Prosperity Gap

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Inequality and Prosperity: Measures and Methods Workshop

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Outline

1. What does the Prosperity Gap add to the understanding of shared prosperity?
2. An introduction to the Prosperity Gap measure.
3. Global and Malaysian trends in the Prosperity Gap.
4. Decomposition of the Prosperity Gap level and growth.

1. Prosperity gap: a new measure of shared prosperity

Shared Prosperity: The World Bank's commitment to promoting equitable growth

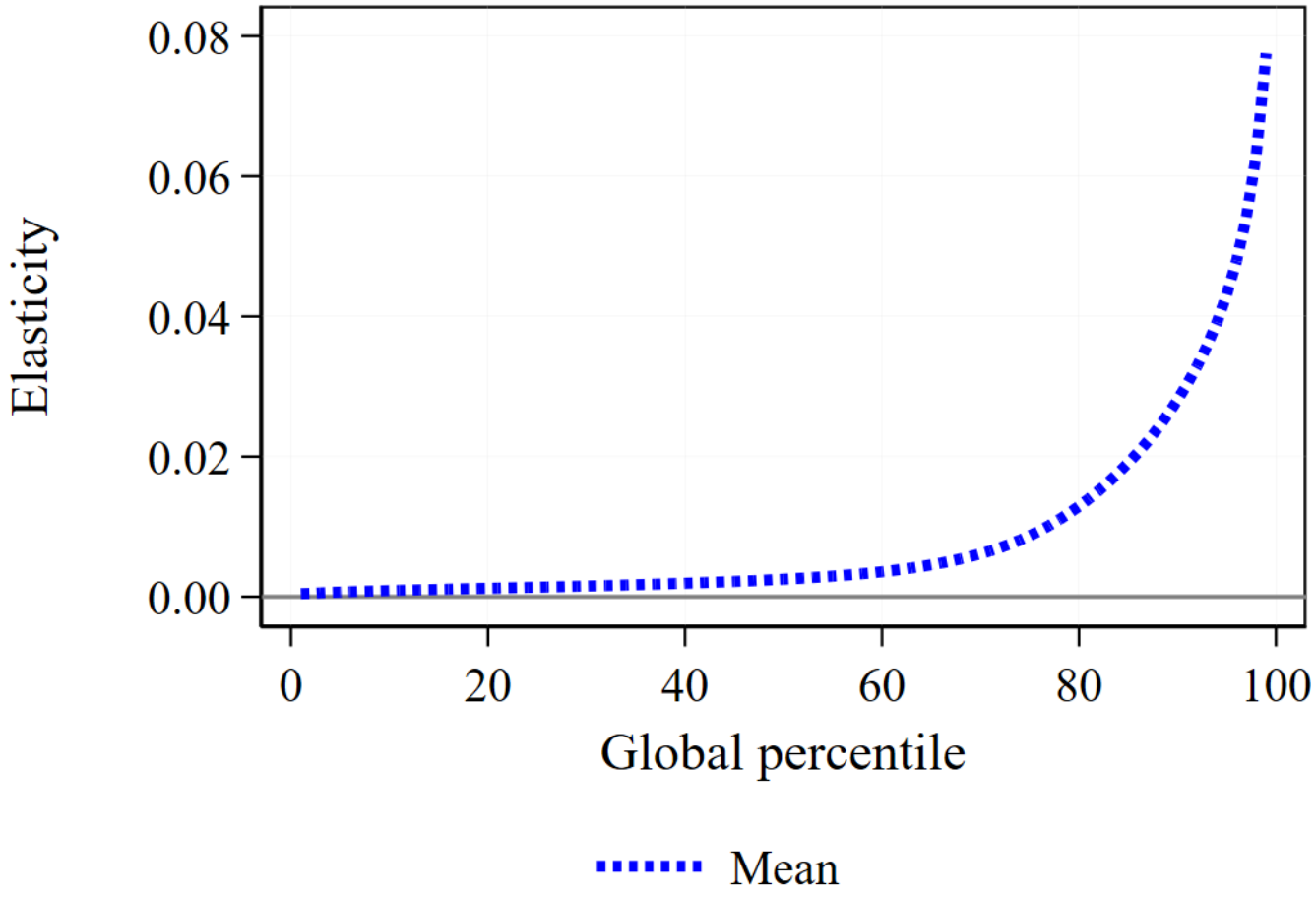
- Since 2013 the World Bank has monitored "shared prosperity" as one of its Twin Goals alongside "ending extreme poverty"

> *One way to think about the World Bank's new shared prosperity goal is as an **alternative to average income** as the benchmark of development progress. …. [G]ood progress is judged to occur not merely when an economy is growing, but, more specifically, when that **growth is reaching the least well-off in society**. Thus, the shared prosperity goal seeks to **increase sensitivity to distributional issues**, shifting the common understanding of development progress away from average per capita income and emphasizing that good growth should benefit the least well-off in society. (World Bank (2015), p.10)*

How is the prosperity gap different from the growth in the bottom 40 percent (B40)?

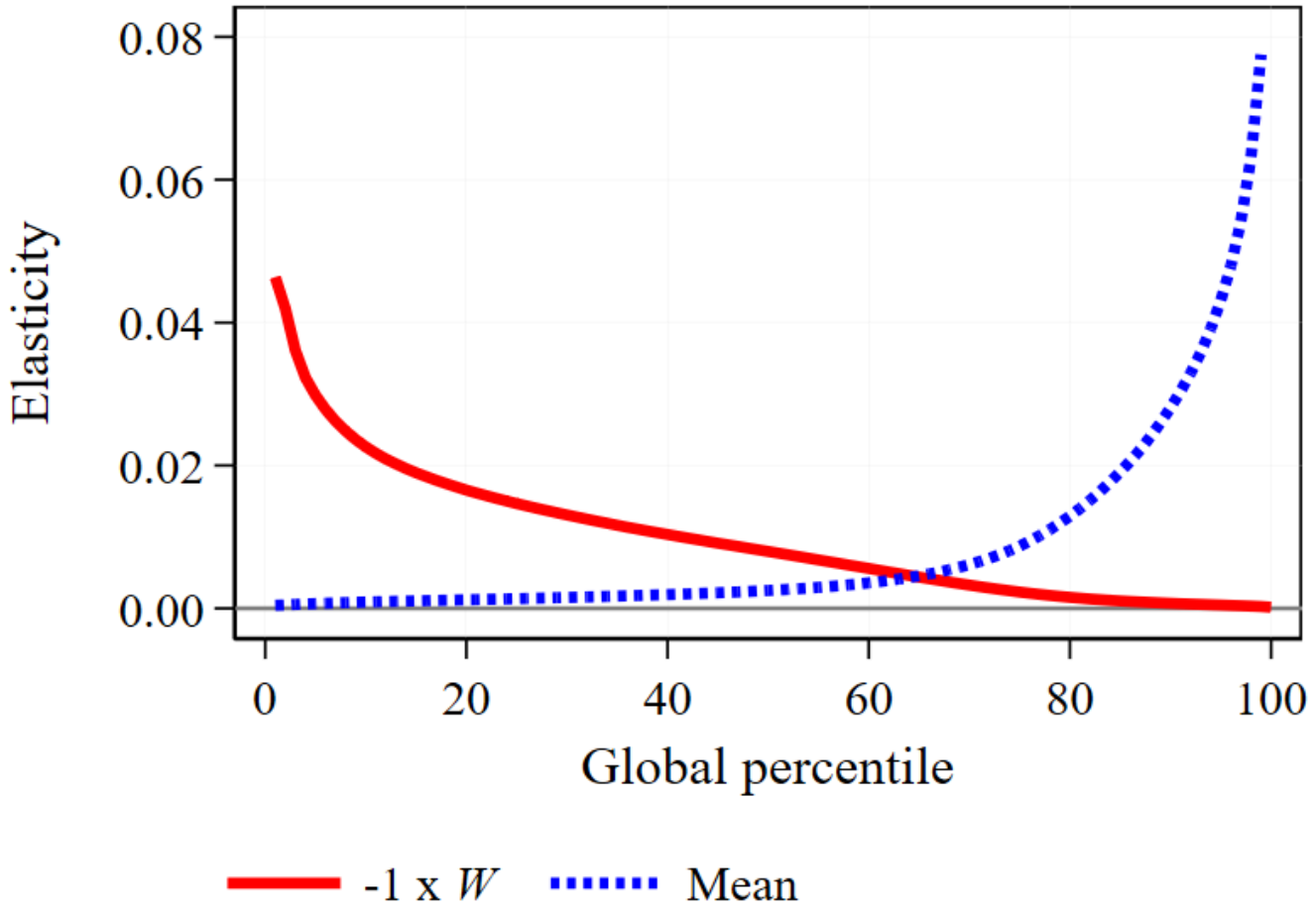
1. **It is not distribution sensitive.** Growth in the poorest in the B40 matters least for the growth in the B40. And so, it ignores inequality within the B40.
2. **Peculiar welfare weights.** Growth in income of a person earning in the top 60 percent of their country does not "count" as shared prosperity, even if the person is very poor by global standards.
3. **It is not subgroup decomposable.** Growth in the country's B40 cannot be decomposed into regional/subgroup contributions.
4. **Data constraints.** It requires two surveys (ideally comparable) to calculate the measure.

Whose growth matters?
Mean income gives highest weight to the richest.



Source: Kraay et al. (2023).

Whose growth matters?
Prosperity gap gives highest weight to the poorest.



Source: Kraay et al. (2023).
Acronym: W - prosperity gap

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	Distribution sensitivity			Subgroup decomp.	Comparisons independent of z
	Pigou-Dalton	Transfer	Growth		
Poverty measures					
Headcount ($\alpha = 0$)	x	x	x	v	x
Poverty Gap ($\alpha = 1$)	x	x	x	v	x
Squared poverty gap ($\alpha = 2$)	v	x	x	v	x
Sen poverty index	v	x	x	v	x
Class of Chakravarty (1983)	v	v	x	v	x
Watts (1969) & Murdoch (1998)	v	v	x	v	x
Welfare measures					
Average income per capita	x	x	x	v	v
Atkinson welfare index ($\varepsilon = 1$)	v	v	x	x	v
Atkinson welfare index ($\varepsilon = 2$)	v	v	v	x	v
Sen welfare index	v	x	x	x	v
Income growth B40	x	x	x	x	x
New measure					
Prosperity Gap	v	v	v	v	v

Adoption of various welfare and poverty measures

	Academic Use	Policy Use	Public Discourse
	EconLit*	Multilateral Development Banks at nlp4dev.org*	Google Ngram**
Poverty Measures			
Poverty Rate OR Headcount ***	40832	26730	40.49
Poverty Gap	4438	4609	6.84
Squared Poverty Gap	473	681	0.32
Watts Index	47	52	0.09
Welfare Measures			
Average income	61493	15492	36.11
Atkinson Index	744	122	0.49
Sen Index	258	70	0.12

Notes: * Number of documents. ** 1 million times fraction of corpus in 2019. *** Search results in last column for "poverty rate" only as Ngram viewer does not support Boolean search. Search results retrieved March 22-24, 2023.

2. Prosperity gap: introduction

The Global Prosperity Gap

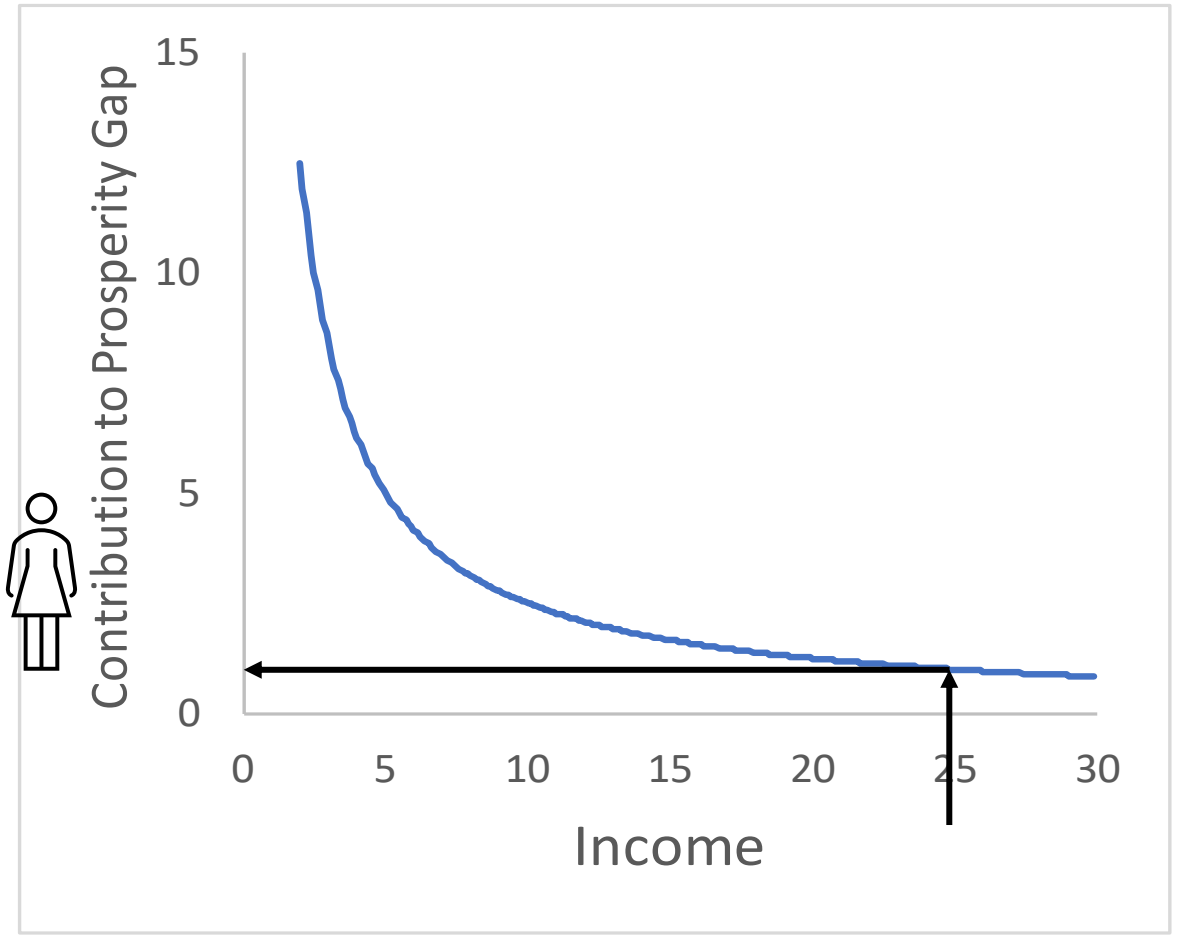
- The global prosperity gap measures the average factor by which incomes must increase to reach $25/day – the typical poverty line in rich countries today.
  - Let y_i represent income of person i and let $z = \$25$ be prosperity standard.

$$Prosperity\ Gap = \frac{1}{N}\sum_{i=1}^{N}\frac{z}{y_i}$$

- Analogous to the familiar *poverty gap,* with two key differences:
  - Measures shortfall from a *prosperity* (not poverty) standard
  - Measures gap as *ratio* (not levels), making it highly distribution-sensitive

Intuition for the Global Prosperity Gap

- Person A has income of $25 and contributes 1 to the prosperity gap



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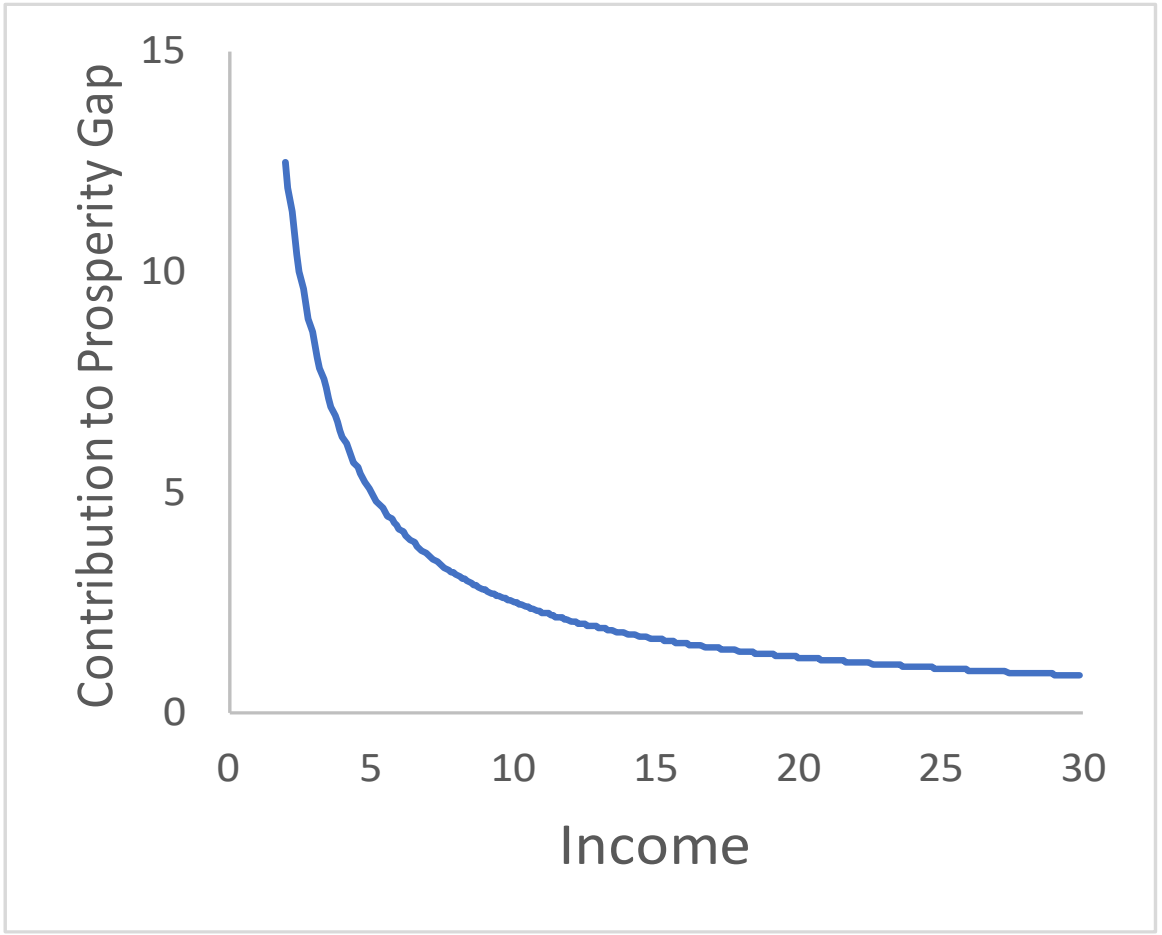
A

Intuition for the Global Prosperity Gap



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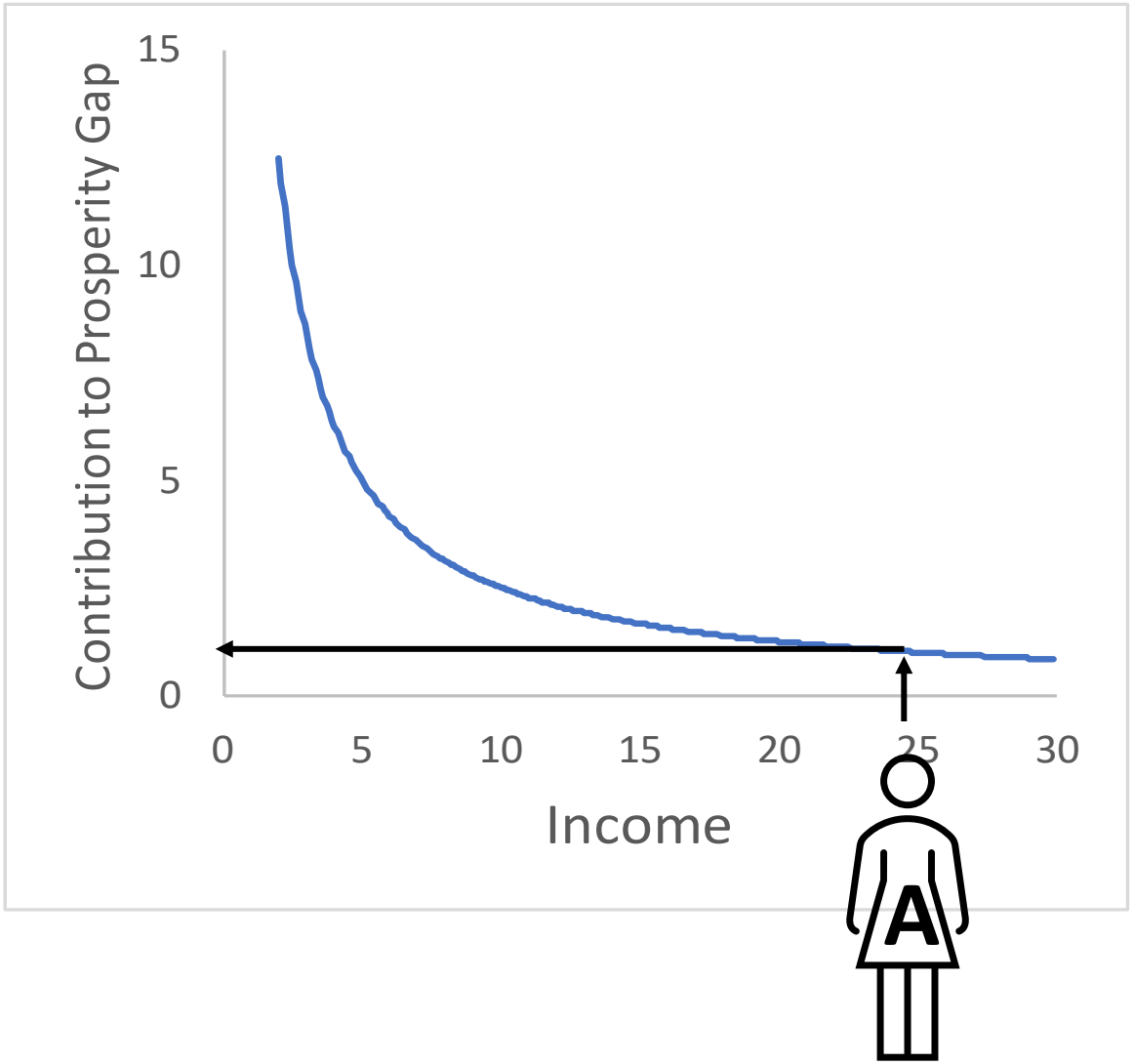
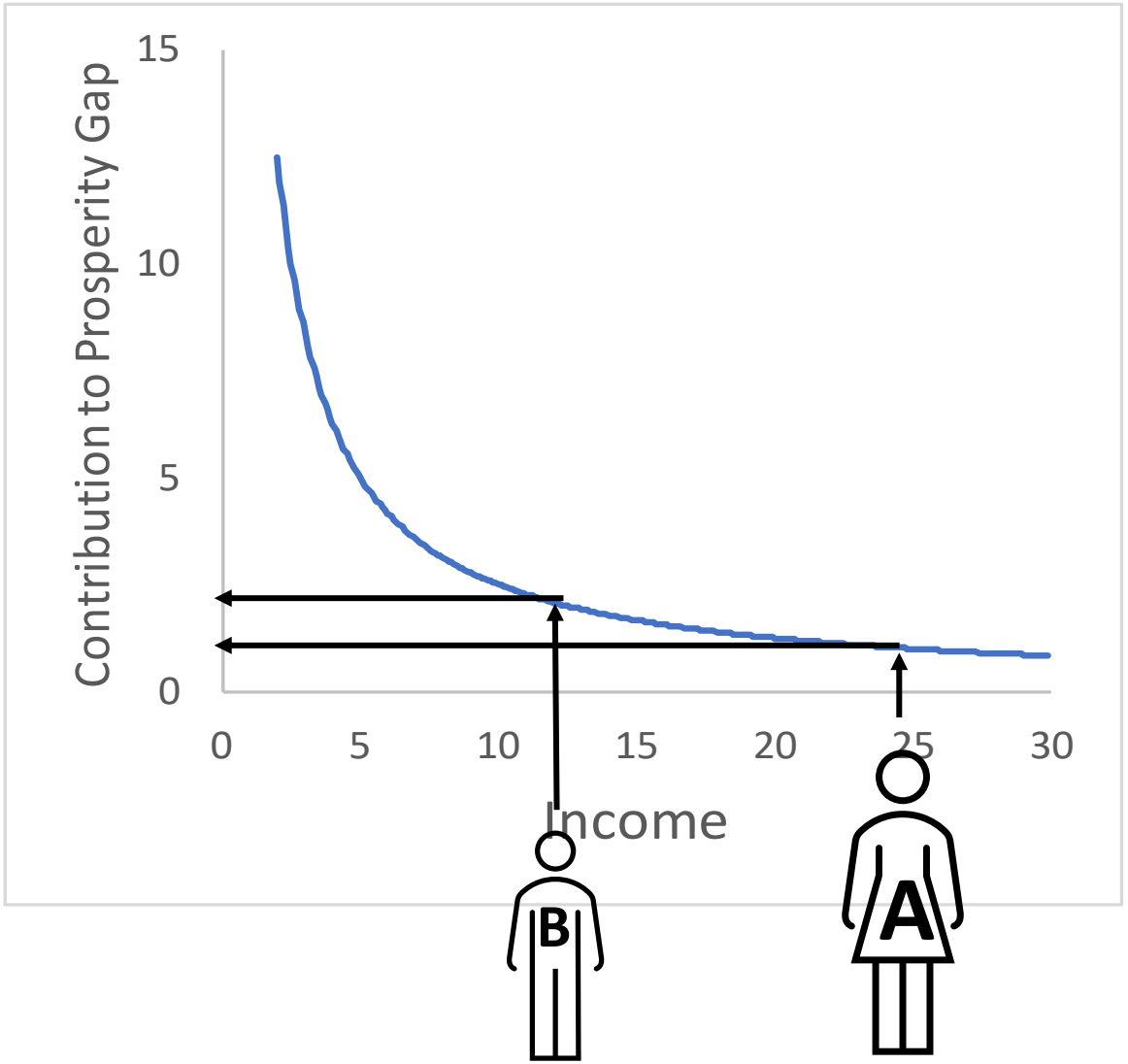


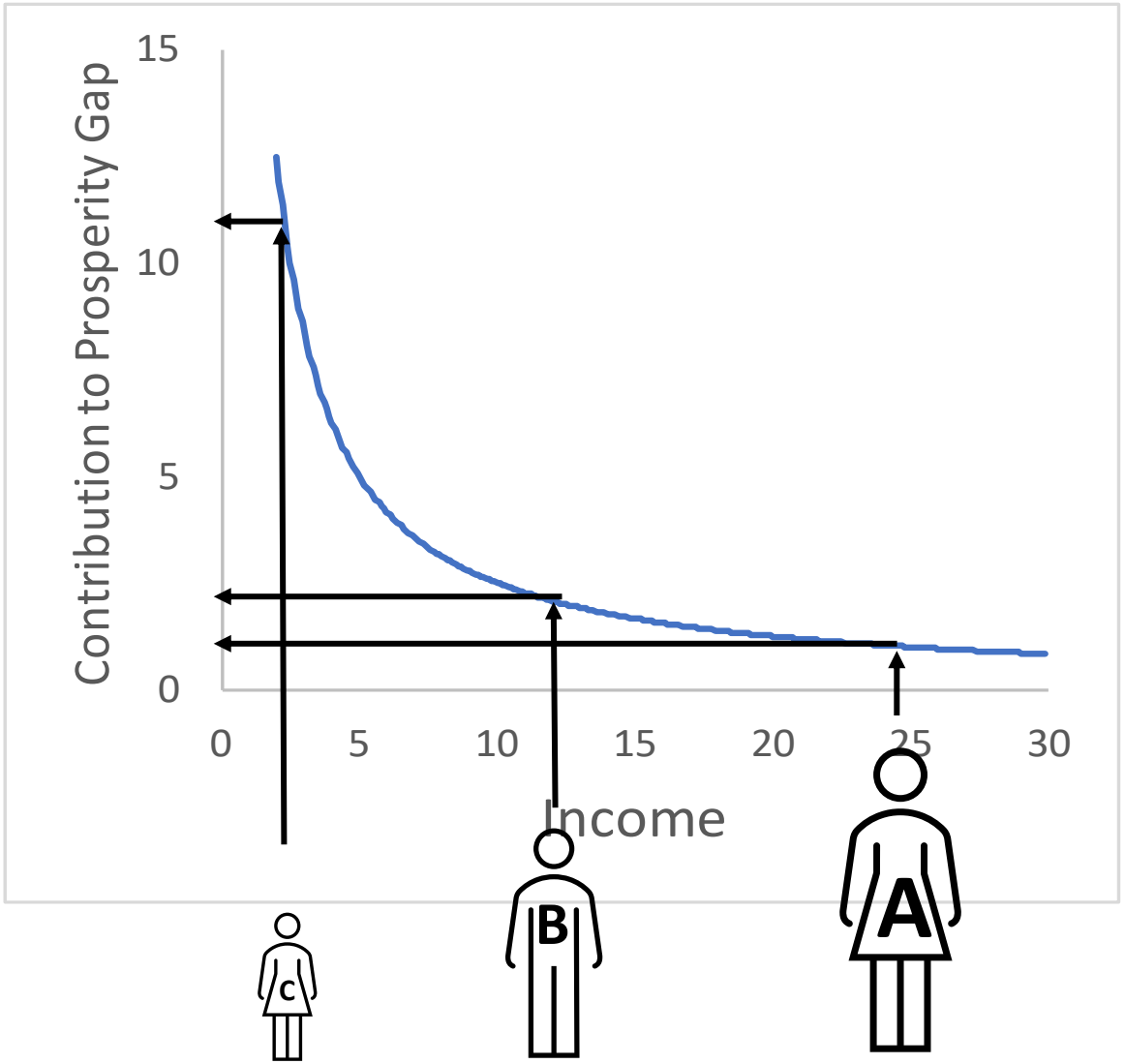
Intuition for the Global Prosperity Gap

- Person A has income of $25 and contributes 1 to the prosperity gap
- Person B has income of $12.50 and contributes ***twice as much to the prosperity gap***



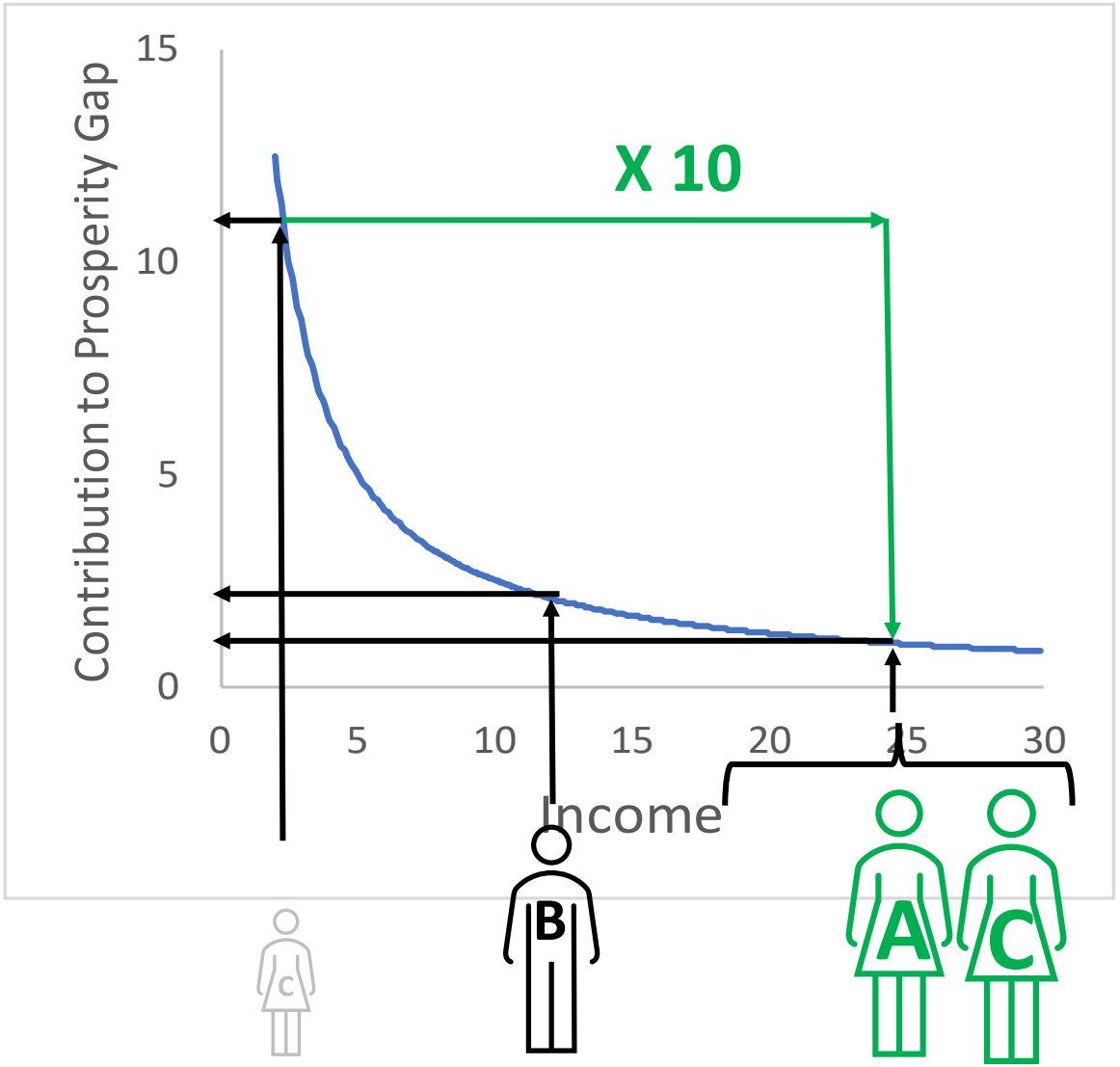
Intuition for the Global Prosperity Gap

- Person A has income of $25 and contributes 1 to the prosperity gap
- Person B has income of $12.50 and contributes ***twice as much to the prosperity gap***
- Person C has income of $2.50 and contributes ***ten times as much to the prosperity gap***



Intuition for the Global Prosperity Gap

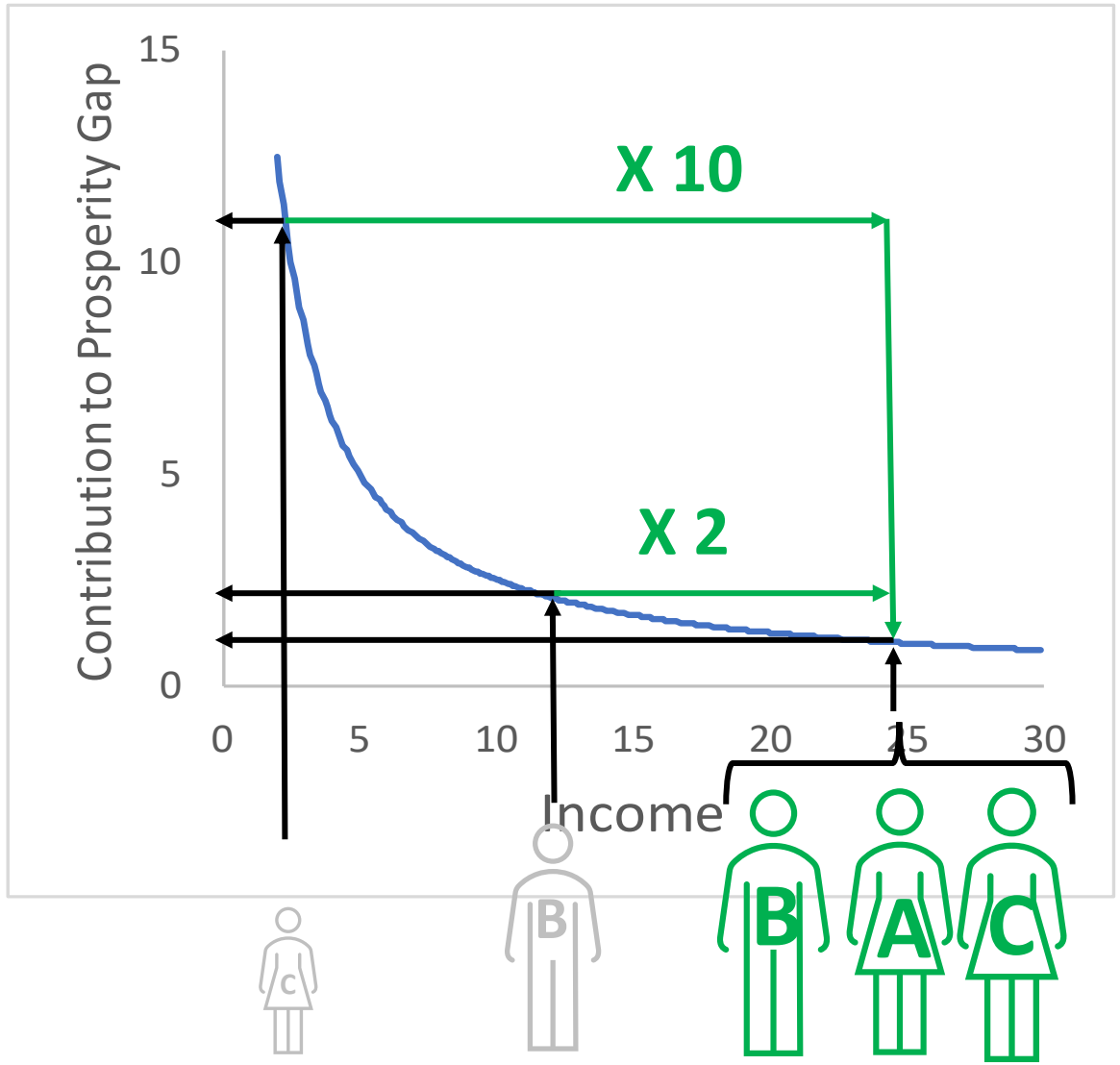
- Person C's ***income needs to increase 10-fold to achieve the same prosperity as person A***



Intuition for the Global Prosperity Gap

- Person C's ***income needs to increase 10-fold to achieve the same prosperity as person A***

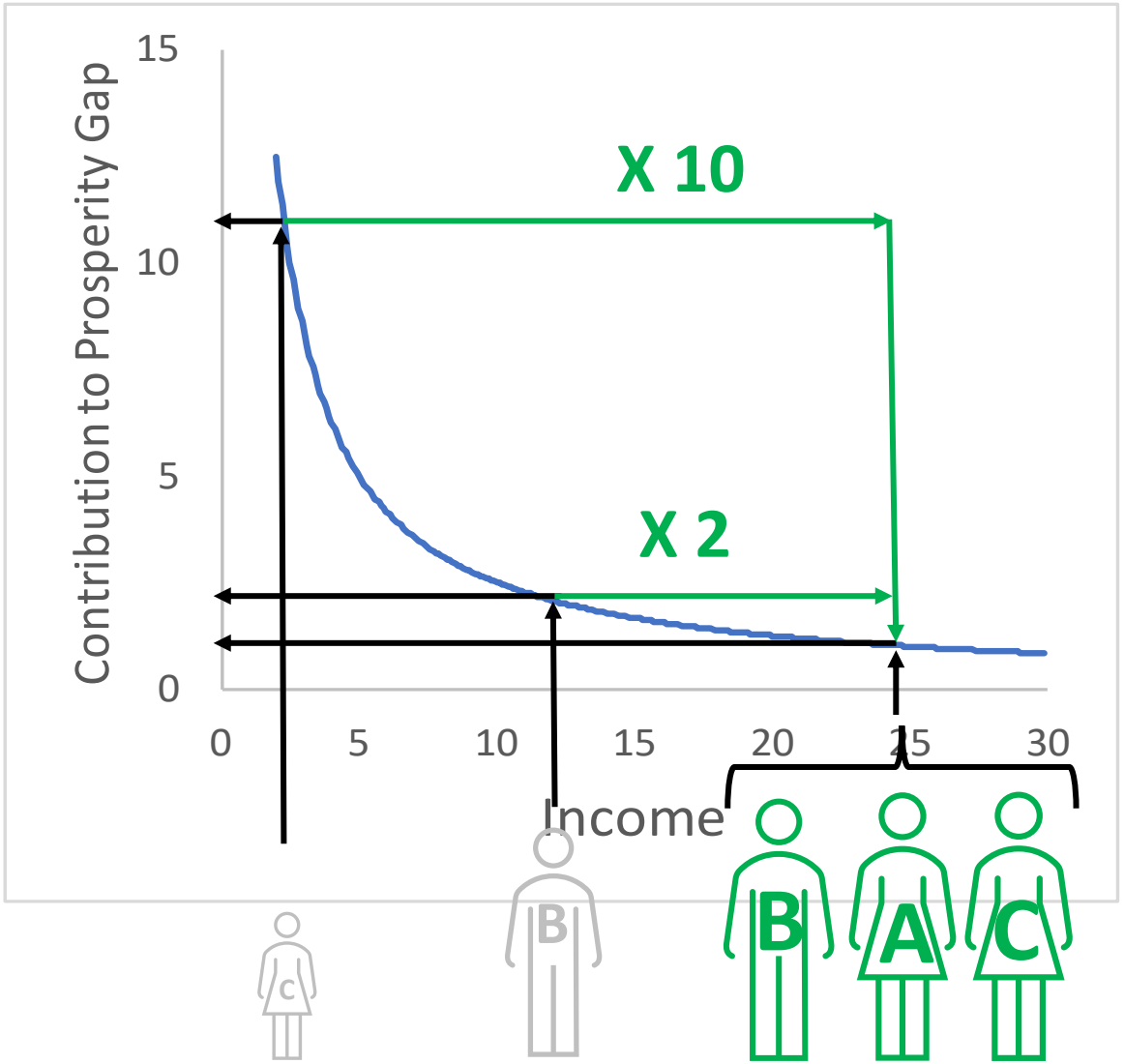
- Person B's ***income needs to increase 2-fold to achieve the same prosperity as person A***



Intuition for the Global Prosperity Gap

- Person C's ***income needs to increase 10-fold to achieve the same prosperity as person A***
- Person B's ***income needs to increase 2-fold to achieve the same prosperity as person A***
- The global prosperity gap is the ***average factor needed for everyone's to reach $25/day***

$$10 + 2 + 1 = 13 \div 3 = 4.3$$



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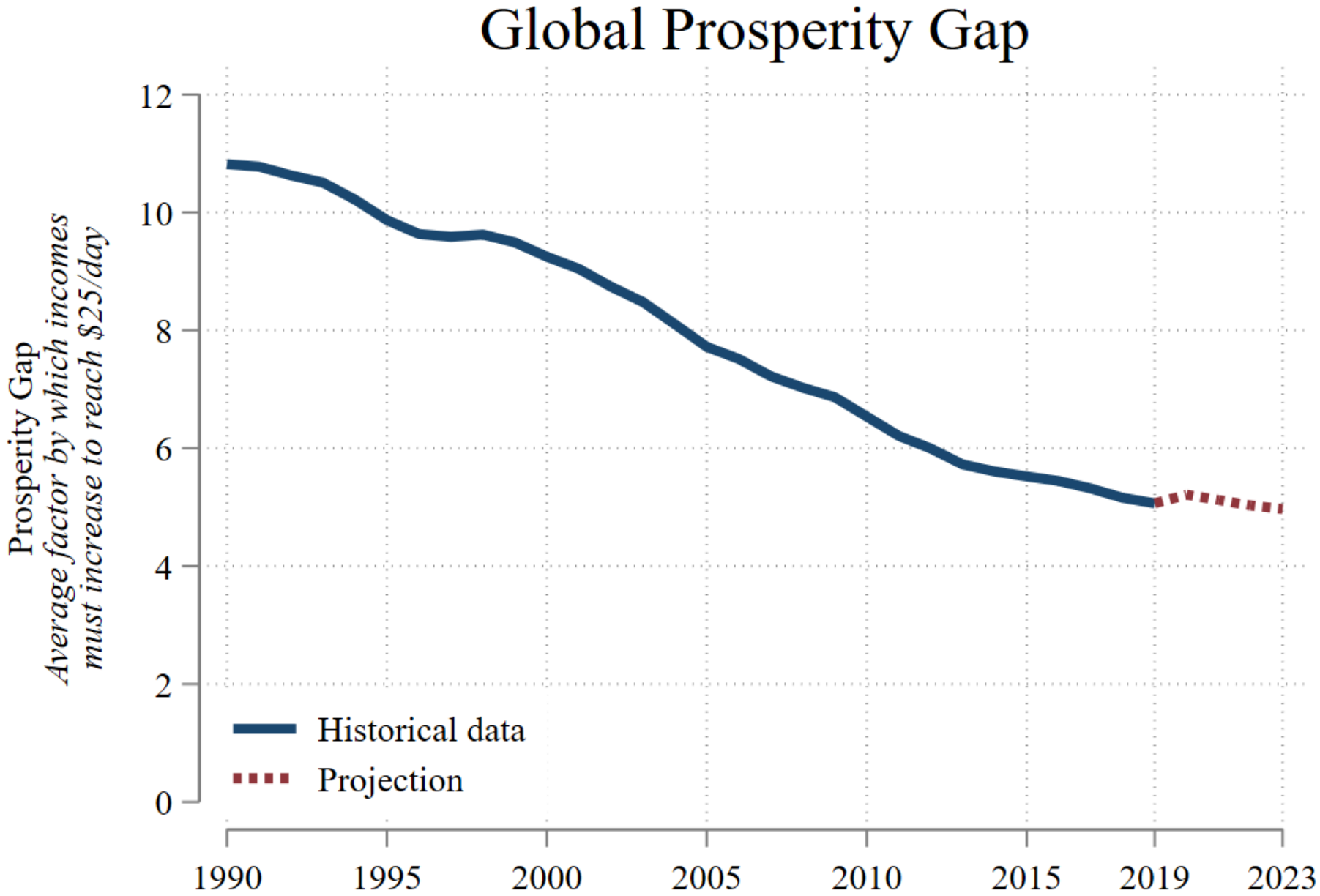
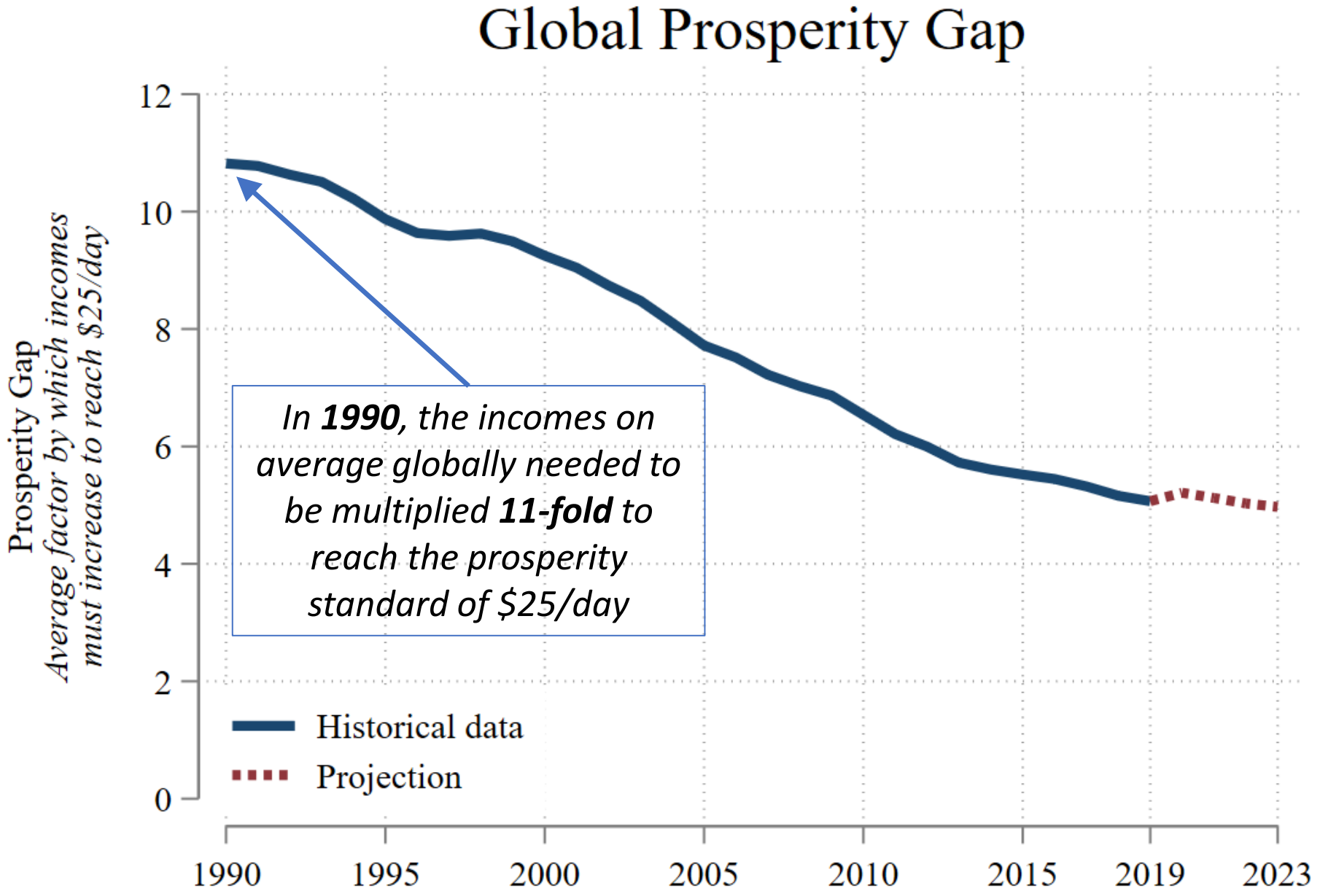
3. Prosperity gap: global and Malaysian trends



Source: Kraay et al. (2023) updated



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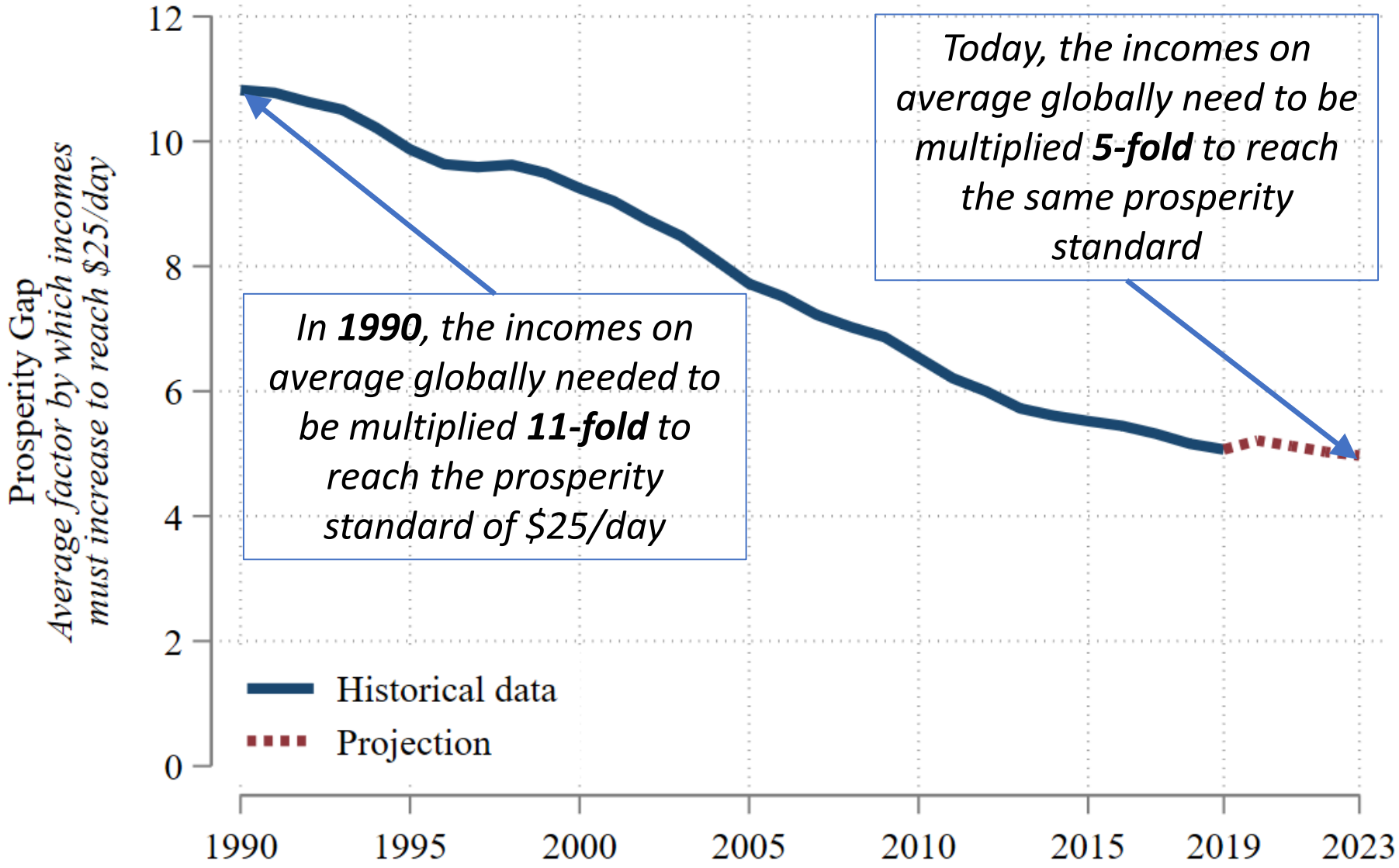
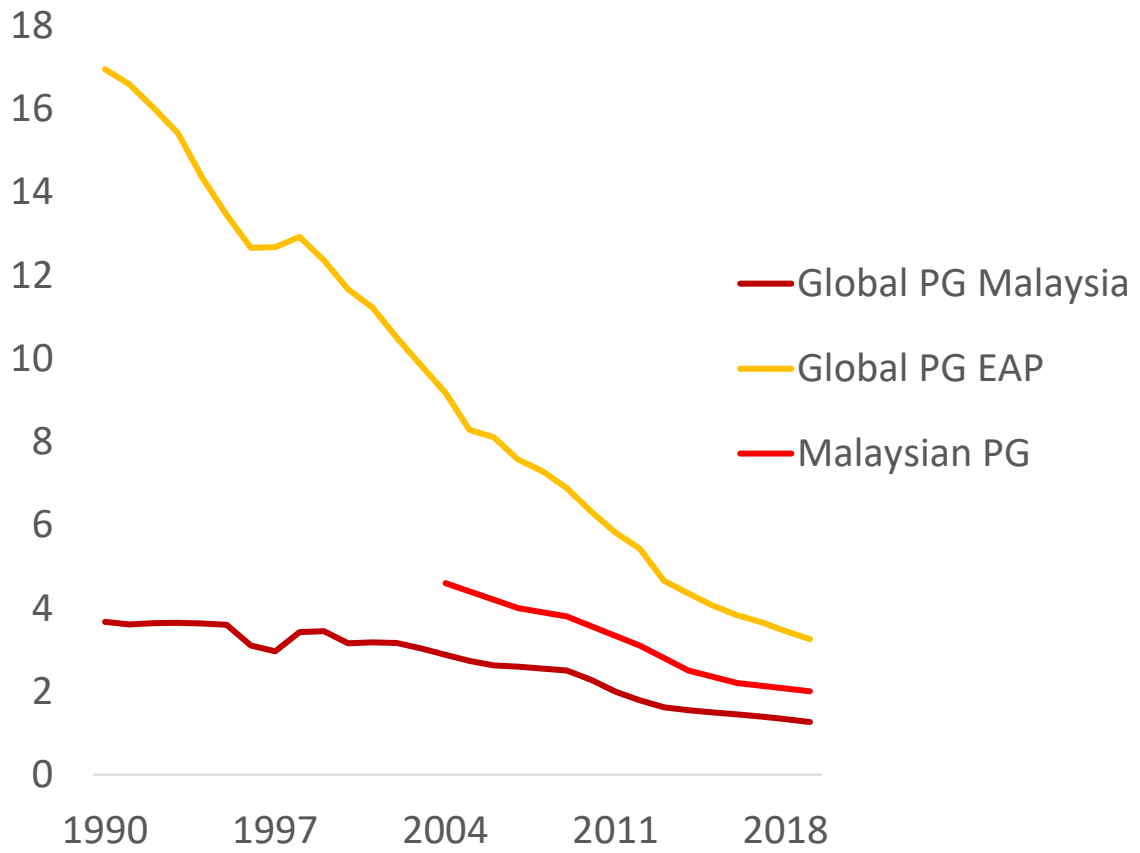
Global Prosperity Gap



Source: Kraay et al. (2023) updated

Prosperity Gap in Malaysia and EAP



Source: Measuring and Addressing Inequality in Malaysia (2024), World Bank

Global Prosperity Gap (z=$25 per person/day). Malaysian Prosperity Gap (z= approx. $36 per person/day)

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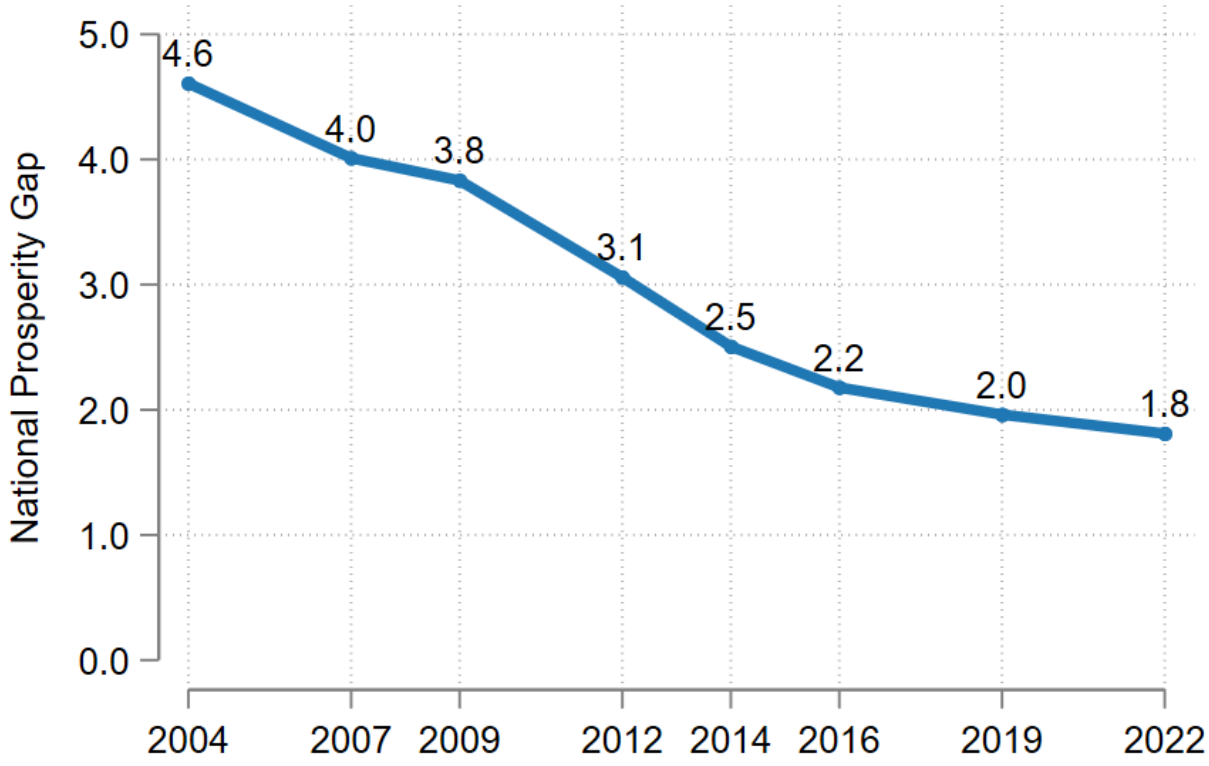
Malaysian shared prosperity in the last 15 years with a threshold of 2,000 RM per person per month



- While on average incomes needed to increase by more than 4.6-fold in 2004 for everyone to reach a threshold of RM 2000 per month, this multiple has more than halved to just over 1.8-fold in 2022.

Source: Measuring and Addressing Inequality in Malaysia (2024), World Bank

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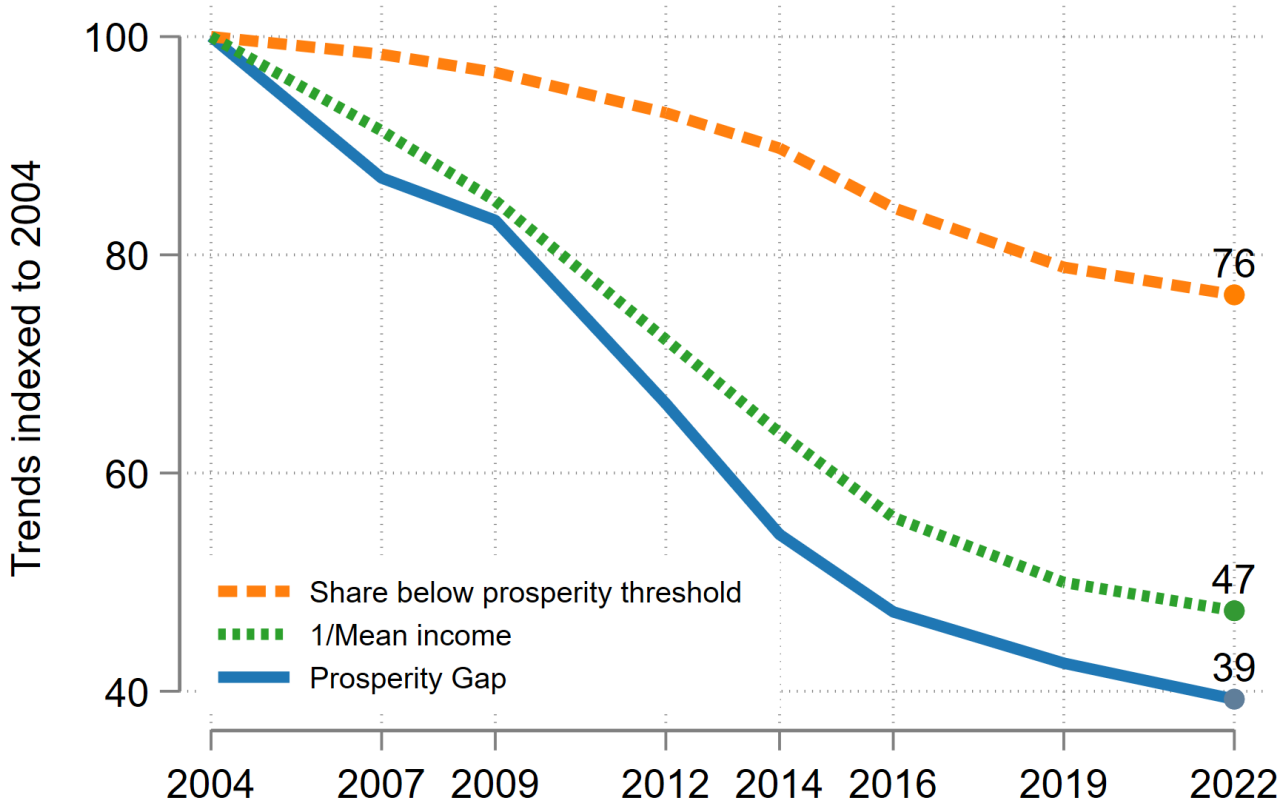
The Prosperity Gap falls faster as the incomes of the bottom improve relatively faster



- Prosperity gap has declined 61% from 2004 to 2022.
- At the same time the number of people living above RM 2000/month has only increased by 24%.
- Average income improved by 53%, a relatively slower pace compared to the prosperity gap, as the latter also incorporates improvement in inequality.

Source: Measuring and Addressing Inequality in Malaysia (2024), World Bank

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4. Prosperity gap: some nice properties

Features of the Prosperity Gap

I. **The prosperity gap is subgroup decomposable**.

- The prosperity gap for the world is the population-weighted average of the prosperity gaps of individual countries
- Allows measurement of shared prosperity in the same terms for global advocacy and country engagement

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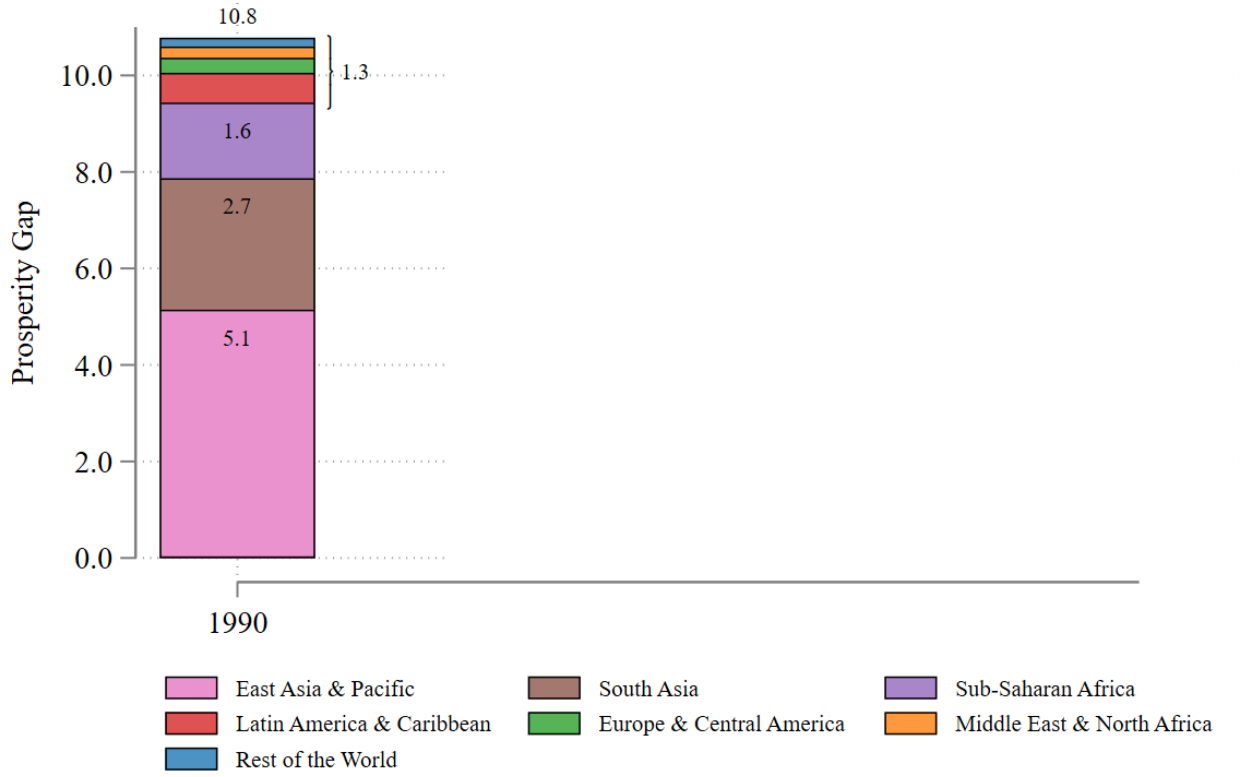
II. **The prosperity gap is a distribution-sensitive welfare measure**.
- The prosperity gap narrows (i.e., it improves) when incomes anywhere in the world increase
- The prosperity gap improves *faster* when incomes of the *poorest* increase
- Inequality measure can be decomposed into within and between components

I. The Prosperity Gap is sub-group decomposable using population weights

- $Prosperity\ Gap$

$$= \sum_{j=1}^{J} \frac{N_j}{N} \times W_j$$

where N_j is the population of the j^{th} subgroup, N is the total population, and W_j is the prosperity gap of the subgroup.



Source: Kraay et al. (2023)

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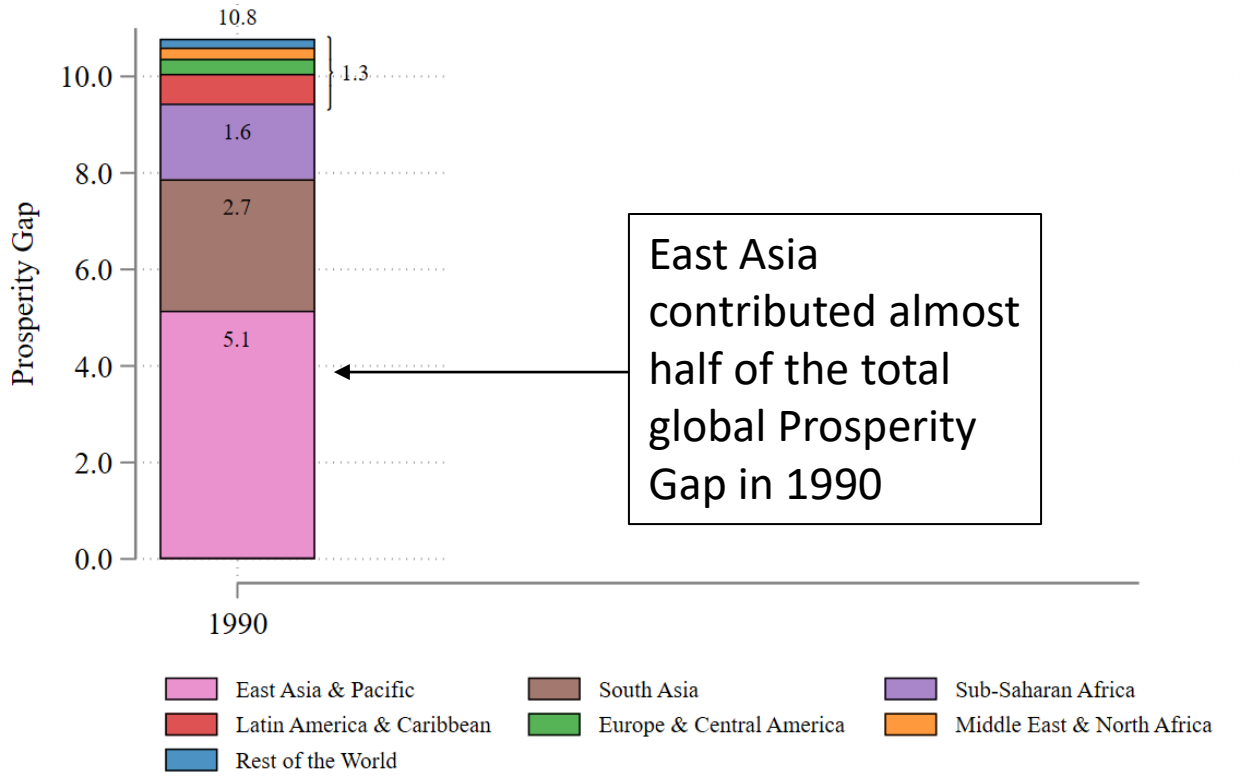

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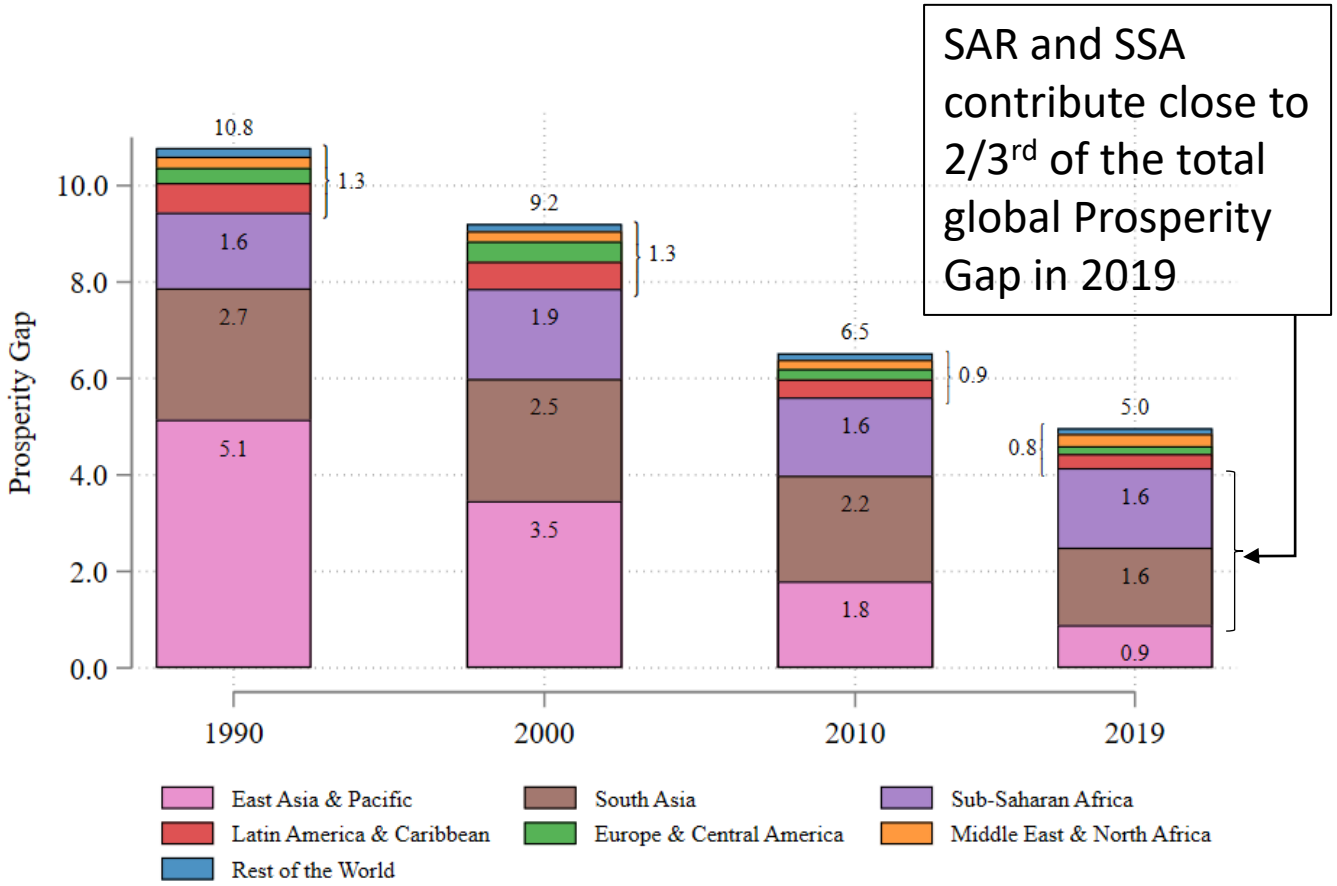

Source: Kraay et al. (2023)

II. Distribution sensitivity

- Alternate specification leads to an inequality measure is *the average factor by which incomes need to be multiplied to reach mean income*.

$$I = \frac{1}{N}\sum_{i=1}^{N}\frac{\bar{y}}{y_i},$$

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- Alternate specification leads to an inequality measure is *the average factor by which incomes need to be multiplied to reach mean income*.

$$I = \frac{1}{N}\sum_{i=1}^{N}\frac{\bar{y}}{y_i},$$

- The Prosperity Gap can be rewritten as the product of the *mean* and the *inequality* measure.

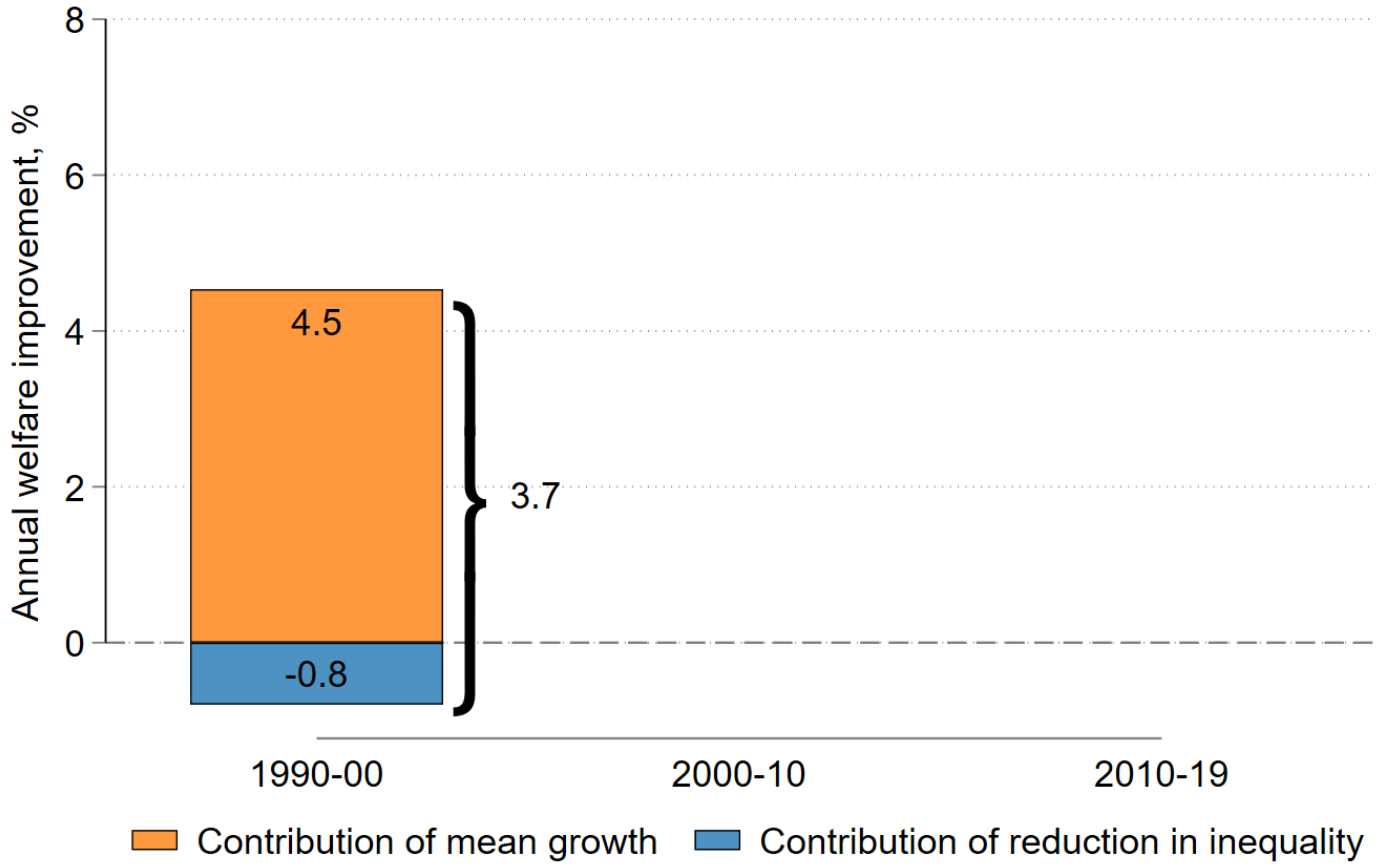
$$Prosperity\ Gap = \frac{z}{\bar{y}} \times I$$

Mean and inequality decomposition

$$Prosperity\ Gap = \frac{z}{\bar{y}} \times I$$

- The prosperity gap narrows (i.e., it improves) when *inequality falls and* when *average incomes increase*
- This formulation also allows us to decompose the growth (log difference) of the prosperity gap into growth in the mean and changes in inequality.

Contributions to decline in East Asia's Prosperity Gap



Source: Poverty and Inequality Platform, World Bank

- The prosperity gap in EAP decreased from 17 in 1990 to 3.3 in 2019 – a 3.7 percent annual decline.
- The growth in the mean (4.5% annually) almost entirely explained the decline in prosperity gap.
- *Inequality increased in the 1990s meaning that the improvement in the prosperity gap was slower than the improvement in the mean income.*

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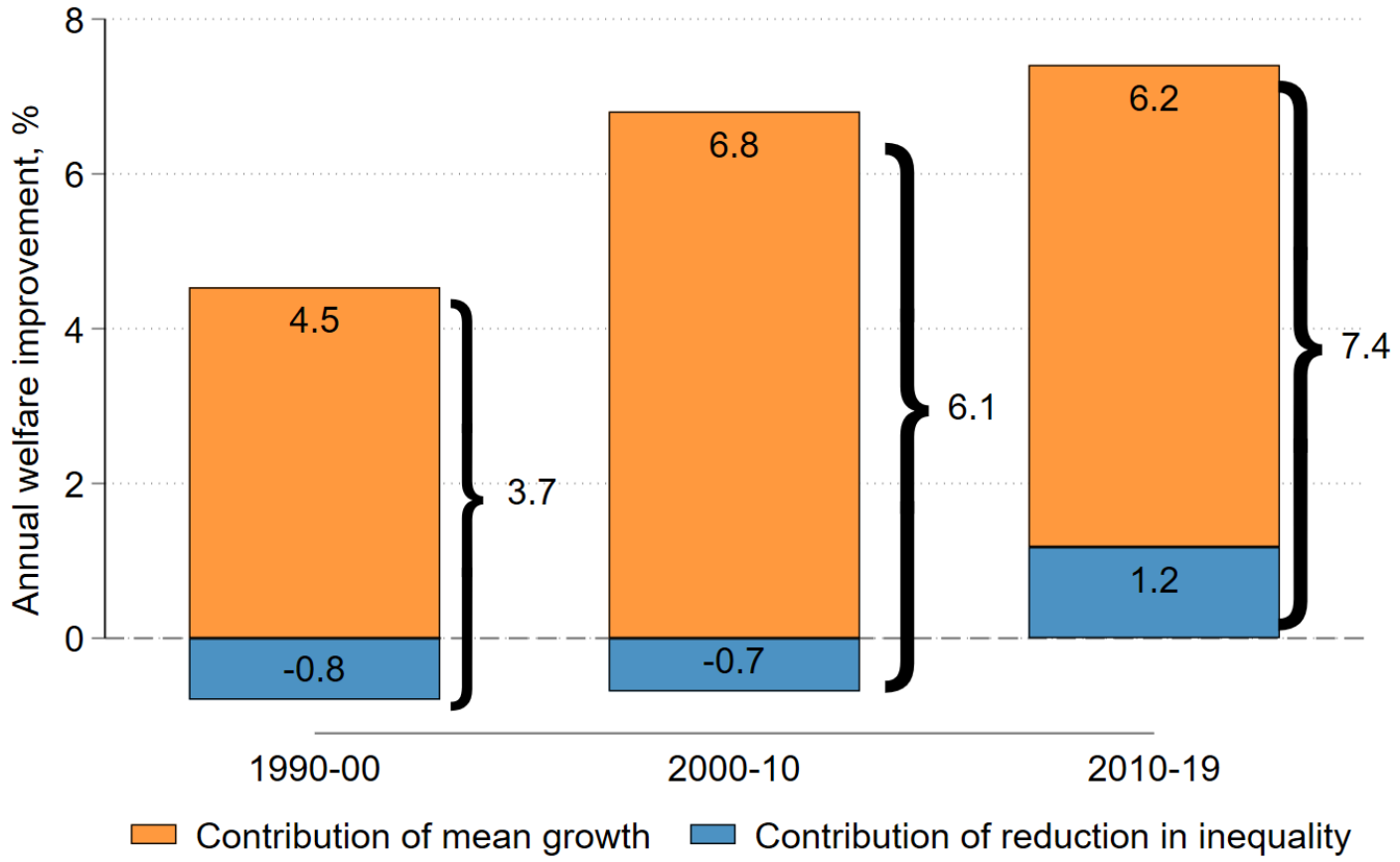

Source: Poverty and Inequality Platform, World Bank

- Despite higher annual growth in the mean in the 2000s, EAP's prosperity gap improved by 6.1% annually in that decade compared to 7.4% in the following decade.
- The 2010s saw a much faster decline in the prosperity gap as inequality went down compared to the previous decade.

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Within and between group decomposition of the inequality measure

- The new inequality measure can be exactly decomposed into group and between-group inequality

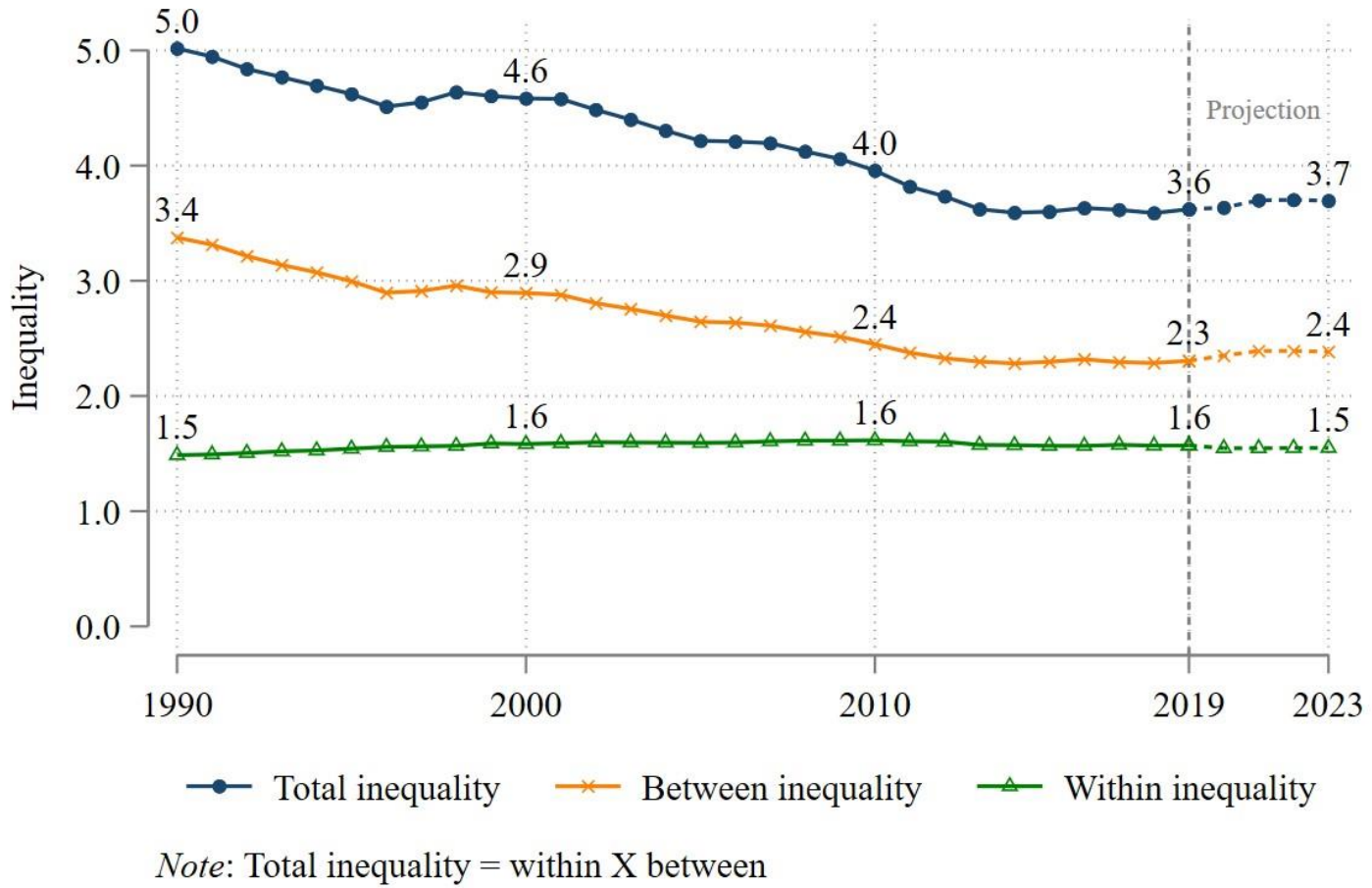
$$I_{overall} = I_{within} \times I_{between}$$

$$I_{within} = \sum_{c=1}^{C} w_c I_c \text{ , } I_{between} = \sum_{c=1}^{C} \frac{N_c}{N} \frac{\bar{y}}{\bar{y}_c}$$

$$w_c = \frac{\frac{N_c}{\bar{y}}}{\sum_{c'=1}^{C} \frac{N_{c'}}{\bar{y}_{c'}}}$$

where c indicates group and N is population.

Sharp decline in global inequality since 1990

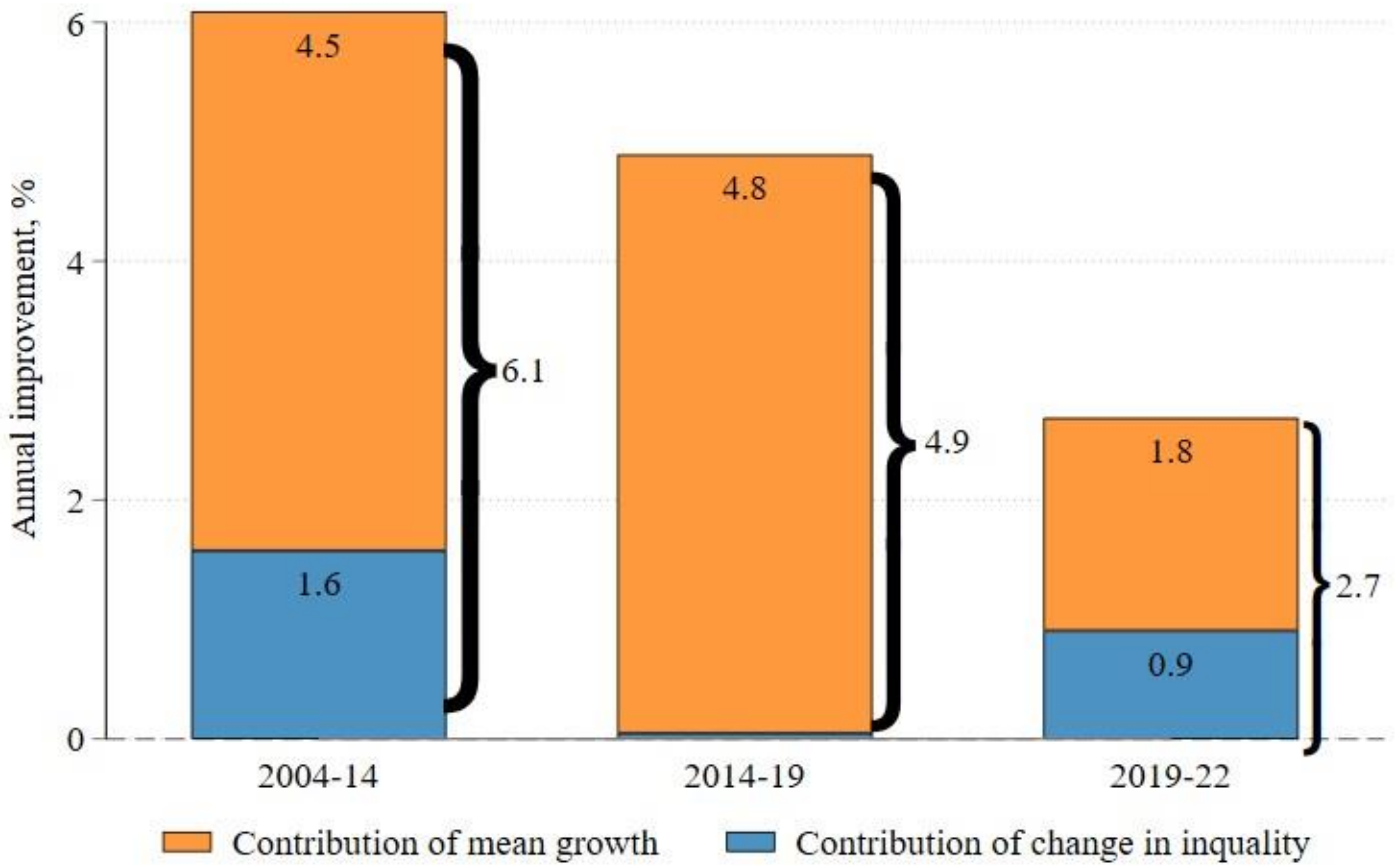


Note: Total inequality = within X between

Source: Poverty and Inequality Platform, World Bank

- Substantial decline in global interpersonal income inequality 1990-2019 was driven by reductions in inequality *between countries*
- Weighted average inequality *within countries* has increased slightly

Reduction in the prosperity gap driven by growth, Malaysia



Source: Measuring and Addressing Inequality in Malaysia (2024), World Bank

- Prosperity Gap improved on average by 6.1% annually between 2004-14, by 4.8% between 2014-19, and by 2.7% after the pandemic.
- Decrease in inequality contributed to the improvement of the Prosperity Gap in the first period and the period after the pandemic. While inequality did decrease between 2019-22, growth overall slowed down to 1.8% compared to over 4.5% in the earlier periods.

Sensitivity to very small values

- By design the prosperity gap gives larger weight to the lower welfare values.
- If the welfare values are too small, then the weight of those observations become extremely large. Example, the consumption of an individual is $0.002, then the prosperity gap = 25/0.002 = 12,500.
- To make sure the estimates are resonable, we will winsorize at $0.25 a day (meaning bottom code all values below 0.25 to 0.25)
- Note that a choice of bottom code is necessary for most bottom sensitive measures.

Further resources and references

- Technical paper
- Non-technical blog
- Data dashboard; User guide blog
- Stata Ado

References:

- Kraay et al. (2023) A New Distribution Sensitive Index for Measuring Welfare, Poverty, and Inequality Policy Research working paper ; no. WPS 10470; RRR Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/099934305302318791/IDU0325015fc0a4d6046420afe405cb6b6a87b0b
- Measuring and Addressing Inequality in Malaysia (2024) [*forthcoming*, World Bank]
- Poverty and Inequality Platform (PIP): https://pip.worldbank.org/home