

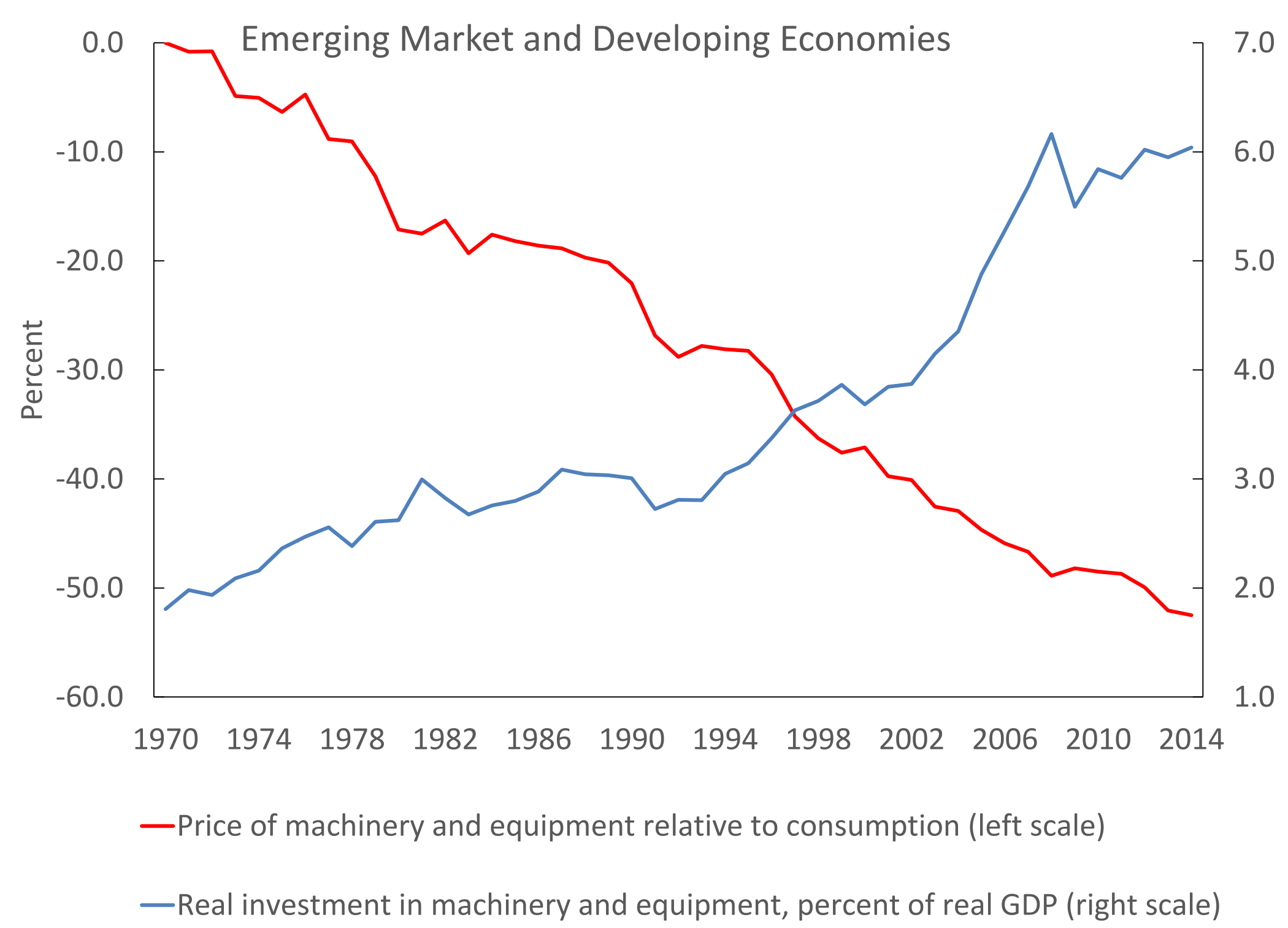
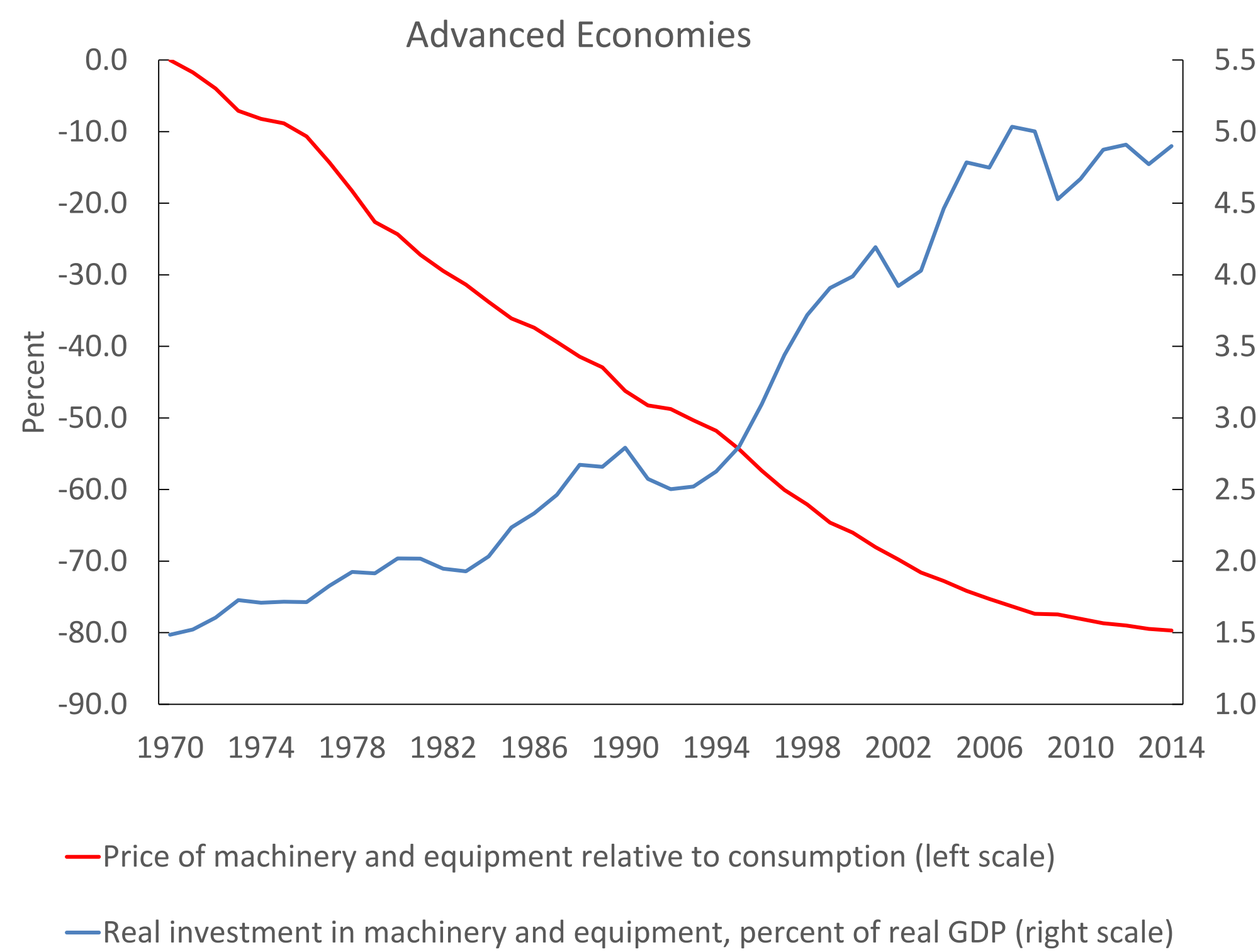


# The Price of Capital Goods: An Investment Driver under Threat?

*Weicheng Lian, Natalija Novta, Evgenia Pugacheva, Yannick Timmer, and  
Petia Topalova (team leader), with support from Jilun Xing and Candice Zhao, and contributions from  
Michal Andrle and Rafael Portillo*



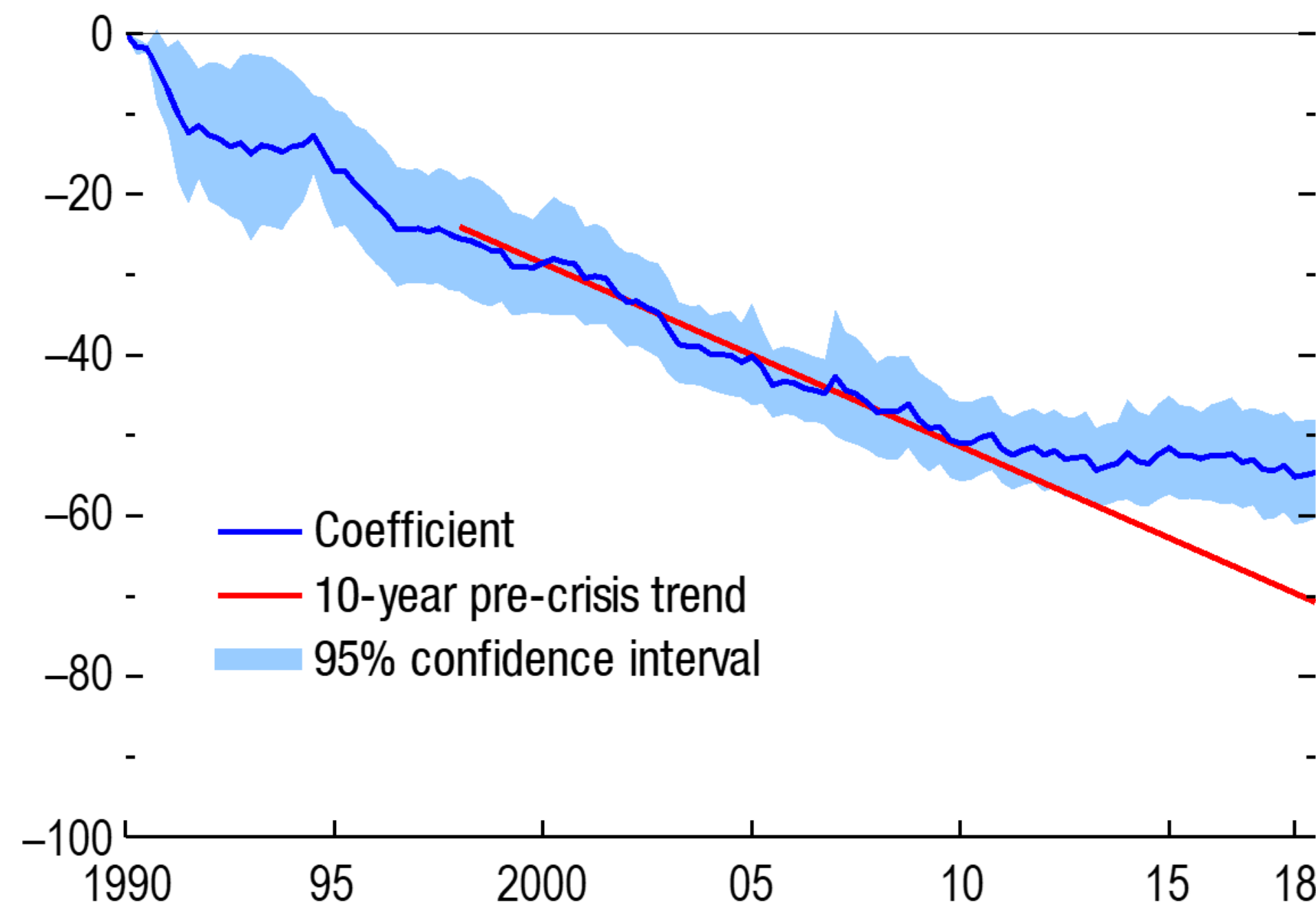
# Real investment rates have significantly increased, and relative prices of capital goods have fallen sharply



Sources: Penn World Table 9.0; IMF, *World Economic Outlook*; and IMF staff calculations.

# But there has been a slowdown in the pace of decline in recent years

**Relative Price of Machinery and Equipment**  
(Percent change relative to 1990:Q1)



Sources: Haver Analytics, and IMF staff calculations.

Note: Relative prices are obtained by dividing the price of investment by the price of consumption. Data come from 10 advanced economies, including: Australia, Canada, Germany, Hong Kong SAR, Italy, Norway, Portugal, Spain, United Kingdom, United States.



# Main questions

- Stylized facts
  - Do EMDEs face higher prices of capital goods?
- What are the key drivers of the relative price of capital goods?
- How much does the relative price of capital goods matter for real investment?

# The fall in relative price is particularly strong for tradable capital goods

## Relative price of different types of investment over time

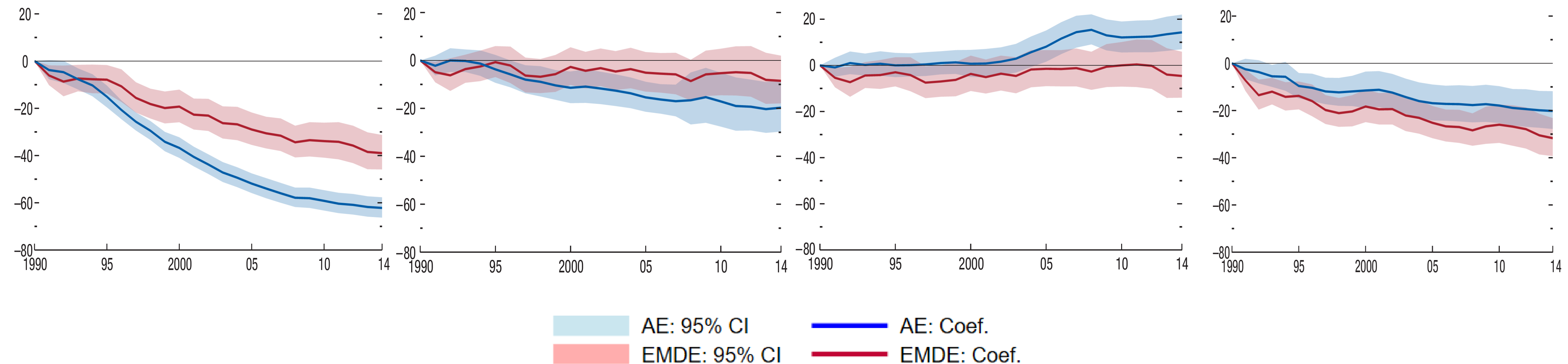
(Percent change relative to 1990)

### 1. Machinery and Equipment

### 2. Transport

### 3. Structures

### 4. Other investment (e.g. Intellectual Property)



Sources: Penn World Table 9.0, and IMF staff calculations.

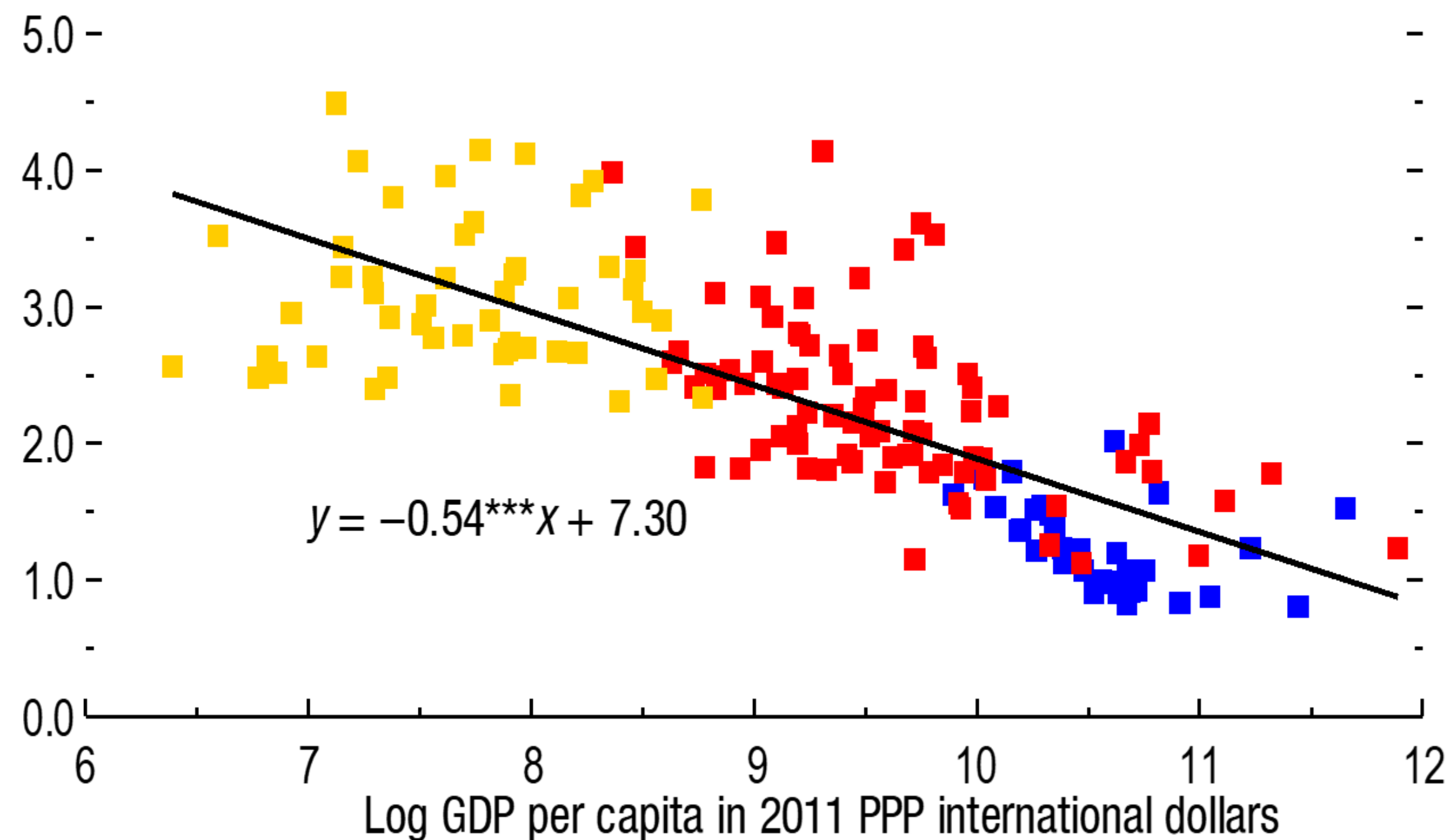
Notes: The figure shows year fixed effects from a regression that also includes country fixed effects.



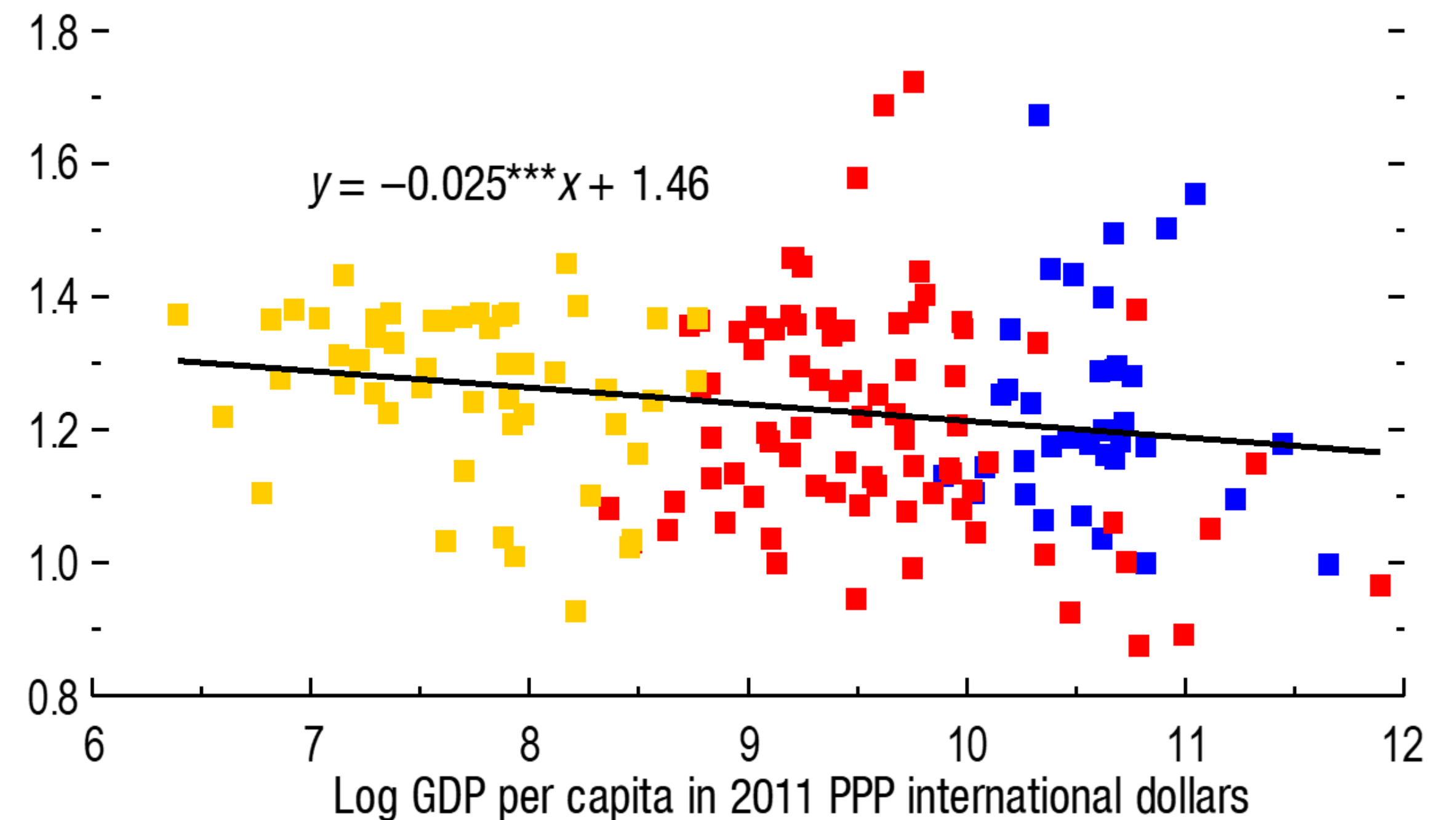
# Yet, poorer countries face higher relative prices of machinery and equipment

## Price of Investment Goods vs Income in 2011

### 1. Relative prices



### 2. Absolute prices



■ AE ■ EM ■ LIC

Sources: International Comparison Program (ICP) 2011, and IMF staff calculations.

Note: The absolute price of Machinery and Equipment is the price level of Machinery & Equipment, derived from the ICP. The relative price is that relative to the price of consumption.

# Drivers of the Relative Price of Capital Goods

Domestically produced

$$\frac{P_I}{P_C} = f\left(\frac{a_T}{a_{NT}}\right),$$

Relative  
Productivity

Imported

$$P_I^*, \quad \text{trade costs}$$

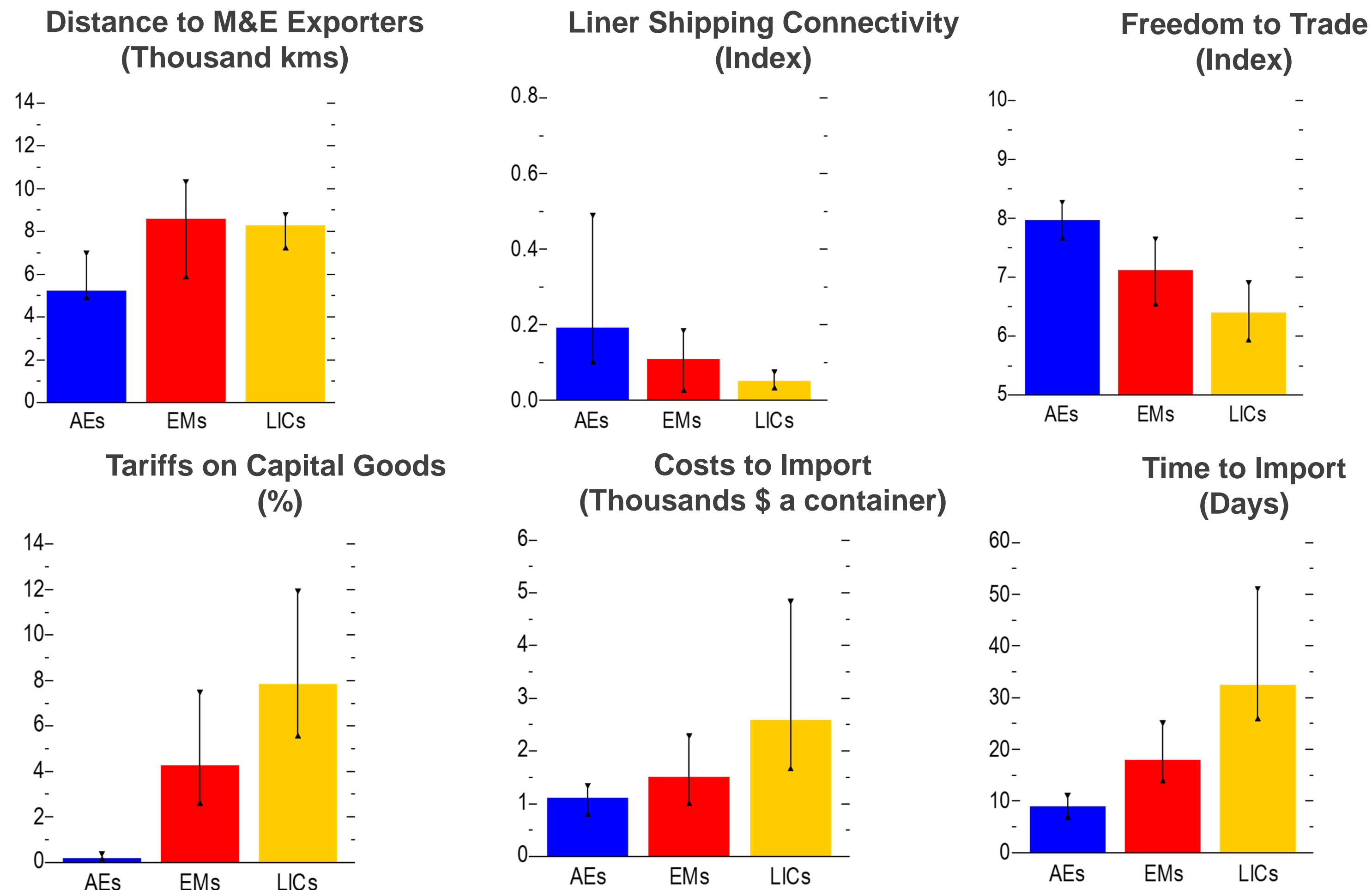
Prices  
charged by  
exporters

Transportation,  
tariffs, etc.



# Trade costs are larger in EMs and LICs

## Measures of policy and other trade barriers, 2011 (Median, and interquartile range)

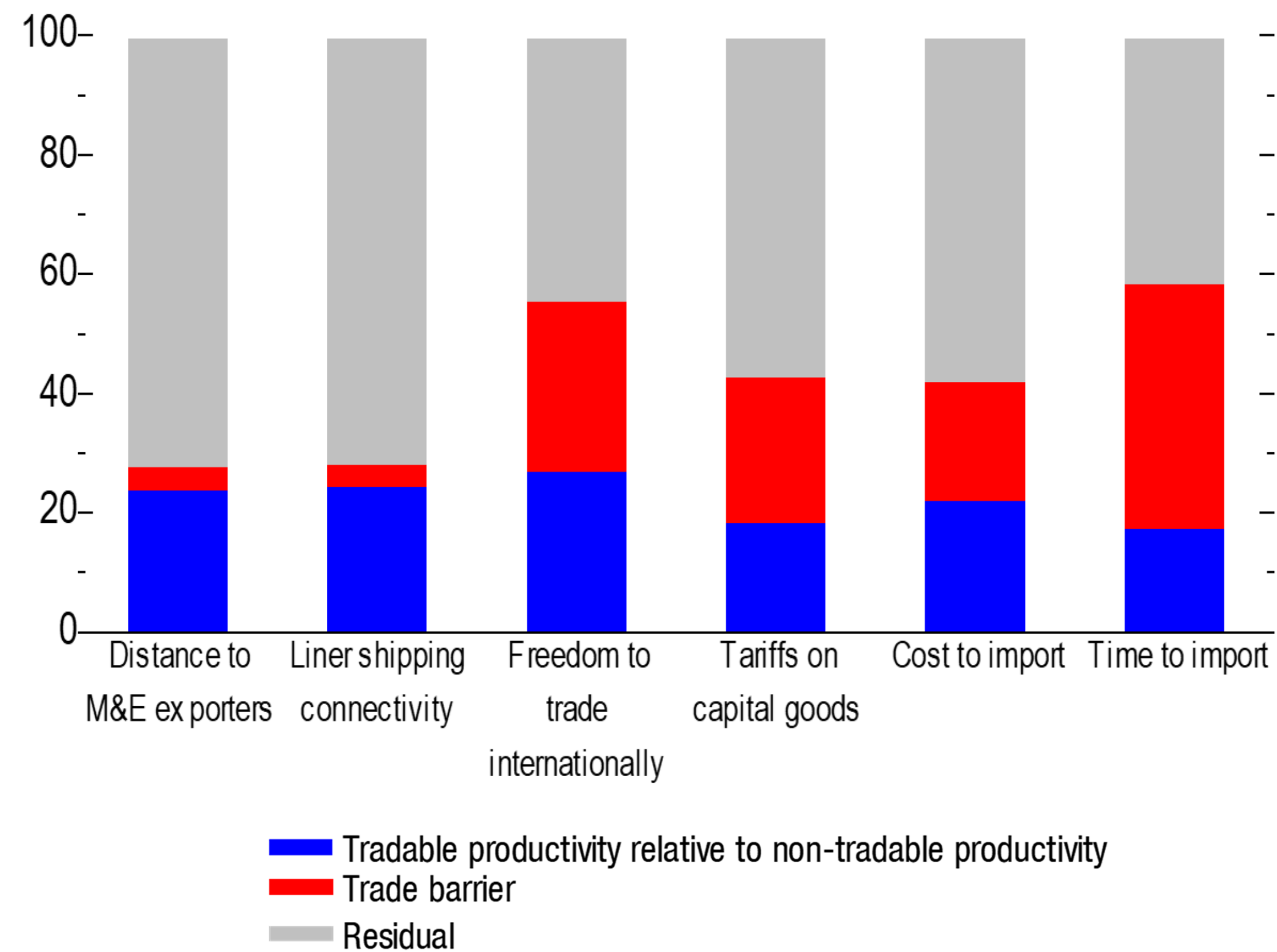


Sources: CEPII, GeoDist database; Eora Multi-Region Input-Output database; Feenstra and Romalis (2014); Fraser Institute; United Nations Conference on Trade and Development (UNCTAD); World Bank, Doing Business Indicators; and IMF staff calculations.



# Both trade barriers and relative productivity explain cross-country dispersion in relative price of machinery and equipment

**Cross-country variation in relative prices explained by relative productivity and trade costs, 2011 ICP**  
(Percent)

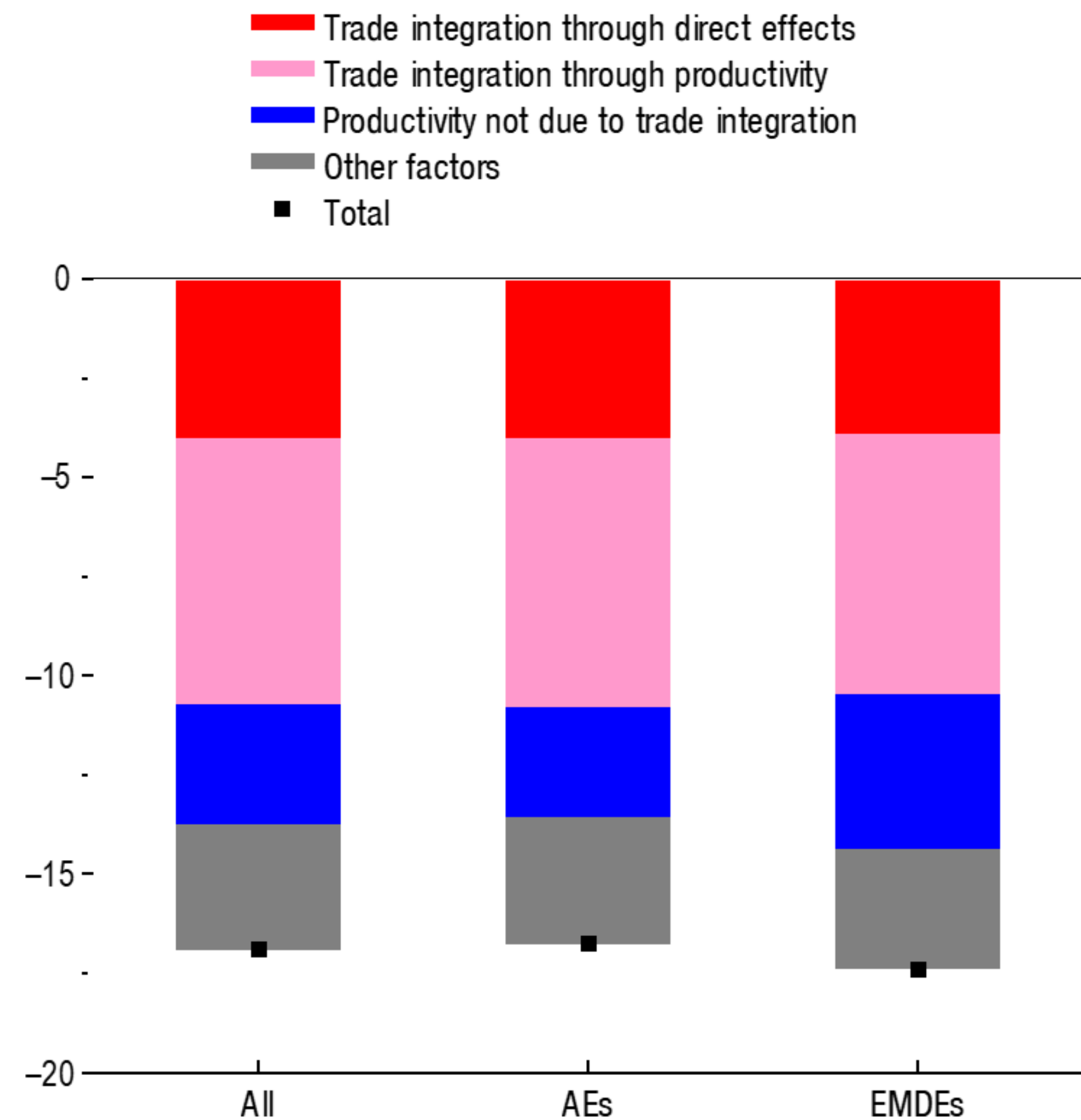


Source: IMF staff calculations



# The decline in relative prices was driven by deepening trade integration and faster productivity growth

## Decomposition of changes in relative prices of investment from 2000 to 2011

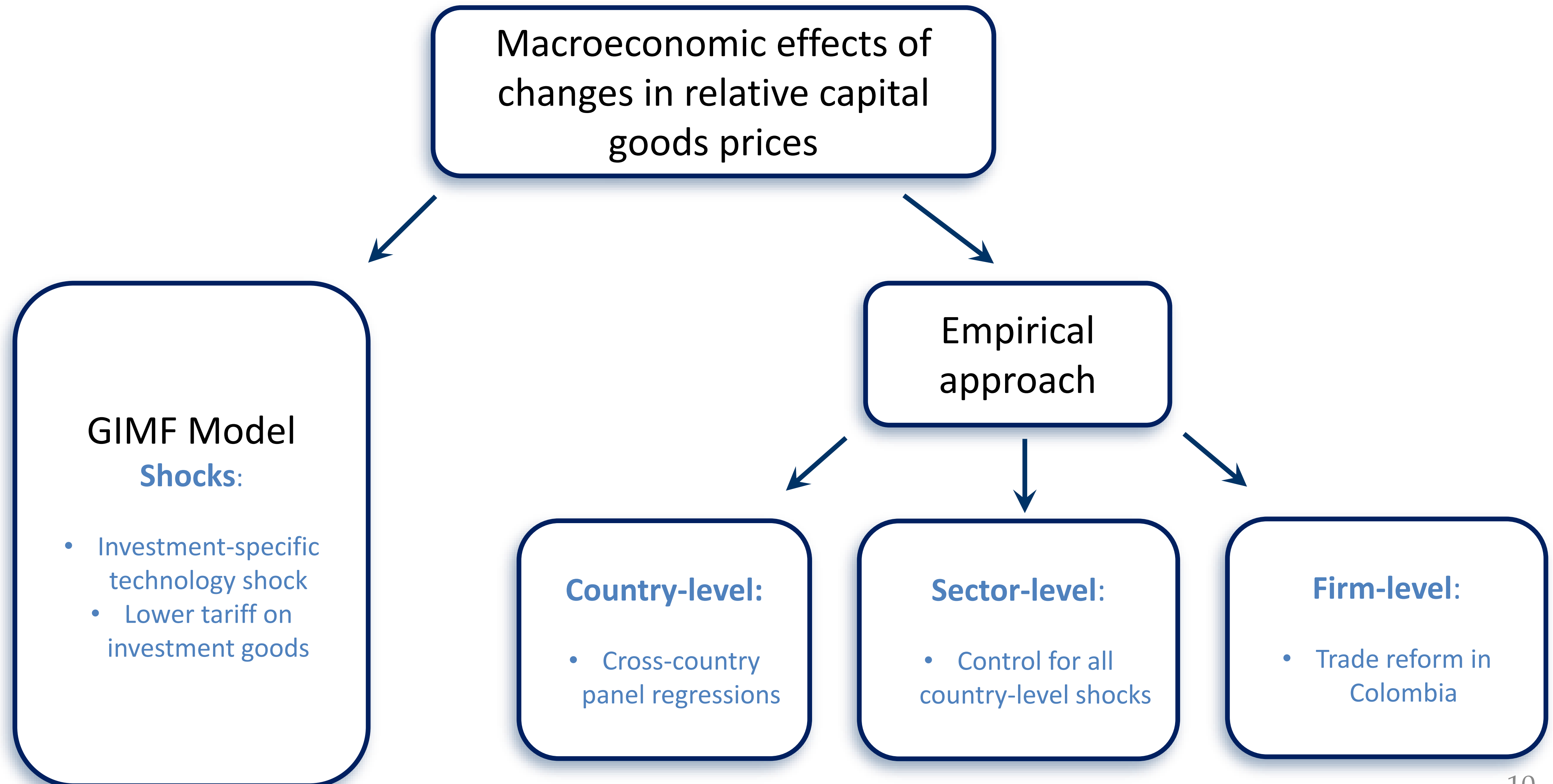


Source: IMF staff calculations.

Note: The figure combines the estimated elasticities of producer prices to trade integration and relative labor productivity, and changes in these factors for the capital goods sector between 2000 and 2011 to compute their contribution to the observed change in the producer price of capital goods relative to the price of consumption.



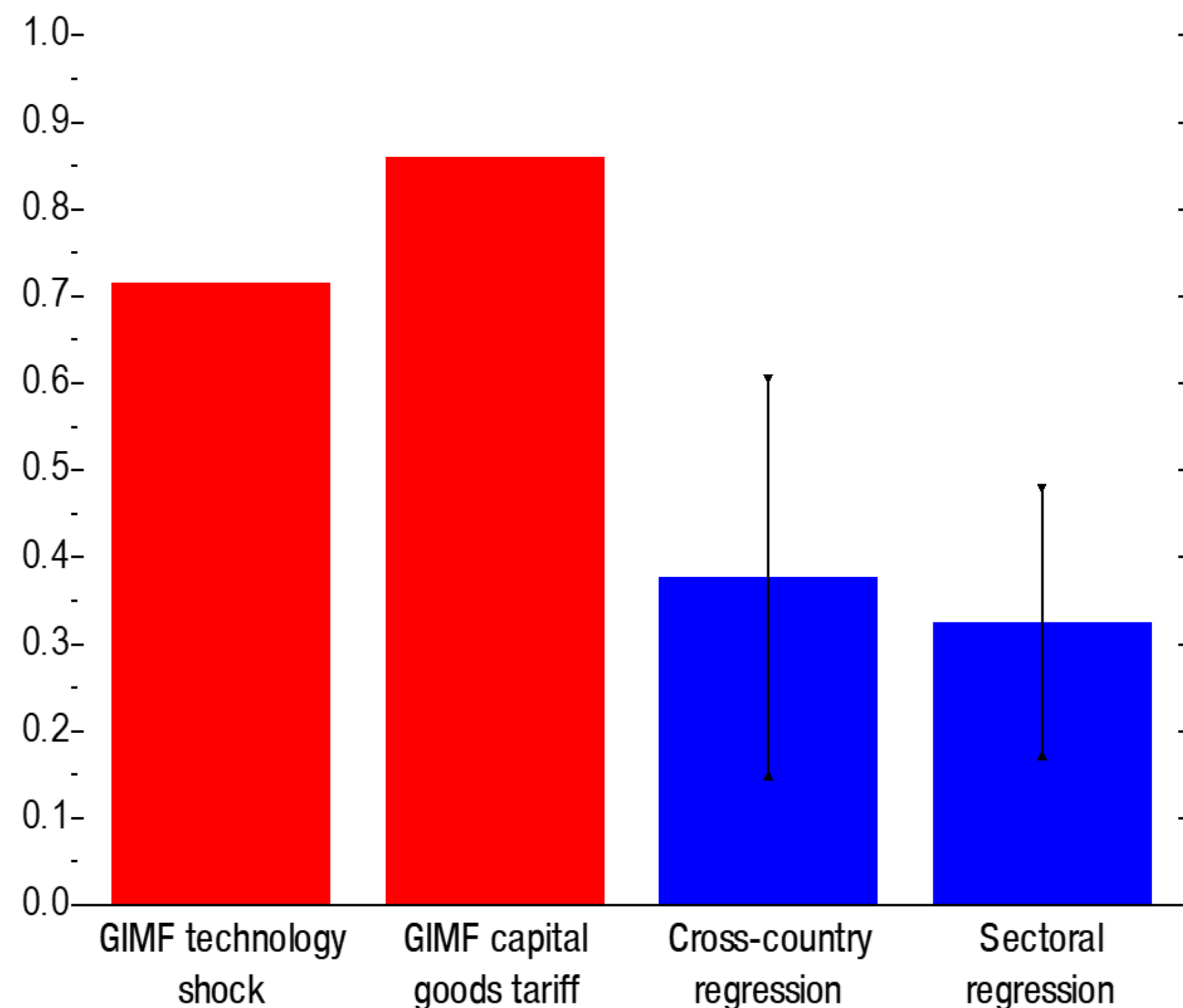
# Analysis to examine macro implications





# Relative prices are an important driver of real investment rates

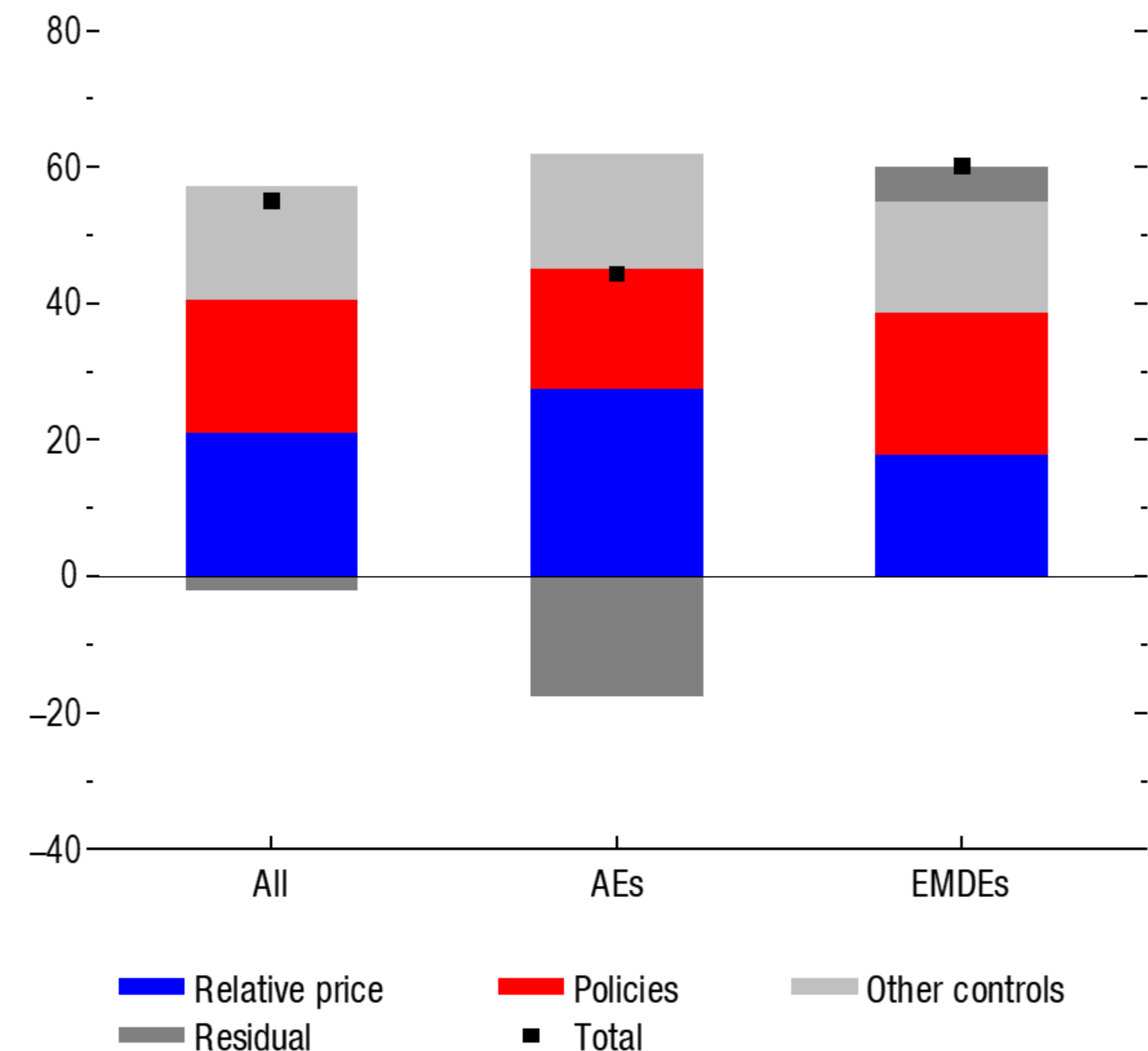
**Increase in real investment rate associated with one percent decline in the relative price of capital goods (Percent)**



Source: IMF staff calculations.

Note: The bars depict the simulated/estimated elasticity of the real investment-to-GDP to the price of capital goods relative to the price of consumption.

**Average contributions to changes in M&E investment rates from 1990-94 to 2010-14 (Percent)**



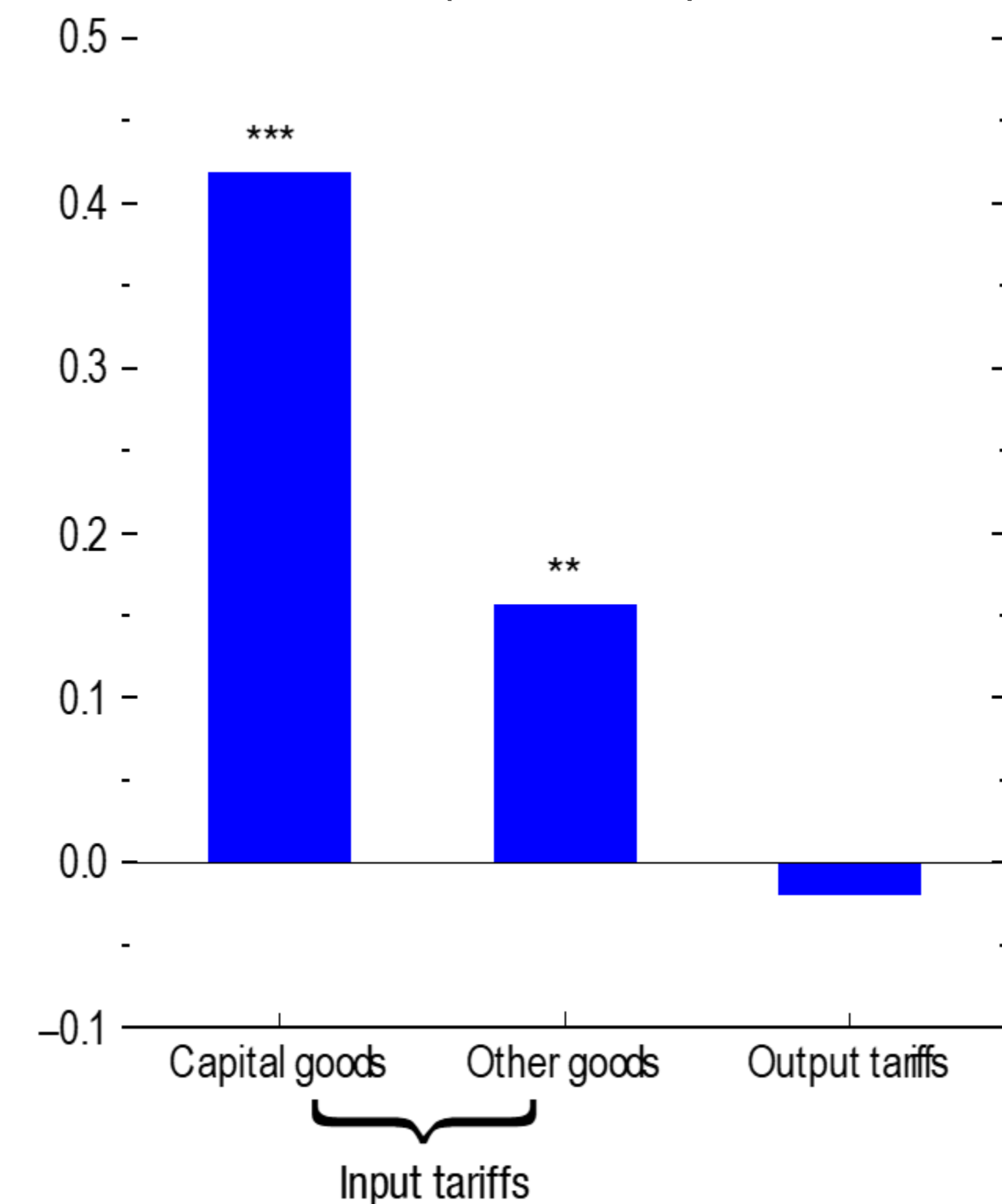
Source: IMF staff calculations.



# Capital Goods Tariffs and Investment: Firm-Level Evidence from Colombia

- Tariff reform in Colombia 2011 to study link between capital good tariffs and firm-level investment
- Differentiate between capital good input tariffs, other input tariffs and output tariffs
- Reduction in capital good input tariffs has a strong positive impact on investment

Effect on Investment from Cuts in Tariffs on  
Capital Goods Inputs, Other Inputs, and Output  
(Percent)



Sources: Meleshchuk and Timmer (2019); and IMF staff calculations.

Note: \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ . 12



# Summary and policy Implications

- The decline in the relative price of machinery and equipment was driven by rising trade integration and faster productivity growth in the capital goods producing sectors
- The declines in relative investment prices have provided an important boost to real investment rates over the past three decades
- Slowing trade integration and the possibility of its reversal could pose a threat to further declines in the relative price of capital goods and, hence, investment
  - Avoid trade barriers that could disrupt global supply chains and limit the spread of knowledge across borders
  - Support innovation that can fuel productivity gains in the capital goods producing sector





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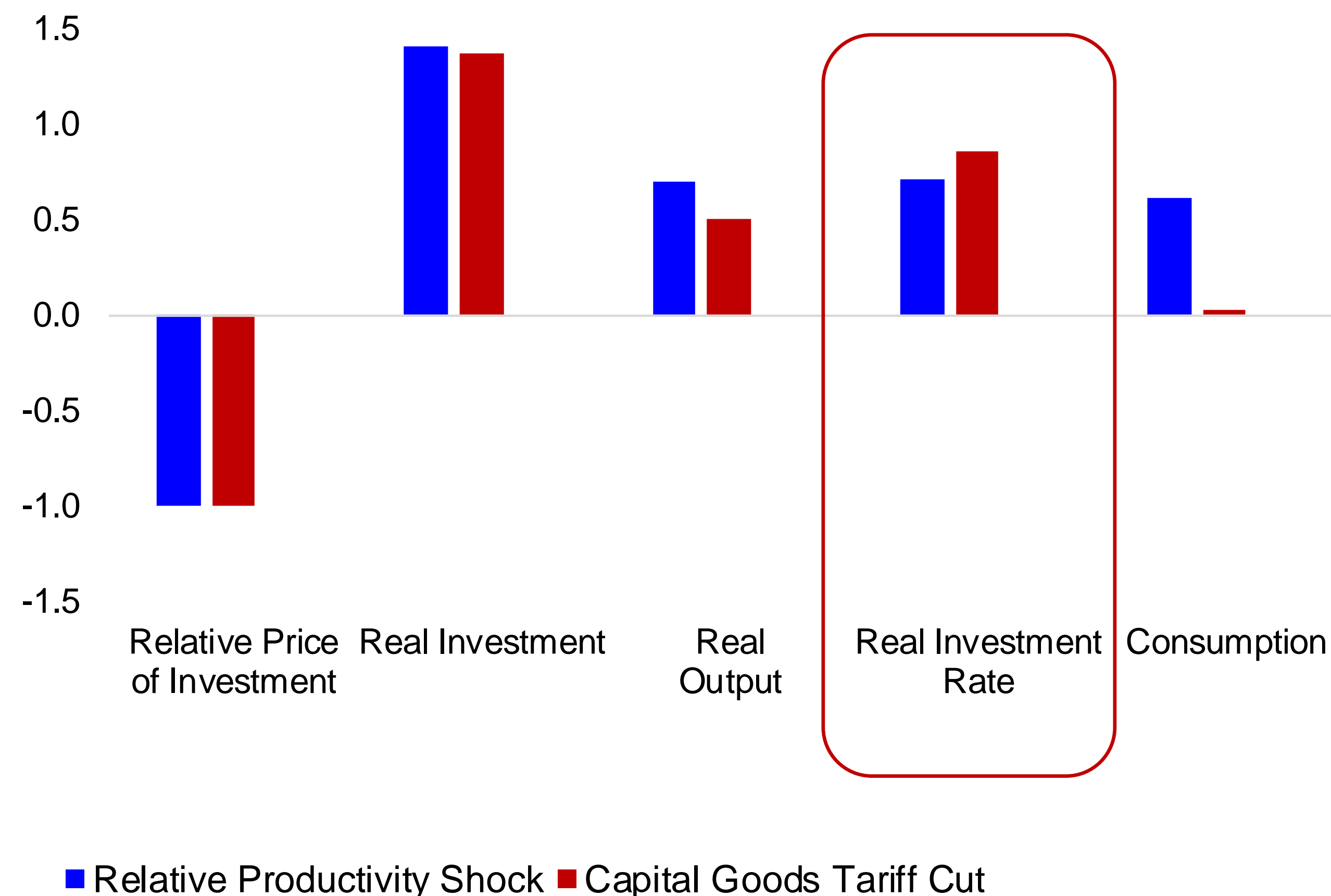


# ANNEX



# Lower relative price of capital goods stimulates investment based on the GIMF model

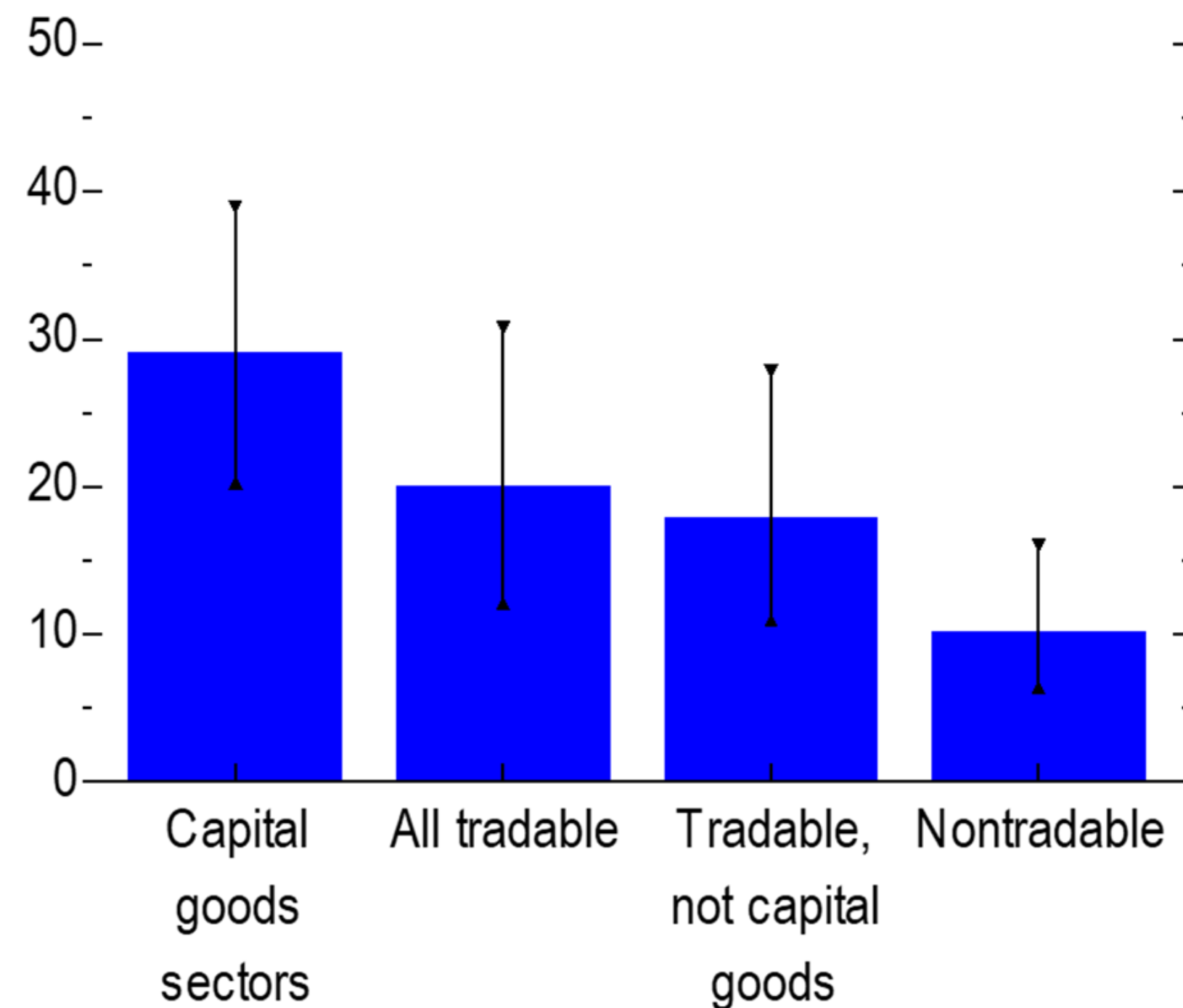
Simulations from Global Integrated Monetary and Fiscal Model  
(percent, deviation from the original steady state, year 10)





# Production of machinery and equipment is strongly embedded in global value chains

**Backward Participation in GVCs**  
*(Percent of exports, foreign value added)*



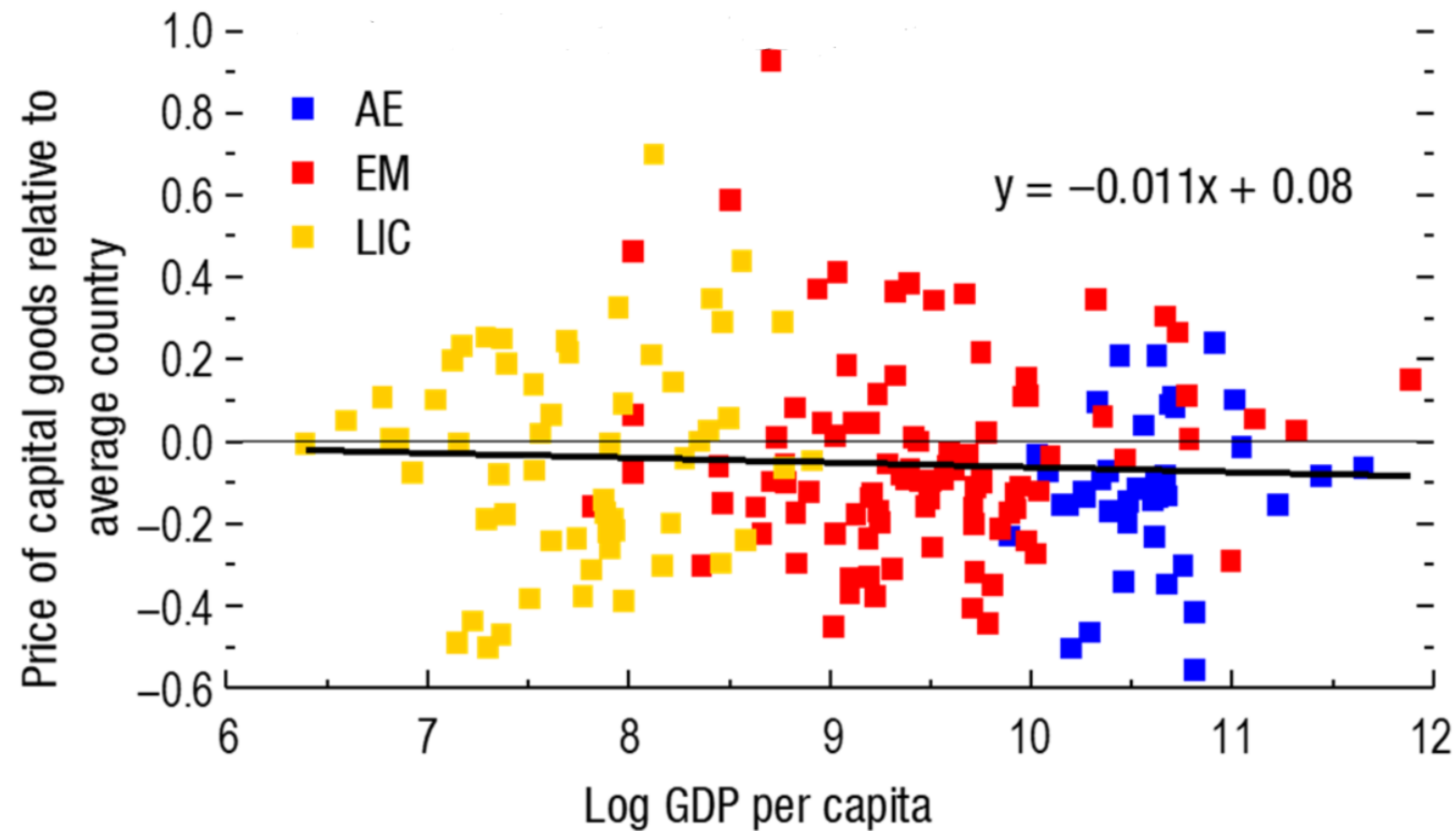
Sources: Eora MRIO database

Note: The figure depicts the median and interquartile range of the sector's backward global value chain participation (defined as the foreign value added in exports) across all economies in the Eora MRIO database deemed to have sufficient data quality at the sectoral level during 1995–2015.



# There is no evidence that EMDEs are charged higher prices by exporters

Index of prices of tradable capital goods charged by key exporters ( $P^*$ ) in 2011



Source: IMF staff calculations.





***WORLD ECONOMIC OUTLOOK:  
GROWTH SLOWDOWN, PRECARIOUS RECOVERY***

**April 2019**

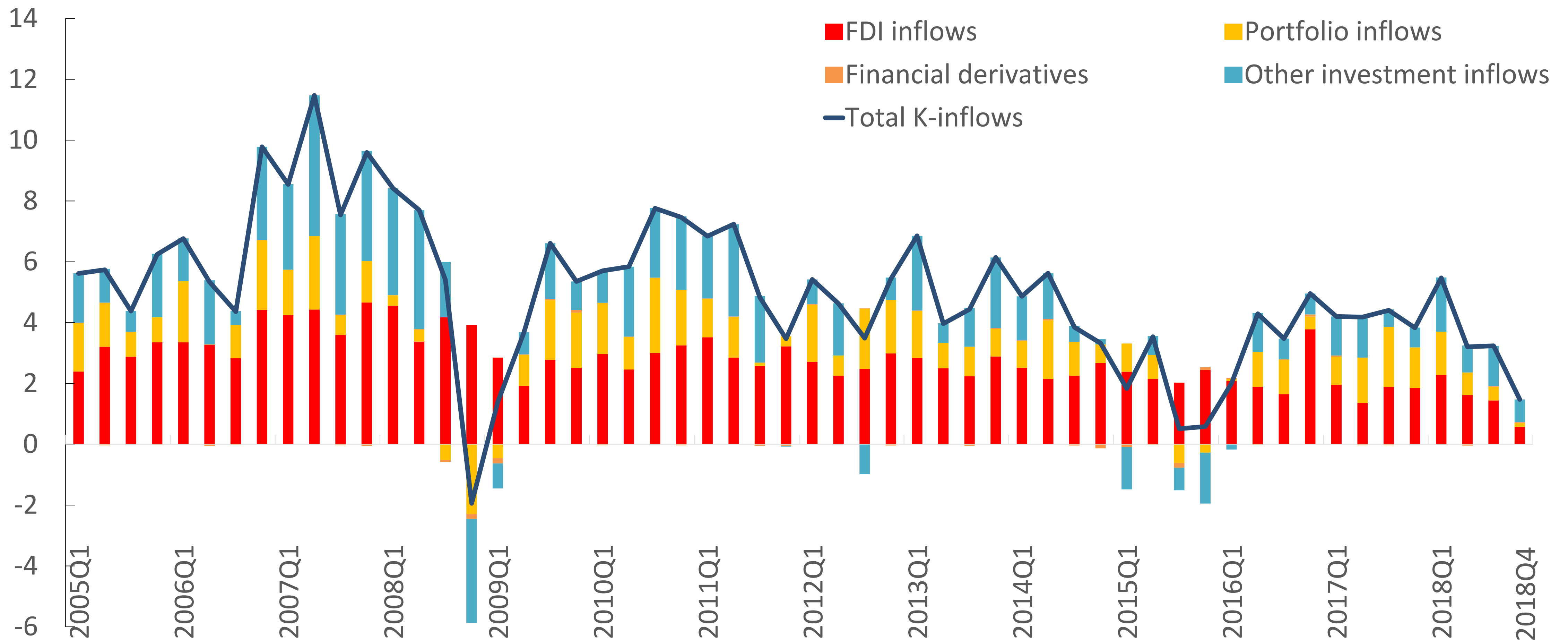
**International Monetary Fund**



...as capital flows to EMs, which had declined in 2018,...

## Capital Inflows to Emerging Market Economies

(percent of GDP)

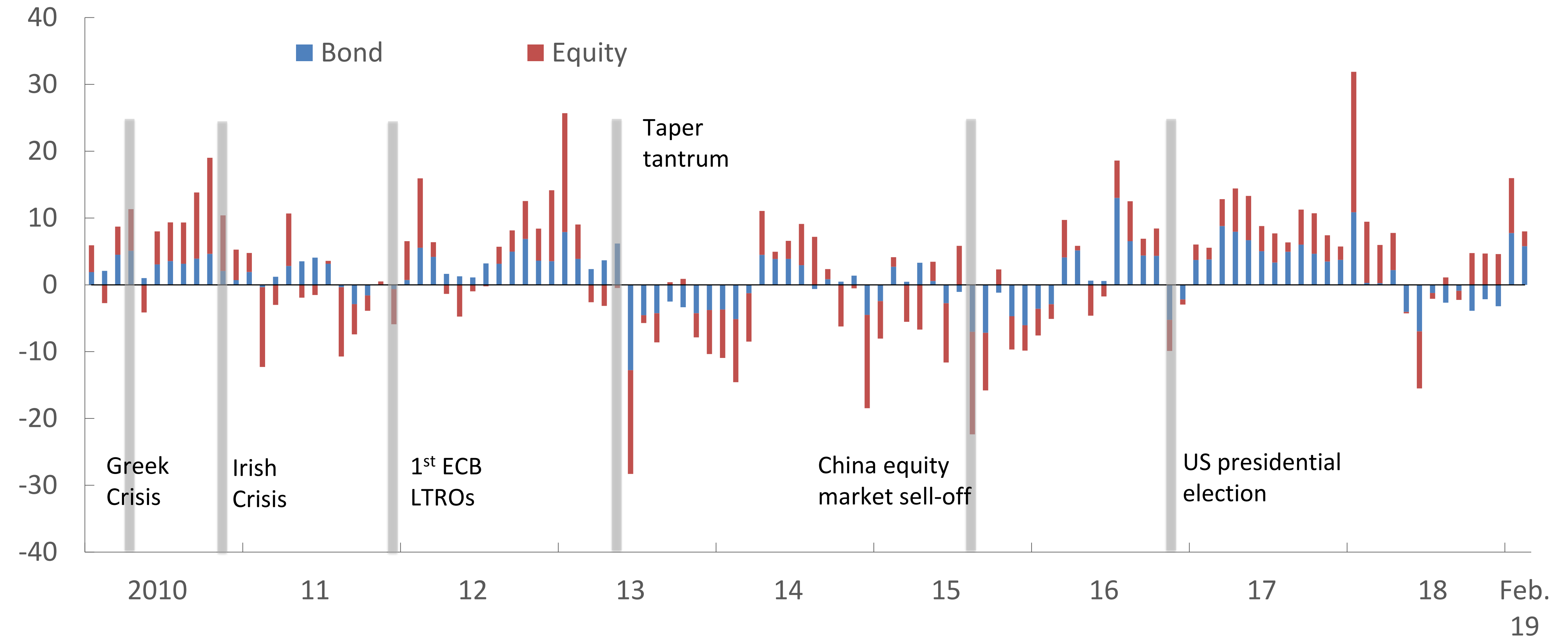




...appeared to recover since the start of the year

## Net Flows in Emerging Market Funds

(Billions of US dollars)

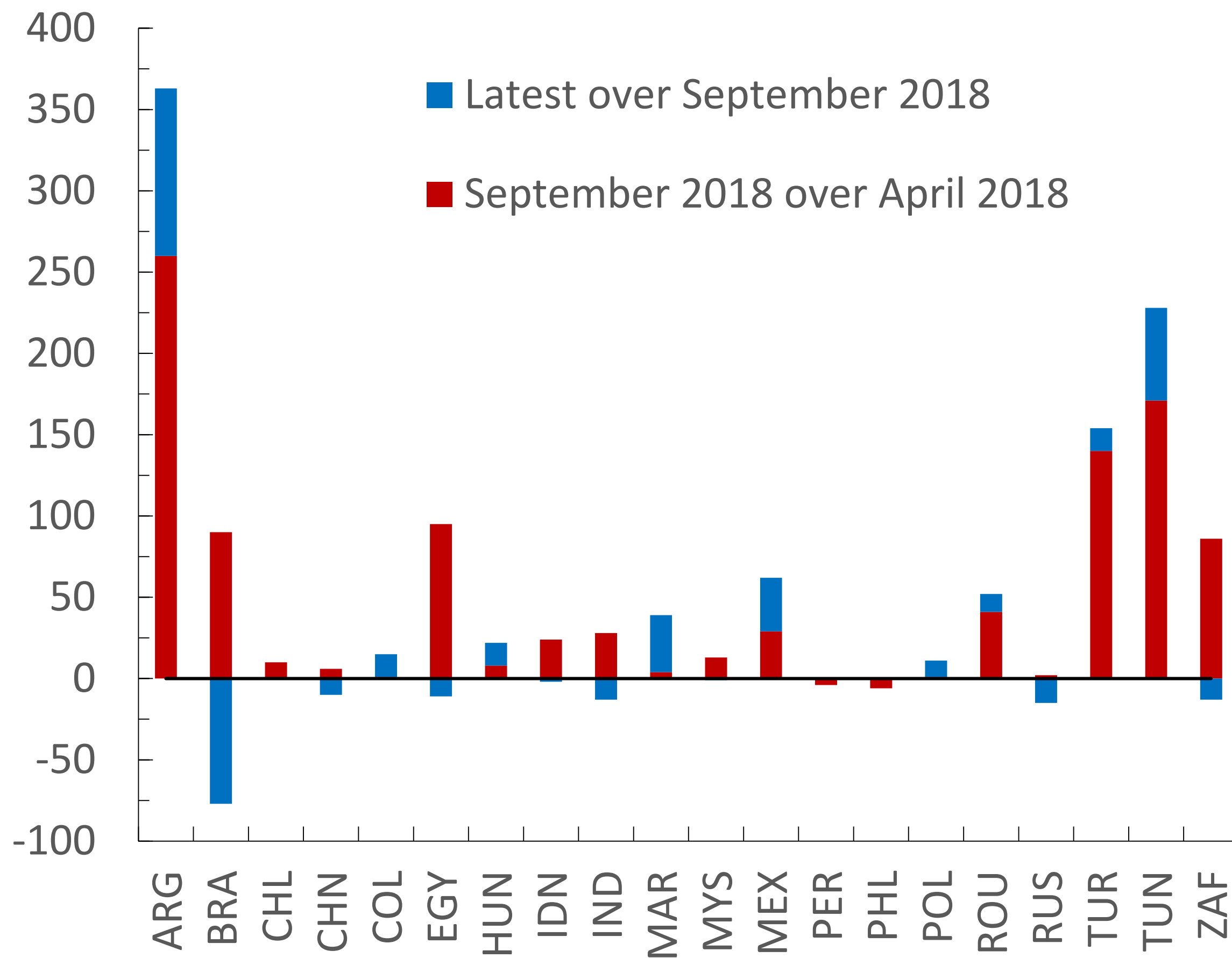




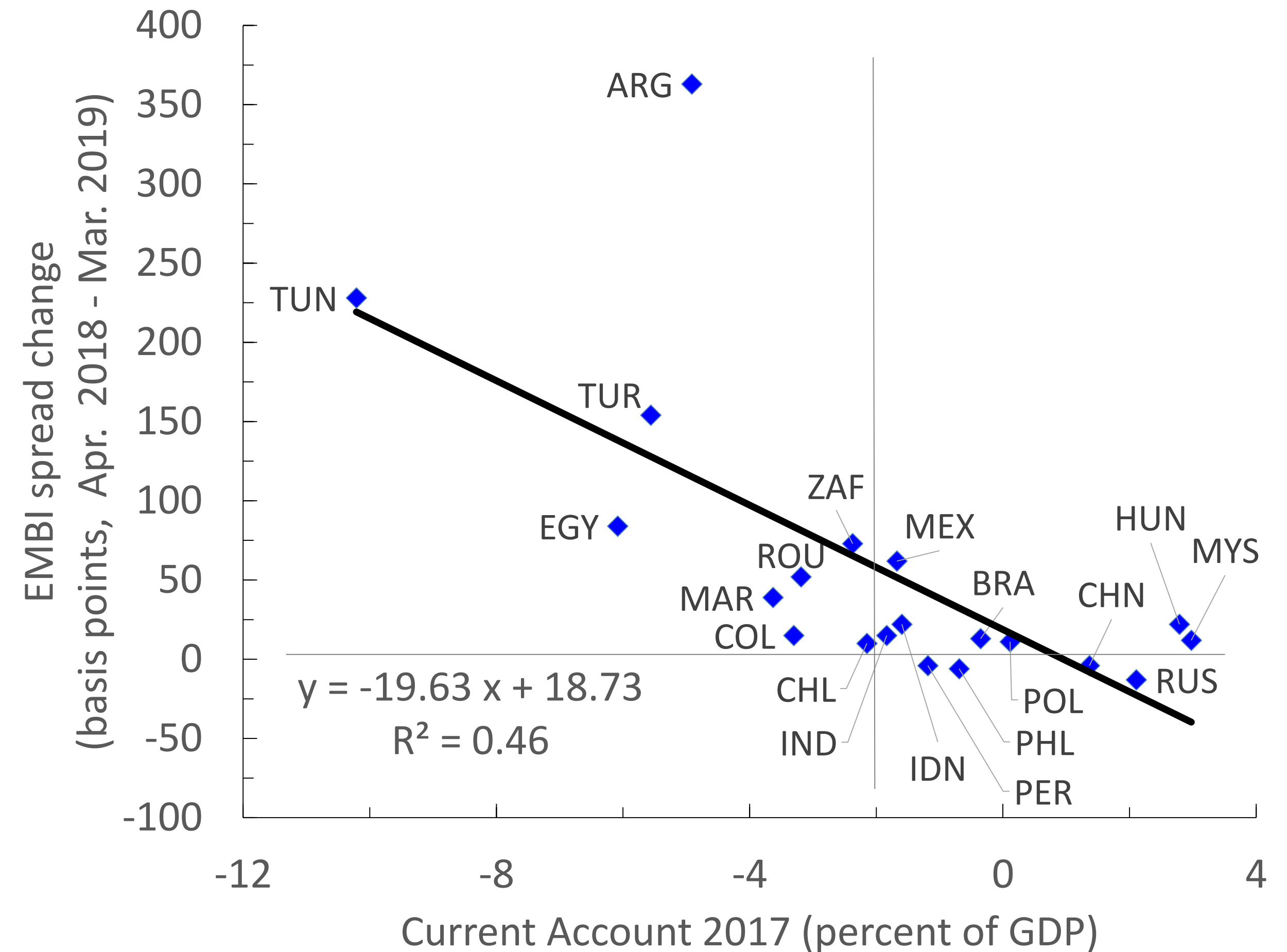
# More broadly, financial conditions for EMs are modestly more restrictive than in the fall; differentiation based on fundamentals

## Change in EMBI Spreads

(Basis points)

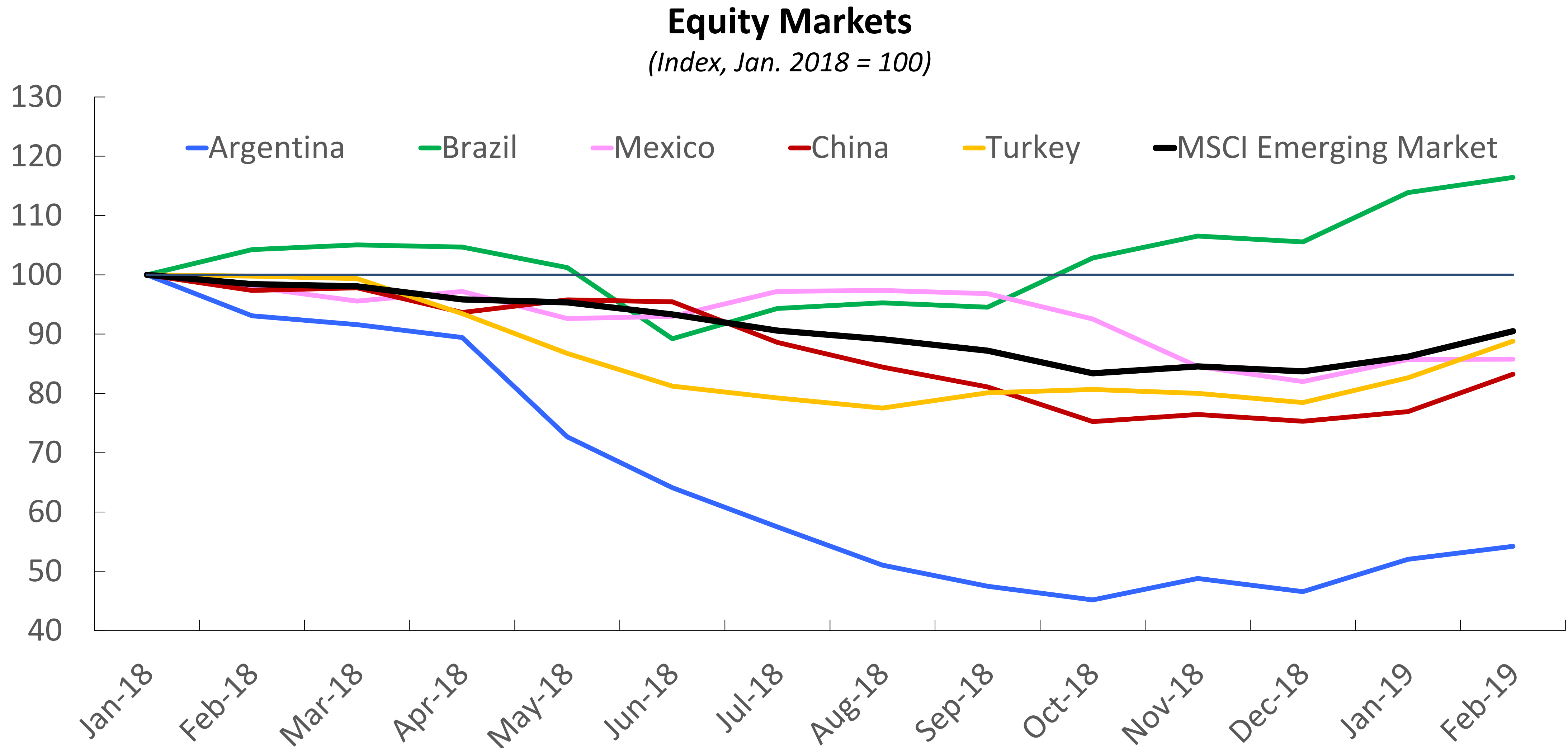


## Current Account Balance and Change in EMBI Spreads





# EM equities: recovered some of the ground lost in late 2018

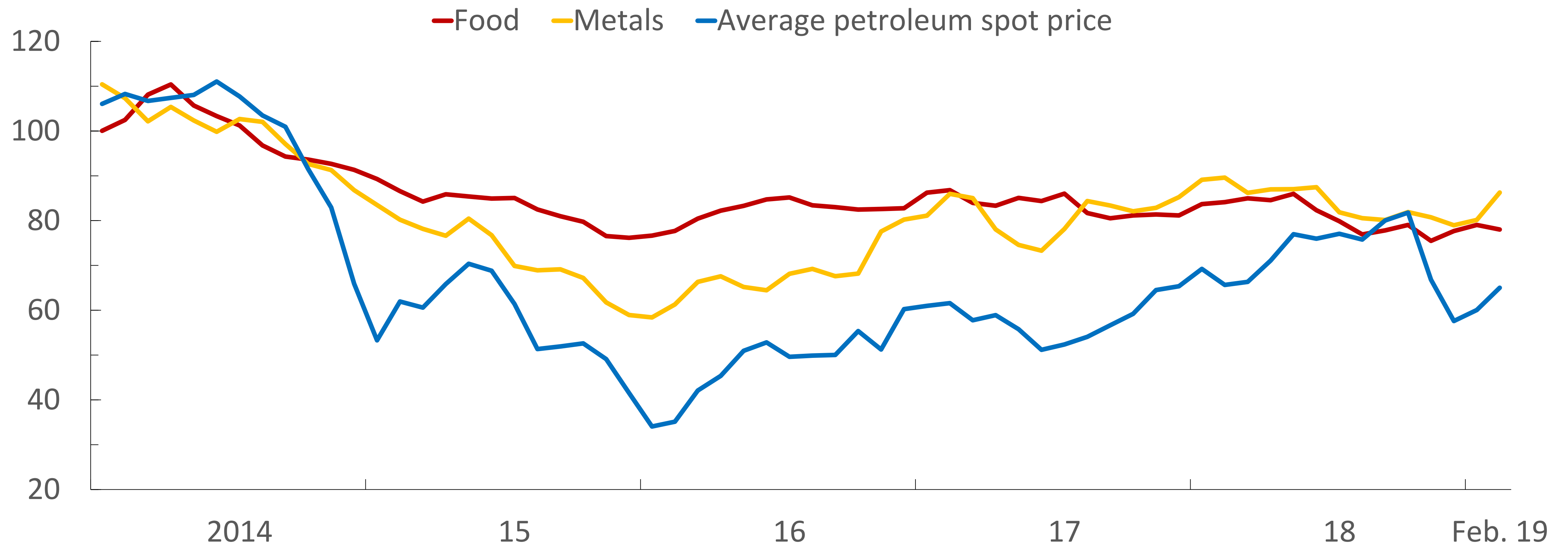




# Commodity prices: volatile in recent months

## Commodity Prices

*(Deflated using US consumer price index; 2014 = 100)*

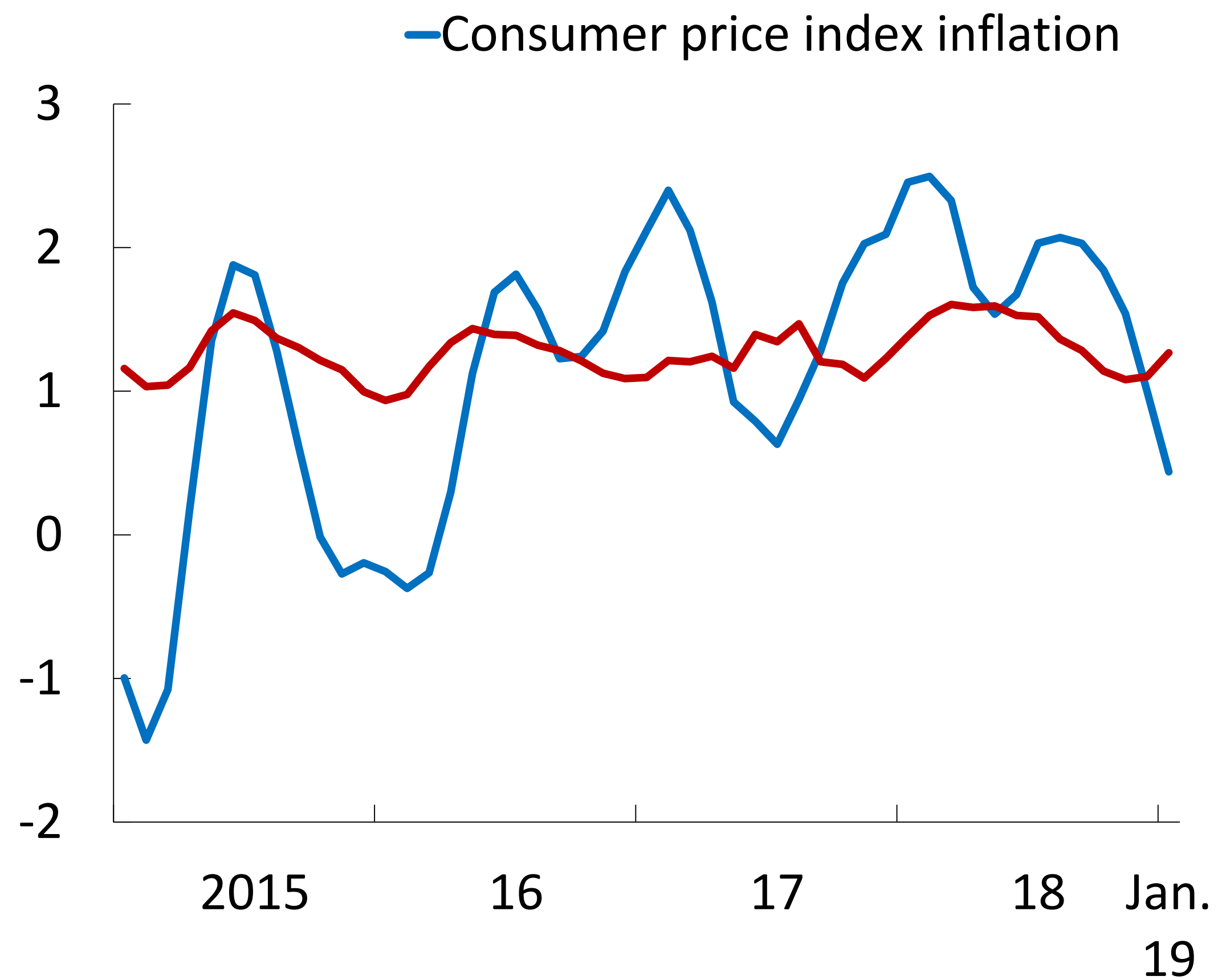




# Consumer price inflation: muted

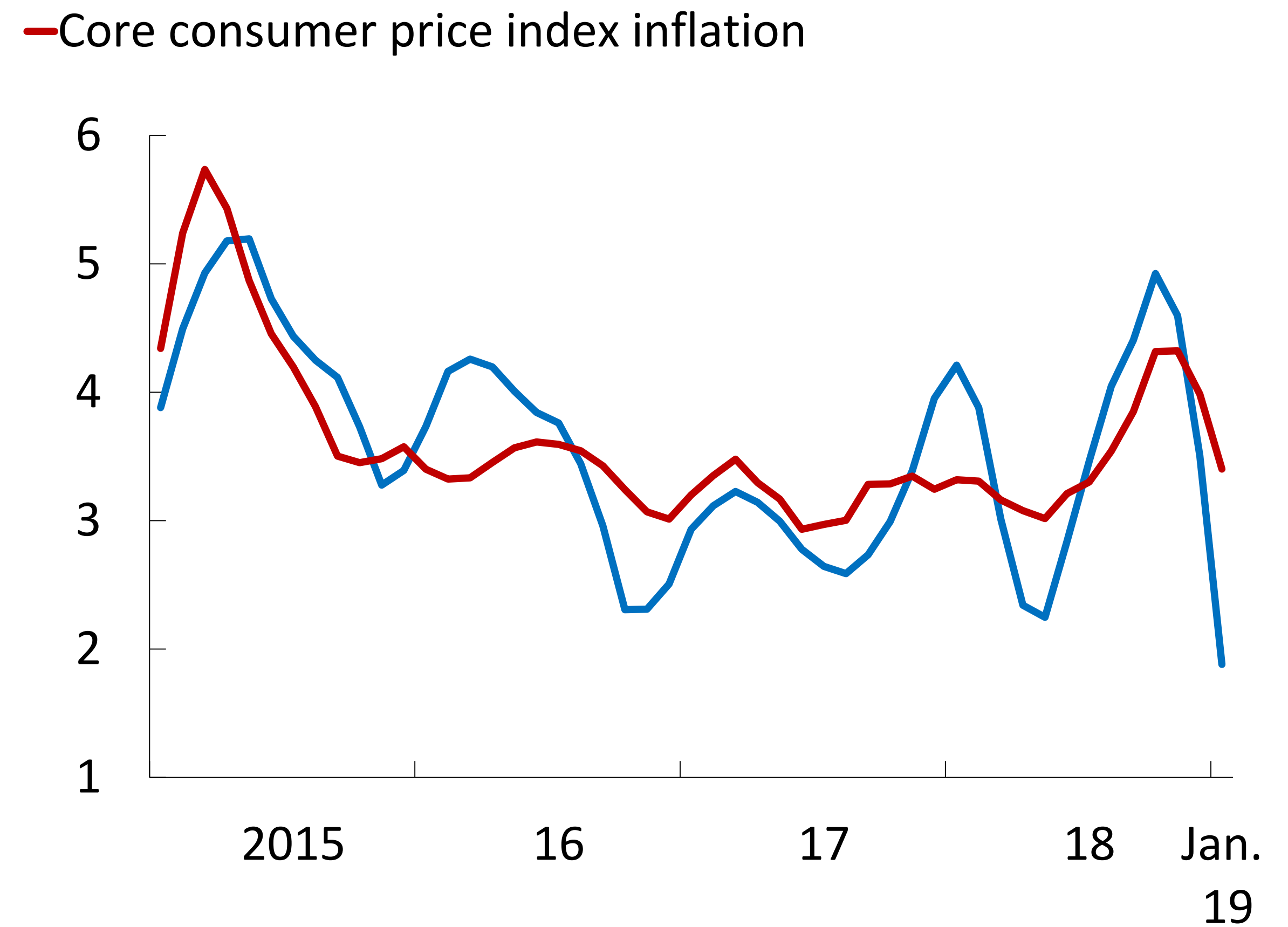
## Advanced Economies

*(Three-month moving average; annualized percent change)*



## Emerging Market and Developing Economies

*(Three-month moving average; annualized percent change)*

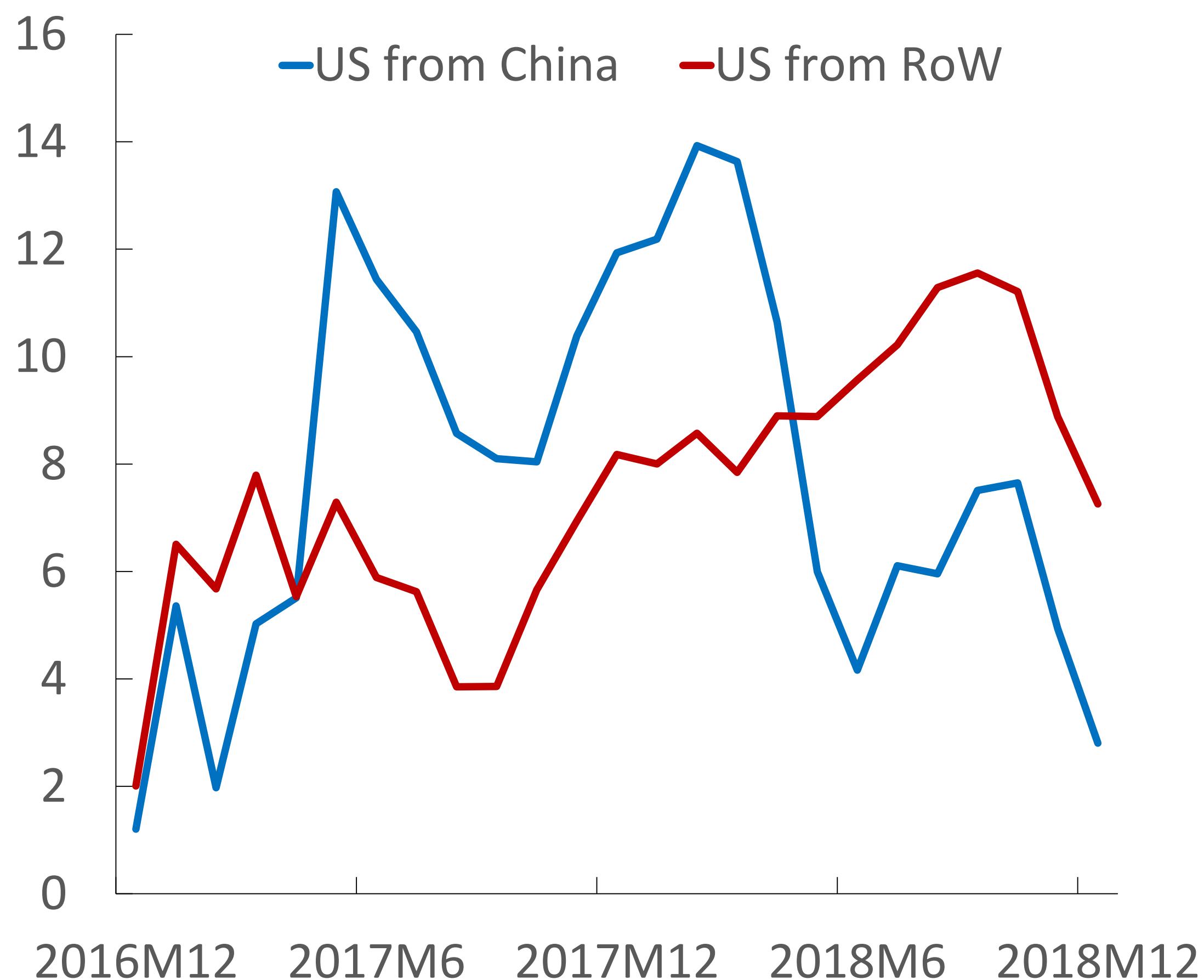




# Re-escalation of trade tensions could further drag activity, compounding effects of actions enacted in 2018

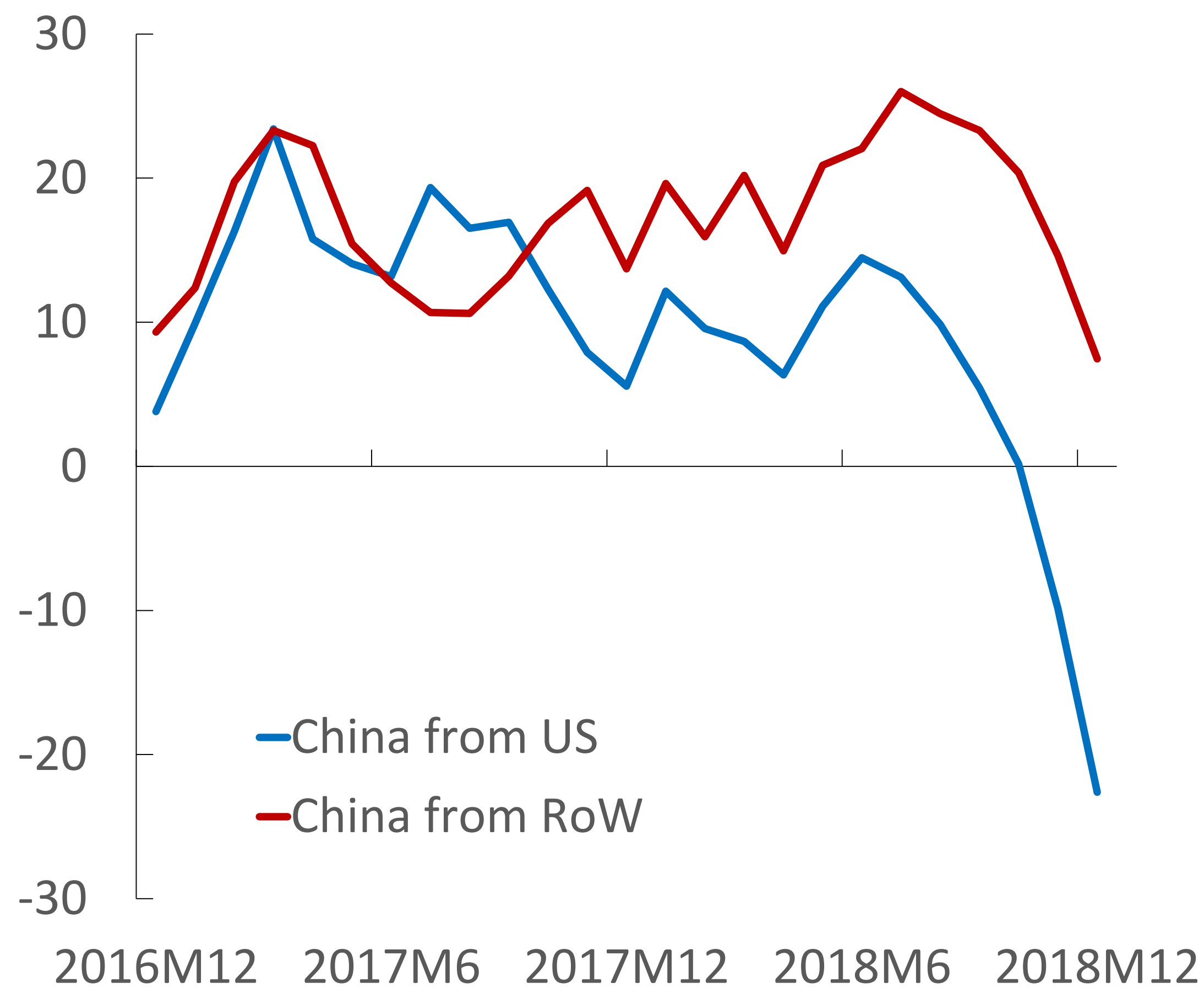
## China losing market share in US import basket

(US imports, 3mma, y/y percent change)



## US losing market share in China import basket

(China imports, 3mma, y/y percent change)

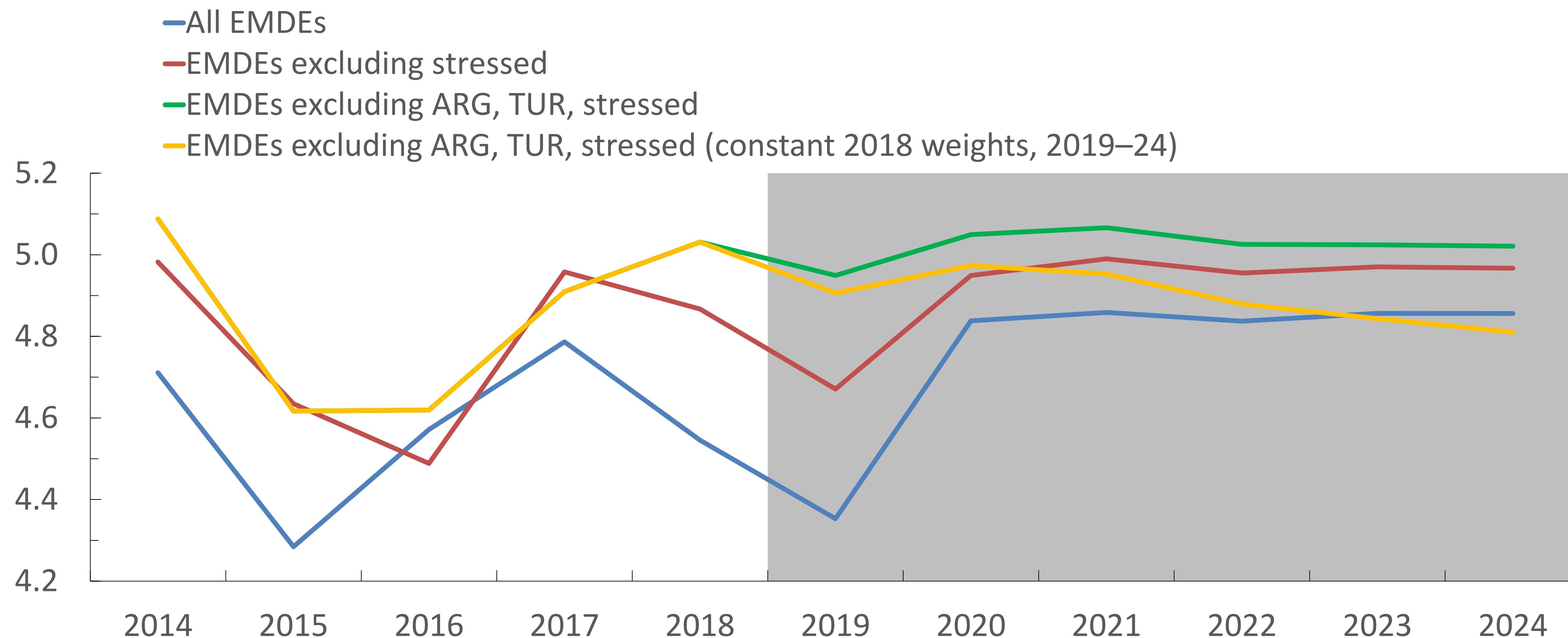




# More broadly, global growth pickup predicated on precarious recovery in EMDEs

## Growth Rate: Emerging market and Developing Economies

(Percent)

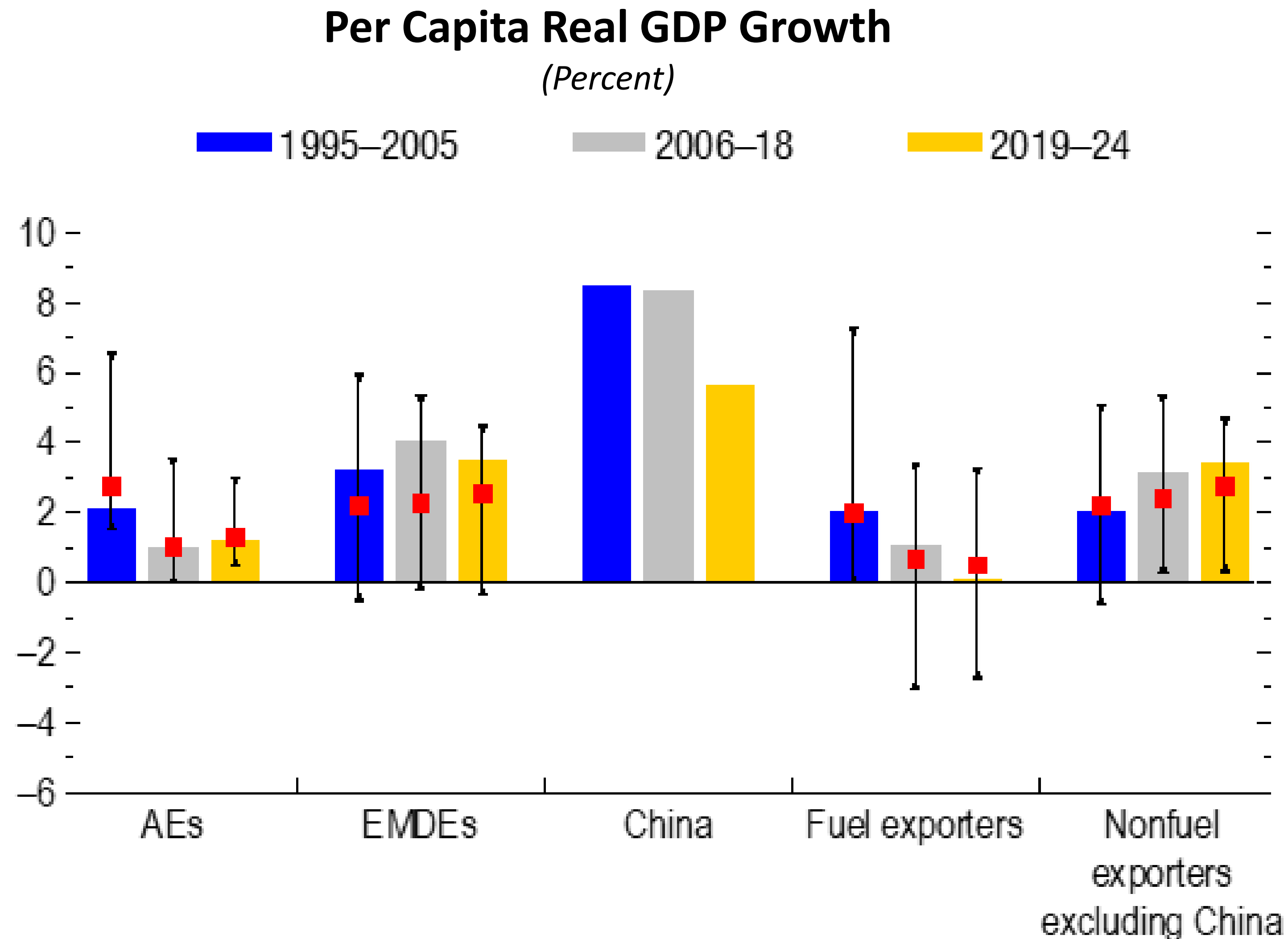


Source: IMF staff calculations.

Note: EMDEs = emerging market and developing economies; stressed = IRN, IRQ, LBY, SDN, SSD, UKR, VEN, YEM.



# Interrelated risks compound a difficult medium-term outlook, where convergence prospects already appear limited for several EMDEs...

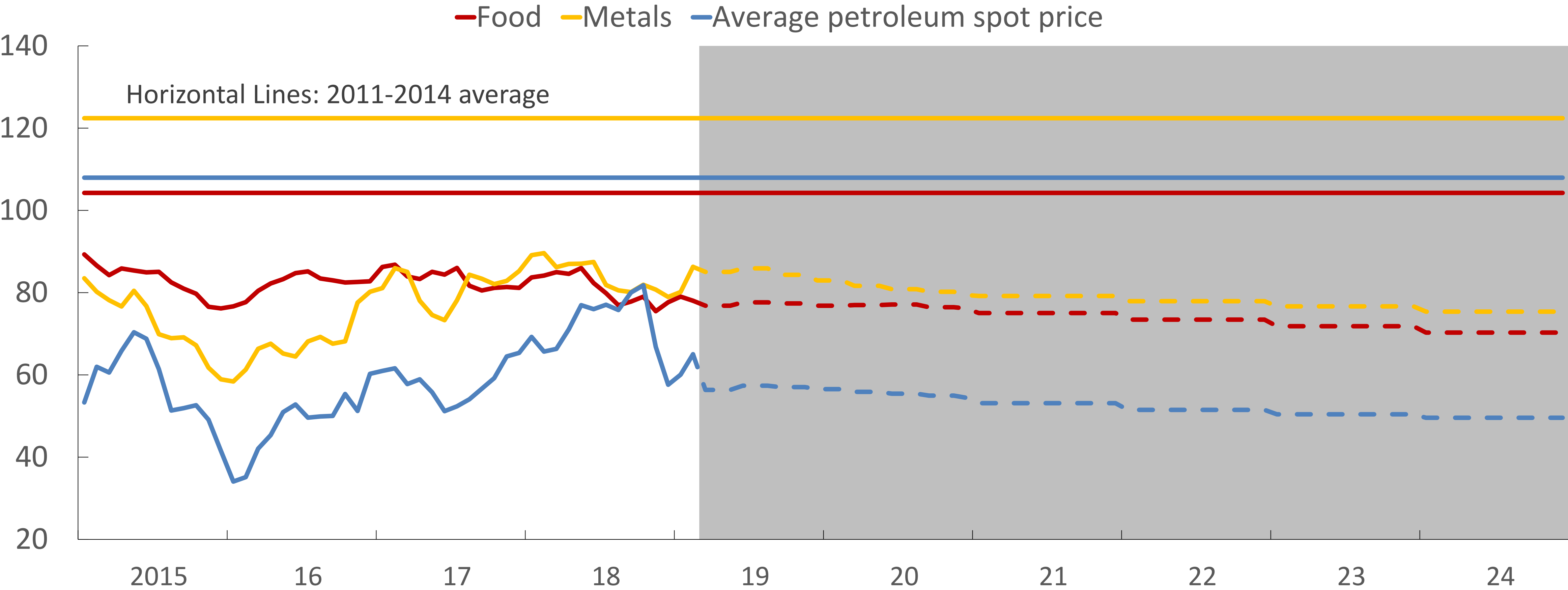




...in particular for commodity exporters, with prices expected to settle at levels well below past averages

Commodity and Oil Prices

(deflated using US consumer price index; index, 2014 = 100)



Sources: IMF, Primary Commodity Price System; and IMF staff estimates.



...contributing to a reversal of the late-2018 appreciation of the dollar and a general strengthening of EM currencies...

## Real Effective Exchange Rate Changes

(percent)

■ Latest over December 2018

■ December 2018 over September 2018

