



The Next Generation of the Penn World Table

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Why PWT?

- To explain:
 - global poverty,
 - international inequality and
 - the sources of productivity differences
- We need relative price data
 - For the right concepts
 - Over time
- Next Generation of PWT will take a new step

Main features version 8.0

- Include GDP on the output side, GDP^o
 - Adds data on quality-adjusted relative export and import prices (Feenstra/Romalis)
 - Trade broken down by Broad Economic Categories
- Based on all ICP benchmarks
 - ICP 1970, 1975, 1980, 1985, 1996, 2005 and OECD/Eurostat comparisons 1995-2010
 - Covers the 167 countries that participated in one or more benchmark comparisons

Why GDP^o?

- Current PWT PPP only covers consumption and investment (C, I and G)
 - A useful measure of relative income (GDP^e) but not of relative output
- Route 1: build up from the industry level
 - Feasible, though data-intensive (Inklaar & Timmer, 2012)
- Route 2: full expenditure-side accounting => prices of exports and imports
 - Feenstra et al. (2009)

Estimating GDP^o & GDP^e (1)

- Geary-Khamis (GK) system with prices of C, I, G, X and M (details later)

$$\pi_i^o = \frac{\sum_{j=1}^C (p_{ij}^o / PPP_j^o) q_{ij}}{\sum_{j=1}^C q_{ij}}, \forall i = 1 \dots M$$

$$\pi_i^x = \frac{\sum_{j=1}^C (p_{ij}^x / PPP_j^o) x_{ij}}{\sum_{j=1}^C x_{ij}}, \forall i = M + 1 \dots M + N$$

$$\pi_i^m = \frac{\sum_{j=1}^C (p_{ij}^m / PPP_j^o) m_{ij}}{\sum_{j=1}^C m_{ij}}, \forall i = M + 1 \dots M + N$$

$$PPP_j^o = \frac{GDP_j}{\sum_{i=1}^M \pi_i^o q_{ij} + \sum_{i=M+1}^N (\pi_i^x x_{ij} - \pi_i^m m_{ij})}$$

Estimating GDP^o & GDP^e (2)

- GK system can be solved iteratively, subject to a normalization
 - USA is equal to GDP deflator: $PPP_{USA,t}^o = P_{USA,t}^{GDP}$
- PPP for GDP^e and real GDP^o and GDP^e computed from GK outcomes:

$$PPP_j^e = CIG_j / \sum_{i=1}^M \pi_i^o q_{ij}$$

$$RGDP_j^o = \sum_{i=1}^M \pi_i^o q_{ij} + \sum_{i=M+1}^N (\pi_i^x x_{ij} - \pi_i^m m_{ij})$$

$$RGDP_j^e = \sum_{i=1}^M \pi_i^o q_{ij} + (X - M) / PPP_j^e$$

Why multiple benchmarks?

- Changing benchmarks (e.g. PWT6=>7) would change the full time series
 - Criticism of Johnson et al. (2009)
- Best estimate of real GDP in year T is based on benchmark in year T
 - Position of OECD & Eurostat
 - Extrapolating PPPs often misses the mark (e.g. Deaton, 2012) => especially comparing developed and emerging or developing economies

Counter arguments

- Older benchmarks are inferior due to measurement improvements
 - But hard to see they would be completely invalidated (also see application 1 below)
- Trend in price levels will no longer match National Accounts price trends
 - But that is a different goal: if you want NA trends, use NA
 - NA uses only country weights, PPPs use multiple country weights

Implementation: CI_G

- Use basic heading data on CI_G from
 - The ICP benchmarks (1970, 1975, 1980, 1985, 1996, 2005)
 - The rolling-benchmark Eurostat data (1995-2010)
 - The OECD benchmarks (1996, 1999, 2002, 2005, 2008)
- Use GEKS to aggregate across basic headings to PPPs for C, I and G
 - Then interpolate and extrapolate for a full time series of 1950-2010

Implementation: XM

- Use EKS price levels from Feenstra/Romalis
 - Quality-adjusted unit values
 - Aggregated across sources/destinations and products to BEC-1 level
 - Annual for 1984-2008
- Extrapolate to 1950-2010 period
 - Use BEA end-use price indexes at BEC-1 level, normalized to country-level export and import price trends

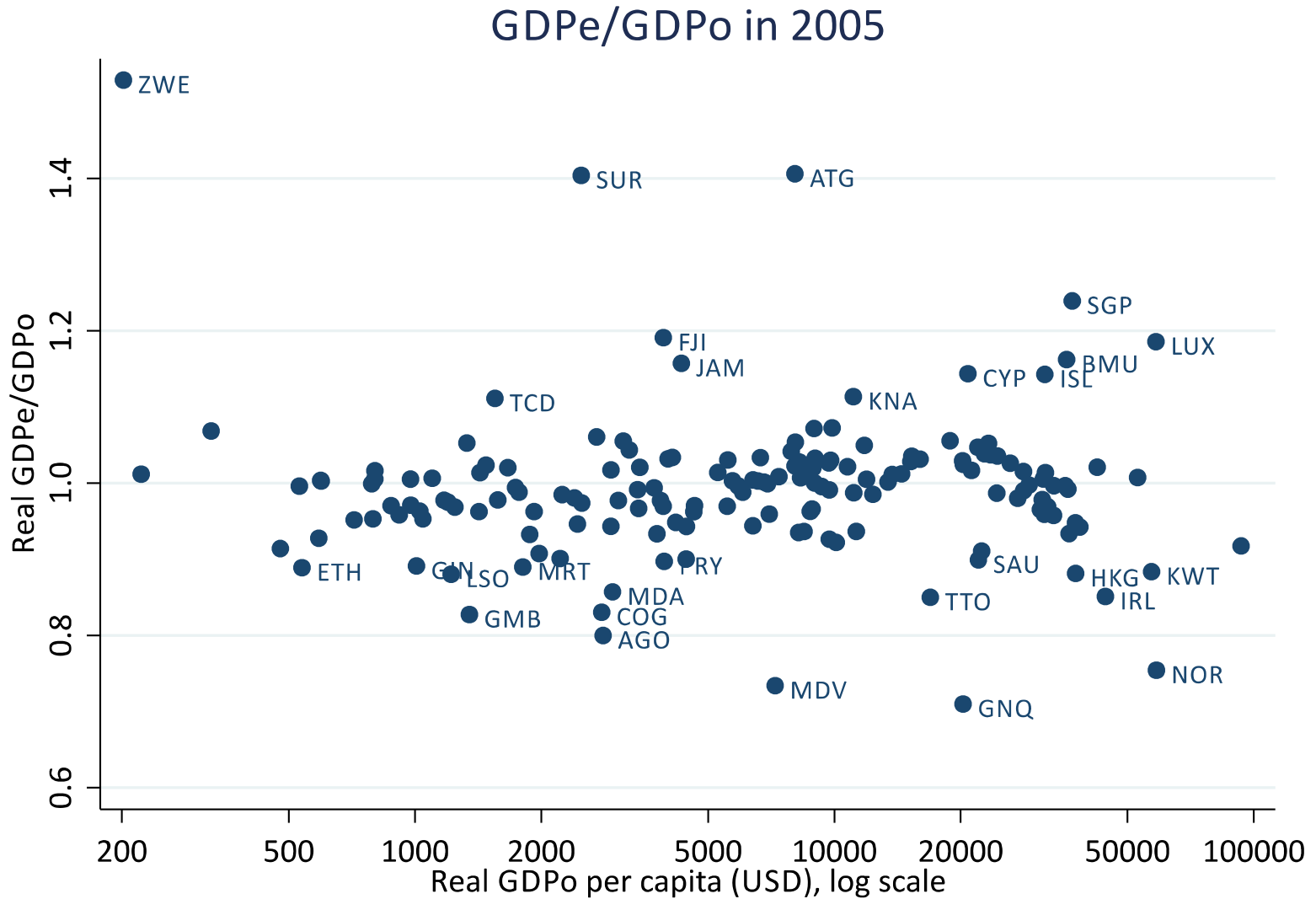
Linking approach

1. If there is benchmark for country i in year t , use that
2. If year t is between benchmarks T and T^* , interpolate using the NA price pattern
3. If there is no earlier or later benchmark, extrapolate using NA price trend

Then run GK for 3 CIG and 12 XM products

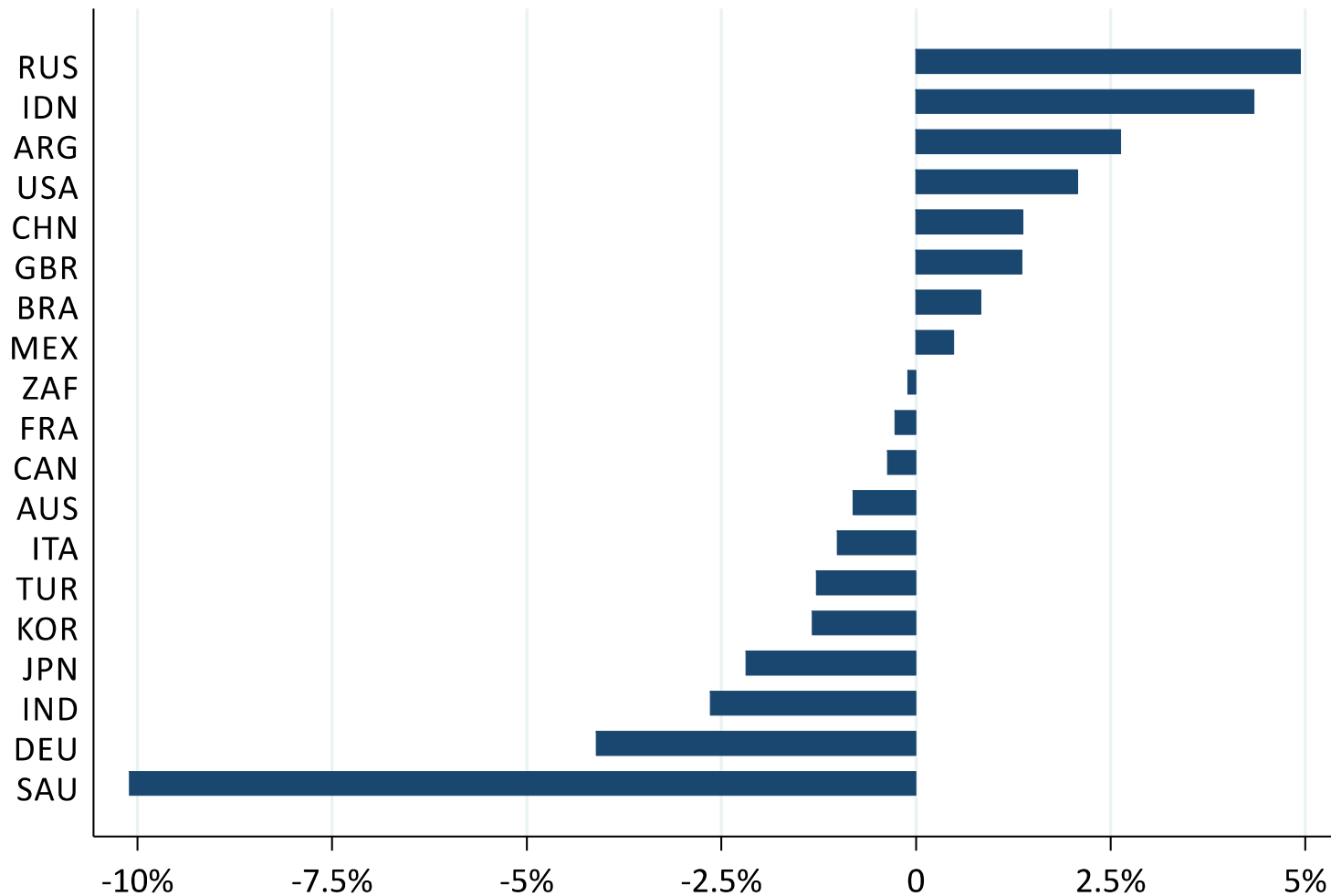
=> Gives Real GDP at current reference prices

Clear gaps between income & output



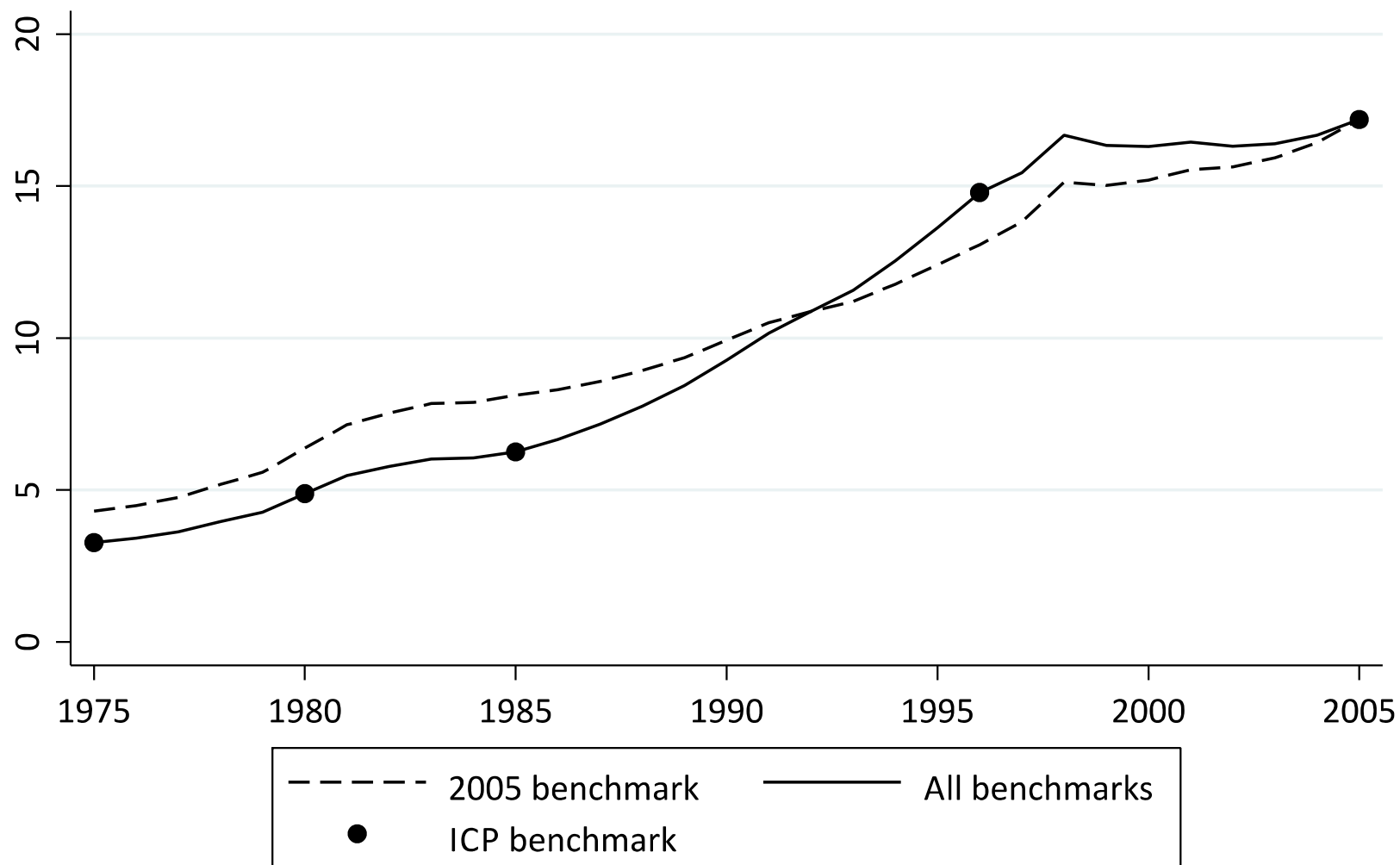
Major economies mostly up to 5% difference

GDPe relative to GDPo for G-20 countries in 2005



Linking benchmarks vs. extrapolation

Household consumption PPP for Thailand (THB/2005USD)
2005 vs. all benchmarks

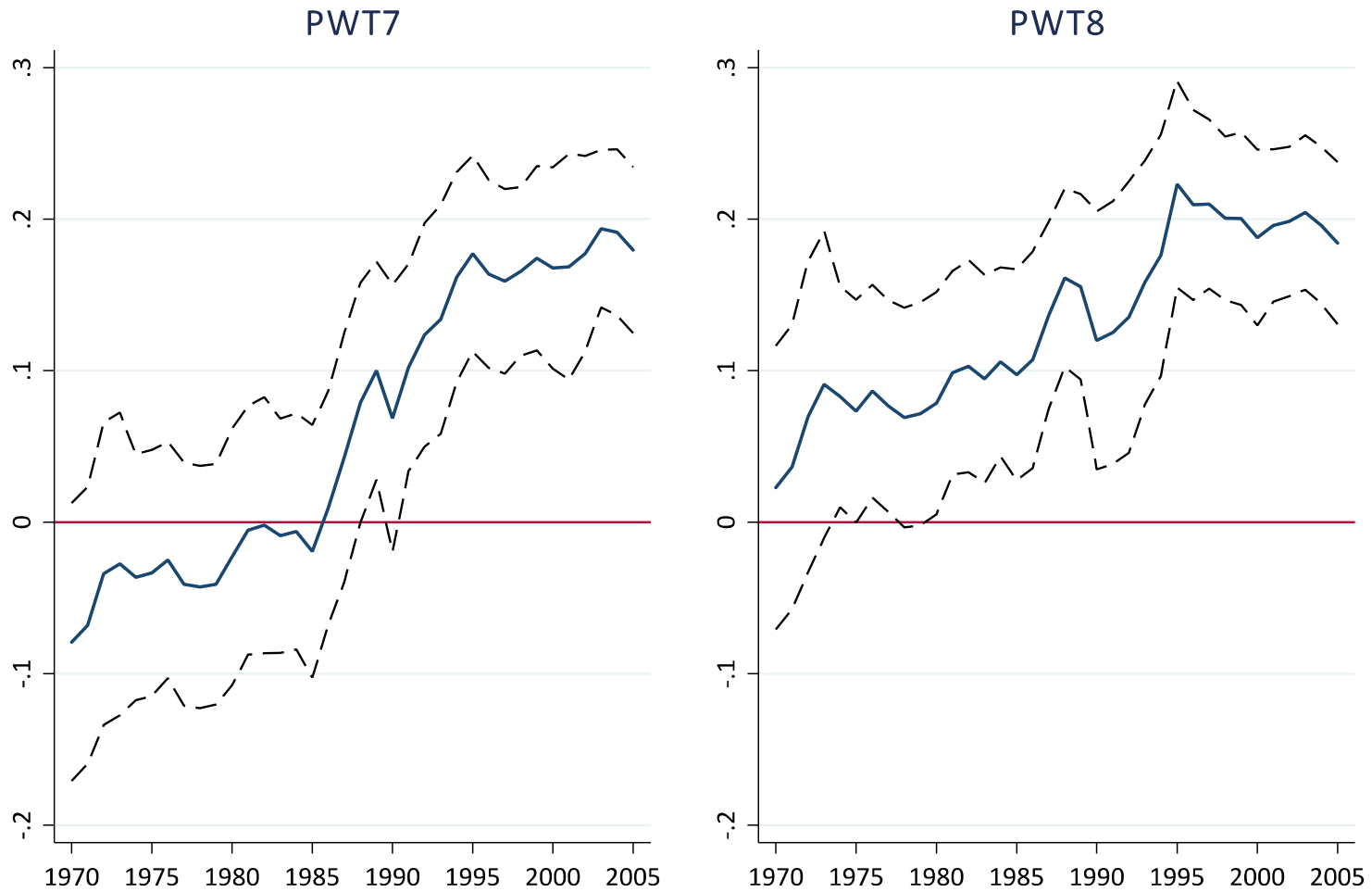


Application 1: Balassa-Samuelson

- Empirical foundation: Penn effect
 - Positive relationship between log income and log price levels
- Bergin, Glick and Taylor (BGT - JME 2006): Penn effect increases over time and was insignificant until early 1960s
 - Based on PWT6
- Check for PWT7 and 8
 - And in 8, distinguish benchmark & interpolated obs

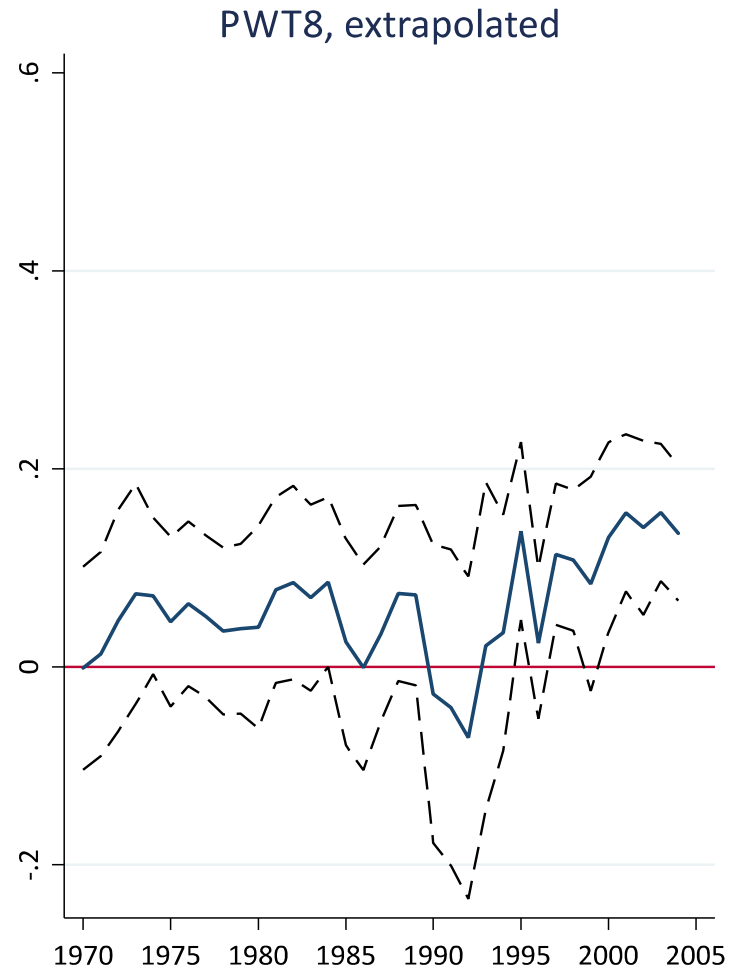
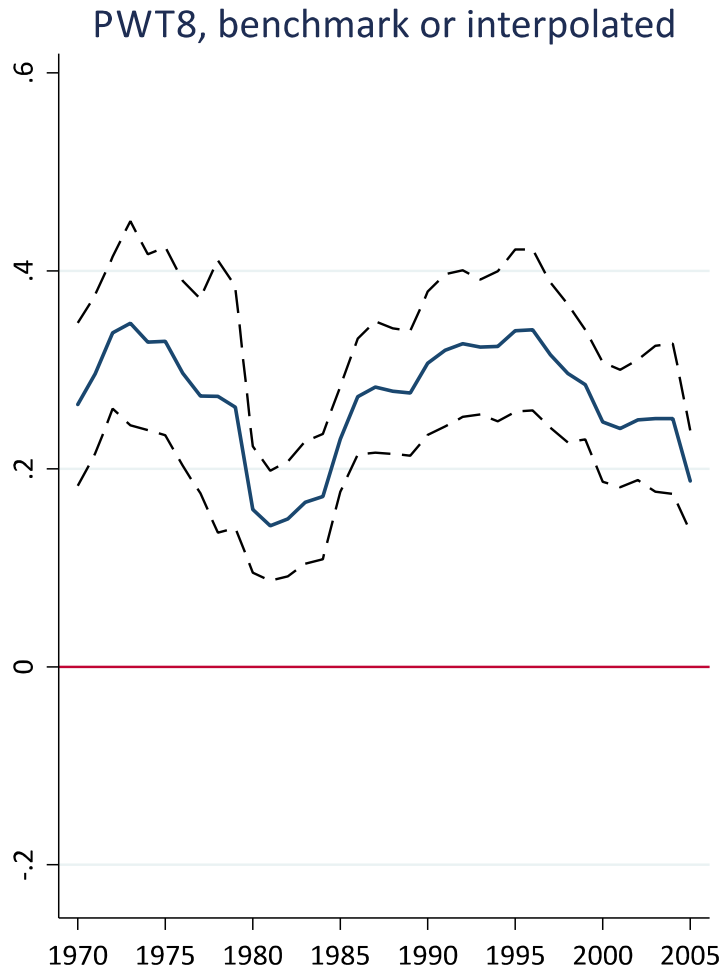
BGT findings seem confirmed

The coefficient of income on prices and 95% confidence interval



But is an artifact of extrapolation

The coefficient of income on prices and 95% confidence interval

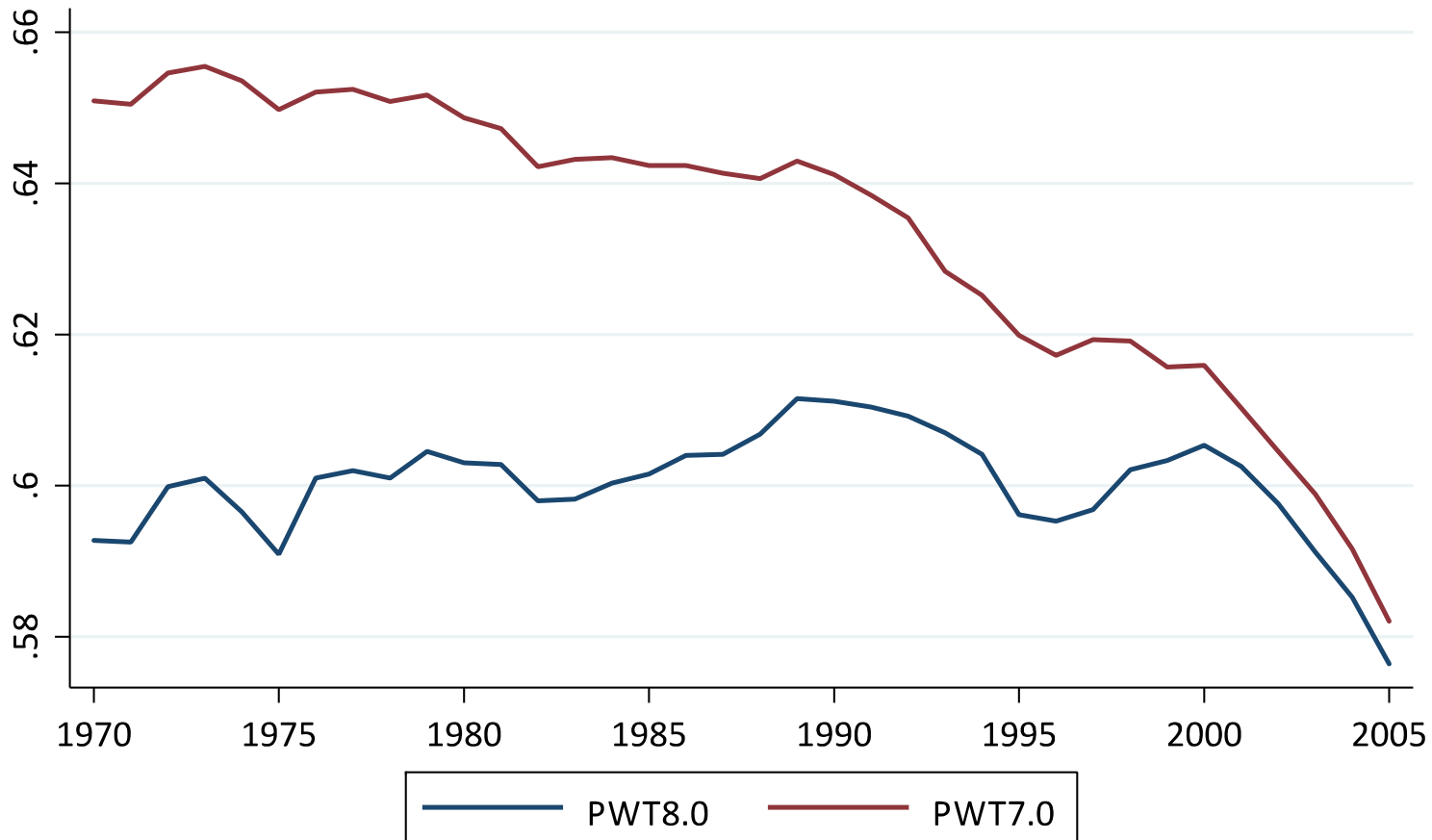


Application 2: International inequality

- Chen & Ravallion (2010): with ICP 2005, poverty was higher than previously thought
 - But the downward trend is the same as before
 - The trend, though, is based on national price trends
- Deaton (2010): between-country inequality increased with every new benchmark
- So why not take the benchmarks seriously?

International inequality trends before 2000 differ greatly

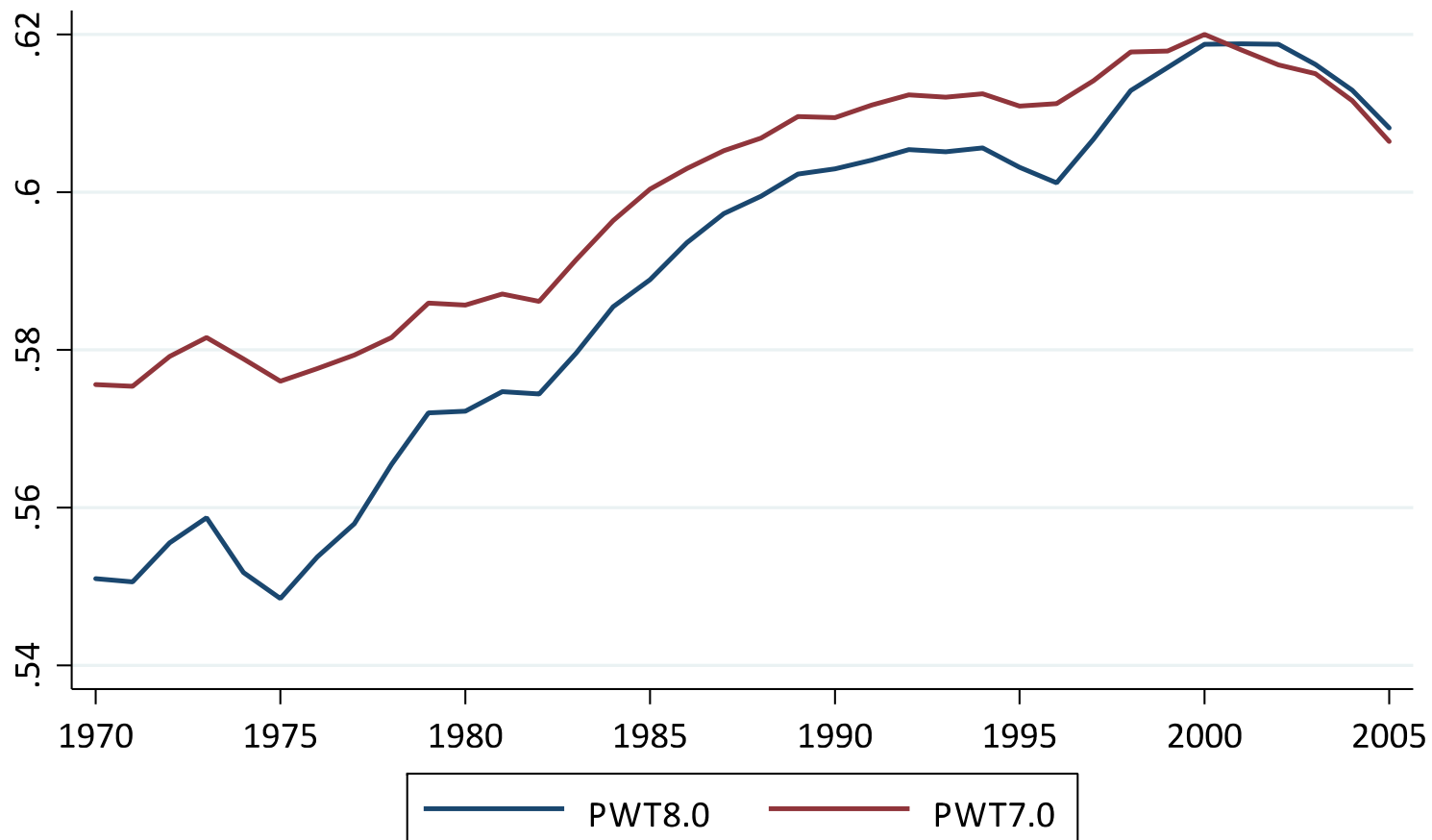
Gini coefficients of real GDP, PWT7.0 vs 8.0
Population-weighted 1970-2005



For 140 countries with full coverage in 7.0 and 8.0

And China matters much

Gini coefficients of real GDP, PWT7.0 vs 8.0
Population-weighted 1970-2005, excluding China



For 139 countries with full coverage in 7.0 and 8.0; excludes China

Release plans (1)

- Planned release: 2012Q4
- Documentation
 - Feenstra, Inklaar & Timmer paper
 - User guide
 - Technical guide – to accompany Stata do-files and detailed data files
 - Comparison PWT7.0 and 8.0 – results and variable naming scheme
- New web-based data access tool

Release plans (2)

- Developing sensitivity datasets
 - Based on GEKS instead of GK
 - Based on IDB instead of GK
 - Based on “official” China instead of adjusted 2005 PPPs and NA growth rates
 - Based only on the 2005 ICP benchmark instead of all benchmarks

=> Allows users to gauge the sensitivity of their results

Release plans: modules

- Alongside 'core' PWT data, include data modules
 - Can be constructed by anyone, credit for contributors
 - Main requirements: data on international comparisons with clear documentation & link to literature
- Examples:
 - McWages and Big Mac prices
 - GAIA/GAWA type indexes
 - Industry-level PPPs

Concluding remarks

- PWT8.0 is getting closer
- Major changes
 - Multiple benchmarks & new real growth series
 - GDPo and GDPe
- Main results
 - Noticeable gaps between GDPe and GDPo
 - Restores Penn effect for the full period
 - Cross-country inequality pre-2000 was lower