pillars, elements, and indicators where the transformed measure perfectly correlated with the raw data. The transformation means a one-unit difference for each indicator (e.g. child mortality, access to electricity, primary enrollment rate, etc.) is $1/99^{th}$ of the gap between the worst and best country for that indicator. For instance, in 2018 for under 5 mortality the best outcome is Finland at 2 deaths per 1000 births and the worst outcome is for Somalia at 129.4 so a one unit in a 1 to 100 scale is $1/99^{th}$ of the gap between 129.4 and 2. While there is no perfect way to compare a wide variety of pillars, elements, and indicators and how they are associated with GDPPC common cardinal scale at least has a clear interpretation that a common change in GDPPC moves indicators a certain distance from the worst observed country outcome to the best outcome.

Two, we transform every measure so that "up is good" so that, for instance, for under-five mortality where in raw units "up is bad" we simple reverse the 1 to 100 scale. So for "under-5 child mortality" Somalia is 1 and Finland is 100 and the interpretation is therefore child survival (up is good).

Three, there are a number of countries that have LPI data but do not have GDPPC data in the PWT 10.0. For these countries we regress GDPPC on a variety of correlated indicators from the LPI but not from the four pillars of direct measures of wellbeing (which would induce circularity) and use the predicted values of GDPPC from that regression for the countries with missing GDPPC. We do this filling in in part because a commonly cited outlier in some elements of the wellbeing-GDPPC is Cuba, but which is missing from nearly all empirical analyses because it does not have GDPPC measures from the standard sources.

Table 1: Pillars, elements and indicators for material living conditions from Legatum Prosperity Index		
Pillar	Elements (22)	Indicators (82)
Living Conditions (6 elements)	Material Resources (MRE):7	Poverty rate at national poverty lines, Poverty rate at $1.90 a day, Poverty rate at $3.20 a day, Poverty rate at $5.50 a day, Households with a refrigerator, Ability to source emergency funds, Ability to live on household income
	Nutrition (NUT): 4	Availability of adequate food, Prevalence of undernourishment, Prevalence of wasting in children under-5. Prevalence of stunting in children under-5
	Basic Services (BSC): 5	Access to electricity, Access to basic water services, Access to piped water, Access to basic sanitation services, Unsafe water, sanitation or hygiene
	Shelter (SHR): 4	Availability of adequate shelter, Housing deprivation, Access to clean fuels and technologies for cooking, Indoor air quality
	Connectedness (CTD): 6	Access to a bank account, Use of digital payments, Access to a cellphone, Rural access to roads, Satisfaction with public transportation, Satisfaction with roads and highways
	Protection from Harm (PHM): 4	Death and injury from road traffic accidents, Death and injury from forces of nature, Unintentional death and injury, Occupational mortality
Health (6 elements)	Behavioral Risk Factors (BRF): 3	Obesity, Smoking, Substance use disorders
	Preventive Interventions (HPI): 6	Diphtheria immunization, Measles immunization, Hepatitis immunization, Contraceptive prevalence, Antenatal care coverage, Existence of national screening programs
	Health Care Services (HCS): 7	Healthcare coverage, Health facilities, Health practitioners and staff, Births attended by skilled health staff, Tuberculosis treatment coverage, Antiretroviral HIV therapy, Satisfaction with healthcare
	Mental Health (MTH): 3	Emotional wellbeing, Depressive disorders, Suicide
	Physical Health (PHH): 5	Physical pain, Health problems, Communicable diseases, Non-communicable diseases, Raised blood pressure
	Life Expectancy (LEX): 5	Maternal mortality, Under 5 mortality, 5-14 mortality, 15-60 mortality Life expectancy at 60
Education (5 elements)	Pre-primary (PPE): 1 (1 Indicator)	Pre-primary enrolment (net)
	Primary (PRI): 3	Primary enrolment, Primary completion, Primary education quality
	Secondary (SEC): 4	Secondary school enrolment, Lower-secondary completion, Access to quality education, Secondary education quality
	Tertiary (TER): 5	Tertiary enrolment, Tertiary completion, Average quality of higher education institutions, Skillset of university graduates, Quality of vocational training
	Adult Skills (ASK): 5	Adult literacy, Education level of adult population, Women's average years in school Education inequality, Digital skills among population
Natural Environment (5 elements)	Emissions (EMS): 5	CO2 emissions, SO2 emissions, NOx emissions, Black carbon emissions, Methane emissions
	Exposure to Air Pollution (EAP): 3	Exposure to fine particulate matter, Health impact of air pollution, Satisfaction with air quality
	Forest, Land, Soil (FLS): 3	Forest area, Flood occurrence, Sustainable nitrogen management
	Freshwater (FWT): 4	Renewable water resources, Wastewater treatment, Freshwater withdrawal, Satisfaction with water quality
	Preservation Efforts (EPE): 6	Terrestrial protected areas, Marine protected areas, Long term management of forest areas, Protection for biodiverse areas, Pesticide regulation, Satisfaction with preservation efforts
Source: Legatum Prosperity Index.		

II) The variety of country indexes of basics

Any national (or regional, sub-national or group) general measure of the basics of human material wellbeing must answer three questions: (i) which measures are included as 'basic'? (ii) what is the summary statistic used from the distribution of the measure of the basic: is there a "deprivation" threshold and the indicator for each household is a binary indicator of whether the household is below/above or a median/average measure of the central tendency of the distribution across households?) (iii) what are the weights for combining indicators?

Equation 1 is the generic formula of a basics index for country k as a linear weighted average of N indicators each with weight α_n where the measure for each indicator n is some mapping from the underlying distribution across households of the indicator B (which in our case all N indicators M^n are re-normed to a 1 to 100 scale).

$$1)\ Index\ of\ BHMWB^k = \sum_{n=1}^{N} \alpha_N * M^n(f_n^k(B^j))$$

Our claim is very strong: for *any* general, plausible cross-national measure of the basics of human material wellbeing there is a strong, non-linear, empirically sufficient and empirically necessary relationship with GDPPC. We support this strong claim by constructing measures of basics using four different approaches, each with many variants, that span the range of measures of 'basics' that are 'general' and 'plausible.'

The first approach uses the Legatum Prosperity Index (LPI) data to construct two different "correlational" indexes of basics, which use an analytically grounded method to choose which measures and which weights. The Basics Correlational Index-Elements (BCI-E) uses the 22 'elements' of the LPI while the Basics Correlational Index-Indicators (BCI-I) uses the 82 raw indicators. We use the empirical results of the relationship of these two measures to GDPPC as a kind of 'base case' but this of course only establishes 'existence'--that there exists measures of basics with these associations, not any general claim.

Our second approach "anchored" indexes. An anchored index starts from any indicator that is widely accepted as a 'basic' as the "anchor." A *general* anchored index adds N-1 other indicators, choosing the N-1 other indicators most strongly correlated with the anchor, and then use principal components for the weights. A wide variety of plausible anchors from different domains of wellbeing (say, under five child mortality, women's years of schooling, prevalence of stunting, access to clean cooking fuels, etc.) lead to basics indexes with similar relationships to GDPPC. Moreover, our "data undermining" shows that even the anchored index with the *weakest* relationship to GDPPC has a strong relationship with the same four characteristics.

Our third approach is to start from seven domains widely regarded as important to human wellbeing from a variety of normative stances (consistent with either a choice/preferences/utility grounding or a capabilities approach): health, education, nutrition, housing conditions, water and sanitation, poverty and natural environment. Within each of these seven domains there are a number of plausible indicators. For example, health can be measured by life expectancy, or under five child mortality or access to health care, education can be measured by completion of

various levels (primary or secondary) or measures that incorporate quality. We iterate over the space of *general* and *plausible* measures of basics by (i) choosing a single indicator from each of the seven domains randomly and (ii) assigning the weights to the seven indicators randomly, with only the mild constraint that no one indicator receives more than 3/7 weight in the index. We iterate over this procedure 100,000 times which essentially spans the set of general, plausible, indexes. Again, in the spirit of "data undermining" we show the index that emerges from 100,000 iterations with the *weakest* relationship with GDPPC still has a strong, non-linear relationship.

Our fourth approach simply use measures created by other organizations. The World Bank (and others) provide a measure of "poverty" based on thresholds of income/consumption. The Social Progress Initiative has a measure of Basic Human Needs. Sabina Alkire has developed and the Oxford Poverty and Human Development Initiative report a sophisticated multidimensional poverty index (Alkire and Foster 2011, Alkire, Kanagaratnam, Suppa 2021). Each of these is based on choices of indicators, thresholds, and weights that are plausible, but ultimately are social conventions. Not surprisingly, each of these three measures has a very similar relationship to GDPPC as our typical correlational, anchored, or iterated indexes.

III) Correlational Indexes of Basics from the Legatum Prosperity Index

A good or service "basic" to human could defined as one for which: (i) the income expansion path is steep at low levels of income but which flattens out as income increases and (ii) has low-price elasticities, especially at very low levels of consumption (and at moderate levels of aggregation: the price elasticity of "staples" (e.g. rice, wheat, etc.) is lower than that for any given staple.[2] Clearly it would be circular to define which elements/indicators are basics by their income expansion path and then then "find" something about the relationship of that basics index to GDPPC.

We avoid build "correlational" indexes of basics that avoid circularity by using only the correlations *amongst* the elements/indicators to define basics. Our working hypothesis is that, across a wide variety of causal models of basics (including but not only the "income expansion path" from standard economics or "capabilities" approaches), we should expect that the cross-national correlation of basics should be high. If there are N distinct items, each of which "basic" to material wellbeing then most causal models would predict a country who have more of the n^{th} basic (e.g. "utilization of sanitation") to have also have more of any other basic (e.g. "adequate nutrition").

[2] The enormous literature on Engel curves (the share of food in consumption wrt to total income/consumption) shows that over time and across countries (i) the budget share of food starts at a very high level and falls as income expands and (ii) Engel curves tend are empirically strikingly similar across time and across countries (see, among the many, Pritchett and Spivack 2013 and references therein).

III.A) Basic Correlational Index using Elements of LPI (BCI-E)

We compute the bivariate correlation matrix among the 22 elements of the four LPI wellbeing pillars and from that matrix we compute the median correlation of each element with the other 21 elements. We choose a median correlation above .6 as the threshold for an indicator to be 'basic' based on the large gap between the median correlation of Health, Preventive Interventions (HPI) at .647 and the 15th (Freshwater (FWT) at .471 (Table 2). This correlation threshold is the only free parameter in this approach and we explore robustness of results to this choice below.

Before discussing the results of this Basics Correlation Index-Elements (BCI-E) understanding *how* the construction of this index works is important for understanding all of the results of the paper. In Table 2 we report the results of the median correlations for each of the 22 LPI elements. For each element we run a simple OLS regression of the element on a quartic in GDPPC. Table 2 shows: (i) regression predicted gain in moving from the 5th percentile of GDPPC to the 60th percentile, (ii) the same in moving from 60th to 95th percentile, (iii) the difference between those predicted gains, which is assesses the concave non-linearity of the element's income expansion path, and (iv) the R2 of the quartic regression.

The 14 elements chosen as 'basics' by a .6 correlation threshold are very different in their relationship with GDPPC than the 8 elements which are non-basics by this threshold. The basics have (i) a very steep GDPPC expansion path at low levels of income: the median predicted gain in moving from the 5th to 60th percentile is 32 (on a 1 to 100 cardinal scale), (ii) a highly non-linear GDPPC expansion path that flattens out: the gain from the 60th percentile to 95th percentile is only 8.7 and (iii) a high R2: the median is .729. In contrast, the predicted gain for the non-basics is small: the median gain from the 5th to 60th percentile is only .7 and not particularly non-linear and the median R2 for the eight non-basics is only .153.

The 'non-basics' chosen by the correlational method are intuitive. Among the six elements of health pillar four--Life Expectancy (LEX), Physical Health (PHH), Health Care Services (HCS), and Preventive Interventions (HPI)--are classed as basics whereas two, Mental Health (MTH) (e.g. depressive disorders, suicide) and Behavioral Risk Factors (BRF) (e.g. smoking, obesity) are not 'non-basics' (which is not to say they are unimportant). Within the five elements of the education pillar four are 'basic'--pre-primary (PPE), primary (PRI) and secondary (SEC) and adult skills (ASK)--whereas tertiary enrollment (TER) is non-basic. All of the elements of the living condition pillar are basic. None of the natural environment measures are classed as basic by this method. The natural environment elements have with varying patterns: exposure to air pollution (EAP) has an environmental Kuznets curve (gets worse with GDPPC, then better), whereas preservation efforts only get better at very high levels of GDPPC, and overall emissions (EME), which includes climate change causing emissions CO2 and methane) get consistently worse with respect to GDPC, deteriorating by roughly the same amount from 5th to 60th and 60th to 95th.

Table 2: A correlational test for which elements of the Legatum Prosperity Index are "basics" to material wellbeing

	Variable		Correlation with all other 21 elements (sorted)	GDPPC expansion path			R2 of quartic in GDPPC	Percent deviation of principal component weight from equality	
	Pillar	Element		From 5th (P$1,520) to 60th (P$16,920) percentile	Predicted gain from 60th (P$16,920) to 95th (P$62,270)	Difference in predicted gain		With all variables	With just basics
Basics	**LC**	**MRE**	**0.805**	**47.0**	**10.6**	**36.3**	**0.797**	**10.7%**	**-0.6%**
	ED	**SEC**	**0.802**	**36.3**	**9.6**	**26.7**	**0.777**	**-4.4%**	**-13.9%**
	LC	**NUT**	**0.794**	**33.8**	**14.7**	**19.1**	**0.732**	**10.7%**	**-0.9%**
	ED	**ASK**	**0.781**	**41.7**	**8.2**	**33.5**	**0.726**	**8.6%**	**-2.7%**
	HL	**LEX**	**0.778**	**32.1**	**3.9**	**28.1**	**0.654**	**20.2%**	**7.1%**
	ED	**PRI**	**0.776**	**27.9**	**-0.6**	**28.5**	**0.555**	**25.2%**	**11.3%**
	LC	**SHR**	**0.774**	**56.4**	**9.1**	**47.3**	**0.838**	**19.2%**	**7.0%**
	HL	**HCS**	**0.767**	**28.8**	**15.7**	**13.1**	**0.774**	**-1.5%**	**-11.7%**
	LC	**BSC**	**0.753**	**53.7**	**3.7**	**50.0**	**0.779**	**30.4%**	**16.6%**
	LC	**CTD**	**0.726**	**20.9**	**19.3**	**1.6**	**0.752**	**2.1%**	**-9.0%**
	ED	**PPE**	**0.718**	**32.0**	**5.5**	**26.4**	**0.581**	**-5.3%**	**-14.9%**
	HL	**PHH**	**0.697**	**29.6**	**5.7**	**23.9**	**0.563**	**18.1%**	**4.8%**
	LC	**PHM**	**0.648**	**15.5**	**14.7**	**0.8**	**0.504**	**6.8%**	**-5.5%**
	HL	**HPI**	**0.647**	**12.3**	**3.3**	**8.9**	**0.336**	**27.1%**	**12.4%**
Median			**0.771**	**32.0**	**8.7**	**26.6**	**0.729**	**10.7%**	
Not basics	NE	FWT	0.471	4.9	-4.3	9.2	0.284	-14.4%	
	NE	EPE	0.444	0.8	11.9	-11.1	0.311	-26.7%	
	HL	MTH	0.271	13.3	-6.5	19.9	0.107	8.8%	
	NE	FLS	0.269	6.5	17.7	-11.2	0.200	-37.1%	
	NE	EAP	0.149	-8.0	1.4	-9.5	0.089	11.4%	
	NE	EMS	-0.056	-13.5	-13.5	0.0	0.072	-1.2%	
	ED	TER	-0.071	0.6	-0.6	1.1	0.009	-97.3%	
	HL	BRF	-0.532	-34.8	-17.8	-17.1	0.457	-11.3%	
Median			0.209	0.7	-2.5	-4.7	0.153	-12.8%	

The simple analysis in Table 2 reveals that there are a substantial number of measures of the basics of material wellbeing that are both (a) quite highly correlated amongst themselves and (b) quite highly correlated (in a non-linear) way with GDPPC. As we will see, this is going to imply that (roughly) no matter how you choose measures across multiple domains to form an overall index of basics and (roughly) no matter how you choose weights for those indicators you are going to end up with any general, plausible, index of basics with roughly the same relationship to GDPPC.

Once an which measures are 'basics', an index needs weights. Equal weights are often used as a "focal point" default. This is not because equal weights has any good justification, but rather that no particular set of weights (including equal weights) has a good justification, which forces reliance on an arbitrary "focal point." Our first preference is to use weights derived from the principal component of the set of basics. The final two columns of Table 2 show that if one chooses basics based on a correlational threshold the difference between principal component weights and average weights is quite small (intuitively, as all the elements are highly correlated) such that the correlation of indexes with principal components weights and equal weights is over .99. In contrast, if one uses all elements the principal components produces quite different weights.

III,B) Basics Correlational Index with LPI Indicators (BCI-I)

We implement the same procedure for the 82 indicators from the Legatum Prosperity Index which are direct measures of human wellbeing and which do not have missing values for any of the countries. We compute the 82 by 82 bivariate correlation matrix and from that the median correlation. Using the 82 indicators we chose a median correlation threshold of .65 to distinguish between non-basic and basic indicators. This relatively high threshold produces 10 indicators that are 'basic' with 6 of those 10 indicators are from the education pillar.

As with the elements of LPI, there are no natural environment indicators that make the correlation threshold, which remains true even if the threshold is made quite low, the highest correlation of any natural environment indicator is "Long term management of forest areas" with a correlation of 0.445.

III.C) Results for the relationship of GDPPC and basics (BCI-E and BCI-I)

Figure 1 illustrates the relationship between GDPPC and the two correlational indexes of basics (BCI-E and BCI-I) in four distinct ways (which will be used for other indicators below).

We show the 17-country rolling median of BCI-E and BCI-I by GDPPC[3]. This statistic is both non-parametric—other than the width of the window nothing about the functional form between basics and GDPPC has to be imposed—and robust.

[3] This is a special case of a a large variety of smoothed statistics, which pick a weighting function and a window, in this case we calculated median using a rectangular window with a width of roughly 10 percent of the sample.

Figure 1 also shows the predicted value of BCI-LE and BCI-LE from a regression on a quartic in GDPPC. This flexible functional form trades off the costs imposing some structure on the relationship but with the (modest) analytical gain of allowing more traditional summary statistics like the R-Squared and exact formulas for slope and elasticity (equations 2 and 3 below).

Three, we show an "envelope" of the range of country experiences with basics and GDPPC with a lower and upper bound on basics for any given level of GDPPC[4].

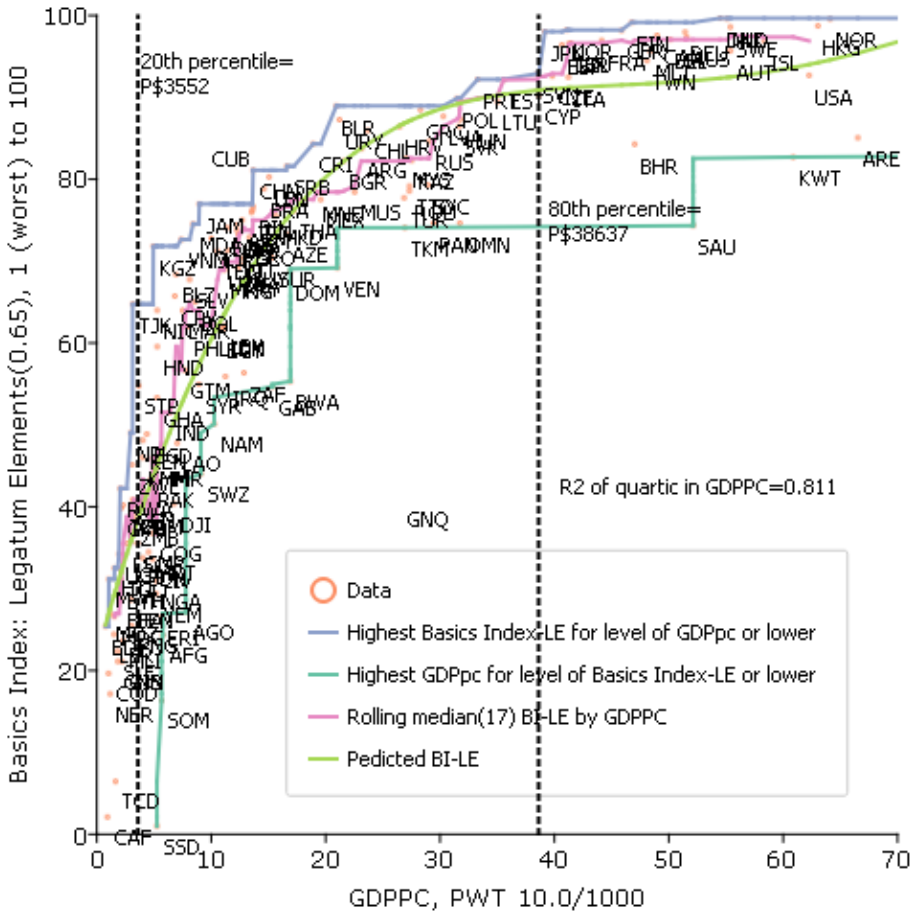
The lower line of the envelope shows the *worst* outcome for basics for any country with a given level of GDPPC or *higher*. This lower limit illustrates empirical sufficiency as the lower-right or "southeast" of the graph shows the combinations of high GDPPC and low basics that never happen.

The upper line of the envelope shows the *best* outcome for basics for any given level of GDPPC or *lower*. This is, in some sense the "production possibility frontier" of producing basics from GDPPC. The upper limit illustrates empirical necessity as the upper-left or "northwest" of the graph shows the combinations of high achievement on basics and low GDPPC that do not happen.

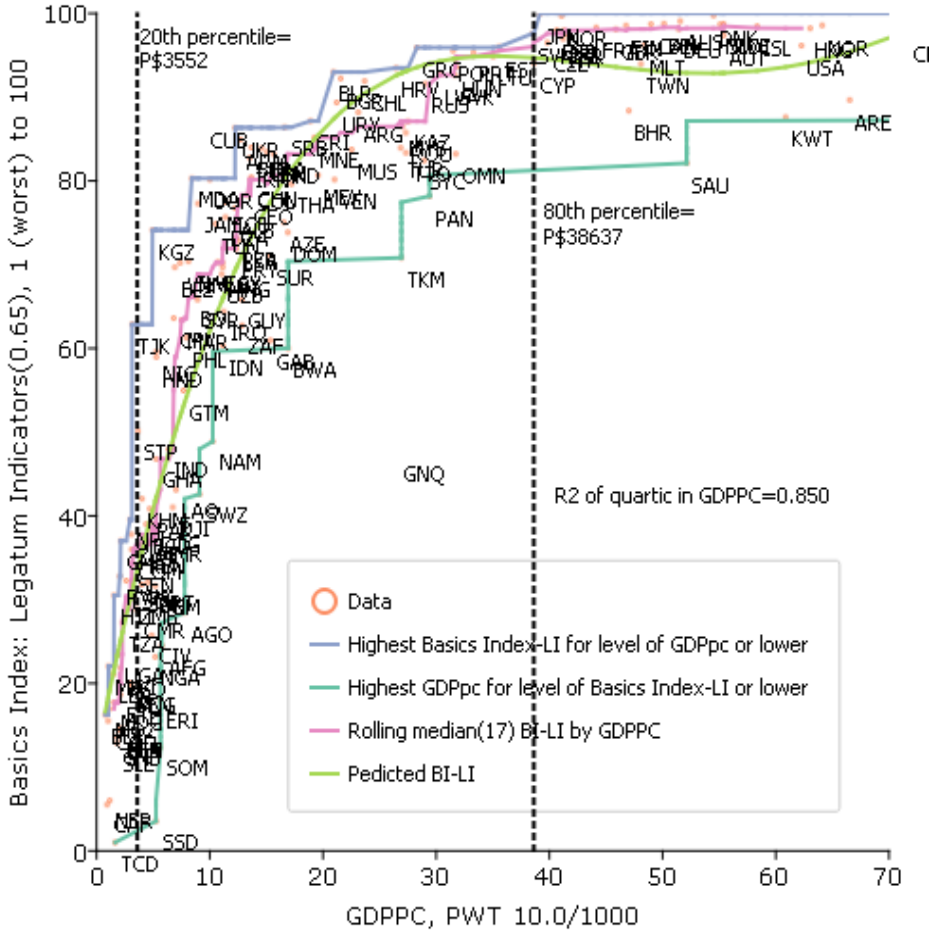
[4] As we discuss below, the regressions include but the envelope calculations shown exclude Cuba and Equatorial Guinea, which we discuss as interesting outliers below.

Figure 1: Relationship between an index of Basics and GDPPC: strong, non-linear, sufficient, necessary

Panel A: Using 22 'elements' from Legatum Prosperity Index



Panel B: Using 82 'indicators' from Legatum Prosperity Index



Source: Authors' calculations.

Table 3 shows summary statistics from the regressions of these indexes of basics on a quartic in GDPPC. (Table 3 also reports the exact same calculations for all other indexes, as a preview of coming attractions). The regression coefficient estimates and other summary statistics are presented in Table A.R.1 (for BCI-E, BCI-I and three other measures) and Appendix Table AR.2 for the anchored indexes.

The first column of Table 3 shows the regression R-Squared, which is .811 for the BCI-LE(.6) and .850 for the BCI-LI(.65). With a bivariate linear regression the R2 is the square of the correlation coefficient, bivariate the correlation equivalent for a non-linear functional form in this case is .90 and .92[5]. The appendix tables report the p-levels of the F-tests for excluding all terms in GDPPC. In this era of "replication crisis" and concern about relying on p-levels (like .01), it is worth pointing out that the p-level of the test for inclusion of all terms in GDPPC is 10^{-54} and 10^{-60} (Table A.R.1) are literally astronomically low p-levels[6].

The next four columns of Table 3 show the elasticity of the basics index wrt to GDPPC at the mean GDPPC of the first four quintiles: P$2,050, P$6,450, P$13,240 and P$27,1000. With the quartic functional form in GDPPC the elasticity (equation 2) varies across levels of GDPPC as the slope is a cubic in GDPPC (by simple differentiation, equation 3). This allows, unlike a linear, log-linear, or log-log functional form, the elasticity to vary across levels of GDPPC.

$$2)\ \epsilon_{BI,GDPPC} = \frac{dBI}{dGDPPC} * \frac{GDPPC}{BI}$$

$$3)\ \frac{dBI}{dGDPPC} = \beta_1 + 2 * \beta_2 * y + 3 * \beta_3 * y^2 + 4 * \beta_4 * y^3$$

The results show that the elasticity tends to start at a moderate level, then rises, reaching a peak in Quintile II, fall modestly but remain high in Quintile III, and then falls to a much lower level by the average GDPPC in Quintile IV, P$27,100. The mean of quintile IV is about the upper limit for "developing" countries, as Turkey is around P$26,900, Malaysia P$27,100 and Greece P$28,300.

The population weighted average of GDPPC of those countries below the 80th percentile (roughly the "developing" countries) is P$10,044 (naturally, this lies in between the population giants of India at P$6366 and China at P$13,664). This implies the typical developing country person lives in a country near the peak of the elasticity of basics wrt to GDPPC.

[5] The naïve use of the bivariate correlation as a measure of strength of association, which (incorrectly) imposes linearity in the relationship is only .73 and .71. There is no reason that the relationship should be linear and basic microeconomic theory suggests it should not. This point might seem too trivial to even mention but prominent authors often show scatter plots of measures of basics against GDPPC which are obviously non-linear but nevertheless only show a linear relationship (e.g. Figure 7 of Porter, Stern, and Artavia Loria 2013).

[6] "Astronomical" because astronomy produces very large numbers: $3*10^{52}$ is the estimated mass of the universe in kg, 10^{24} a rough estimate of number of stars in the universe.

Table 3: Summary of the regression results of the relationship between GDPPC and the basics of material human wellbeing for the four different classes of basics indexes

Measure of country basics of material wellbeing	N	R-Squared of quartic	Non-linear: Elasticity of index wrt GDPPC at				Empirically necessary		Empirically sufficient	
			μ_{QI} $2,030	μ_{QII} $6,450	μ_{QIII} $13,240	μ_{QIV} $27,100	Pred at μ_{QI}	Max at μ_{QI}	Pred at μ_{QIV}	Minimum at μ_{QIV}
BCI-LE(.6)	167	0.811	0.293	0.458	0.430	0.200	31.6	42.2	87.0	74.3
BCI-LI(.65)	167	0.850	0.497	0.613	0.503	0.162	24.5	32.8	93.0	78.2
Anchored Basics Indexes (N=10, anchor plus 9 most highly correlated other indicators), PC weights, 15 different anchors										
Median of 15 Anchored Indices	167	0.821	0.468	0.579	0.452	0.090	30.2	33.2	100.1	85.9
Contraceptive Prevalence Rate (lowest R2 of any of the 15 anchors)	167	0.703	0.272	0.429	0.388	0.126	35.1	47.9	88.1	68.8
Seven Domain Basics Indexes, randomly chosen indicators and random weights, 100,000 iterations										
Lowest R2 over with randomly chosen indicators, equal weights: wasting, primary enrollment, maternal mortality, headcount poverty (extreme), indoor air quality, exposure to fine particulates	167	0.625	0.165	0.290	0.262	0.019	50.5		91.3	
Lowest R2 with randomly chosen indicators and weights: Wasting (.394), mortality rate age 15-60 (.009), education of adult population (.047), safe water (.185), extreme poverty (.012), housing deprivation (.001), exposure to fine particulates (.353)	167	0.327	0.071	0.146	0.155	0.048	45.7		62.9	
Other commonly used indicators of basics of human wellbeing										
Basic Human Needs (SPI)	153	0.833	0.290	0.424	0.342	0.051	37.9	40.6	90.2	79.1
Multidimensional poverty index (OPHI)	100	0.725	0.516	0.339	-0.02		49.9	70.5	104.1	99.6
Poverty (P$5.50/day)	143	0.865	1.329	0.880	0.588	0.112	11.6	13.9	89.7	87.8
Source: Authors' calculations										

The final four columns of Table 3 show the calculations of the predicted value of the measures of basics at the mean value of GDPPC of the first quintile (P$2,030) and at the average of the fourth quintile (P$27,010).

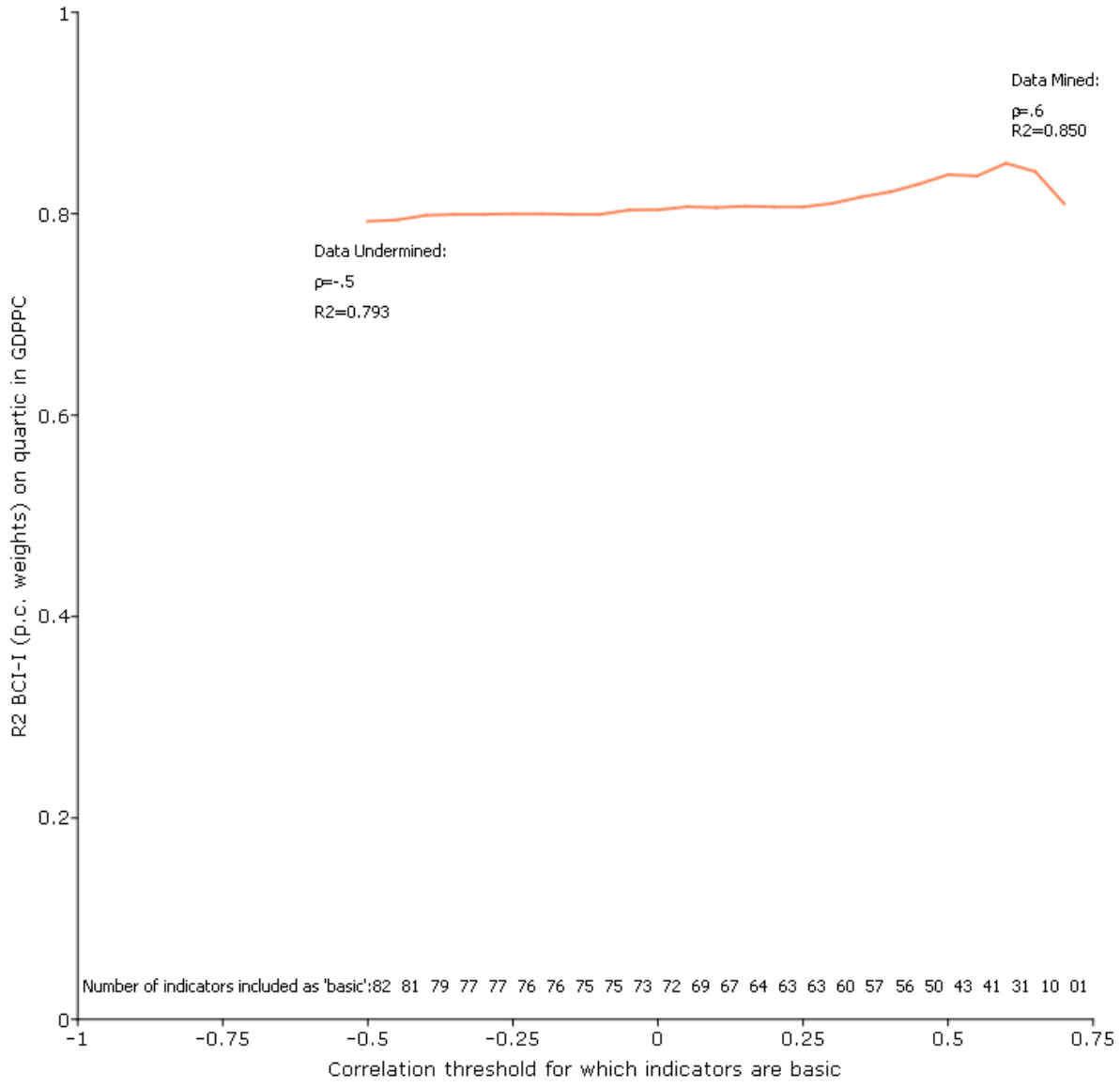
Also shown are the results of the "envelope" calculations showing the highest basics of any country at the mean of quintile I or below (which is an indicator of the "empirically necessary" aspect of GDPPC) and the lowest basics for any country at the mean of quintile IV or above (which is an indicator of the "empirically sufficient").

These results for these two correlational indexes of basics are presented not as definitive proof of anything but rather as a "baseline" for comparison. These are the non-data-mined results from a plausible analytic, non-circular, measure of which indicators are 'basics.'

The main point of this paper is that there is no amount of (plausible) "data *under*mining" that changes these four basic factual findings about the association of basics and GDPPC. "Data mining" is a directed search over the many, many, degrees of freedom in any empirical research to find the strongest result for what the point the authors are making. Data *undermining* is the opposite, a search across the degrees of freedom in defining basics, measuring basics with indicators, and weighting those indicators into a general index to see if any plausible procedure does not produce the same four facts about the relationship with GDPPC.

Figure 2 illustrates the data undermining versus data mining approach for the BCI-LI by iterating over all possible choices of the correlation threshold that defines which LPI indicators are to be included as "basics" which is the only free parameter of the method. Even if one takes at the threshold the smallest possible correlation threshold (-.5) and hence includes all 82 indicators as 'basic' *and* uses equal weights for those indicators--the R2 is still .79, not very much different from the highest possible R2 of .85 when the correlation threshold is .6 and 31 indicators are included. A robust finding is one for which the data undermined results are similar to the typical result (or a data-mined result).

Figure 2: Data mining and data undermining with the correlation threshold for BCI-I



IV) A collection of anchored indexes of the basics of material wellbeing

As experts work in development in a wide array of topics related to human wellbeing--health, education, roads and transport, electricity, nutrition, reproductive health, early childhood development, drinking water, gender, sanitation, indoor pollution, outdoor air pollution, gender, etc.--one cannot expect easy consensus about what is a "basic", either across or within development domains. The consensus constructed Sustainable Development Goals, for instance, include 169 distinct targets. A second method for building a general plausible index of basics is to start from any single indicator that any group argues is "basic" to material wellbeing and use that indicator as an "anchor." An N-indicator basics index around that anchor adds N-1 other indicators by choosing the N-1 indicators most highly correlated with the anchor.

The method for constructing "anchored" indexes of basics:

(i) Choose any single indicator likely to generate significant agreement as a "basic" of human material wellbeing (e.g. under 5 mortality, access to safe drinking water, primary schooling completion, child malnutrition (stunting), indoor air pollution, head count poverty rate (and one could put emphasis on gender by choosing any of these indicators for just females)).
(ii) Compute the correlation of that anchor indicator with all other potential indicators of wellbeing.
(iii) Choose the N-1 mostly highly correlated indicators with the "anchor" indicator.
(iv) Use principal components to create the weights for an anchored index of basics with N indicators.

The two free parameters of this method are the anchor and the total number of indicators. For a "base case" we chose N=10 indicators. 10 is an arbitrary number, but is similar to other existing indicators: the multidimensional poverty index (MPI) has 10 elements, the Social Progress Initiative (SPI) Basic Human Needs index has 16 indicators, the BCI-I index with a correlation of .65 has 10 indicators (Figure 2). Moreover, in the next section we argue there are commonly at least seven conceptually distinct major domains that are included in nearly every discussion of basics and 10 indicators allows, in principle, for at least one indicator from each domain.

Table 3 shows the summary results for the median across all 15 anchors (and Appendix Table AR.3 shows the summary results for all 15 anchors that we explore) and, not surprisingly, these results are very similar to the BCI-LI(.65) results.

Our primary interest with the anchor indexes is data *under*mining and hence we show the summary results for the anchor with the *weakest* R2 of any of the 15 anchors, which happened to be contraceptive prevalence rate. Many consider this to be a basic at it is a key part of reproductive health and an important indicator for women's wellbeing and empowerment. Even for the weakest anchor all four facts are true. The R2 was .703 so the association is strong. The elasticity falls from .43 at quintile II to .13 at quintile IV and so the relationship is strongly non-linear. On the 1 to 100 scale the highest at mean of Quintile I is 47.9 and the lowest at mean of quintile IV is 68.8 and so growth is empirically necessary and (weakly) sufficient.

Even if we search over other free parameters of anchored indexes, say, reduce the number of indicators to a total of 6 (the anchor and five others) the *smallest* R2 of any of the 15 anchors only falls from .703 to .676. If we increase the number of indicators included the R2 of the weakest increases (and the variance across anchors decreases) as eventually the anchor becomes irrelevant and the R2 reaches the R2 of including all 82 indicators.

V) Indexes of basics with randomly chosen elements from key domains

A third way to demonstrate that *any* general, plausible country index of basics will have (roughly) the same relationship with GDPPC is to start from seven domains of basics included in nearly everyone's proposed of list basics: (i) health, (ii) education, (iii) nutrition, (iv) water and

sanitation, (v) housing conditions, (vi) income/consumption headcount poverty and (vii) natural environment[7]. In each of those six domains we choose from the LPI indicators those that are plausibly "basic" (e.g. within "health" we do not include "obesity" and within "education" we do not includer "average quality of higher education"). We create an instance of a "seven domain index of basics" by choosing randomly one indicator from each of the seven domains.

Table 4: Seven domains of basics of human material wellbeing	
Domain (number of indicators)	Eligible indicators from LPI
Health (7)	Healthcare coverage, Births attended by skilled health staff, Maternal mortality, Under 5 mortality, 5-14 mortality, 15-60 mortality, Life expectancy at 60
Education (10)	Pre-primary enrolment (net), Primary enrolment, Primary completion, Secondary school enrolment, Lower-secondary completion, Access to quality education, Adult literacy, Education level of adult population, Women's average years in school, Education inequality
Nutrition (4)	Availability of adequate food, Prevalence of undernourishment, Prevalence of wasting in children under-5. Prevalence of stunting in children under-5
Water and Sanitation (4)	Access to basic water services, Access to piped water, Access to basic sanitation services, Unsafe water, sanitation or hygiene
Housing (4)	Availability of adequate shelter, Housing deprivation, Access to clean fuels and technologies for cooking, Indoor air quality
Poverty (3)	Headcount poverty rate at extreme, low, and medium poverty lines (P$1.9/day, P$3.2/day, P$5.5/day).
Natural Environment (4)	Exposure to particulate matter, Health impact of air pollution, SO_2 emissions, NO_x emissions.

Then there are two choices for weights. One us just to use average weights. The other chooses the weight for each of the seven indicators as a draw from a random uniform distribution, but in order that the weights be "plausible" no single indicator can have a weight higher than 3/7 (.428) of the total.

What if in constructing your equal weighted, seven-domain, cross-national index of the basics you had just happened to choose the indicators from each domain that resulted in the *lowest* R2, how bad would it be? Table 3 show just the *weakest* R2 from 100,000 possible "seven domain basics indexes" for either average weights or random weights. Not so bad, the R2 would be .625. The elasticities in quintiles I, II and III are still substantial (.165, .290, .262) and non-linear (the elasticity falls to only .019 for Quintile IV), and the predicted values rises from 50.1 to 91.3 between the mean GDPPC of quintile I and quintile IV.

The most aggressive data undermining exercise chooses random indicators and then random weights for those indicators across 100,000 iterations. This can drive the R2 wrt a quartic in GDPPC to .327. This still rejects zero association at a p-level on the order of 10^{-13}.

[7] The UN MDGs included 8 goals but with multiple indicators that included some indicator from each of these domains.

The elasticities are still non-linear (rising to .15, declining to .05) and countries are predicted to gain from 45.7 to 62.9. Keep in mind this is just a "torture test" of robustness and the weights are wildly implausible as normative evaluations: to adopt these as weights for a normative index of basics of material wellbeing one would have to believe that exposure to particulate matter was 40 times more important than adult mortality (.353/.009), 29 times more important than extreme poverty (.353/.012) and 7.5 times more important than adult education levels (.353/.047).

VI) Other widely used indicators

In addition to the results of our three methods for creating a general index of basics (correlational, anchored, and random) we compare three widely used indicators: Basic Human Needs from the Social Progress Initiative, the Multidimensional Poverty Index from OPHI, and income/consumption poverty.

VI.A) Basic Human Needs from Social Progress Initiative

As part of the general push back against economic growth there are a number of groups proposing alternatives to GDP as a measure of economic activity or, for that matter, any economic or "money metric" measures, even distribution adjusted measures like poverty rates, as goals for development. One such group proposing non-money metric indicators as the normative goals of development is the Social Progress Imperative, whose mission statement is:

> *We dream of a world in which people come first. A world where families are safe, healthy and free. Economic development is important, but strong economies alone do not guarantee strong societies. If people lack the most basic human necessities, the building blocks to improve their quality of life, a healthy environment and the opportunity to reach their full potential, a society is failing no matter what the economic numbers say.*
> *The **Social Progress Index** is a new way to define the success of our societies. It is a comprehensive measure of real quality of life, independent of economic indicators.*

One of the three components of the Social Progress Index is called Basic Human Needs. Basic Human Needs is an equally weighted average of four sub-indices for Nutrition and Basic Medical Care, Water and Sanitation, Shelter, and Personal Safety and each of those is, in turn, based on indicators either in physical units (e.g. maternal mortality rate) or (rarely) subjective indicators like "perceived criminality" (Table 5).

Table 5: The sub-components and indicators in the Social Progress Imperative Basic Human Needs index	
Sub-component	Indicators
Nutrition and Basic Medical Care (NB): 5	Undernourishment (% of pop.), Deaths from infectious diseases (deaths/100,000), Child stunting (% of children), Maternal mortality rate (deaths/100,000 live births), Child mortality rate (deaths/1,000 live births)
Water and Sanitation (WS): 4	Unsafe water, sanitation and hygiene attributable deaths (per 100,000 pop'l), Populations using unsafe or unimproved water sources (%), Populations using unsafe or unimproved sanitation (%)
Shelter (HS): 3	Usage of clean fuels and technology for cooking (% of pop.), Access to electricity (% of pop.), Household air pollution attributable deaths (deaths/100,000)
Personal Safety (SF): 4	Traffic deaths (deaths/100,000), Political killings and torture (0=low freedom; 1=high freedom), Perceived criminality (1=low; 5=high), Homicide rate (deaths/100,000)
Source: *Social Progress Imperative*.	

Table 3 shows the results of regressing an index of Basic Human Needs constructed by an organization whose stated goal is to *de-emphasize* economic indicators. The relationship of SPI Basic Human Needs with GDPPC is strong, non-linear, necessary and sufficient. The R2 is .833 (with 153 countries) which in the range for the BCI-LE(.6) of .811) and BCI-LI(.65) of .850. The elasticities wrt GDPPC have the same non-linear pattern of increasing, reaching a peak at Quintile II at .424 then falling for a low elasticity of .051 by Quintile IV. The highest of any country at or below the mean of Quintile I (P$2,050) is 40.6 and the *lowest* of any country at or below the mean of Quintile IV is 79.1 so growth over the range of developing countries is empirically necessary and sufficient for SPI Basic Human Needs.

VI.B) Income/consumption poverty and GDPPC

While "development" (in some sense) has always been about the reduction of "poverty" (in some sense) the World Bank's World Development Report of 1990 on poverty brought to wide use the Foster, Greer, Thorbecke (FGT) 1984 class of poverty measures[8]. Primarily for advocacy purposes the WDR 1990 emphasized a very low poverty line for measurement of global poverty, the famous "dollar a day" poverty line, based on the poverty lines chosen by the poorest countries in the world (Ravallion, Datt, and van de Walle 1991)[9]. While there are a variety of ways of choosing national poverty lines, some of which are based on the idea a

[8] A person or household is said to be in poverty if their income or consumption is below a threshold called the poverty line. Formulated with a continuous distribution of income/consumption, f(y), the FGT poverty measures are the weighted partial integrals of the distribution of income/consumption up to a poverty line.

$$(FGT)\ Poverty(\alpha) = \int_{-\infty}^{PL} (PL - y)^{\alpha} f(y) dy$$

When α=0 this produces the headcount, α=1 is the poverty gap measure, and α=2 is the squared gap measure. Although the original FGT 1984 paper emphasized the squared gap measure, in practice the headcount ratio is far and away the most widely used measure of poverty.

[9] The global measurement of income/consumption poverty using FGT measures was promoted by the team around the Living Standards Measurement Surveys (LSMS) ( ) and the team around Martin Ravallion ( ), with special mention to Shaohua Chen.

household should be able to afford a nutritionally adequate diet[10], fundamentally all poverty lines, national or global, are a social convention about a threshold of wellbeing. We use the data on headcount poverty ratios produced by the World Bank's PovCalNet[11] for the P$5.5/day poverty line, as a compromise between the advocates for "low bar" ("extreme") and "high bar" poverty lines (Pritchett 2006), but all of our reported empirical results are robust to using any of the commonly used poverty lines.

Table 3 shows the R2 of poverty on a quartic in GDPPC is .863 which is higher than any of the other basics indexes. The elasticity of poverty reduction wrt GDPPC is massively non-linear falling from 1.33 for Quintile I to .11 in Quintile IV[12]. The *best* poverty rate (on the 1 to 100 'out of poverty' scale) is 13.9 at the median of Quintile I and the *worst* poverty rate is 87.8 at the mean of Quintile IV so higher GDPPC is an empirically necessary and sufficient condition for improvements in poverty. This section can be very brief as the empirically very tight connection between cross-national levels (or long-term changes) in poverty and economic growth, including GDP per capita is widely known and accepted (Dollar and Kraay 2002, Dollar, Kleineberg, Kraay 2016, Pritchett 2020, McKenzie 2020) and well understood analytically.

[10] Even poverty lines which are based on being able to afford food consumption that produces adequate calories has to decide what basket of foods at which caloric adequacy is reached and, since the "cost per calorie" tends to increase sharply with income as people choose higher quality foods (e.g. more meats, eggs, diary) the poverty line depends heavily in the "reference group" consumption that establishes the food basket (e.g. Pradhan, Suryahadi, Sumarto and Pritchett 2001), which is obviously itself a social convention.

[11] PovcalNet: the on-line tool for poverty measurement developed by the Development Research Group of the World Bank.

[12] This is kind of baked into the definition of FGT poverty as, once the poverty line is below the mode of the distribution the slope with respect to a distribution neutral shift in f(y) necessarily falls.

VI.C) Multidimensional poverty index

The Multidimensional Poverty Index combines the features of a poverty measure (with deprivation thresholds) and non-money metric measures using physical outcome measures, like health, schooling, access to water and sanitation, housing conditions, etc. Perhaps the most widely used and cited multidimensional poverty measure is that developed, implemented, refined and maintained by Sabine Alkire (Alkire and Foster 2011, Alkire, Alkire, Kanagaratnam, Suppa 2021) and the Oxford Poverty and Human Development Initiative. Table 7 (table 1 from Alkire, Kanagaratnam and Suppa 2021) presents the indicators, thresholds for deprivation, and weights (along with the corresponding element of the Sustainable Development Goals (SDG) for the current versions of the multidimensional poverty index. We use the Multidimensional Poverty Index which combines the headcount measure and the intensity of deprivation measure. We rescale and invert the raw data so that it measures fraction of the population *not* in poverty, with 1 being the worst country and 100 the best.

The main drawback of this indicator is that it relies on collections of household survey data that are carried out only in developing countries, such as the Demographic and Health Survey (DHS), so the upper range of GDPPC is missing entirely. The highest GDPPC in the MPI sample is Trinidad and Tobago with GDPPC of P$35,800 (about the 80^{th} percentile).

The results in Table 3 show the MPI has a strong, non-linear, necessary and sufficient relationship with GDPPC. The RQ is "only" .723, but that is to be expected from excluding the high-income countries and the p-level of the F-statistic for excluding GDPPC is on the order of 10^{-27}. As with income/consumption poverty, as a "deprivation" index the elasticity is higher at lower levels of income and falls faster—reaching essentially zero by Quintile III since by GDPPC of about P$20,000 the MPI has reached its maximum with (nearly) everyone of out multi-dimensional poverty. Growth is clearly sufficient. Again, given that the MPI has such a steep relationship wrt to GDPPC at low levels even at the mean of Quintile I the predicted score is 50--and the highest is 70.8--but nevertheless growth is still necessary to reach high levels of population out of MPI.

Table 7. MPI (Multi-dimensional poverty index): Dimensions, Indicators, Deprivation Cutoffs, and Weights

Dimensions of poverty	Indicator	Deprived if...	SDG area	Weight
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is **undernourished**.	SDG 2	1/6
	Child mortality	A child **under 18** has **died** in the household in the five-year period preceding the survey.	SDG 3	1/6
Education	Years of schooling	**No** eligible household member has completed **six years** of **schooling**.	SDG 4	1/6
	School attendance	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 8**.	SDG 4	1/6
Living Standards	Cooking fuel	A household cooks using **solid fuel**, such as dung, agricultural crop, shrubs, wood, charcoal, or coal.	SDG 7	1/18
	Sanitation	The household has **unimproved** or **no** sanitation **facility** or it is improved but **shared** with other households.	SDG 6	1/18
	Drinking water	The household's source of **drinking water** is **not safe** or safe drinking water is a **30-minute** or **longer walk** from home, roundtrip.	SDG 6	1/18
	Electricity	The household has **no electricity**.	SDG 7	1/18
	Housing	The household has **inadequate** housing materials in **any** of the three components: **floor**, **roof**, or **walls**.	SDG 11	1/18
	Assets	The household does **not own more than one** of these **assets**: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	SDG 1	1/18

Source: Table 1 of Alkire, S., Kanagaratnam, U. and Suppa, N. (2020). 'The Global Multidimensional Poverty Index (MPI) 2020', OPHI MPI Methodological Notes 49, Oxford Poverty and Human Development Initiative, University of Oxford.

VII) The simple analytics of growth incidence and basics

Our reduced form estimates are not structural but we can nonetheless ask what structural model could generate the reduced form findings we observe. Suppose the demand by each household *h* for outcomes for the i^{th} component of a basics measure (and hence also a derived demand for utilization of inputs) depended on the household h's net of tax and transfer income and the relative prices household *h* faces (equation 4).

$$4)\ Outcome^{i,h,n} = D\left(y^{h,n}, p_i^{private,h,n}, p_i^{public,h,n}\right)$$

The relative price for household *h* of public provision/production depends on the government production function, which itself a function of available resources, the efficacy of the government in turning resources into effective supply (which varies massively across

countries), and the targeting mechanism/allocation function that determines the supply to the particular household.

$$5)\ p_i^{public,h,n} = P(G^{i,n}, Efficacy^{i.n}, T^{h,i,n})$$

The measure of basics for a country is going to be the aggregate across all households and, importantly, if the demand curves have income expansion paths that are non-linear (as, for instance, is true of Engel's law) then the aggregate country demand depends not just on the level but also on the distribution of income, just as a simple application of Jensen's inequality. As a simple example, if the demand for each household depended on log income then the aggregate country demand would not be a function of log of average national income but rather of the average of natural log incomes.

These two simple equations (4 and 5) reveal many causal pathways whereby a country's level of basics could be higher with higher GDPPC.

One, rising GDPPC is associated with a distribution neutral rightward shift in the distribution of aggregate household consumption expenditures, which then produces shifts along the income/consumption path of expenditures on basics. If these pure private consumption paths are non-linear then, even without any distributional shifts, the aggregate elasticity of basics wrt to income is going to be non-linear.

Two, rising GDPPC as a constant tax ratio produces rising balanced budget expenditures G. At a fixed efficacy of translating G and at a fixed degree of targeting, this expansion in G leads to households *h* having a lower effective price of achieving outcomes on basics.

Three, there can be shifts in the *pre* tax and transfer incomes of households that make the distribution more or less equal at the margin than the existing distribution and these will affect the elasticity of private basics expenditures wrt to GDPPC. Growth in incomes that is 'inclusive' have large impacts on basics spendings and outcomes than growth which worsens the distribution of consumption.

Four, redistribution of governments that reduce *post* tax and transfer incomes of households relative to the pre-tax and transfer distribution will lead to larger impact on private spending on basics from the post-tax-transfer distribution, independently of any direct production or provision of government services.

Fifth, for a given level of post-tax-transfer income governments could get better at delivering effective reductions in the price of basics in several ways. One, they could have overall improvements in efficacy of state production/provision. Two, governments could have sectoral improvements. Third, governments could improve 'program design' in ways that are more causally effective, perhaps through the application of evidence. Fourth, if governments increase the targeting of services this can cause the effective price to be lower for poorer households that could lead to improvements in basics outcomes for a given level of government taxation and expenditure.

A major concern of growth skeptics is that some growth processes have a growth incidence in which the incomes of the rich grow faster than the incomes of the poor (pre-tax-and-transfer growth is "exclusive" not "inclusive"). The concern is that "exclusive" growth without either (a) changes in the pre-tax-and-transfer growth process to be more inclusive or (b) redistribution to achieve a more equal post-tax-and-transfer distribution of consumption will not lead to improvements in material wellbeing.

It is analytically important to separate two distinct concerns. One concern is about the distribution of post-tax-and-transfer consumption expenditures. A different concern is about government actions to make available goods and services such that the relative price of certain basics is low. So one group of economists are both skeptical that "growth alone" will bring improvements in wellbeing *and* are in favor of targeted cash transfers to redistribute purchasing power over "in-kind" programs that target the direction consumption of this or that particular good. A very difference concern is that many people have very high effective prices for key goods and services (e.g. health, education) due to a lack of physical access. These economists are growth skeptics because they think higher growth in incomes may not lead to more government spending on key publicly provided goods and services. Even the very simple structure of equations 4 and 5 allows for both these concerns.

Figure 3 shows the growth incidence curves by decile for a select group of countries in two different ways. Panel A shows the standard growth incidence curves showing the annual percentage rate of growth over the indicated percent of the income/consumption of each decile. Panel B shows the two distributions of income/consumption by decile for the beginning and end of the period.

All of this just helps us set up a very simple equation that helps organize thoughts about the impact on basics of economic growth. Suppose the marginal propensity to spend on basics of the ith household is a non-linear function of total consumption, which asymptotes to 1 as consumption goes to zero and asymptotes to zero and this function is the same for households in all countries.

$$6)\ MPSB^i = f\left(c^i\right), c^i \to 0 \Longrightarrow MPSB^i \to 1, c^i \to \infty \Longrightarrow MPSB^i \to 0$$

This implies the increment to spending of household I at the mean income of the dth decile in country n is the percentage rate of the income of the decile times the marginal propensity to spend at that decile.

$$7)\ \Delta SB^{i,d,n} = MPSC^{i,d,n} * \Delta c^{i,d,n} = MPSC^{i,d,n,t} * \Delta c^{i,d,n}$$

This means the total change in the spending on basics in country n is the sum of the changes from each of the deciles, which implies the increase at the margin is the initial decile share of consumption weighted average of the growth incidence times the MPSB.

This simple share weighted equation shows that the question of the impact on growth on basics in any given country is an empirical question. Theoretically (and hence empirically) a situation like Equatorial Guinea, where the growth incidence curve is such that all of the gains to GDP accrue to a very few individuals and the bulk of the population have zero gain, is possible. Alternatively of course a situation where the growth incidence is "pro-poor" and the consumption growth of the poorer deciles is much higher than for the rich is also possible.

Figure 3 uses the income/consumption data by decile from the World Bank's POCVAL to illustrate six country experiences (Zambia, Bangladesh, Vietnam, Chile, Brazil and Denmark) over extended periods that illustrate the key facts about initial conditions and growth incidence possibilities.

The first important fact relevant to discussions of the impact of growth on basics is that in the poorer countries the richest decile is often substantially poorer than the poorest decile in rich countries[13]. If the marginal propensity to spend on basics is declining in income this implies the increment to spending on basics from income/consumption gains to the 90th or 95th percentile in a poor country (e.g. Bangladesh where the mean of the 90th percentile in 1984 was P$1907) will be potentially much larger than the even from very pro-poor gains in a rich country like Denmark (where the mean of the 10th percentile was P$5,752, three times as high)[14]. This is of course not true of highly unequal middle-income countries, like Brazil, where the 80th percentile is less than the 20th percentile of Denmark but the 90th percentile is well above the Danish median.

This is a normatively important point for considerations of growth skepticism as many people are in favor of large (and larger) redistributive transfers in rich countries in the premise that the poor in the rich countries would benefit from higher incomes. But if that is so it is difficult to impossible to be skeptical about the benefits of growth in poor countries where even "the rich" (not of course the few dozen absolutely richest people but the "richer" population) are absolutely much poorer than the poor in rich countries.

The second important fact is that there is no uniform pattern to recent long-term episodes of growth. In Denmark growth incidence from 1987 to 2018 was roughly equal across all deciles, a (roughly) neutral growth incidence. Chile's (1987-2017) and Brazil's (1999-2019) recent growth episodes have been strongly pro-poor, which the growth rate of income/consumption of the poorest substantially faster than for the richest deciles.

The third important point (hard to see directly in Figure 3 which is in levels) is that the initial distribution in the growth episodes is very different. In Bangladesh in 1984 for instance the share of the bottom decile was 4 percent and of the top decile was 22 percent, whereas in Brazil in 1999 this was .8 percent for the bottom decile and 47 percent for the top decile. This means that even if Bangladesh and Brazil had equal growth rates and even if they both had neutral growth incidence with all deciles growing at the same proportionate rate a smaller share

[13] This is a point that Dani Rodrik (blog) has been making for some time, noting that even in his classes in international development many students get this wrong.

[14] Pritchett and Spivack (2013) show the share of food consumption is more than twice as high for the 95th percentile in lower middle income countries than that of the poor in rich countries which confirms this finding about the "rich in poor" versus "poor in rich" without any reliance on purchasing power comparisons.

of the total increase in consumption was accruing to individuals with a high marginal propensity to spend on basics.

The fourth important point from Figure 3 is that the *average* rate of growth is enormously different across countries, such that, even with the very different growth incidence, there was often no overlap at all in the growth rates of the deciles of various countries. In Vietnam from 1993 to 2018 the consumption of the first decile grew much more slowly (9.6 ppa) than the median (14.7 ppa) or the top decile (12.9 ppa)—the growth incidence is an inverted U-shape. In contrast, the richest decile in Bangladesh grew twice as fast as the poorest decile (3.1 ppa versus 1.4 ppa)—but was still far, far, behind the growth of the poorest decile in Vietnam. This is even more true of Zambia from 1996 to 2015 where the incomes of the richest decile were stagnant but that was "pro-rich" growth incidence as the consumption of the poorest decile fell by 2.6 ppa over this period. The "pro-rich" nature of the decline in Zambia still means the incomes of the richest decile in Zambia grew more slowly than any other decile in any of the five other countries, usually by a large amount.

Figure 3 also illustrates two alternatives for the shape of the "marginal propensity to spend on basics"—which of course depends on what one means by "basics" and hence we do not have empirical estimates of that by income level. But we illustrate two possibilities, that will be used in simulating estimates of growth impact on spending on basics.

The first is (roughly) slope from the regressions, adjusted to that the MPSB at the lowest decile is roughly equal to 1. Adapted from equation 3, equation 8 is where *y* is income/consumption divided by 1000.

$$8)\ MPSB = 10 - 2 * .2 * y + 3 * .0018 * y^2 - 4 * -6.65 * 10^{-6} * y^3$$

This is the blue dotted line in Figure 3 which declines non-linearly from roughly 1 (right axis) at low levels of income to around .3 at P$25,000.

An alternative, that might result from a definition of "basics" that was more deprivation based (like the MPI) assumes the MPSB declines very rapidly and so we choose (somewhat arbitrarily) a power of negative 1/3, equation 9, where k is a constant chosen such that the MPSB at the lowest of the 10th decile for any country is equal for this and the empirical estimates based MPSB.

$$9)\ MPSB\left(-\frac{1}{3}\right) = k * 1/y^{1/3}$$

This is the green dotted-dashed line in Figure 3 that declines much more rapidly and converges to roughly .2 at P$25,000. Given equation 7 this is obviously going to make the overall MPSB much more sensitive to the distribution of increases in consumption and hence growth incidence.

Figure 3: Growth incidence for selected countries

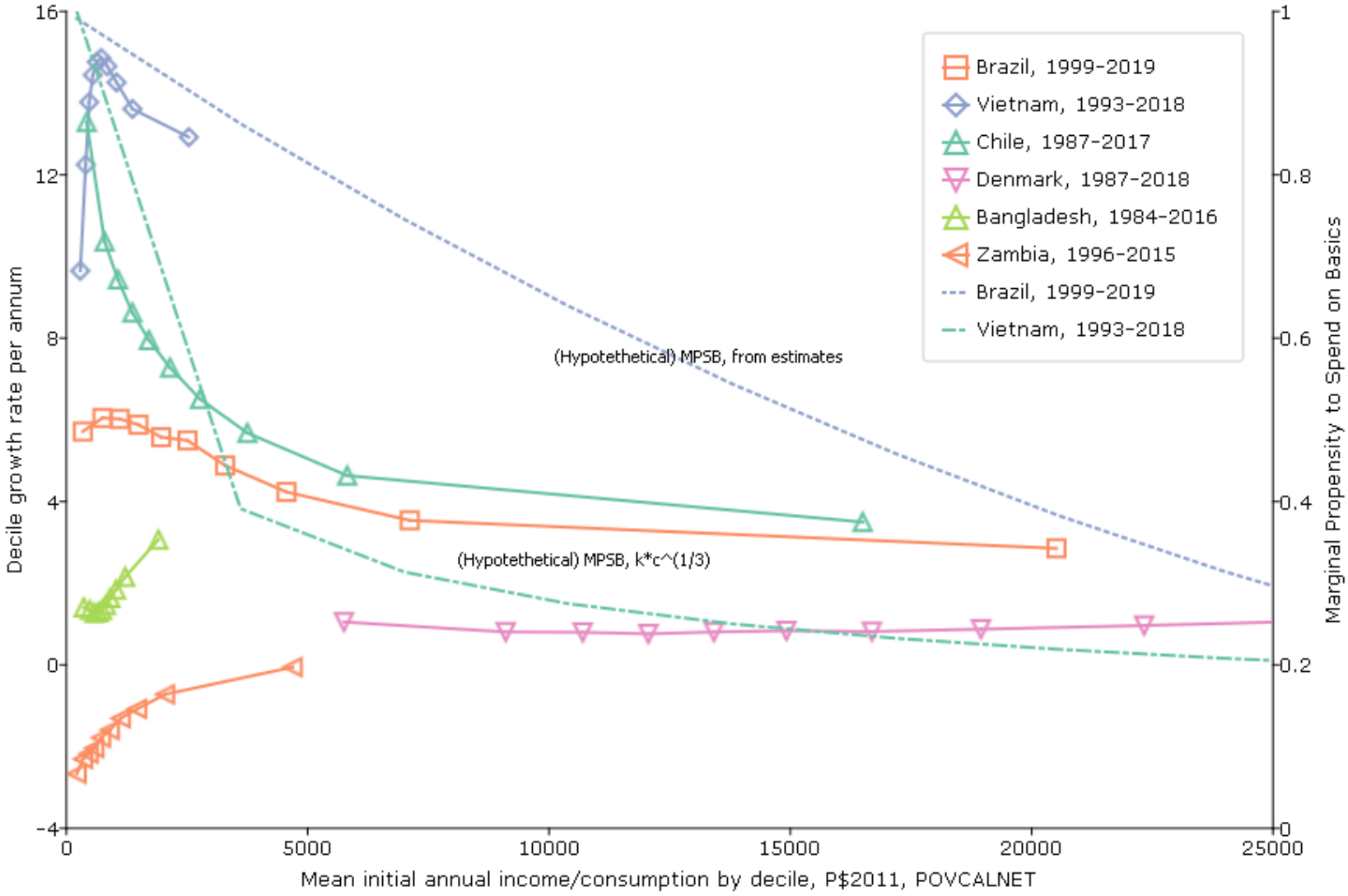
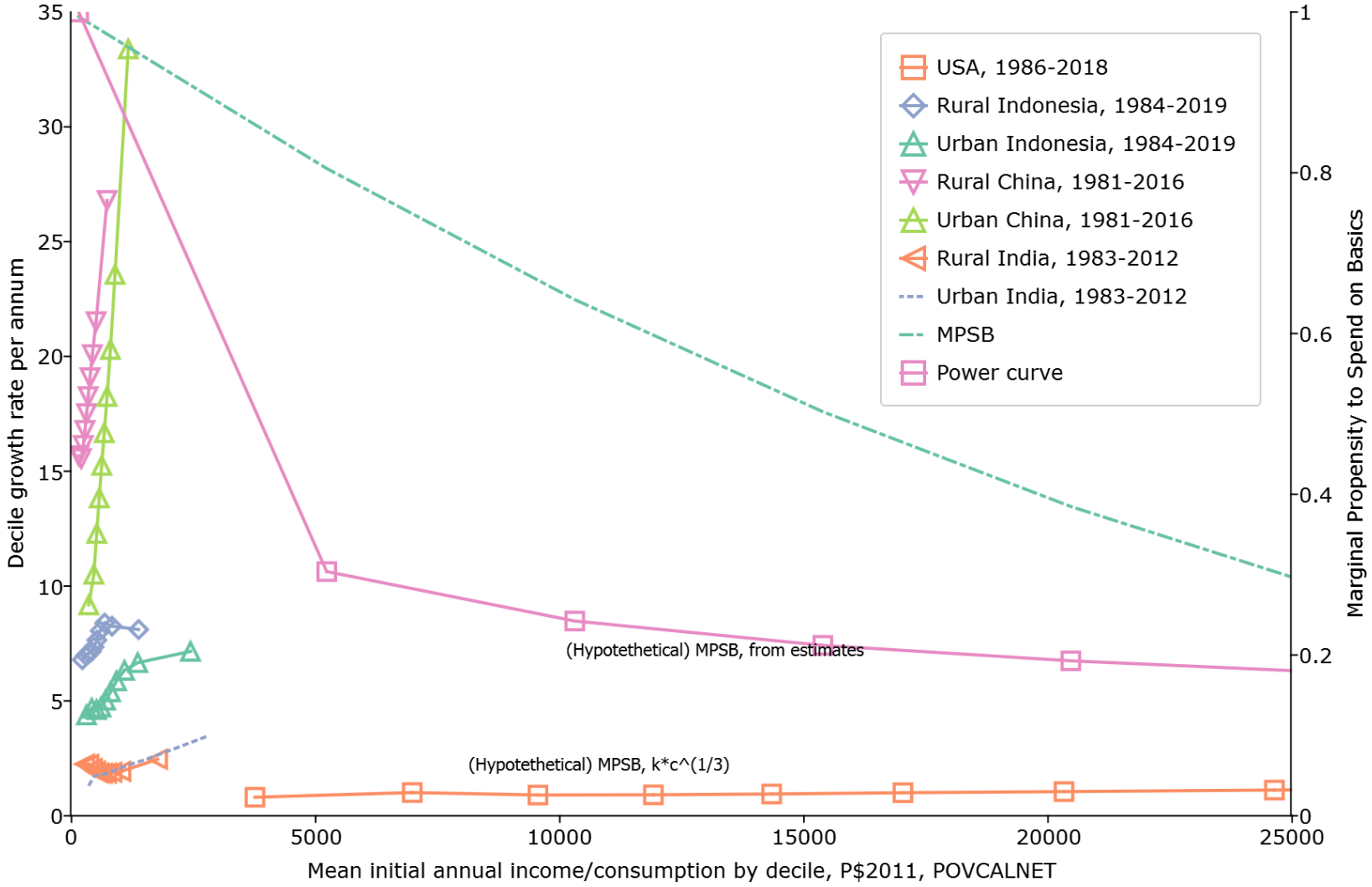


Figure 3: Growth incidence for selected countries



Using the data from POVCAL and the equations 7 and equation 8 (as the default for the MPSB) or equation 9 we can calculate a range of estimates of the percent per annum growth in basics at the start of the various growth episodes for the six countries.

We start with Zambia. The default is that spending on basics fell at -.845 ppa, given Zambia's actual growth incidence (in Figure 3), the initial level and shares of income, and equation 8 for the MPSB. That number is not interesting in and of itself, but as a "base case" around which we can compare various scenarios.

First, how much more would spending on basics have grown if, instead of the actual "pro-rich" growth incidence Zambia had had neutral growth incidence, all deciles growth equally? The answer is that it would have been about .05 (one tenth of one half of a) percentage point better (-.798 vs -.845), as more of the growth would have happened in deciles with higher MPSB.

Second, what if Zambia had had Chile's pro-poor growth incidence? Now the growth in spending on basics would have been about .06 better.

Third, what if Zambia had had a more equal distribution at the beginning of the period, like that of Bangladesh? Given the growth incidence this would have made things worse, as, less of the growth would have been in the high growth deciles.

The results are different is we assume the steeper MPSB and basics spendings would have fallen by .556 ppa—because less of the growth would be in the range of a high MPSB. What is more interesting is to compare the *difference* between actual growth incidence and neutral growth incidence at the steeper MPSB assumptions. In that case neutral growth incidence would have led growth to be roughly .12 ppa higher (less negative) as more of the growth would have been in deciles where the MPSB was substantially higher.

So, better growth incidence would lead to better outcomes on basics. But the magnitude of the difference is very small.

If we compare instead of scenarios of different growth incidence what would have happened in Zambia had the same pattern of growth incidence as in Figure 3 but would had the same average growth as other countries. If Zambia had had the growth of Bangladesh the growth in basics would have been positive 1.69 ppa, which is 2.54 ppa faster than the actual. Of course for the more rapid growth countries like Chile or Vietnam the differential is even larger.

The key point is that the largest estimate of a large improvement in growth incidence, from Zambia's actual to neutral growth incidence assuming a very steep MPSB is .116, which is 20 times smaller than the difference in having had Zambia's growth versus a moderate country's average growth, even at Zambia's pro-rich incidence.

In Zambia's case growth differences between countries dominate distribution differences, not by some percent or even a factor multiple but by an order of magnitude (factor of 21)

between Zambia and Bangladesh or two orders of magnitude (factor of 113 between the gain from Vietnam's growth versus the gain from neutral growth incidence).

Figure 4b shows the same type of calculations for Bangladesh, that had a more equal initial distribution and a pro-rich growth incidence (less so than Zambia). The results are quantitatively similar. More favorable growth incidence has the intuitive direction of effect but is tiny with the default MPSB and even with the steeper MPSB (eqn. 9) the difference between actual growth incidence and neutral as .065 ppa (1.318 ppa vs 1.383 ppa). Again compared to the differentials of growth rates this is a factor of 20 smaller (for either Zambia or Chile) or roughly 100 fold smaller than had Bangladesh had Vietnam's average growth but Zambia's pro-rich growth incidence.

Figure 4c shows the results for Chile. We can see in Figure 3 that Chile is a much richer country and hence the difference in MPSB between the lowest decile and highest decile is going to be very large, under either assumption (eqn. 8 or eqn. 9). Hence we would expect the difference in growth incidence to be larger. This is the case as the difference between Chile's actual, massively pro-poor incidence and Zambia's pro-rich incidence is between 3.97 ppa and 3.11, a difference of .86 ppa (which is ten times larger than the difference for Zambia or Bangladesh). This is because the shift in assuming incidence in growth is shifting across households with very different MPSB. Therefore the difference for spending on basics in going from a very good (Chile) to a very bad (Zambia) growth incidence of .86 is less than 1/3 as large as the difference between Chile's growth and Bangladesh's growth at Chile's growth incidence (3.97-1.71=2.26).

So, very intuitively, as countries have higher average incomes the relative importance of distribution versus growth rises for the mechanical reason that for very poor countries the incomes of decile groups are very low and in the range of high MPSB (under a range of assumptions).

Figure 4d shows the calculations with Denmark, where, not surprisingly, everything is very low (the y axis on the graph is on the same scale with the other countries) because under either assumption about MPSB (eqn. 8 or eqn. 9) the level of MPSB is low. In particular, where the steeper MPSB (eqn. 9) makes the poorer countries more sensitive to distribution it makes Denmark less sensitive as MPSB is low at all ranges of income in Denmark. This is of course consistent with the flattening out of the basics/GDPPC relationship at higher levels of income.

Figure 4a: Estimates of Zambia's growth in spending on basics

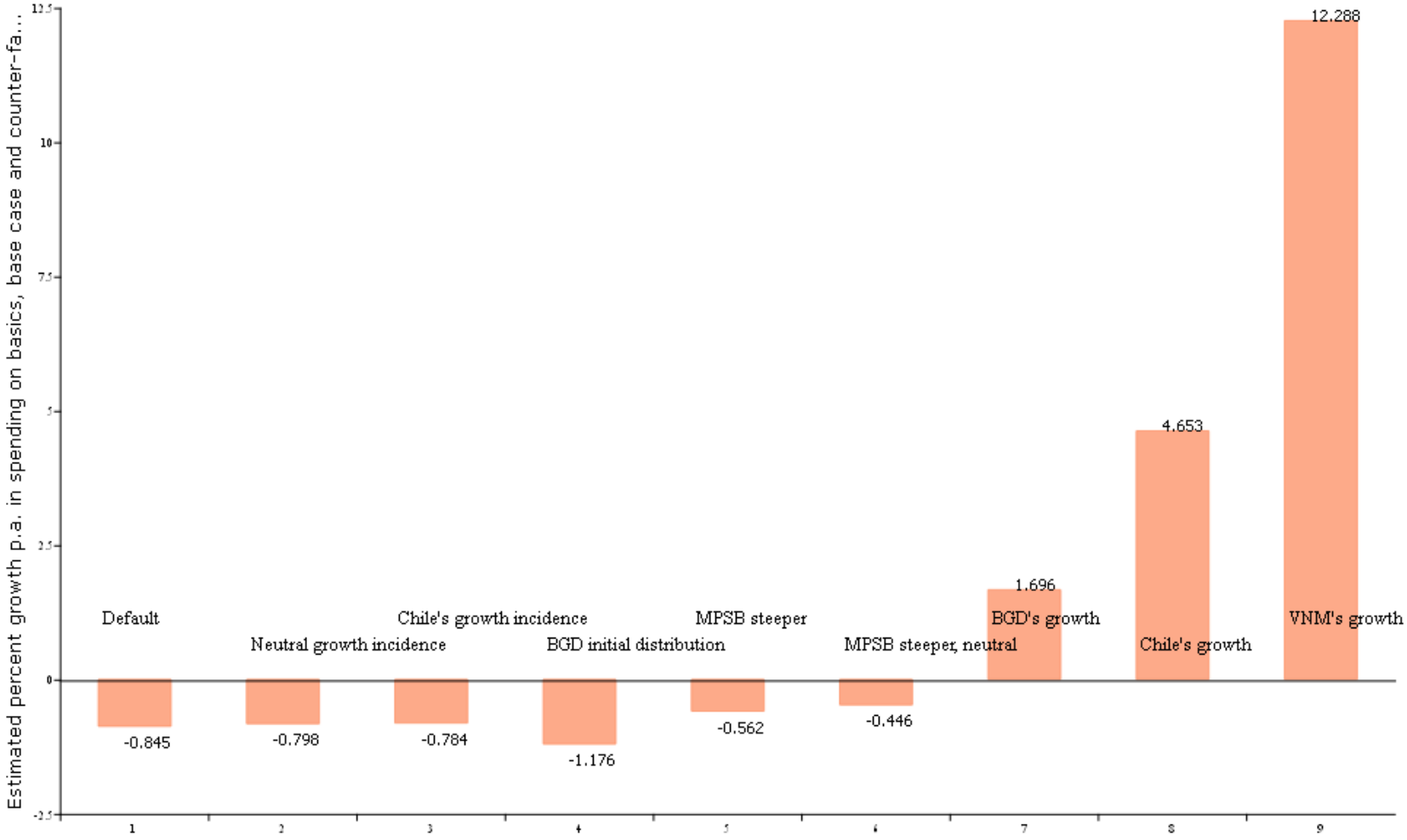


Figure 4b: Estimates of Bangladesh's growth in spending on basics

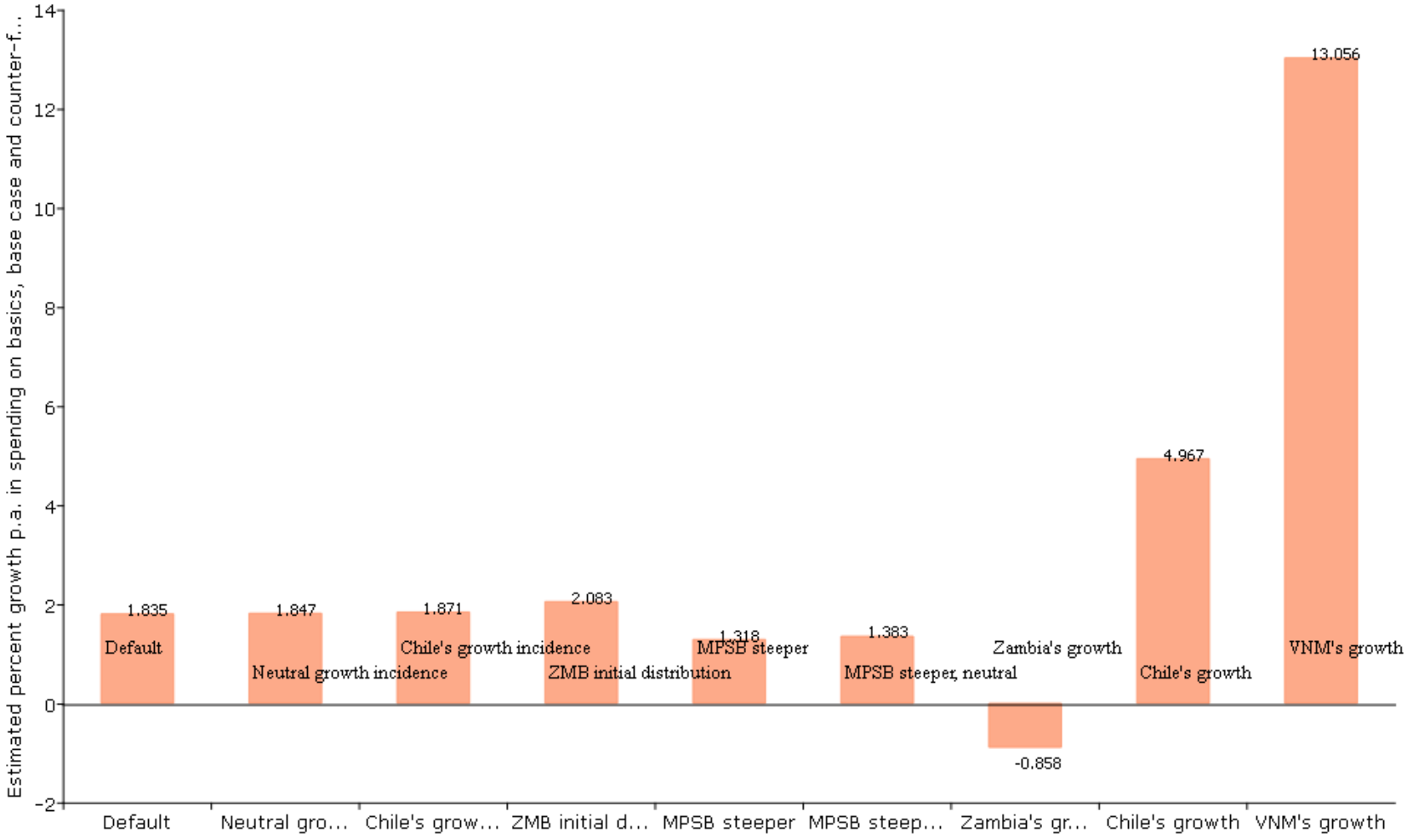


Figure 4c: Estimates of Chile's growth in spending on basics

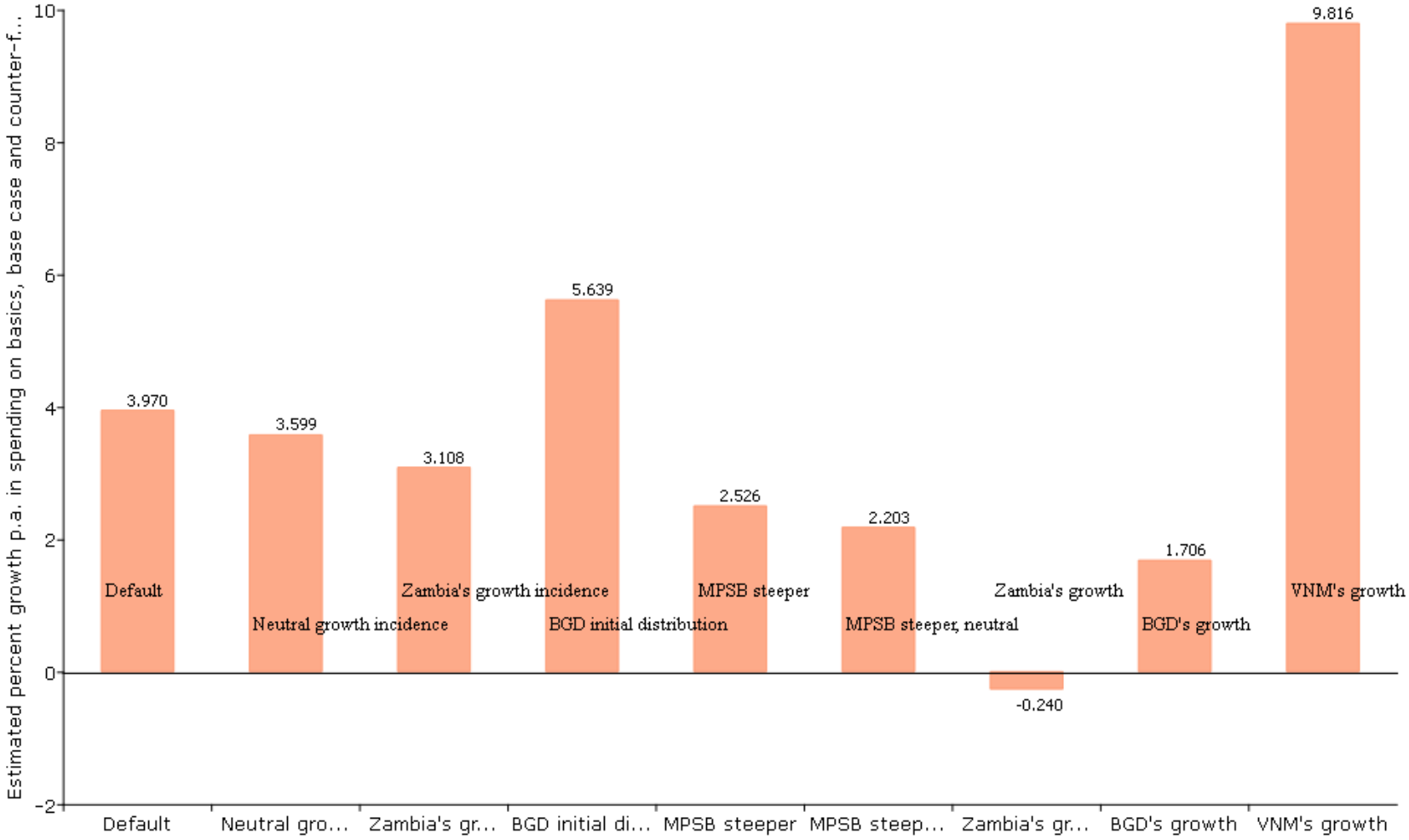
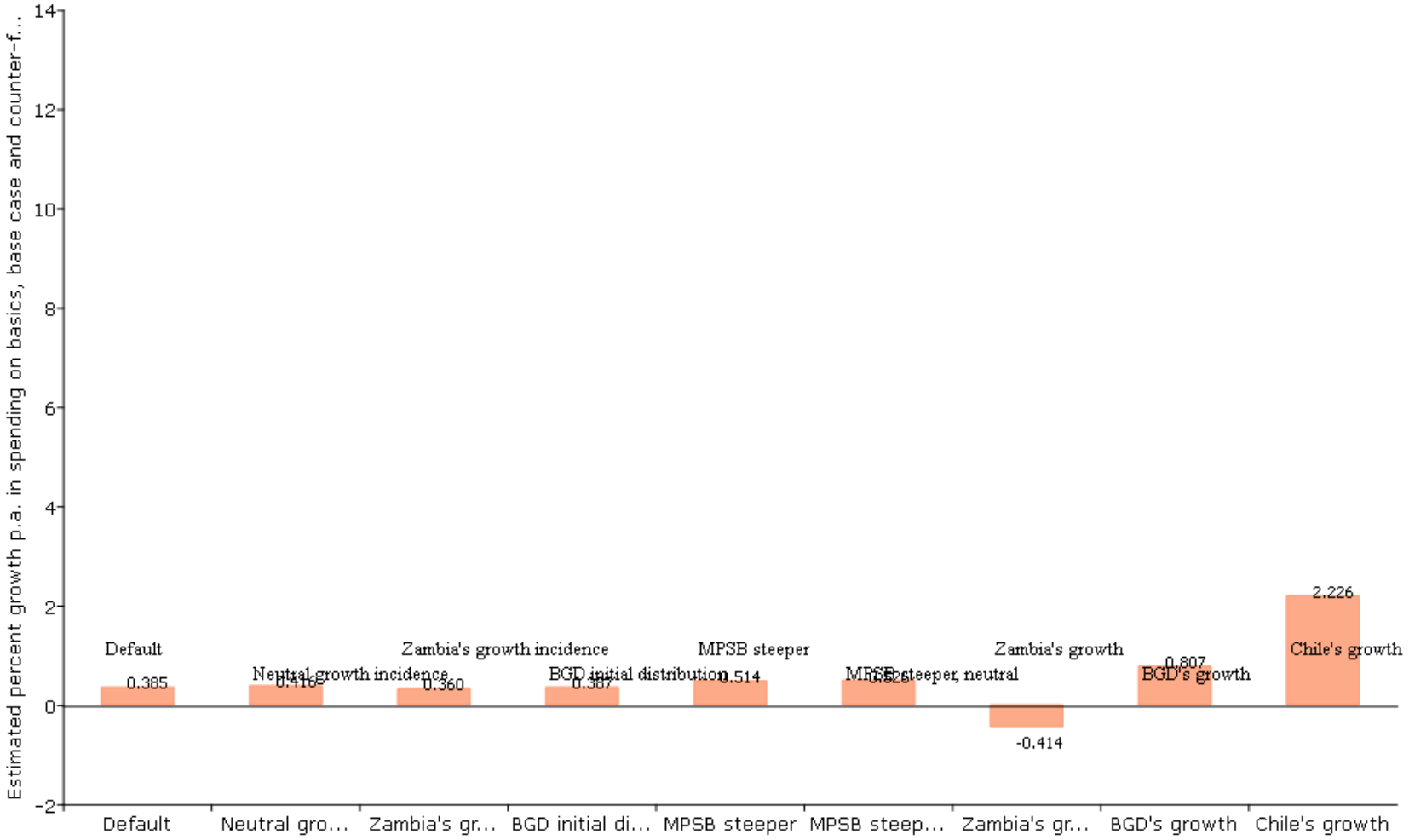


Figure 4d: Estimates of Denmark's growth in spending on basics



As stated in the opening section there are no direct "policy implications" of these facts. Actual choices of policies to improve basics, whether through better distribution of income through taxes and transfers, increases in government spending, improvements in the efficacy or efficiency of government programs or through increased private incomes, are going to depend on the specifics and on the context. We are not arguing that, in general, there are not possibilities for governments to be more effective in improving outcomes important for wellbeing. We are not arguing against the idea that there might be wellbeing improving redistributions that are politically and administratively feasible. Nor are we arguing that anything done with the purpose of improving GDPPC is going to lead to improved basics. As Equatorial Guinea shows there are ways of improving GDPPC that do not lead to improvements. Decisions on specific proposed policy choices will hinge on evidence and analysis of the specifics of design and of context.

However, facts are facts and the existence of a strongly robust association between GDPPC and the basics of human wellbeing cannot just be ignored.

Conclusion

Back to Lucas. For poor countries he was exactly right. The welfare consequences, measured here as improvements in non-money metric indexes of basics of material wellbeing, as indeed so large it makes it hard to think about anything else. Famously, Ghana and South Korea had similar GDPPC in 1960 and their divergence in growth rates over the last (near) 60 nears has produced a GDPPC of near P$41,000 in Korea and an basics index based on Legatum Indicators of 99.7 (very near the highest possible level). In contrast, Ghana, while it does relative well for its GDPPC of P$5,300, has a basics index of 46, more than 50 points behind Korea.

This is precisely *not* about caring about "income" over other indicators of wellbeing or about a "utility" approach over a "capabilities" over a "deprivation" approach to defining human development. Not matter how one chooses indicators the association with GDPPC is very strong.

These do results do make it a little hard to think so exclusively about what a large portion of development economists are in fact thinking about, which is improvements in the magnitude or efficacy of income transfers or government programs. This may well be the tendency to look at what the tool one has to hand is best at looking for, rather than finding the tool for seeing what is important.

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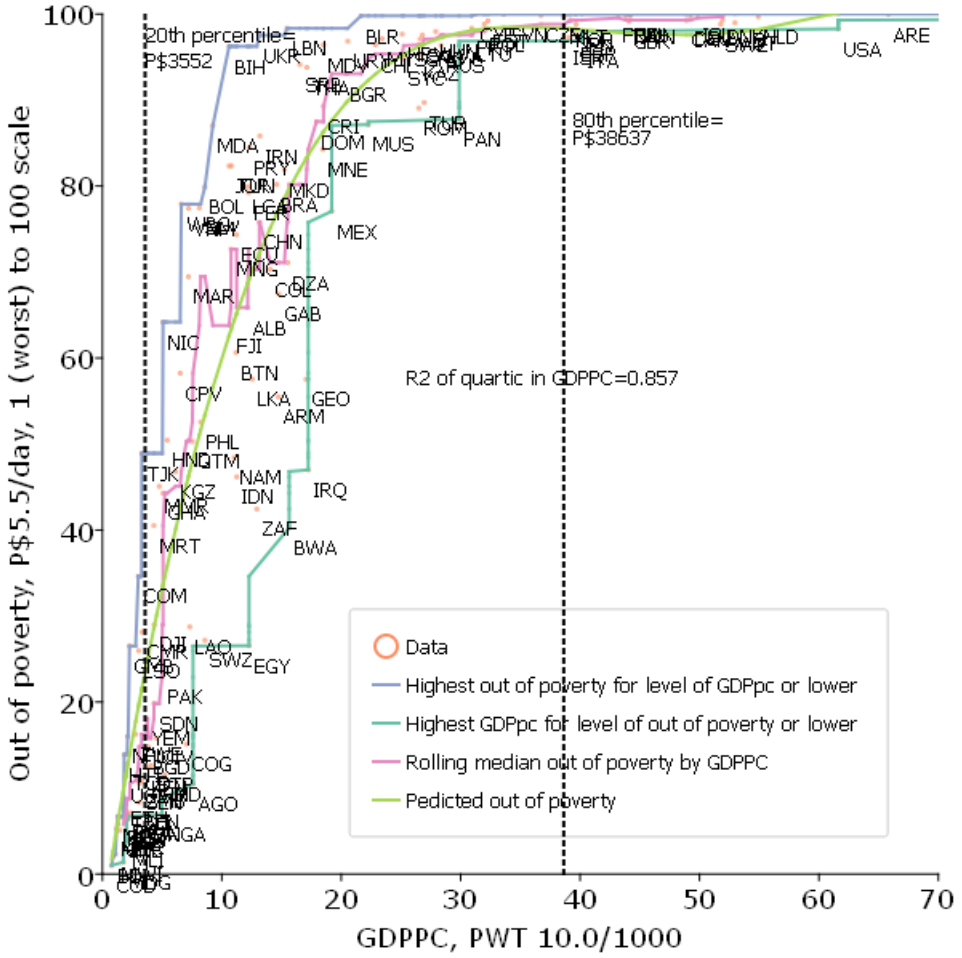
Appendix Table R1: Summary of regression results for Basics Correlational Indexes (Elements and Indicators), Social Progress Initiative Basic Human Needs, World Bank out of headcount poverty (P$5.5/day), Multidimensional Poverty Index (OPHI)						
		Basics Correlation Index-Legatum Elements (.6)	Basics Index-Legatum Indicators (.65)	Basic Human Needs (SPI)	Out of income poverty, P$5.5	Multidimensional poverty index
Constant	Est.	21.79	11.57	26.08	4.4	18.7
	Std. err.	2.34	2.38	2.23	4.58	5.47
GDPPC	Est.	5.090	6.773	6.276	8.67	18.24
	Std. err.	0.430	0.438	0.474	0.704	2.573
GDPPC^2	Est.	-0.138	-0.195	-0.219	-0.281	-1.523
	Std. err.	0.020	0.020	0.027	0.040	0.330
GDPPC^3	Est.	0.00162	0.00231	0.00321	0.00379	0.05313
	Std. err.	0.00032	0.00033	0.00052	0.00079	0.01530
GDPPC^4	Est.	-6.65E-06	-9.44E-06	-1.62E-05	-1.80E-05	-6.45E-04
	Std. err.	1.60E-06	1.63E-06	3.16E-06	4.86E-06	2.27E-04
Number of countries		167	167	153	143	100
R-Squared		0.811	0.850	0.833	0.865	0.725
F-test of YPC and powers		173.9	229.6	184.1	206.0	62.7
p-level of F-test		2.95E-58	1.57E-66	3.37E-57	4.73E-58	2.70E-26

Appendix Table R2: Summary of results for all "anchored" basic indexes										
Measure of country basics of material wellbeing	N	R2 of quartic (sorted)	Non-linear: Elasticity of index wrt GDPPC at				Empirically necessary		Empirically sufficient	
			$\mu_{QI`}$	μ_{QII}	μ_{QIII}	μ_{QIV}	Pred at μ_{QI}	Max at μ_{QI}	Pred at μ_{QIV}	Minimum at μ_{QIV}
Anchored Basics Indexes (anchor plus 9 most highly correlated other indicators, PC weights)										
Nutrition, stunting (LCNUTPST)	167	0.862	0.827	0.768	0.574	0.158	17.1	27.8	94.8	81.0
Health care coverage (HLHCSHCV)	167	0.859	0.675	0.704	0.540	0.139	20.6	32.5	96.4	77.9
Own refrigerator (LCMRERFG)	167	0.851	0.624	0.675	0.516	0.107	23.1	28.5	99.4	86.1
Rural roads (LCCTDRAR)	167	0.849	0.473	0.597	0.492	0.149	25.7	33.3	93.5	79.6
Clear fuels for cooking (LCSHRCFC)	167	0.840	0.661	0.690	0.517	0.090	22.6	24.7	100.1	85.8
Headcount poverty, P$5.5/day (LCMREPRM)	167	0.838	0.689	0.707	0.534	0.120	20.8	30.7	97.1	80.3
Women's years of schooling (EDASKWYR)	167	0.831	0.549	0.641	0.511	0.141	23.4	31.0	94.0	79.0
Access to piped water (LCBSCABW)	167	0.821	0.424	0.550	0.437	0.056	32.2	36.1	101.6	87.6
Access to electricity (LCBSCELA)	167	0.815	0.468	0.579	0.452	0.054	30.2	33.2	101.5	86.7
Access to Sanitation (LCBSCABS)	167	0.815	0.468	0.579	0.452	0.054	30.2	33.2	101.5	86.7
Indoor Air Quality (LCSHRIAQ)	167	0.801	0.399	0.529	0.422	0.042	34.2	38.9	102.6	90.2
Births attended by Skilled health Staff (HLHCSBRA)	167	0.765	0.265	0.413	0.359	0.058	42.5	57.6	100.4	90.5
Under-5 mortality (HLLEXUFM)	167	0.758	0.280	0.425	0.357	0.030	42.6	53.4	101.8	89.4
Primary Completion Rate (EDPRIPRC)	167	0.756	0.295	0.440	0.367	0.033	40.5	49.6	100.1	85.9
Contraceptive Prevalence (HLHPICPV)	167	0.703	0.272	0.429	0.388	0.126	35.1	47.9	88.1	68.8
Median	167	0.821	0.468	0.579	0.452	0.090	30.2	33.2	100.1	85.9
Source: Authors' calculations.										

Figure GA.1: Population out of income/consumption poverty and GDP per capita

Panel A: All countries with GDPPC<P$70,000



Panel B: Countries with GDPPC<P$40,000

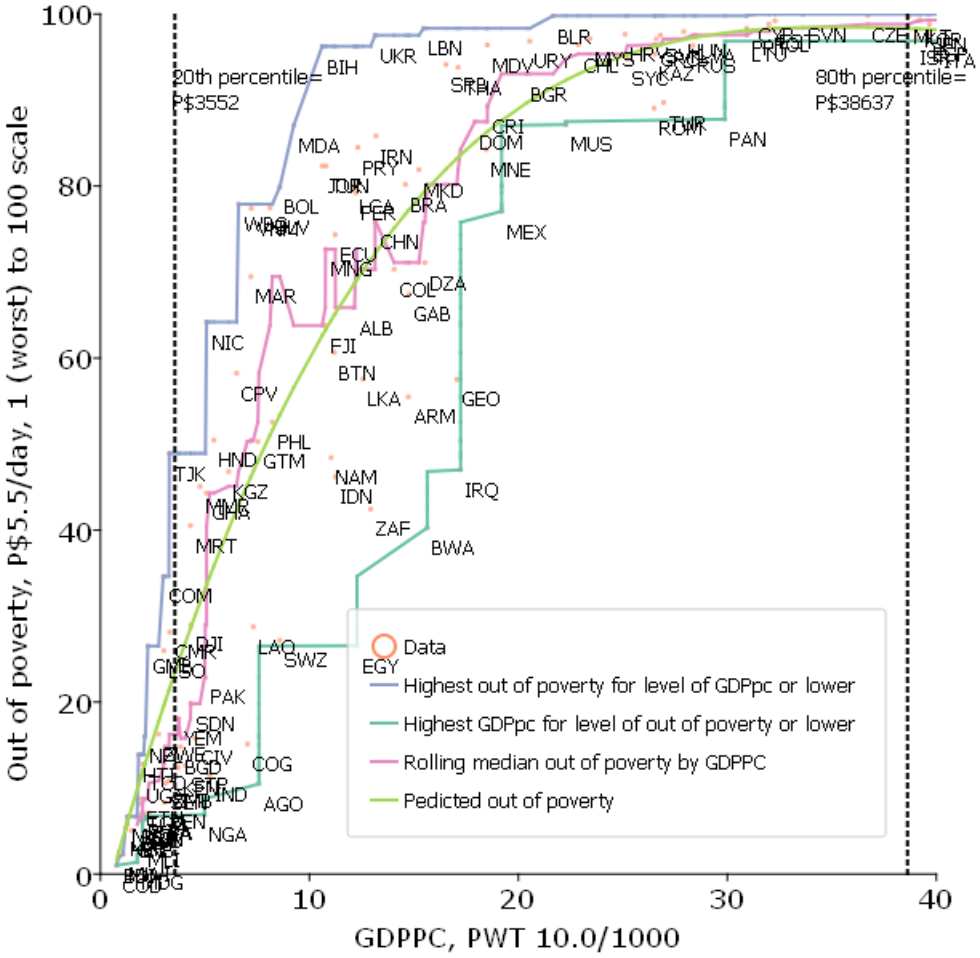
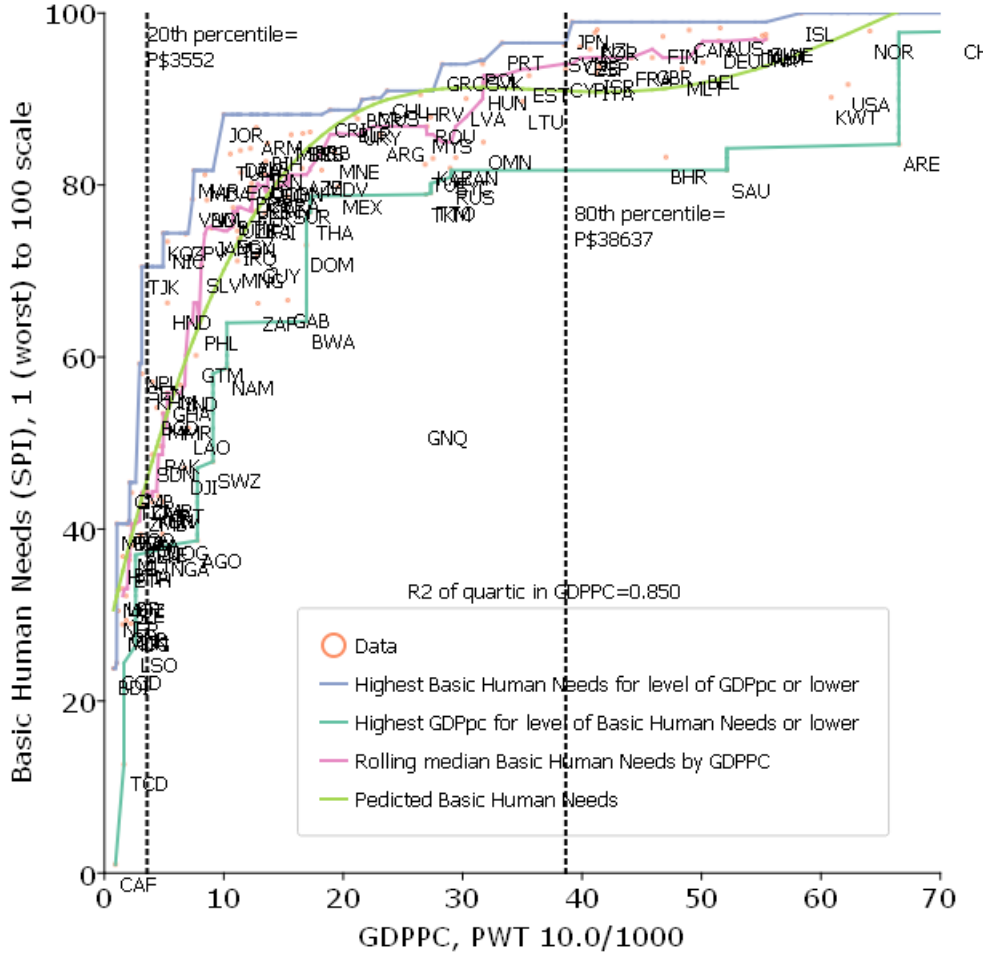


Figure GA.2: Basic Human Needs (from Social Progress Imperative) and GDP per capita



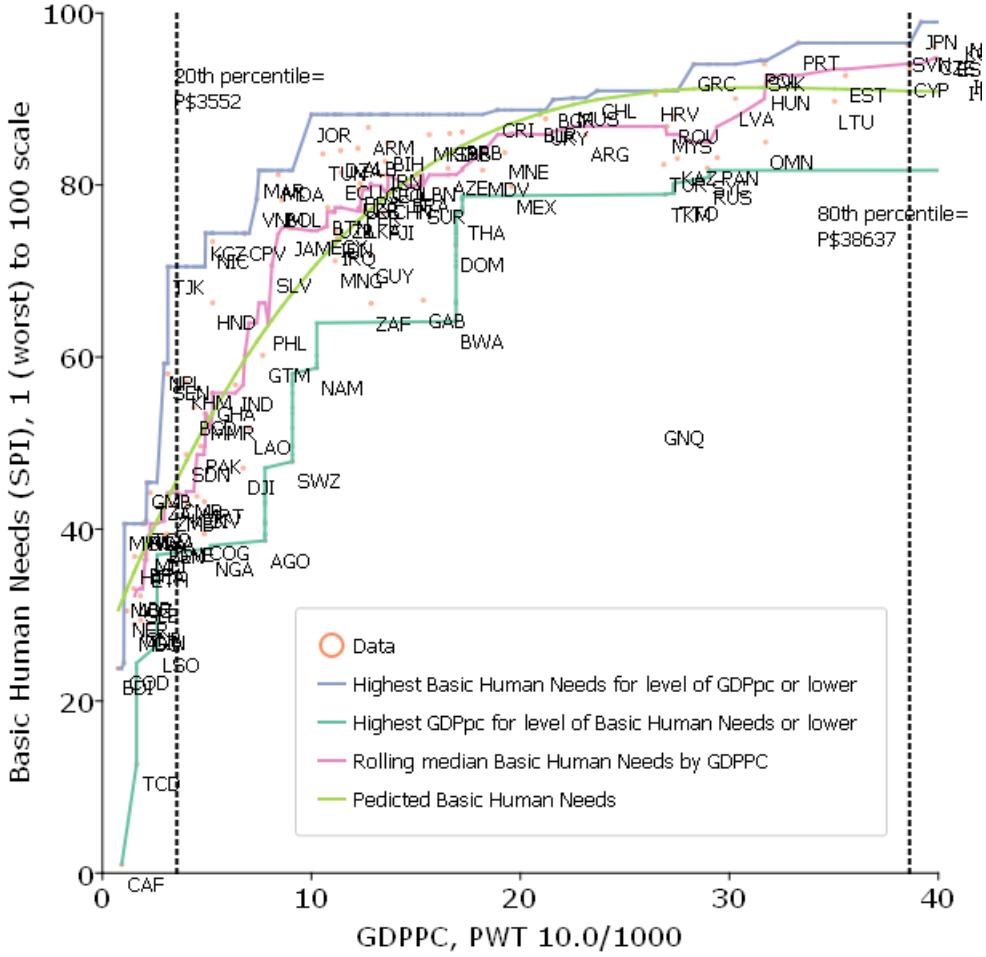


Figure GA.3: (Out of) Multidimensional Poverty Index (headcount and intensity), rescaled to 1 (worst) to 100 (best) scale and GDP per capita