Artificial Intelligence, International Trade and Economic Growth in the Long Run

Presentation Eddy Bekkers at Roundtable on The Digital Economy Amid Rising International Tensions

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Introduction: AI and Trade

- Recent rapid advances in artificial intelligence (AI) are expected to bring substantial changes to the global economy.
- Key question: how will AI's rapid technical progress impact trade and output, and what are the distributional effects within and between economies.
- We employ a quantitative trade model to conduct scenario analysis on how the emergence and development of AI may impact the structure of production, trade patterns, output, and the income distribution.
- The analysis generates three key findings.
  1. AI has strong potential to boost global trade and GDP: 13.2% increase in global GDP and 35% increase in global trade over the next 15 years.
  2. Low- and middle-income countries can capture more of these gains if they improve their digital infrastructure and ensure adequate AI deployment.
  3. AI can change within-country income distribution: all production factors gain in real terms, but the rental-wage rate will increase, whereas the skill premium will fall, depending on the long-run growth rate of AI and the degree of complementarity between production factors.

Methodology

- We extend a standard quantitative trade model with a new sector, "AI services".
  - The AI services sector develops ("trains") and operates AI models, that is, computer programs designed to perform tasks typically associated with human intelligence.
- The employed model features capital and three types of workers (high-skilled, middle-skilled, and low-skilled) and firms combine the labour supplied by workers with AI to produce three types of AI-labour composites.
- In the projections the use of AI as an input into production rises over time, reallocating tasks from labour to AI services.
  - Following Statista (2025) we assume that AI services grow by 26% annually

Methodology

- The reallocation of tasks generates an increase in productivity
  - Average productivity growth is calibrated to estimates by Aghion and Bunel (2024)
  - Productivity growth varies by occupation based on variation in AI occupation exposure mapped to sectors, skills and regions using employment data
- AI reduces trade costs via several channels, including the improvement of logistics and contract enforcement, streamlining trade compliance, as well as diminishing language barriers and distance-related costs.
- In earlier work (WTO, 2024) the upstream demand effects for AI services were omitted and only the productivity and trade cost effects were modelled
- The shocks are phased in over 15 years, from 2026 until 2040

Four Scenarios

1. **Tech divergence**
   - High-skilled labour experiences the highest productivity gains (advanced AI)
   - Digital infrastructure affects the ability of economies to exploit productivity and operational trade cost reductions
2. **Policy catch-up**
   - Medium-skilled workers experience the highest productivity gains (basic AI)
   - Economies with smaller scores of digital infrastructure partially catch-up to better performing regions (closing 50% of the gap)
3. **Tech catch-up**
   - Same shocks as Scenario 2
   - On top, the productivity in tasks performed with AI converges to the productivity of the best-performing region in these tasks
4. **AI catch-up**
   - Same shocks as Scenario 2
   - On top, economies with low productivity in producing AI services partially catch up, closing 100% of the inferred relative productivity gap in AI services relative to a country's average productivity

Trade cost reductions: six channels

1. A reduction in compliance costs employing DB indicator "Documentary compliance to export". Based on the ICC-WTO joint business survey of AI potential, documentary compliance scores fall by 30%
2. Improvement in contract enforcement processes employing DB indicator "Contract enforcement: trial and judgment time". AI solutions will accelerate the timeline of commercial disputes by 5 percent
3. Facilitating the translation of written and spoken communication through machine learning, employing "common official language" (COL). Based on ICC-WTO survey, translation-related costs decrease by 25.5%
4. A reduction in searching and matching costs by easing informal communication and trust building in networks based on "common spoken language" (CSL). AI solutions enable a moving to the mean in CSL for lagging country pairs
5. Improvement in logistics planning and costs ($TMLNS$) measured with the timeliness component of the Logistics Performance Index. The reduction in logistics-related trade cost is 19.5%, based on ICC-WTO survey
6. A reduction in distance-related trade costs ($PDIST$) through improved route optimization for shipments. Based on case study of AI-powered route optimization system (Hyundai) average fuel savings are 5.3%.

Trade cost reductions: regression results

	(1) Primary sector	(2) Secondary sector	(3) Tertiary sector
FTA	-0.0153***	-0.0213***	-0.00241***
	(0.000170)	(6.62e-05)	(0.000243)
CLNY	-0.0401***	0.00225***	0.00692***
	(0.000524)	(0.000173)	(0.000569)
LANDLOCKED	0.114***	0.0594***	0.0633***
	(0.000268)	(7.96e-05)	(0.000270)
CONTIG	-0.0981***	-0.152***	-0.126***
	(0.000212)	(7.68e-05)	(0.000302)
CREDIT	-0.0131***	-0.181***	-0.123***
	(0.000230)	(0.000144)	(0.000414)
CSL	-0.00847***	-0.0115***	-0.387***
	(0.000402)	(0.000142)	(0.000402)
COL	-0.00925***	-0.0177***	-0.143***
	(0.000265)	(0.000101)	(0.000275)
PDIST	0.0671***	0.0656***	0.0875***
	(8.34e-05)	(2.97e-05)	(0.000114)
CONTRACT	0.0255***	0.121***	0.242***
	(0.000182)	(7.58e-05)	(0.000272)
LOG_DOC_EXP	0.0160***	0.0363***	0.0647***
	(4.54e-05)	(2.14e-05)	(7.82e-05)
TMLNS	-0.251***	-0.549***	
	(0.000524)	(0.000257)	
STRI			0.148***
			(0.000215)
Observations	4,161,483	28,978,997	9,488,281
R-squared	0.497	0.624	0.615

Standard errors in parentheses

Trade cost reductions by sector (cumulative)

Notes: the figure depicts the relative sizes of the cumulative AVE trade cost reductions in the observing period at the sectoral level.

AI services and productivity growth

- Statista market report projects 26% annual growth of AI services. Robustness check: UNCTAD's *Technology and Innovation Report 2025* projects 38% annual growth
- Projected productivity growth across the four scenarios is calculated in four steps:
  1. Project average productivity growth in the US based on Aghion and Bunel (2024).
  2. Vary projected productivity growth by occupation, based on an index of AI occupation exposure (AIOE) (Felten et al.)
  3. Map the AIOE to economic sectors segmented by skill levels across countries, using data on on occupation shares from the US BLS for the US and the ILO for other economies
  4. Multiply the projected productivity effects with the digital infrastructure preparedness (DIP) index from the IMF AI Preparedness Index (AIPI) (Cazzaniga et al. 2024) as a proxy for a country's ability to capture the positive impact of AI

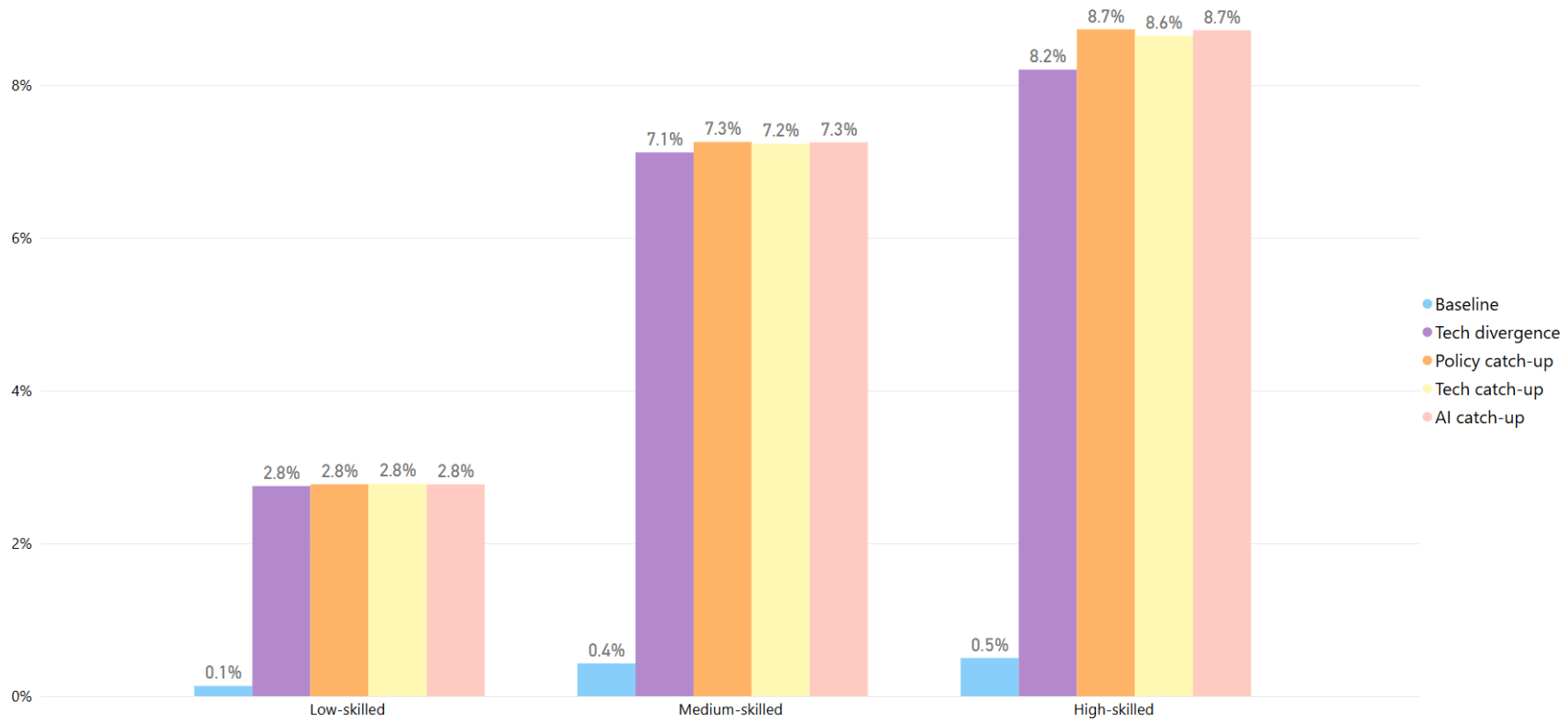
Productivity growth by region

Figure: Cumulative Productivity Growth (%)

Notes: the figure depicts the relative sizes of the cumulative productivity growth in the observing period for different skill types.

Simulation results: production structure

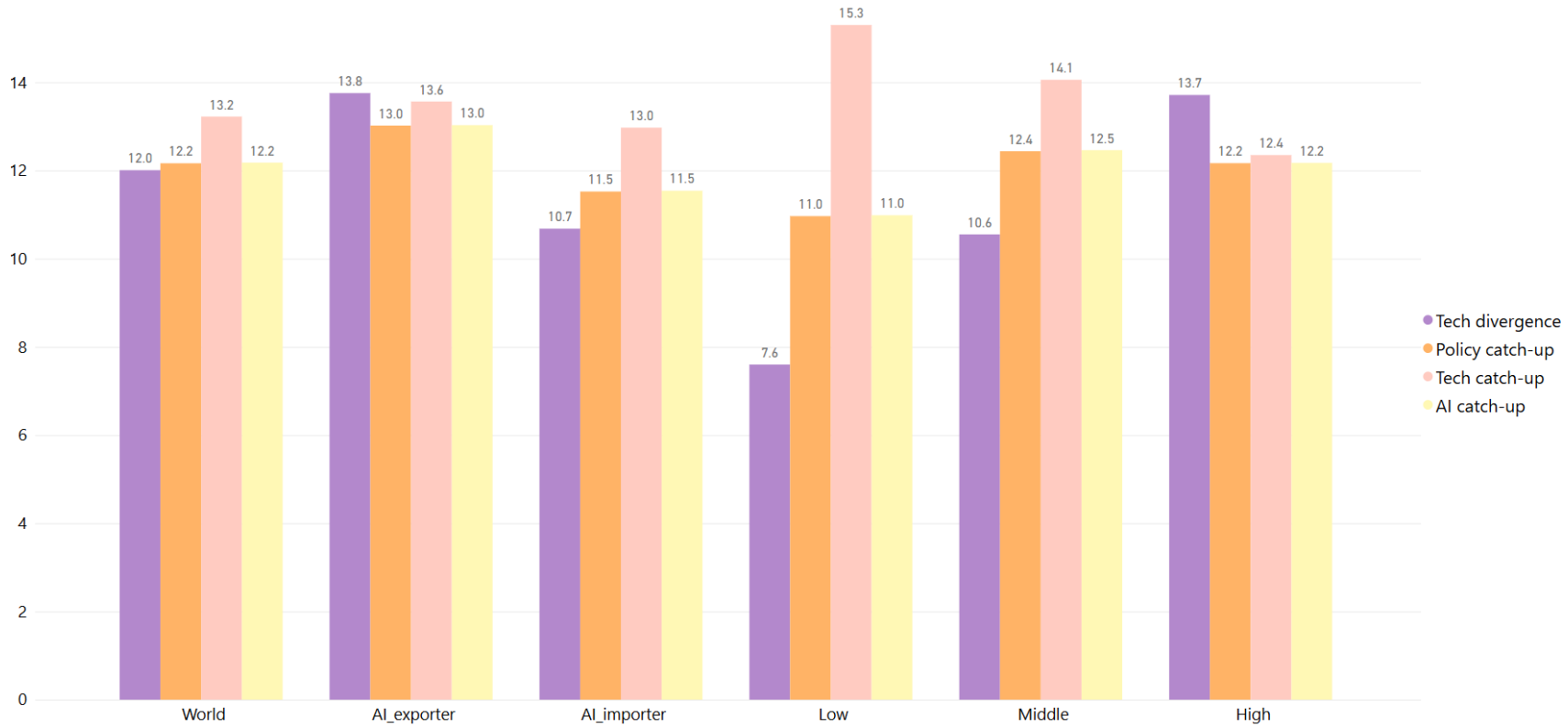
Figure: Share of AI-capital in AI-capital-labour composite in 2040, by skill type.



Notes: The figure displays the share of tasks completed by AI, split by labour skill type, for four scenarios and the baseline scenario in which there is no exogenous growth of the AI sector.

Simulation results: GDP impact by region

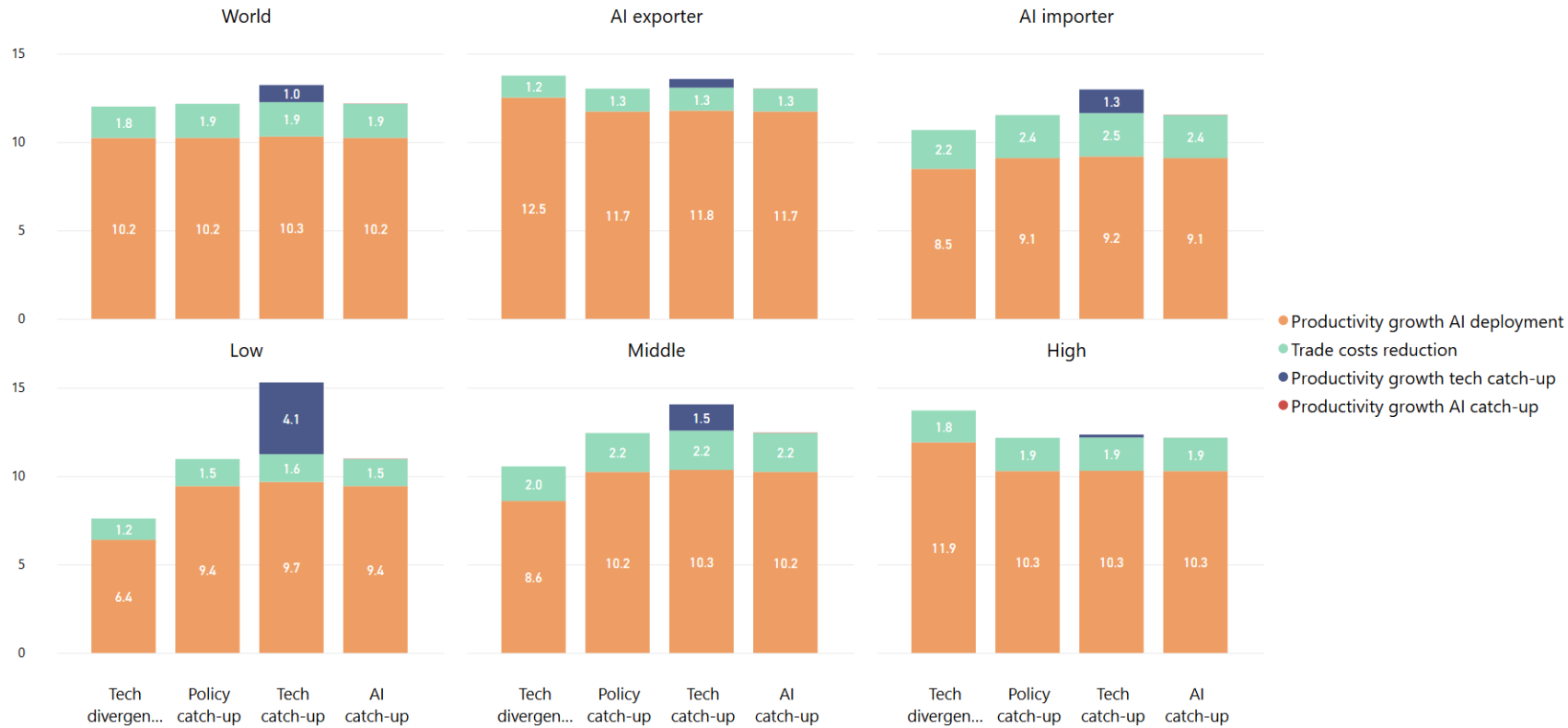
Figure: GDP Impacts across regions



Notes: This figure displays the cumulative change in real GDP from 2025-2040 for four scenarios in deviation from the baseline, both globally and for aggregate regions, split by income level and between AI net exporters and AI net importers. AI net exporters and net importers are defined by calculating net exports (exports minus imports) in AI for each region.

Simulation results: GDP impact by channel

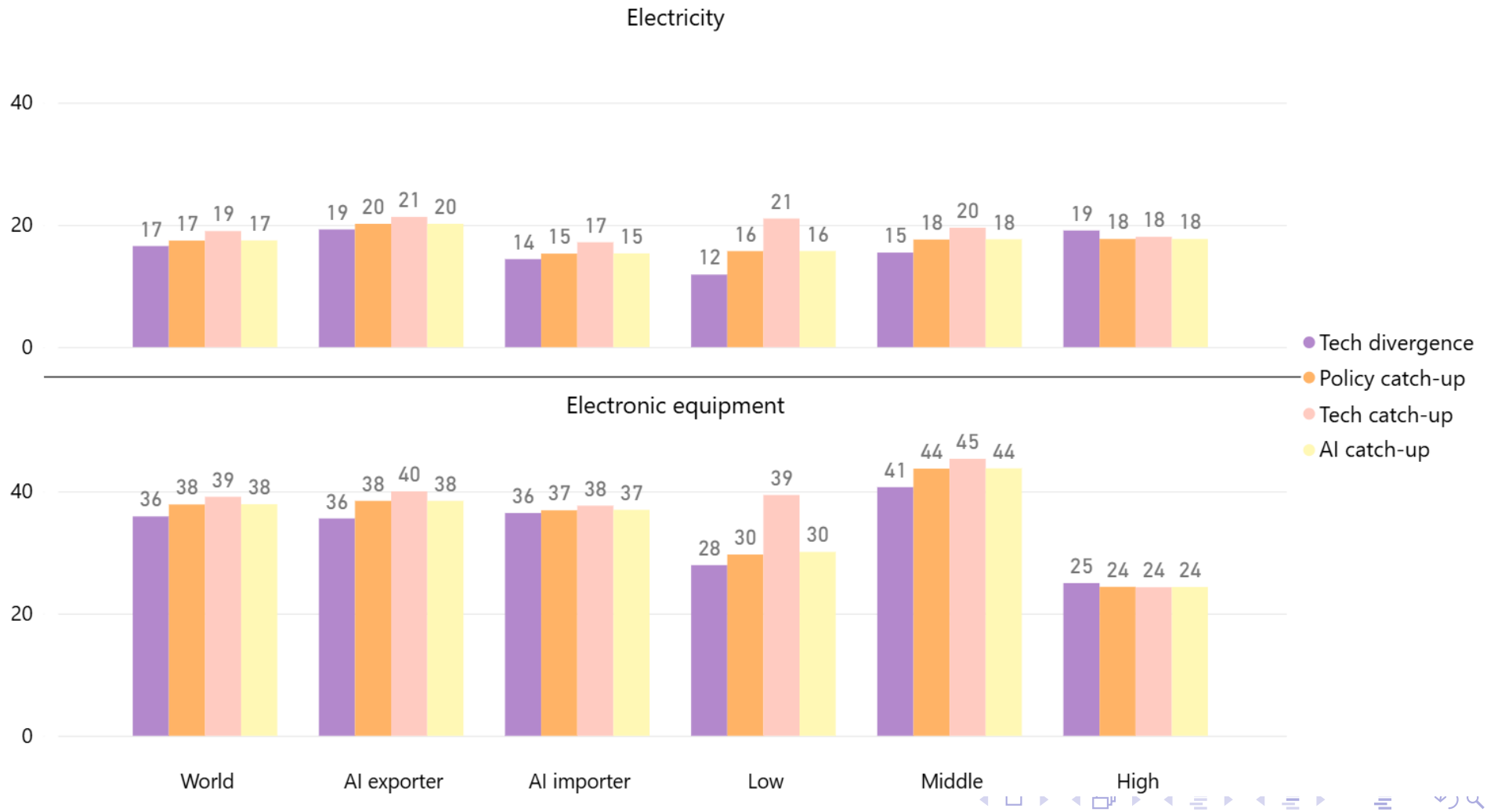
Figure: GDP Impacts across regions with decomposition of channels



Notes: This figure displays the cumulative change in real GDP from 2025-2040 for four scenarios in deviation from the baseline, both globally and for aggregate regions, split by income level and between AI net exporters and AI net importers. The changes are further decomposed into the channels of impact of AI deployment. AI net exporters and net importers are defined by calculating net exports (exports minus imports) in AI for each region.

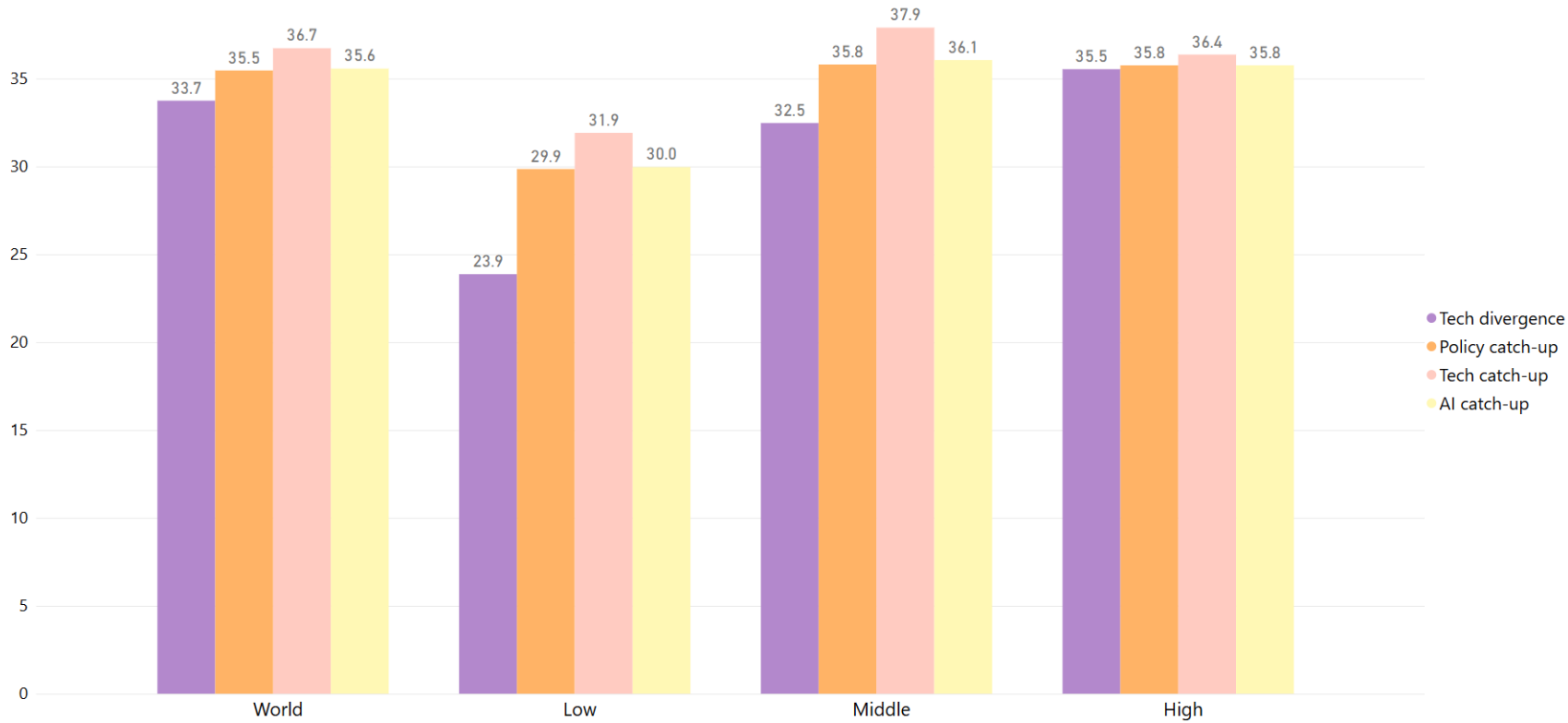
Simulation results: upstream effects

Figure: Cumulative change output of electricity and electronic equipment



Simulation results: trade impact

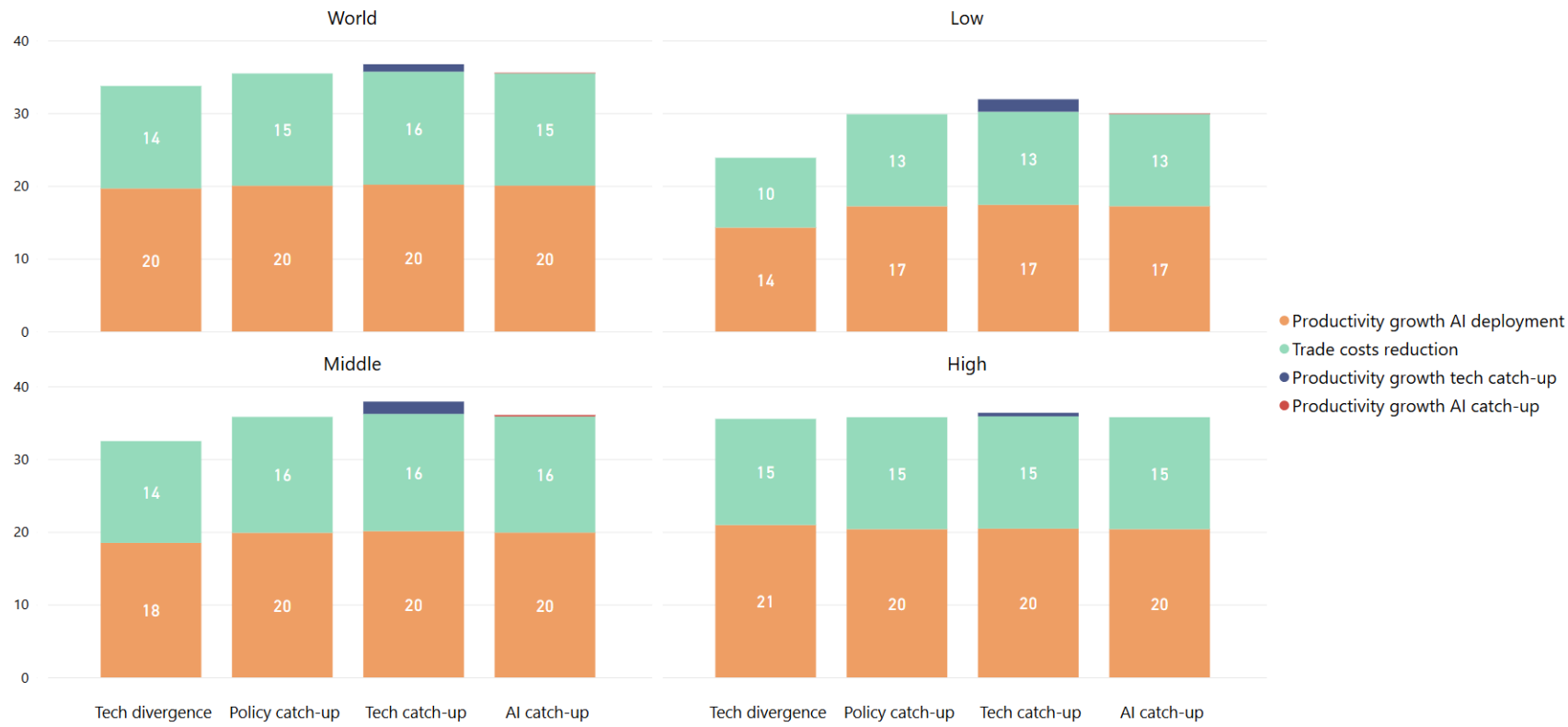
Figure: Cumulative Change in Real Exports by 2040, globally and by income level.



Notes: This figure displays the cumulative change in real exports over 2025-2040 for four scenarios in deviation from the baseline, both for world exports and aggregate regions split by income level.

Simulation results: trade impact

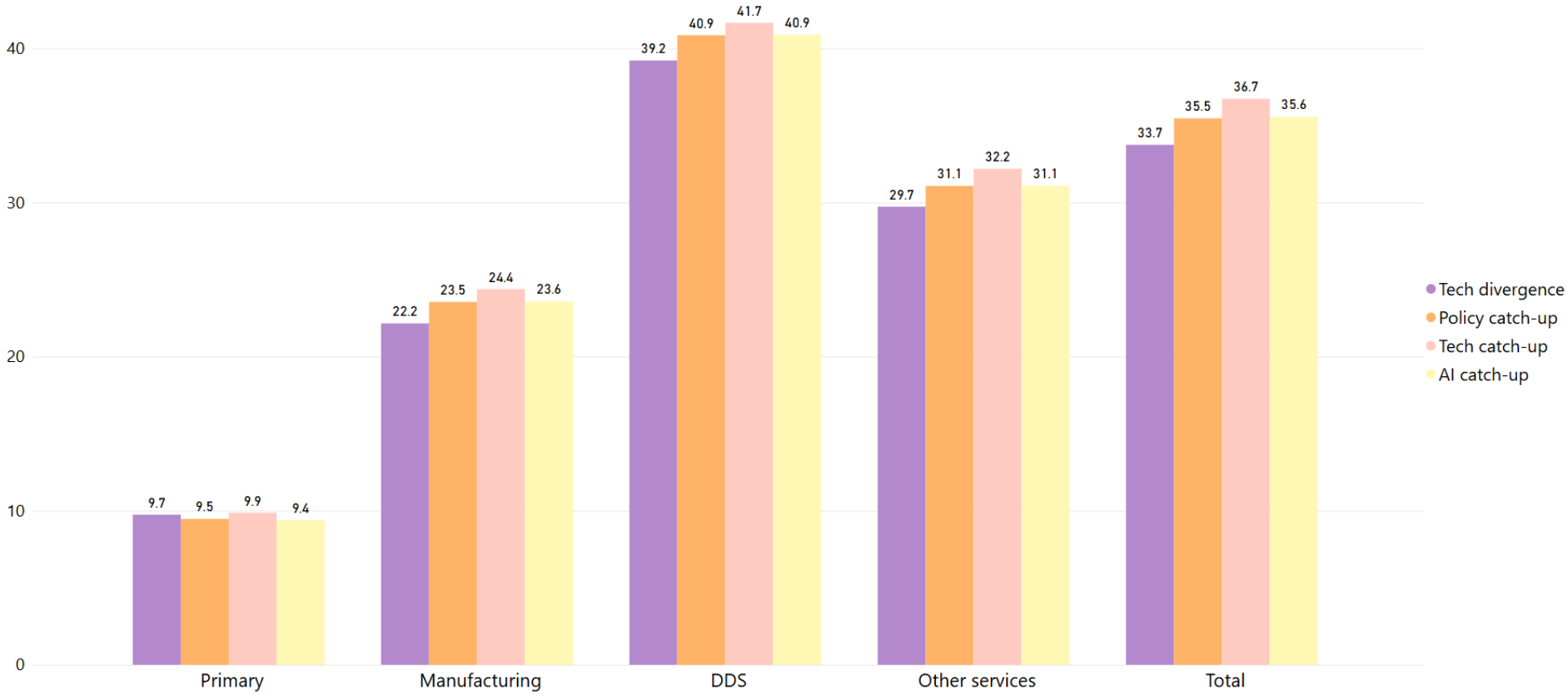
Figure: Cumulative Change real exports (2040) with decomposition of channels.



Notes: This figure displays the cumulative change in real exports over 2025-2040 for four scenarios in deviation from the baseline, both for world exports and aggregate regions split by income level. The changes are further decomposed into the channels of impact of AI deployment.

Simulation results: trade impact

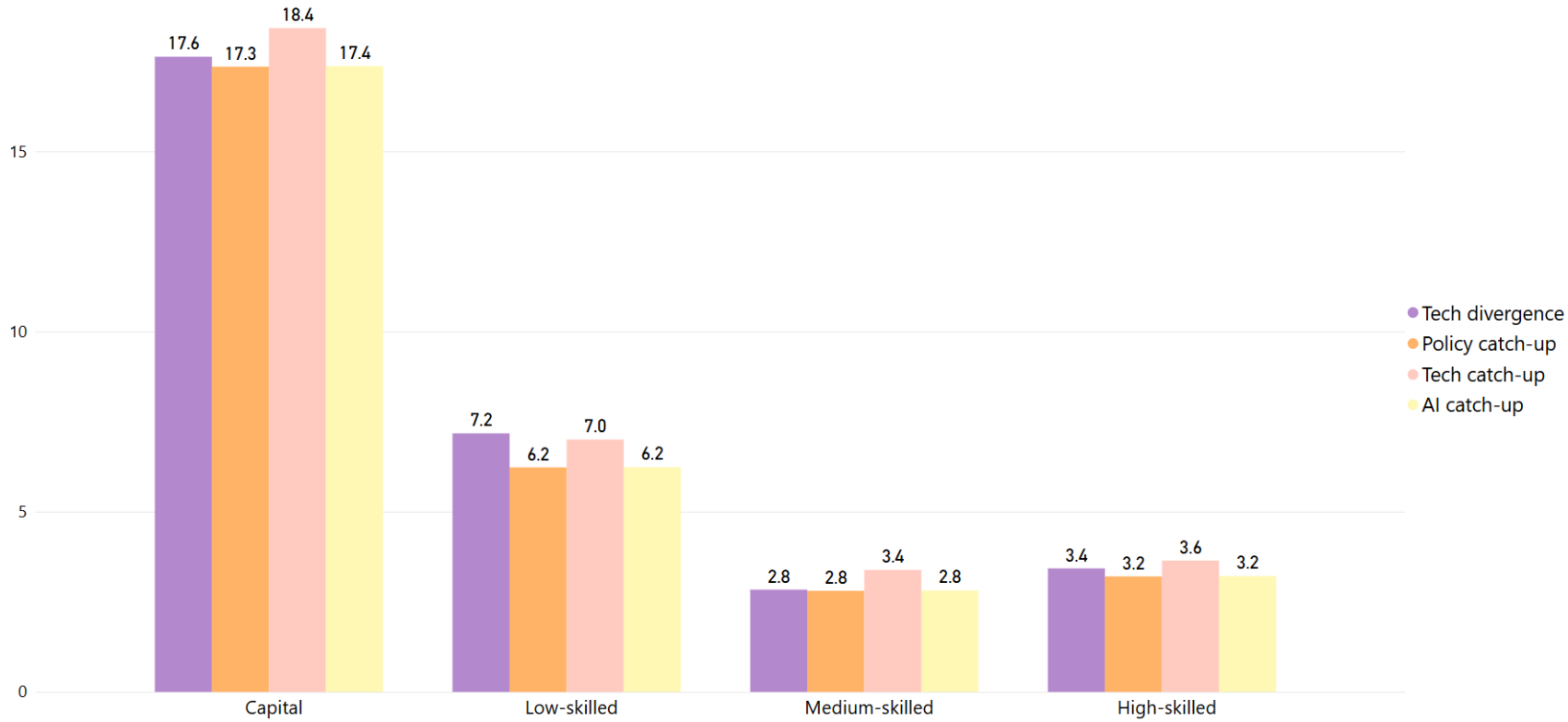
Figure: Cumulative Change in Global Real Exports by 2040 for aggregate sectors



Notes: This figure displays the cumulative change in real exports over 2025-2040 for four scenarios, in deviation from the baseline, for aggregate sectors. DDS is digitally delivered services.

Simulation results: real factor prices

Figure: Cumulative Change in Global real factor price



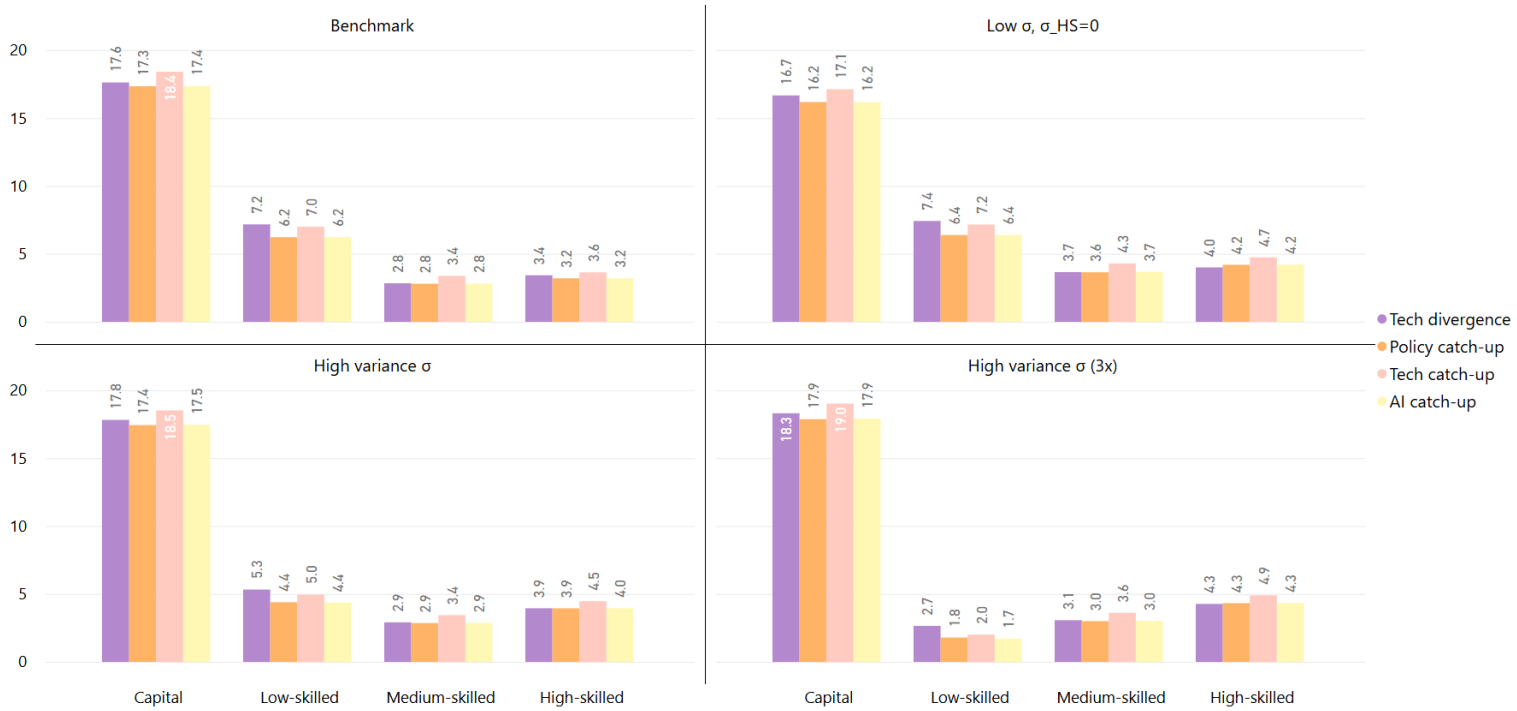
Notes: The figure displays the cumulative change in global real factor prices of the production factors over 2025-2040 for four scenarios in deviation from the baseline.

Robustness checks: real factor prices with 38% growth

Figure: Cum. change in global real factor prices, 38 per cent growth AI services

The figure displays the change in global real factor prices in 2040 for the four scenarios with growth in the AI sector of 38 per cent compared to 26 per cent per year (benchmark).

Robustness checks: alternative elasticities



The figure displays the change in global real factor prices in 2040 for the four scenarios for alternative values of the substitution elasticity between labour and AI services, σ

Concluding remarks

- Three main findings
  - Global GDP can rise by as much as 13.2 percent over the next fifteen years, and global trade volumes expand by about 35 percent
  - The distribution of the gains across economies hinges on the improvement of digital infrastructure and the scope for technological catch-up for tasks automated with AI in low and middle-income countries
  - AI can alter the income distribution within countries by (1) increasing the rental-wage rate and (2) reducing the skill premium,
- Avenues for further research
  - Study impact of creation of new tasks besides reallocation of tasks
  - Explore the implications of potential market power in AI production
  - Include more detailed input-output linkages for the AI services sector such as semiconductors (geographically concentrated) and generation of electricity with different sources (emission effects)
  - Study the interaction of AI and trade policy
    - Effect of growth of AI on the impact of digital trade policies
    - Impact of digital trade policies on the ability of economies to exploit the productivity gains and trade cost reduction potential of AI

Calibration of parameters

Parameter	Description	Value	Source
Preferences and Demand			
θ	Household demand elasticity	0.10	Comin, Lashkari, and Mestieri (2021)
ε_c	Income elasticity of sectoral consumption		Comin, Lashkari, and Mestieri (2021)
Production and Technology			
ν	Substitution between value added and intermediates	0.90	Atalay (2017)
κ	Substitution between capital and labour–AI composite	0.90	Calibrated (capital share)
σ_s	Substitution between labour and AI services		Own calculation based on Felten, Raj, and Seamans 2021
σ_{LS}	- low-skilled	1.16	
σ_{MS}	- middle-skilled	0.94	
σ_{HS}	- high-skilled	0.78	
Labour Supply			
μ_s	Cross-sector labour supply elasticity	5	Bekkers and Francois (2018)
ξ_s	Aggregate labour supply elasticity	0.50	Chetty (2012)
Trade Parameters			
ρ_c	Armington trade elasticity		Rubinova and Sebti (2021)