



# The sources of productivity convergence: sectors and structural change

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Robert Inklaar & Ryan Marapin

University of Groningen



# Background & Motivation

- › Patel, Sandefur & Subramanian (2021) find evidence of recent income convergence
  - Convergence process initiated in the 1990s
  - No evidence of a middle-income trap
- › What is driving this convergence in income levels (GDP/capita)?
  - Faster growth in lower-income countries
  - Convergence in labour productivity (GDP/worker)



# Why does this matter?

- > What role should industrial policy play? Where should resources be allocated?
  
- > Is industrialization (still) a key strategy to achieve growth?
  
- > Or should new development strategies be developed?
  - Rise of Global value chains (GVCs)
  - Productivity in GVC jobs higher than non-GVC jobs (Pahl et al., 2022)
  - Role of ICT investments in promoting growth



# Current literature

- > Rodrik (2013): convergence present in manufacturing, absent in the rest of the economy
- > Kinfemichael & Morshed (2019): convergence in services
- > Herrendorf, Rogerson & Valentinyi (2022): no convergence in manufacturing
- > What about agriculture? And structural change?
  - Structural change key growth driver but overlooked in convergence analysis
- > Fresh look on the role of sectors and structural change required
  - Important related new work by Dieppe and Matsuoka (2022) on this as well

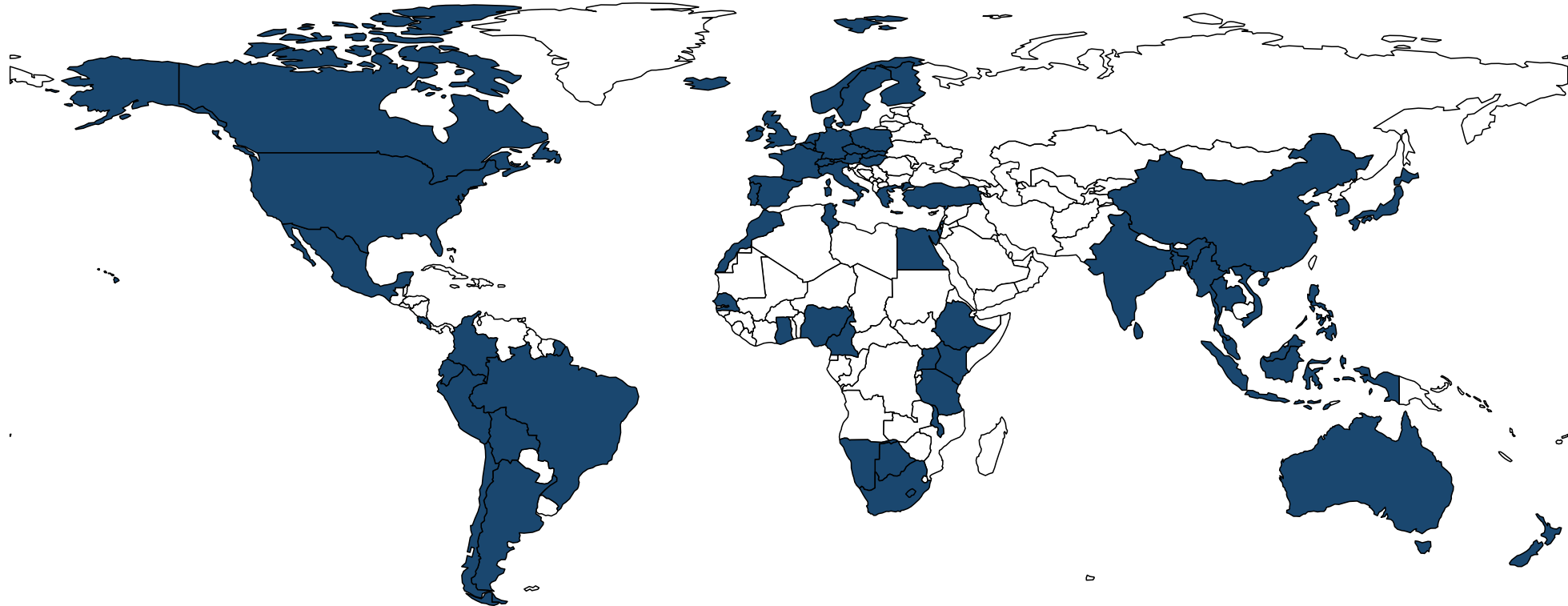


# Contribution

- › This paper analyses convergence in labour productivity by industry
  - 66 countries, 20 industries, 1990-2018
  - Based on newly constructed sectoral PPPs (work in progress)
  - Enables sectoral productivity comparisons across countries
- › Assess the role of structural change on convergence
  - Separate within-sector dynamics from structural change impact



# Country coverage





# Main findings

- > Aggregate convergence in labour productivity levels since 1990
- > Several industries exhibit convergence → manufacturing is not unique
  - Convergence also present in agriculture
- > Manufacturing shows divergence
  - In contrast to Rodrik → strong convergence in manufacturing, absent in rest of economy
  - Rodrik focuses on formal manufacturing, relies on Law of One Price assumption
- > Decrease in productivity dispersion of 19%: 9% due to structural change out of agriculture
  - Remaining 10% due to within-sector convergence, with industry heterogeneities present



# Measurement approach

- > Real value added per worker:  $LP_{jkt} = \frac{VA_{jkt}/PPP_{jkt}}{EMP_{jkt}}$ 
  - Country  $k$ , industry  $j$ , time  $t$
- > PPPs computed using the aggregation method by Inklaar & Diewert (2016)
  - Multilateral Törnqvist index
  - Simultaneous country-year weighting
- > Analyse  $\sigma$ -convergence, i.e. dispersion of productivity levels:

$$\sigma_{jt} = \left\{ \frac{1}{K} \sum_k [\log(LP_{jkt}) - \log(\overline{LP}_{jt})]^2 \right\}^{1/2}$$





# Data ingredients

- > Nominal value added and employment by sector
  - Economic Transformation Database (ETD, de Vries et al., 2021)
  - OECD STAN [from 1990 onwards]
  
- > PPPs
  - Agriculture: FAO; Mining: World Bank (unit value ratio method)
  - Remaining industries: Expenditure PPPs from ICP (purchaser prices)
  - Adjust manufacturing expenditure PPPs for domestic trade costs and terms of trade
  - Domestic trade costs: Data collected from SUTs
  - Terms of trade adjustment: Import and export prices based on Feenstra and Romalis (2014)

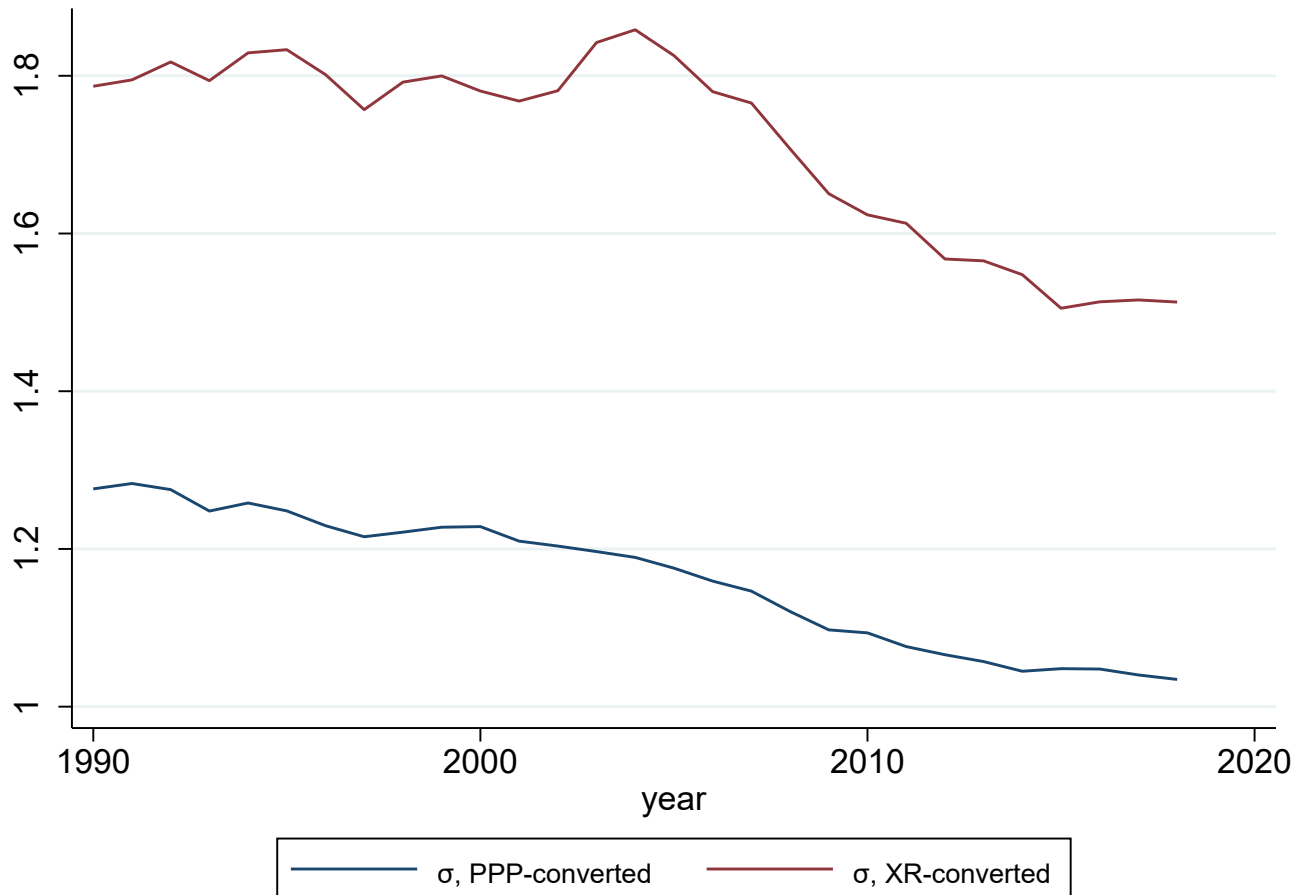


# PPP status & agenda

- > Status:
- > Gross output PPPs, applied to value added
  - Benchmark years (2005,2011,2017) utilized, interpolation and extrapolation for missing years using industry deflators
  - Domestic trade costs adjustment (margins, net taxes)
  - Terms of trade adjustment (export and import prices)
- > Agenda
- > Compute value added PPPs (using SUTs)



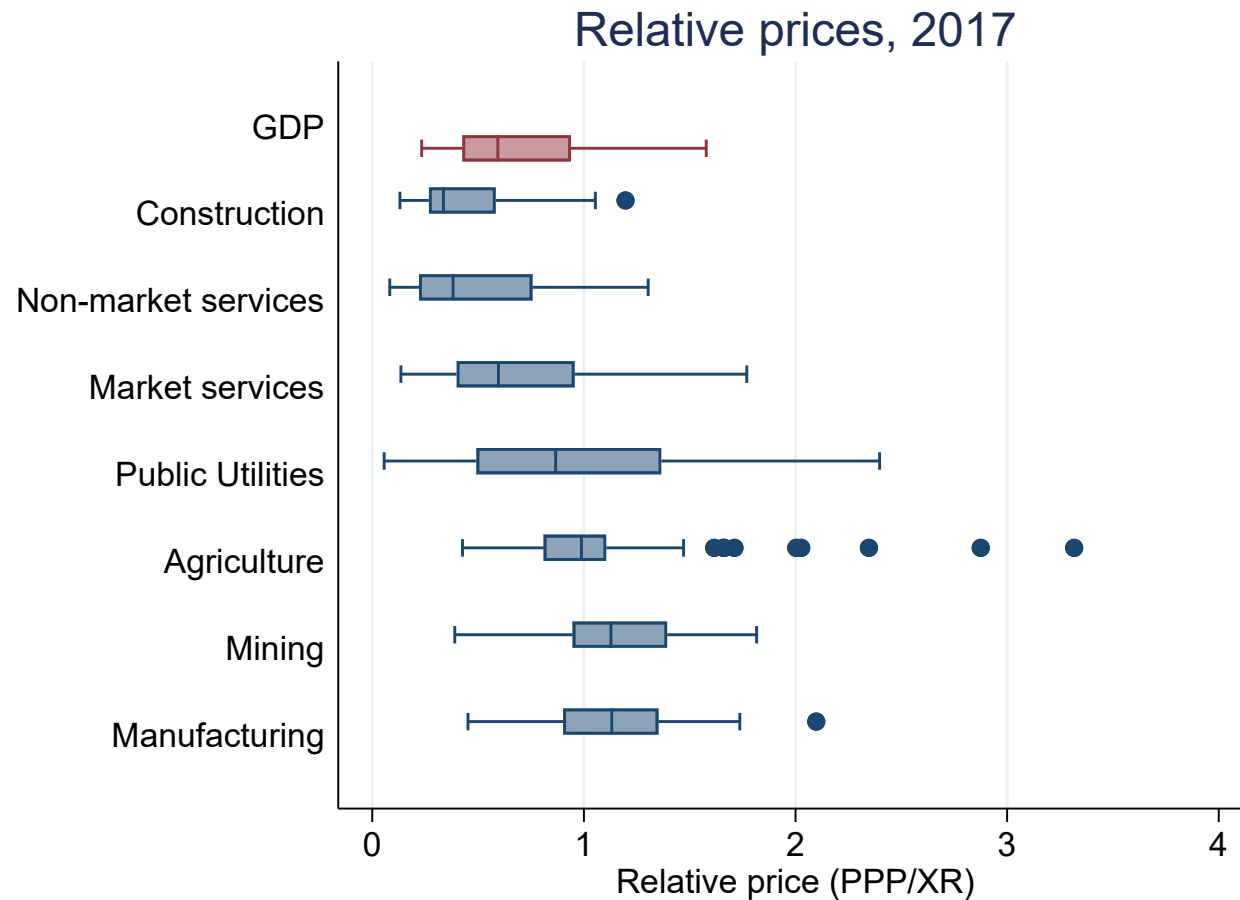
# Economy-wide convergence since 1990



Smaller LP dispersion and more consistent convergence trend when LP is measured using PPPs vs XR



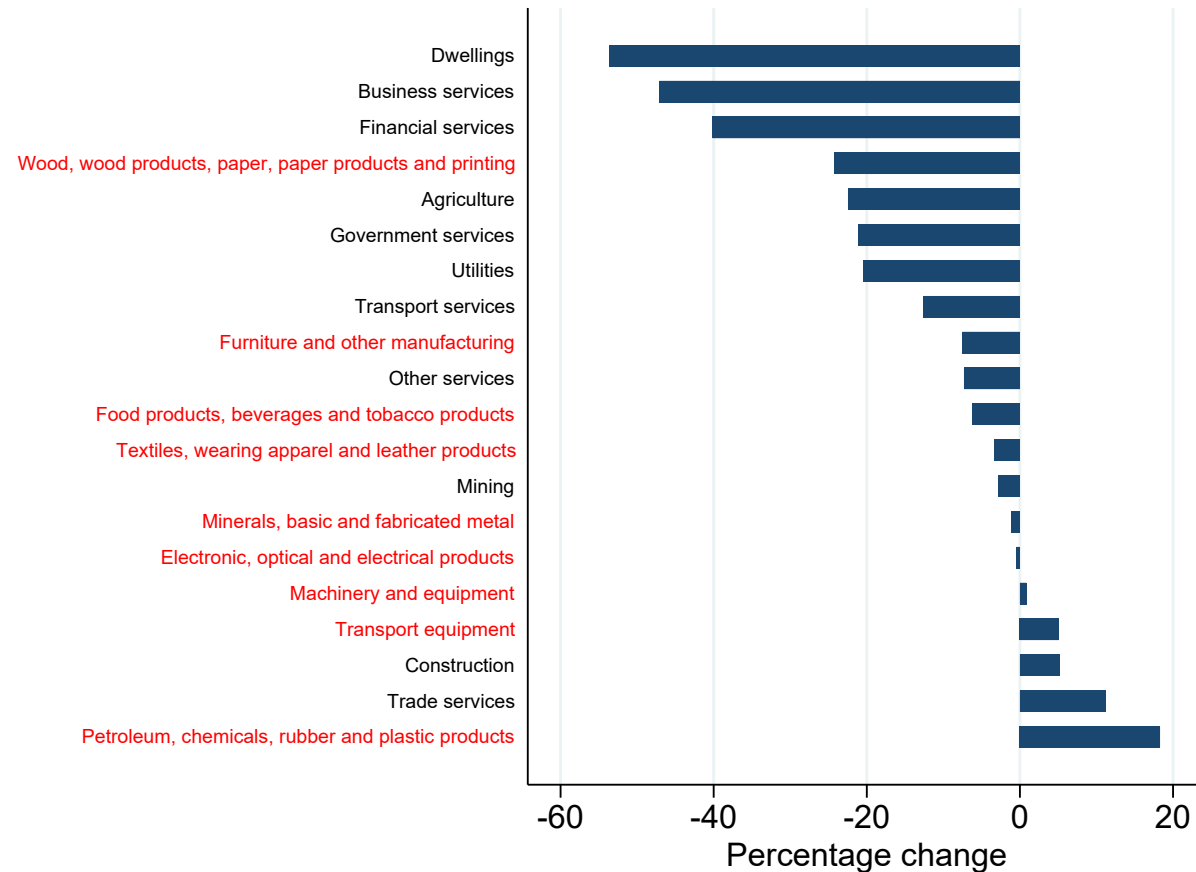
# Sectoral prices: why we need PPPs



Substantial deviation *and* variation in deviation of relative prices (PPP/XR) from Law of One Price → use of XR and GDP PPPs not desirable

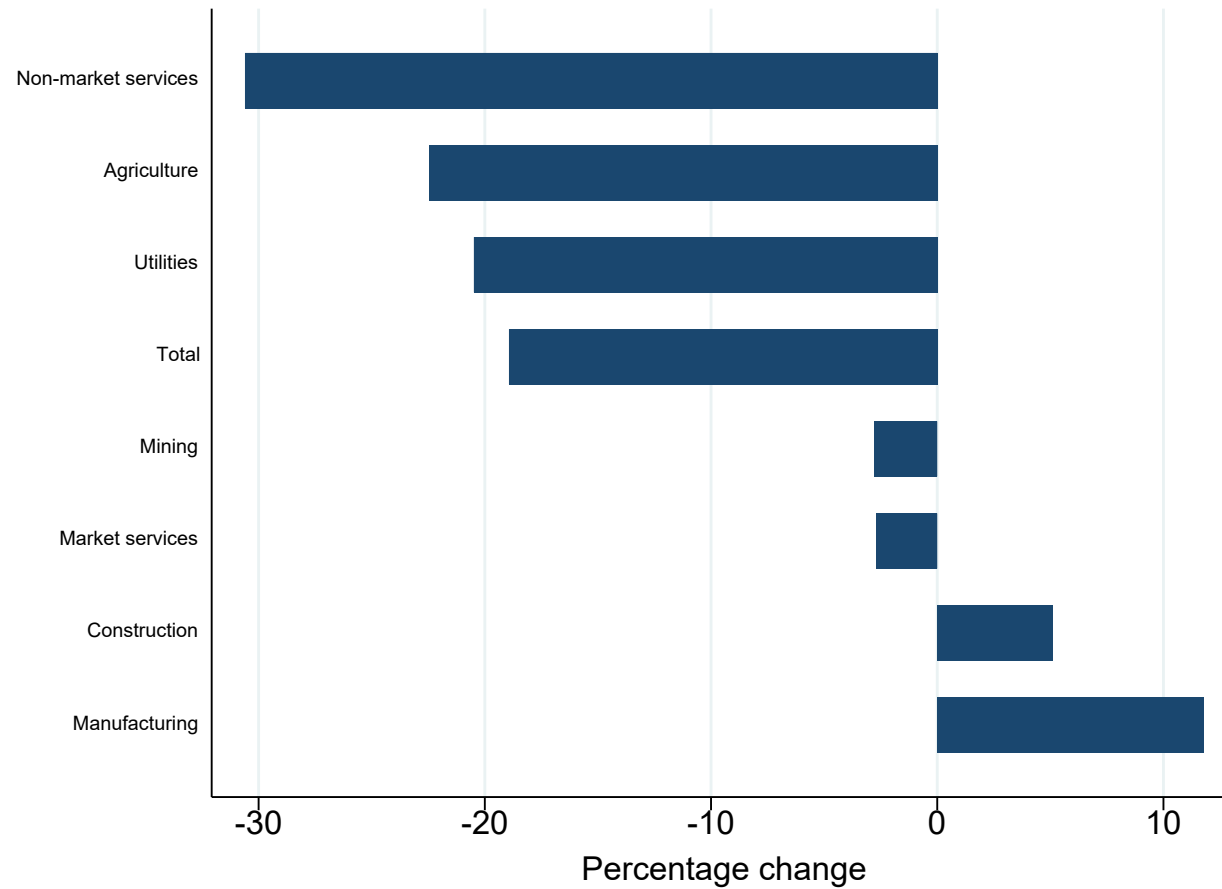


# Manufacturing industries are not special





# Convergence present in different sectors of the economy





# Some notes about measurement

- > PPPs and deflators for public services (government, health, education) are difficult to estimate (in particular for developing countries)
- > Better for dwellings, but productivity analyses ill-defined for owner-occupied housing
  - Imputed rents increase output but do not have an employment equivalent
- > PPPs for financial and business services (mostly) based on overall prices, and thus not specific to the sector



# Role of structural change

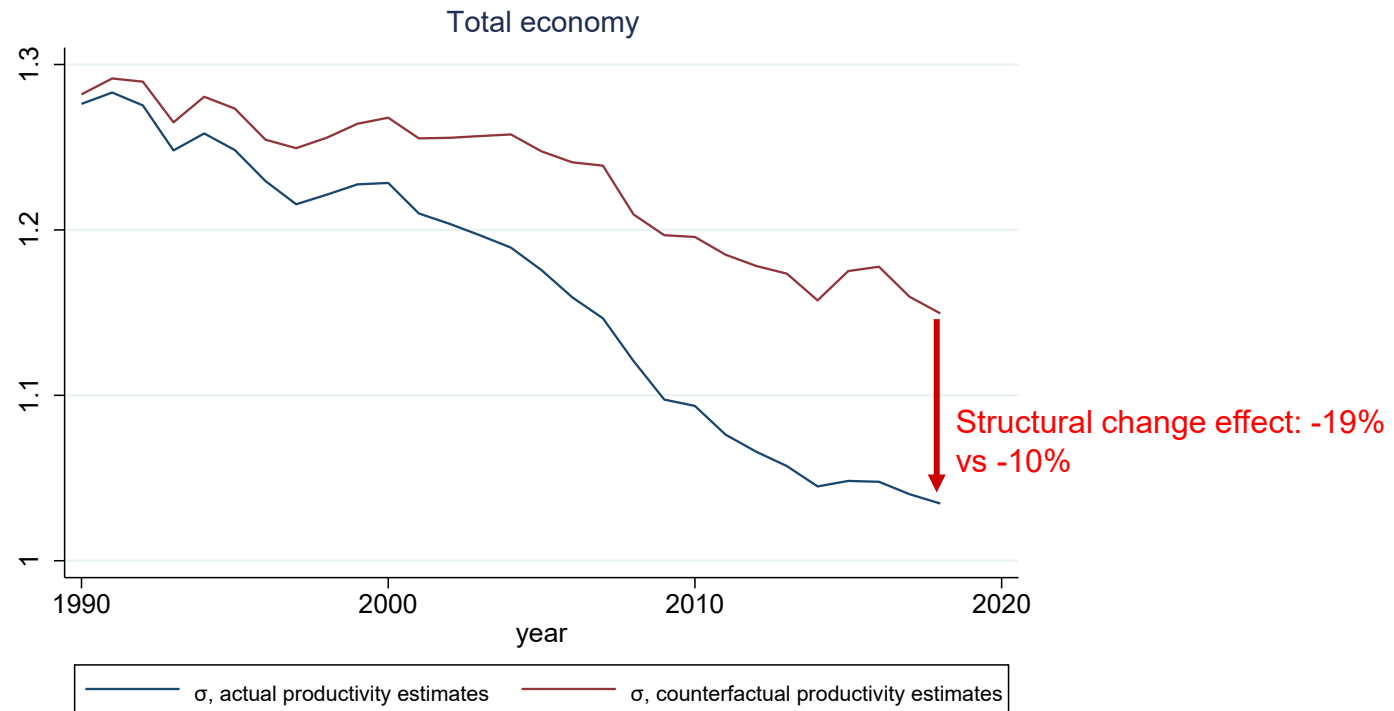
- > Observed aggregate LP:  $LP_{kt} = \frac{\sum_j s_{jkt} \times \left( \frac{VA_{jkt}}{EMP_{jkt}} \right)}{P_{kt}}$
- > Idea: compute a counterfactual  $\sigma$ , based on keeping value added and employment shares constant to 1990  $\rightarrow$  no structural change occurs
- Nominal LP: weighting industry LP using 1990 employment shares
  - GDP PPP: counterfactual using 1990 value added shares

$$\widetilde{LP}_{kt} = \frac{\sum_j s_{jk1990} \times \left( \frac{VA_{jkt}}{EMP_{jkt}} \right)}{\widetilde{P}_{kt}}$$





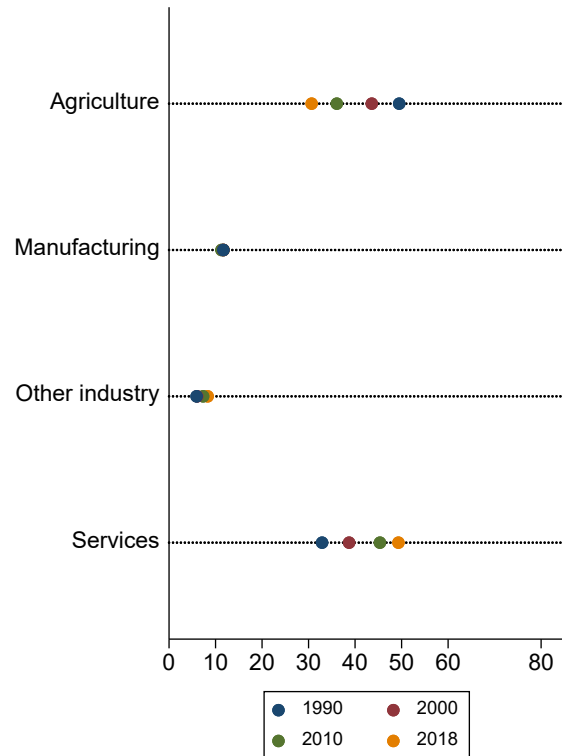
# Role of structural change



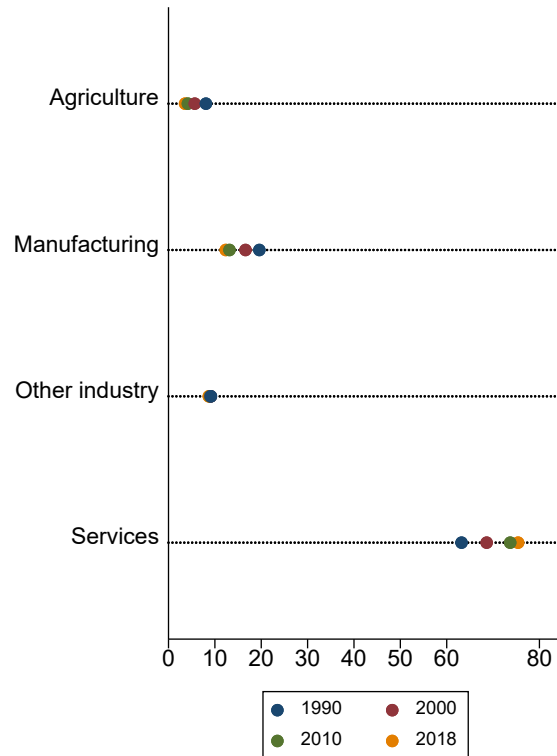


# Structural change: out of agriculture

Panel A: Developing countries



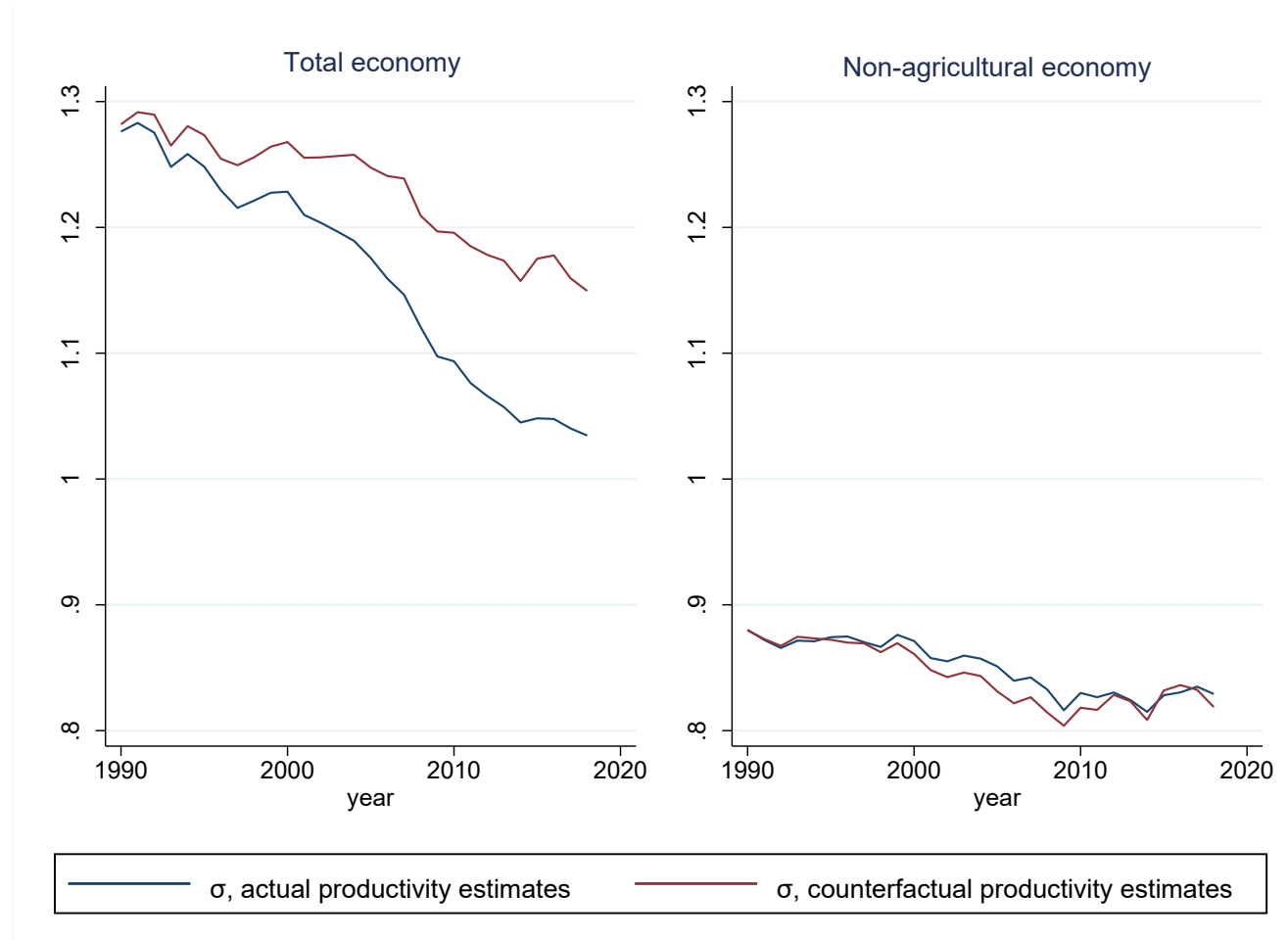
Panel B: Developed countries



Developing countries: from  
 agriculture to services



# Structural change: out of agriculture





# Conclusion

- > Key findings:
  - Manufacturing seems less crucial for convergence as often argued
  - Agriculture may still play an important role in development
  - Structural change key in driving convergence
  
- > PPP measurement still has some steps (in progress)
  - Refinement of the sectoral PPP estimates → compute value added PPPs



- > Thank you for attending this presentation!
- > Any questions or comments?
- > Email: [ryan.marapin@rug.nl](mailto:ryan.marapin@rug.nl)



# References

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