RC28 Spring Meeting

A century of change in global educational inequality between and among genders

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Motivation

- Huge education expansion
- Gender gap reversal in education

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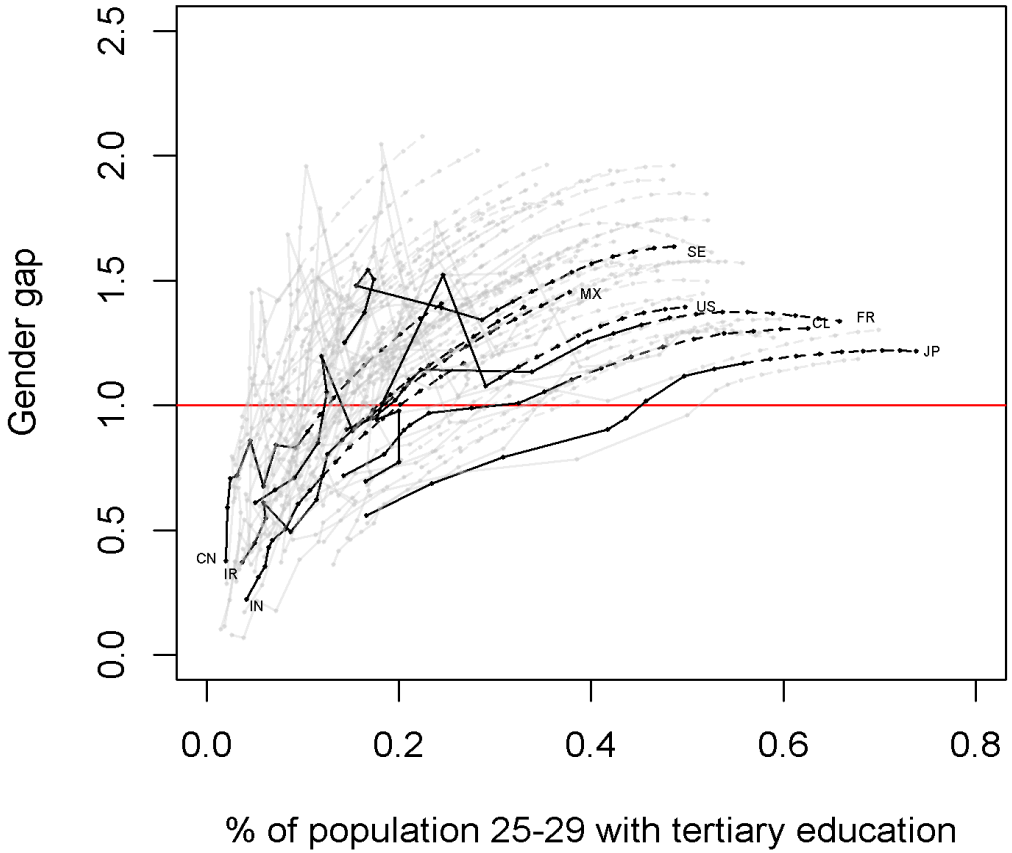

Source: Authors' elaboration based on data from Lutz et al (2007) and KC et al (2010)

Research Questions

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- What is the relationship between global education inequality and the gender gap reversal?
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- How are these different elements related with each other?

Outline

- Introduction ✓
- Measuring educational attainment
- Data
- Methods
- Empirical findings
- Summary and discussion

Measuring educational attainment

Cardinal approach ('Years of schooling')

Advantages

- Many tools to measure variability (e.g. Theil, Gini, Variance,…)
- Decomposition in within- and between-group inequalities

Disadvantages

- Poor proxy of substantive type of education (varying education cycle durations; grade retention)
- Relatively small geographic and temporal data coverage.
- Recall bias errors

Ordinal approach (educational attainment categories)

Advantages

International comparability

Less prone to measurement error

Huge data availability (Barro and Lee dataset)

Disadvantages

Lack of ordinal inequality measures

Lack of inequality decomposability within- and between-groups

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Data

Data (I)

- Barro and Lee dataset: 1950-2010
- 7 education categories (no education, some primary, primary, some secondary, secondary, some tertiary and tertiary)
- 146 countries in 7 regions (Advanced Economies, Eastern Europe, Middle East/North Africa, Sub-Saharan Africa, East Asia/Pacific, Latin America & Caribbean, South Asia)
- Balanced panel

Data (II)

- Projected data using logistic growth curve models for the period 2015 – 2040.

$$\ln\left(\frac{s_{j,t}}{100 - s_{j,t}}\right) = \alpha_j + \beta_j * t + \mu_{j,t}$$

- Highly accurate fit for the observed data

Methods

Methods (I)

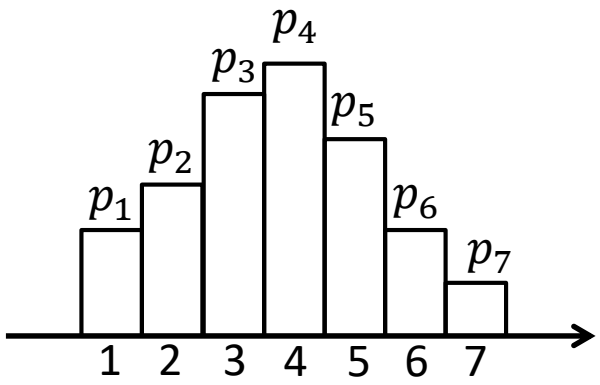
- We propose a new inequality measure for ordinal variables (with *k* outcomes):

$$I(p_1, \cdots, p_k) \coloneqq \sum_{i=1}^{i=k} \sum_{j=1}^{j=k} p_i p_j \mathbb{U}(i,j)$$

where p_i is the share of individuals with educational attainment '*i*' and $\mathbb{U}(i,j)$=1 when $i \neq j$ and 0 otherwise.

- $I(p_1, \cdots, p_k)$ measures **the probability that two randomly chosen individuals have *different* educational attainments**

Methods (II)



$$\Longrightarrow \quad I(p_1, \cdots, p_k) = 0.6$$

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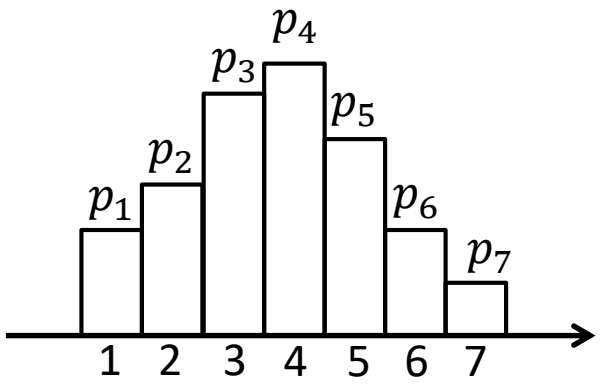

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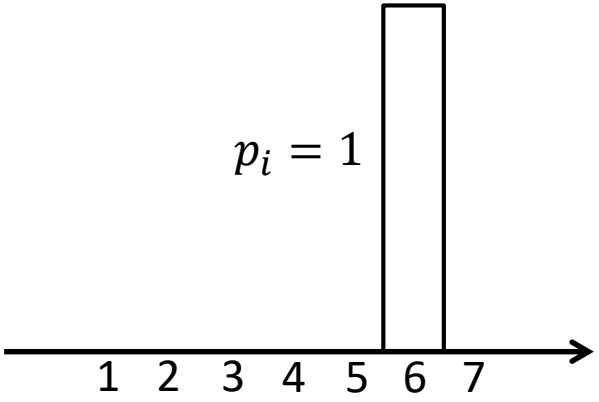
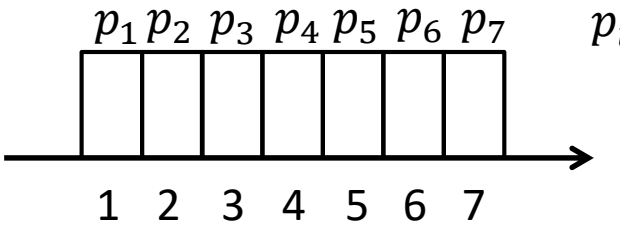


Minimal inequality



$p_i = p_j$

Maximal inequality

Methods (III)

Overall inequality can be decomposed into four quantities:

Inequality among women: $I_W^f = I\left(p_1^f, \cdots, p_k^f\right)$

Inequality among men: $I_W^m = I(p_1^m, \cdots, p_k^m)$

Women outperforming men: $I_B^f = \sum_{i=2}^{i=k} \sum_{j<i} p_i^f p_j^m$

Men outperforming women: $I_B^m = \sum_{i=2}^{i=k} \sum_{j<i} p_i^m p_j^f$

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Decomposition: $I = s_f I_W^f + s_m I_W^m + s_b\left(I_B^f + I_B^m\right)$

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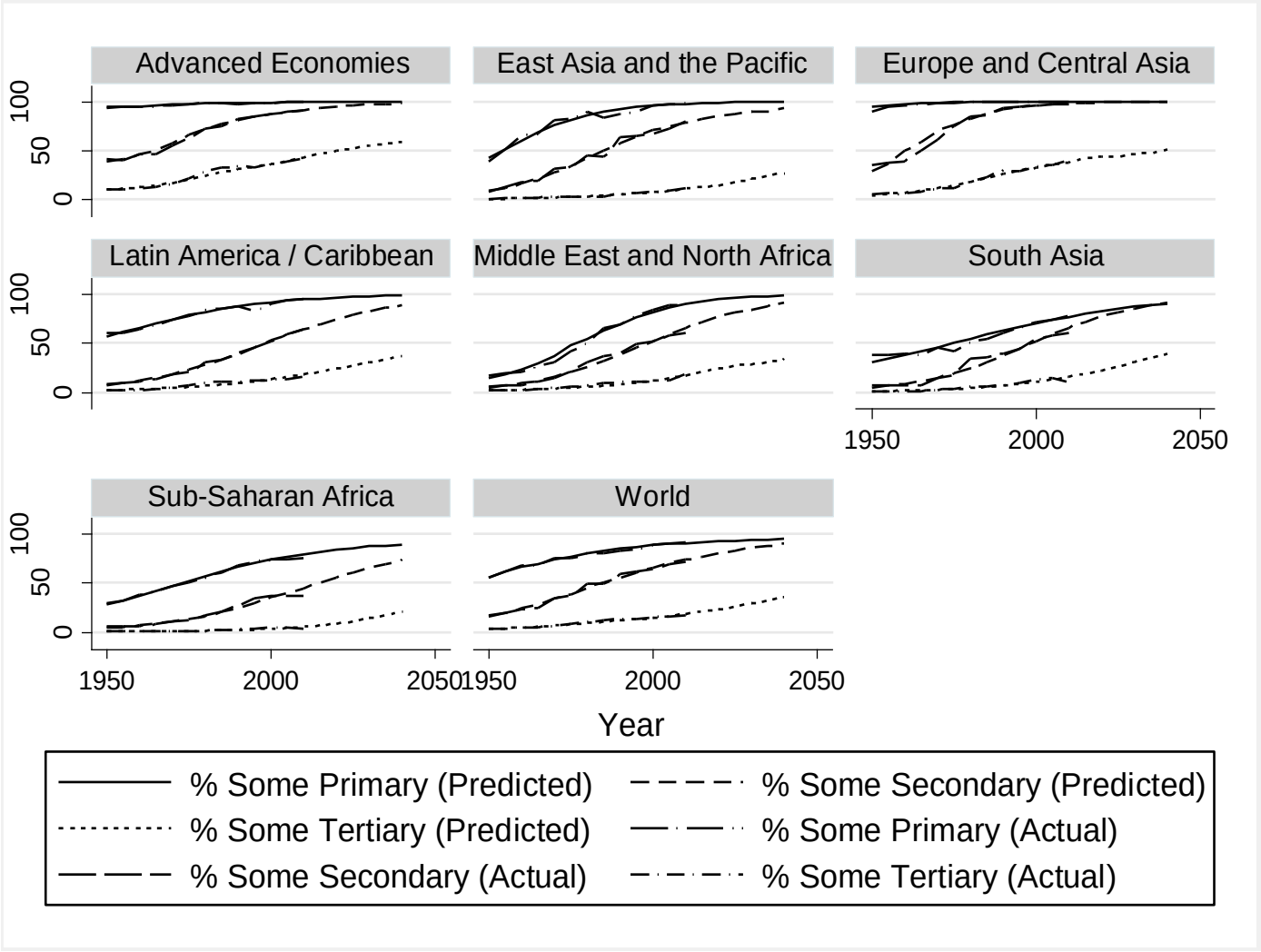
Gender inequality: $G = I_B^f / \left(I_B^f + I_B^m\right)$ (0=all inequality favoring men, 1=all inequality favoring women, 0.5= gender equality)

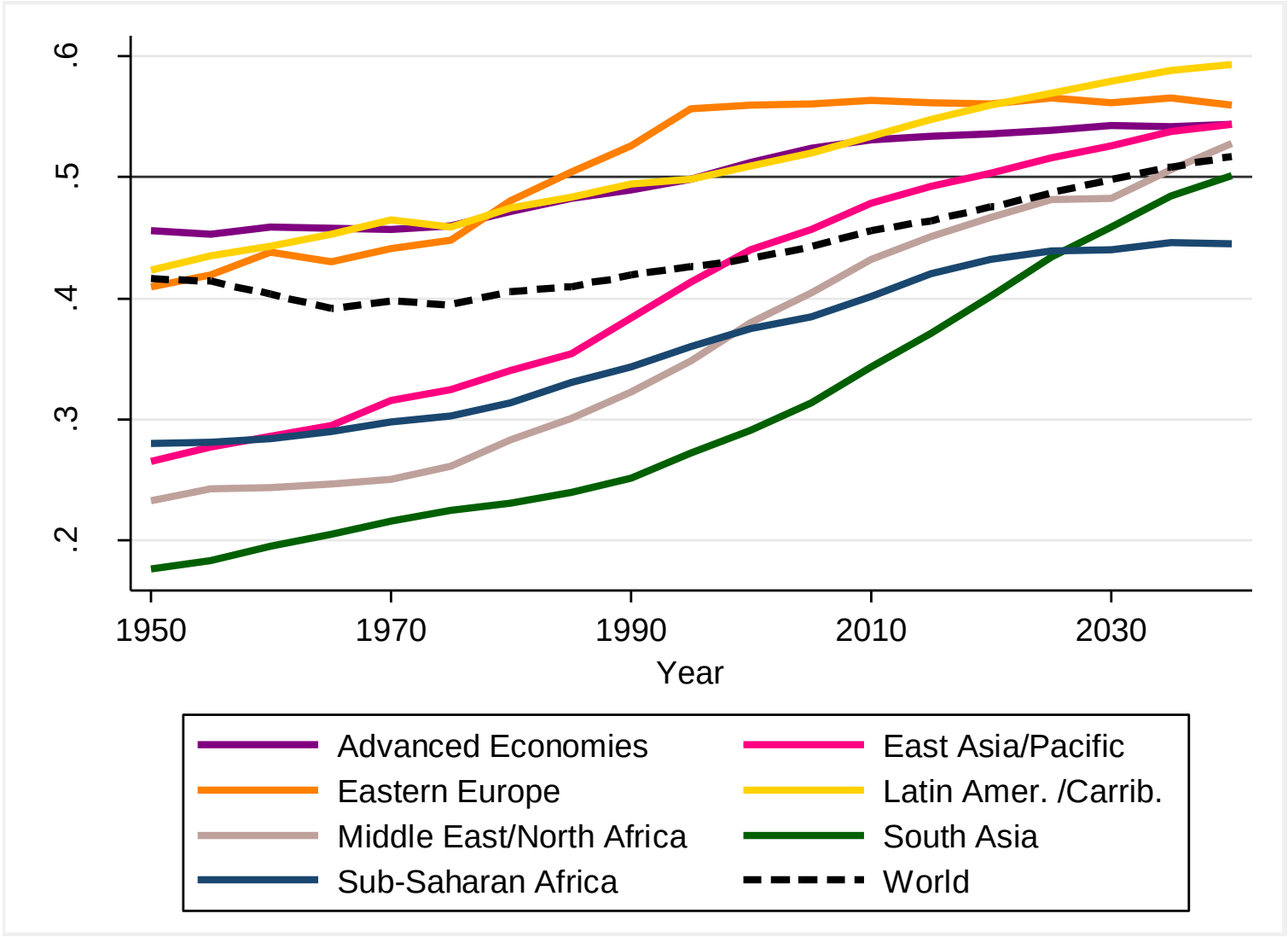
Empirical findings

Education expansion



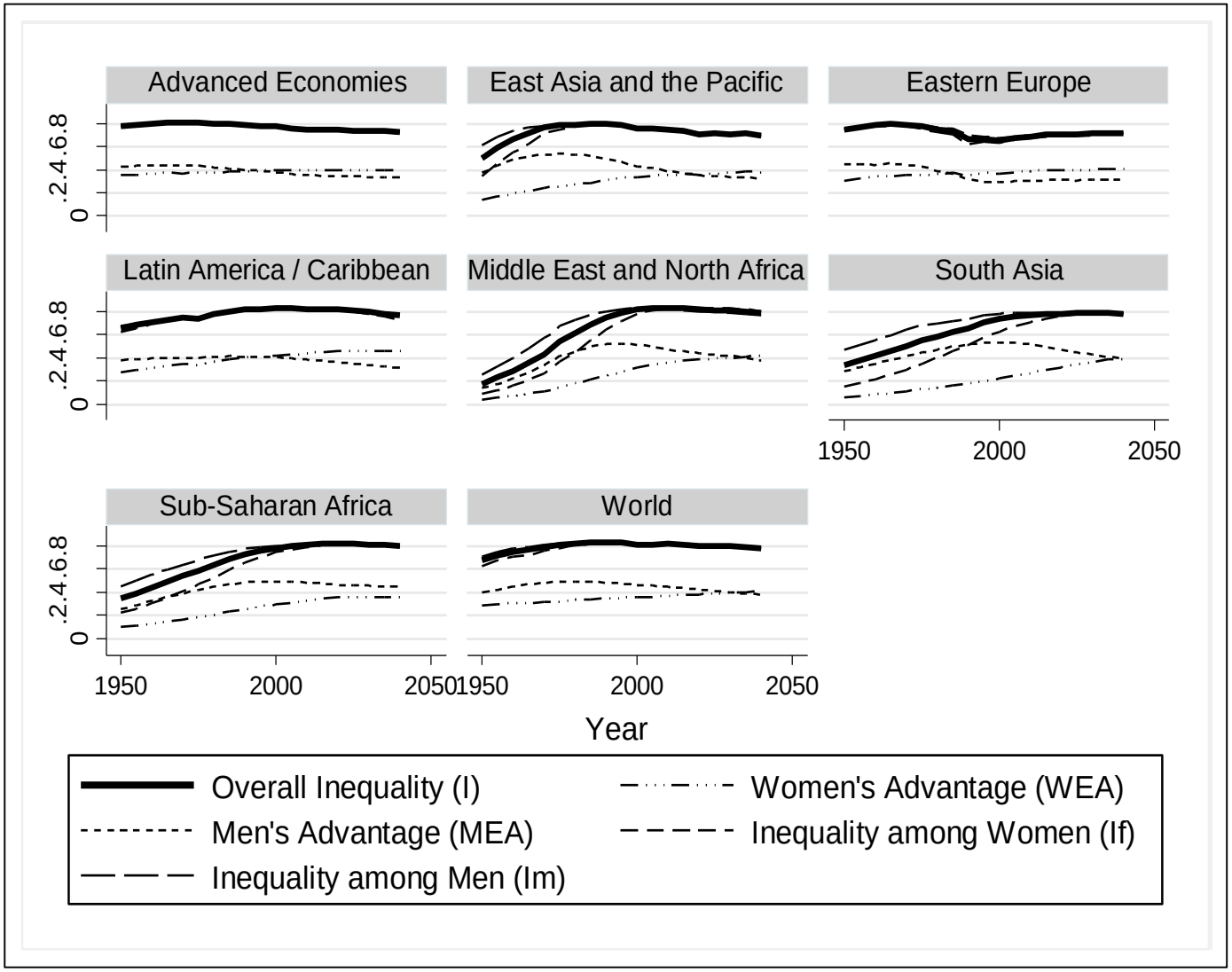
Women's attendance of educational stages 1950-2040, by region, predicted and actual. Weighted by population size of countries.

Gender gap reversal



Gender Gap in Education across the period 1950-2040, weighted by country population size

Education inequality and its components



Educational Inequality and its components across time and space, 1950-2040

Contribution of inequality components

$$I = s_f I_W^f + s_m I_W^m + s_b \left(I_B^f + I_B^m \right)$$

Region	Year	$\%CI_W^f$	$\%CI_W^m$	$\%CI_B^f$	$\%CI_B^m$
Advanced Economies	1950	26.8	23.2	22.8	27.2
Advanced Economies	2010	24.4	25.6	26.6	23.5
Advanced Economies	2040	23.7	26.2	27.2	22.8
East Asia and the Pacific	1950	16.1	32.9	13.5	37.5
East Asia and the Pacific	2010	24.2	25.7	24.0	26.1
East Asia and the Pacific	2040	21.7	28.2	27.2	22.8
E. Europe & Central Asia	1950	33.1	17.8	20.1	28.9
E. Europe & Central Asia	2010	25.8	24.0	28.3	21.9
E. Europe & Central Asia	2040	23.8	26.1	28.1	22.1
Latin America & Carib.	1950	23.7	26.0	21.3	29.0
Latin America & Carib.	2010	25.7	24.2	26.7	23.3
Latin America & Carib.	2040	23.4	26.0	30.0	20.6
Middle E.& North Africa	1950	12.1	37.4	11.7	38.7
Middle E.& North Africa	2010	23.2	26.5	21.7	28.5
Middle E.& North Africa	2040	22.9	26.7	26.6	23.7
South Asia	1950	9.9	38.9	9.0	42.2
South Asia	2010	21.7	27.4	17.5	33.5
South Asia	2040	22.3	27.7	25.0	24.9
Sub-Saharan Africa	1950	16.6	31.9	14.4	37.1
Sub-Saharan Africa	2010	23.7	26.0	20.2	30.1
Sub-Saharan Africa	2040	24.7	25.2	22.3	27.8
World	1950	23.2	26.5	20.9	29.4
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In 1950, I_B^m was the main contributor to education inequality. I_B^f was the smallest contributor. Very often, I_W^f lower than I_W^m

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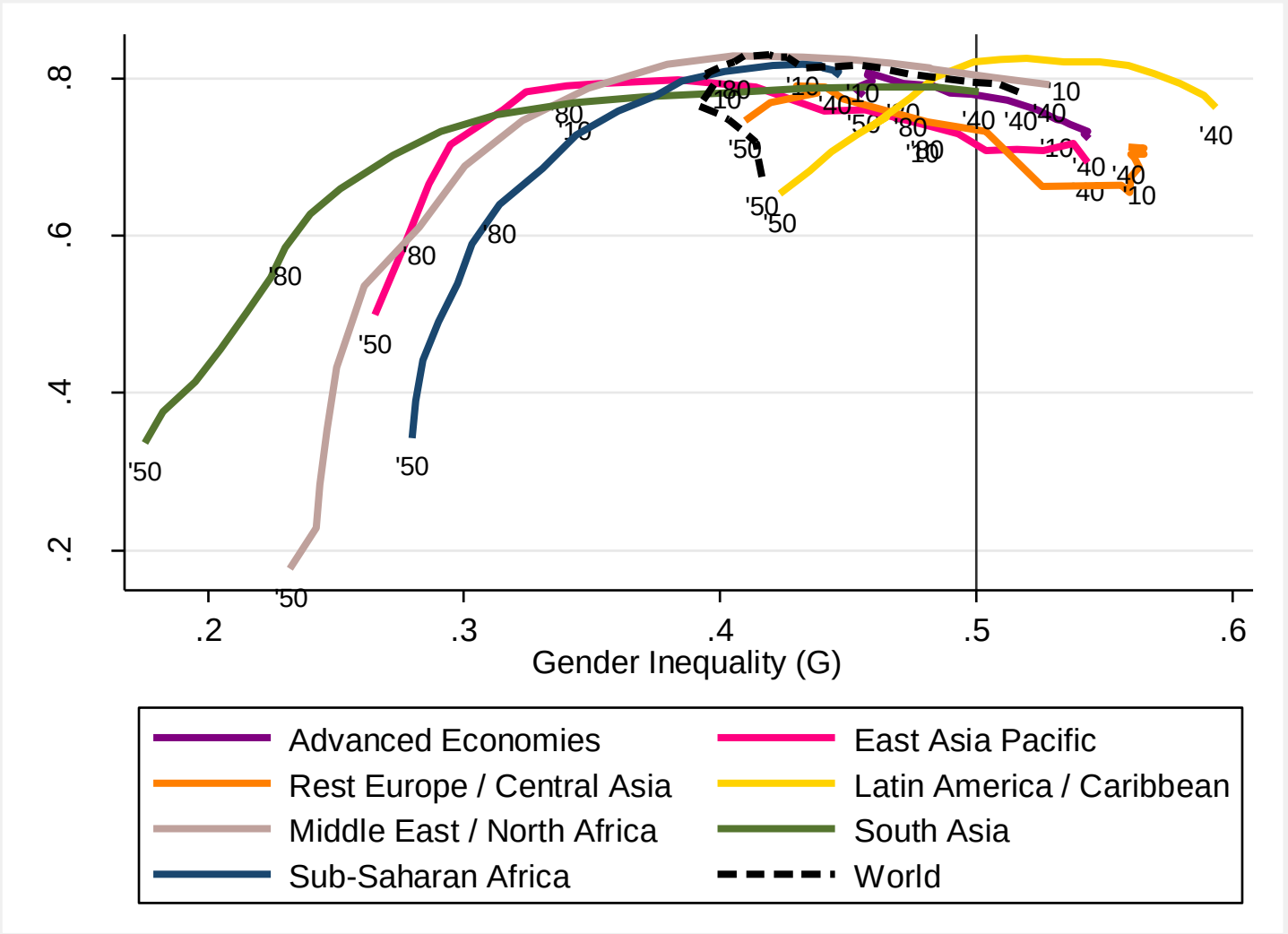
In 2010, I_B^m has decreased substantially. Nowadays, I_B^f is the main contributor in most high and middle-income countries

Overall and gender inequality



Development of gender and overall inequality in education over time (1950-2040)

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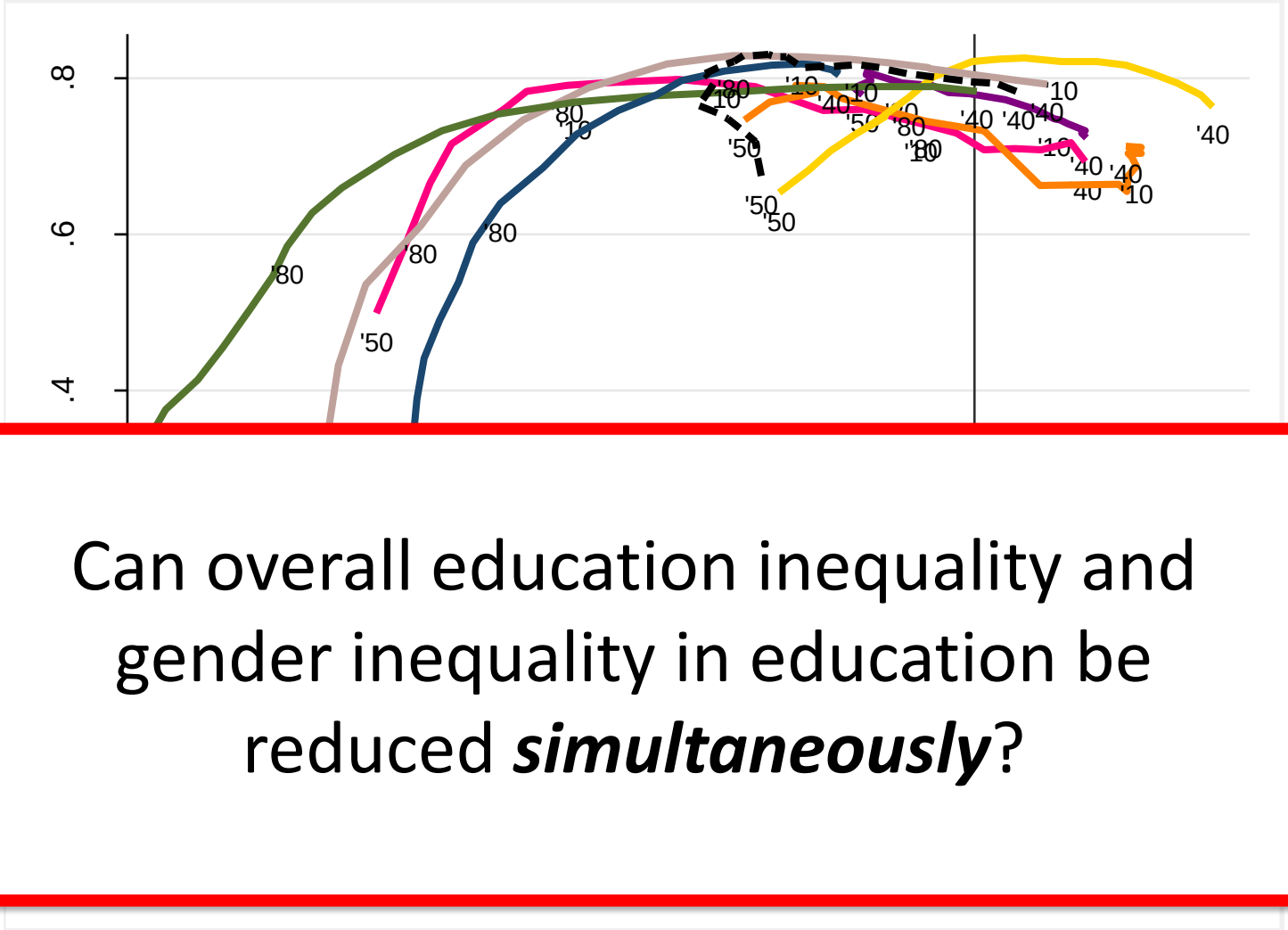
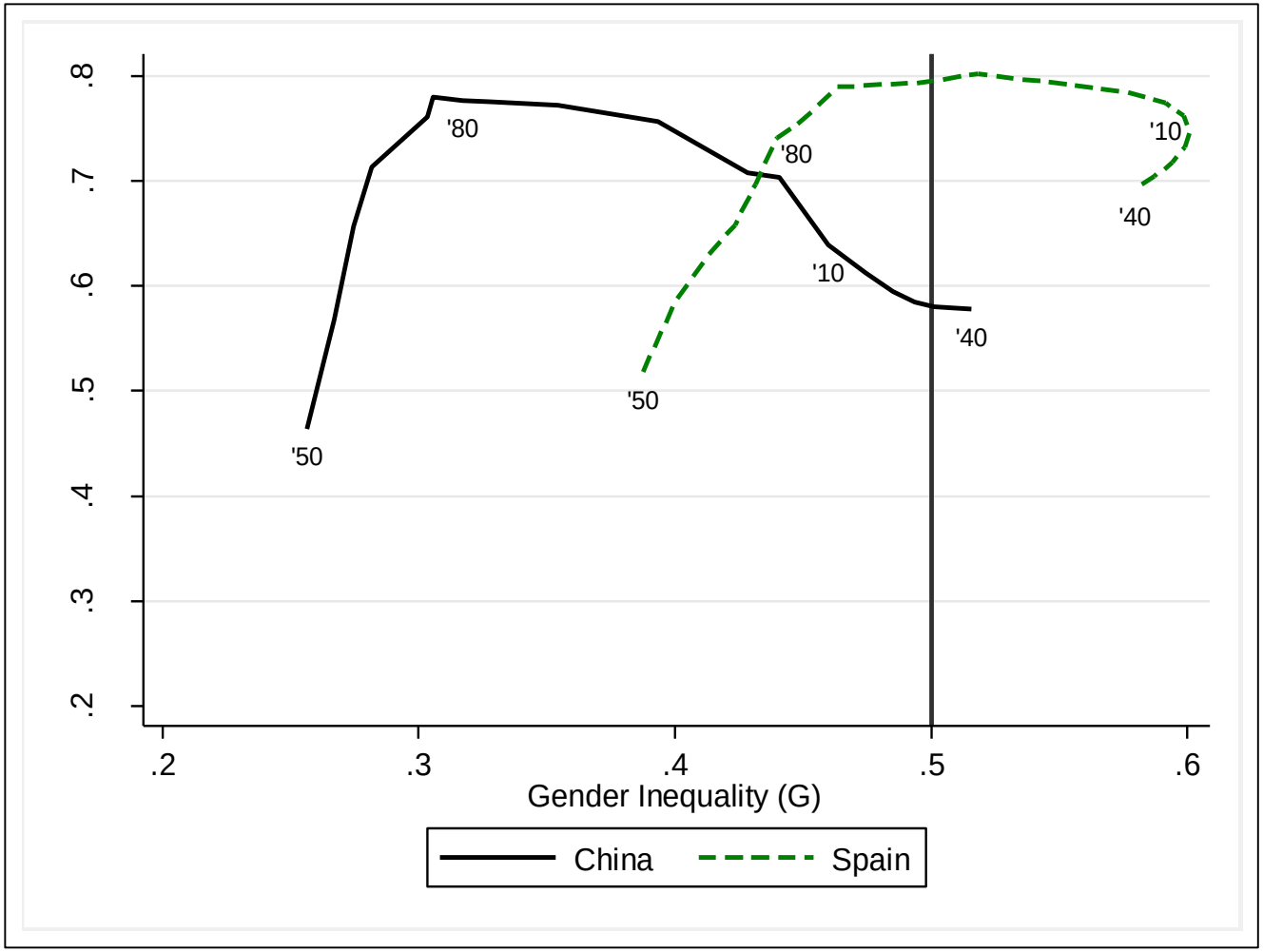


Can overall education inequality and gender inequality in education be reduced ***simultaneously***?

Development of gender and overall inequality in education over time (1950-2040)

Country-specific trajectories



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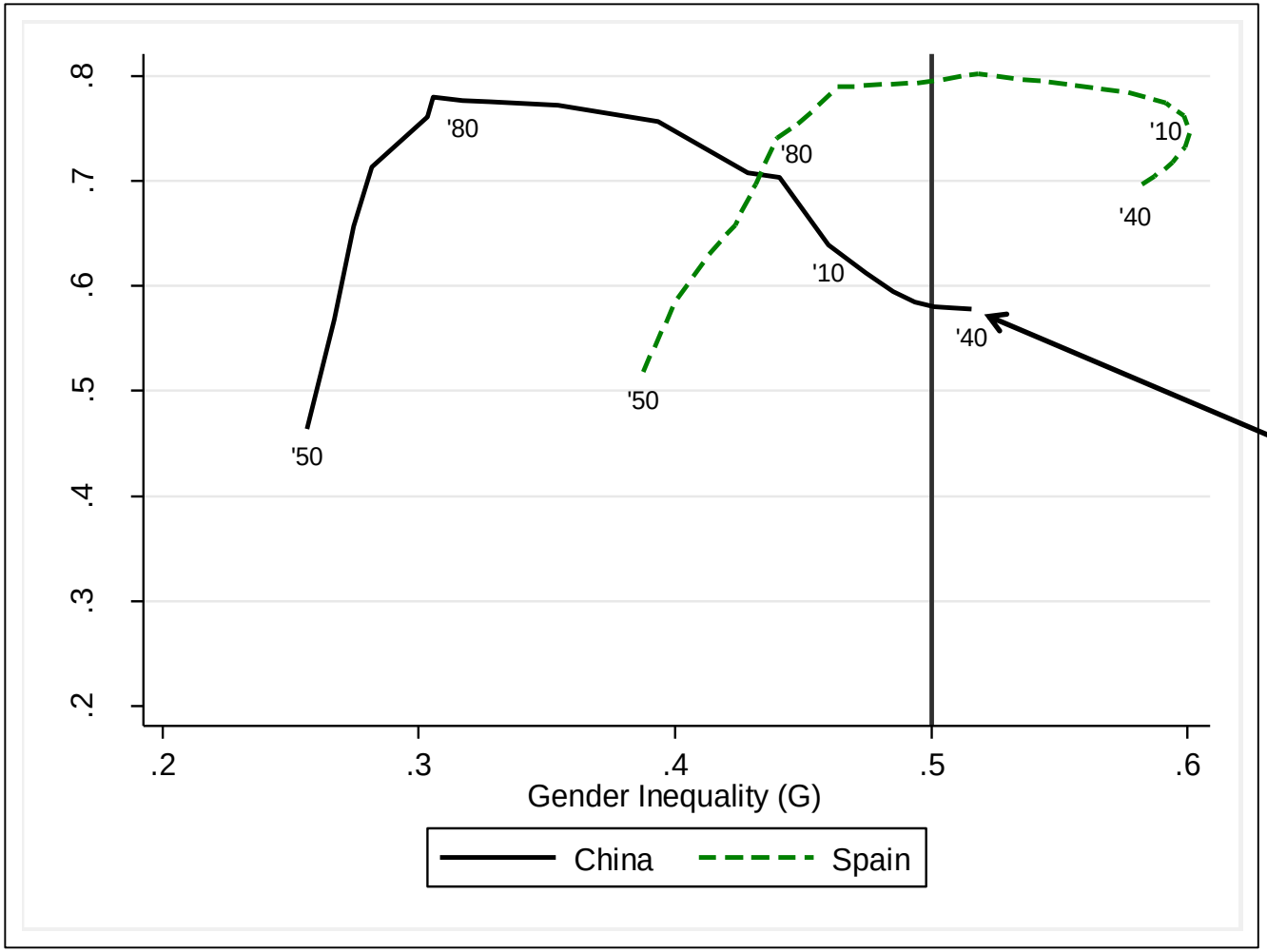

Low levels of 3ary education, with 1ary and 2ary education approaching universality both for women and men

Summary & discussion

- Education inequality follows an inverted U-shape over time

  (consistent with Dorius 2013, Morrisson and Murtin 2013)

  Dependence on the number of education categories (7 in this case)
  Ceiling effects? New forms of inequality?

- Increasing inequality among women from very low levels; Women and men are equally unequal since 2000 in most parts of the world

- Back in 50s, educational advantage of men was the main contributor to inequality. Nowadays, women's educational advantage is the main contributor in most high- and middle-income countries

- Overall inequality and gender inequality go in ***opposite directions***.
  Trade-offs between gender and overall inequality in education

- Policy implications

Thank you!

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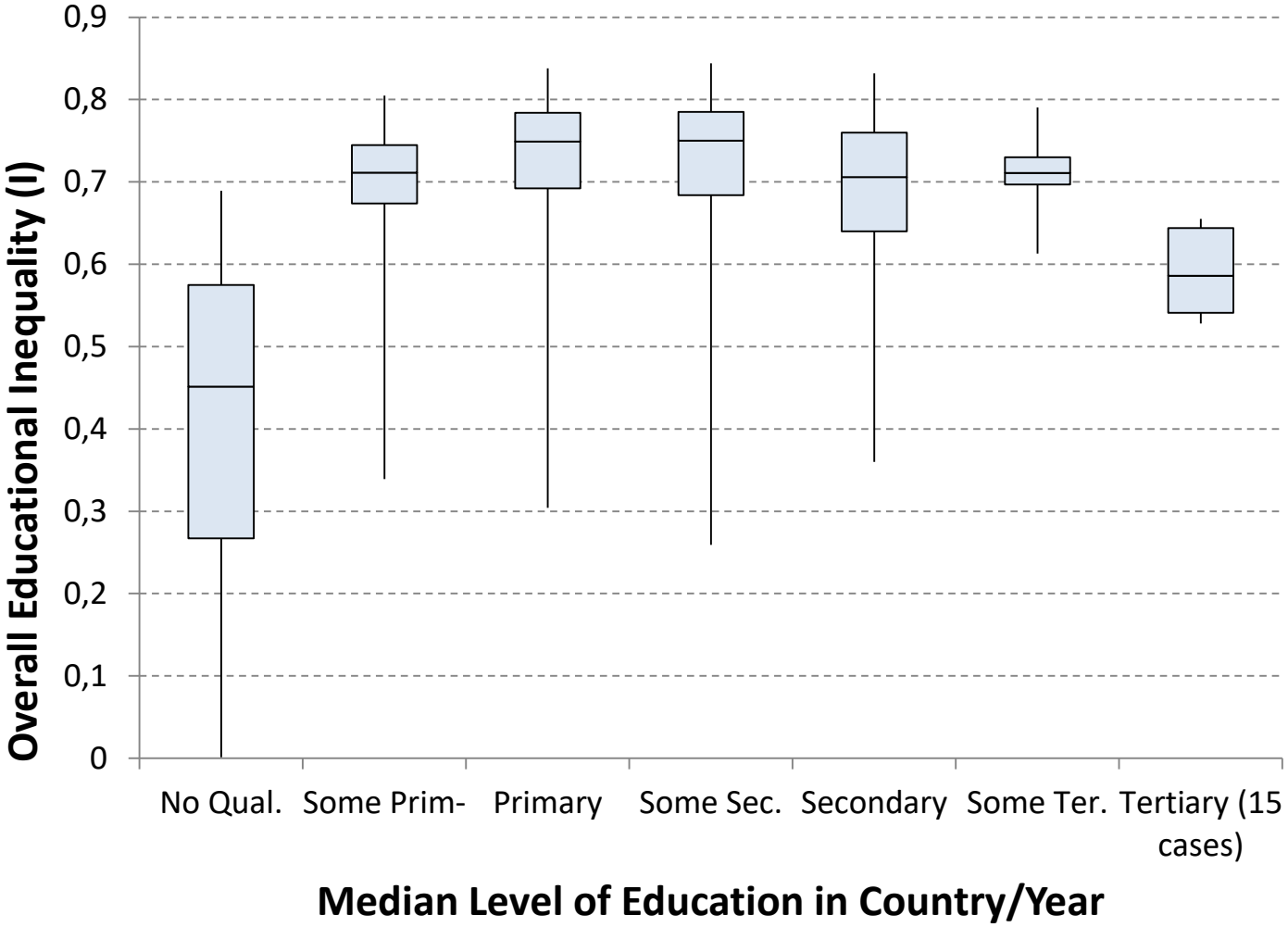
Education expansion and inequality



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