How Important are Spillovers from Major Emerging Markets?

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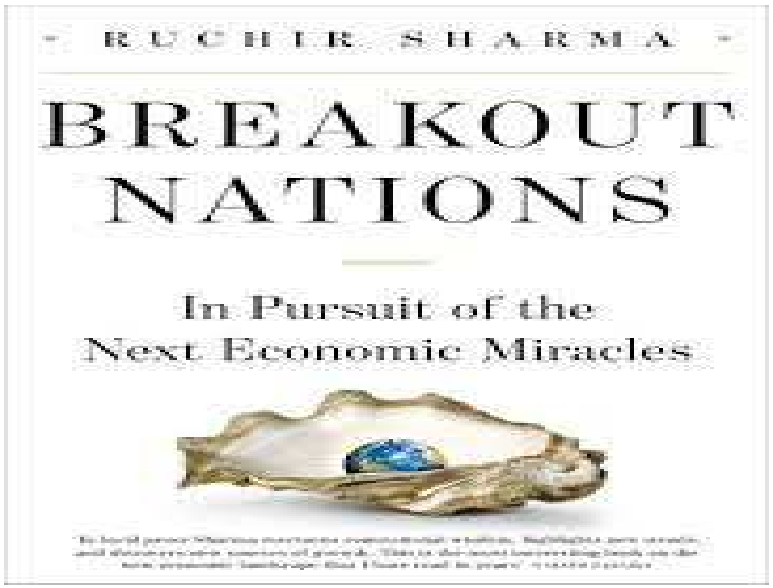
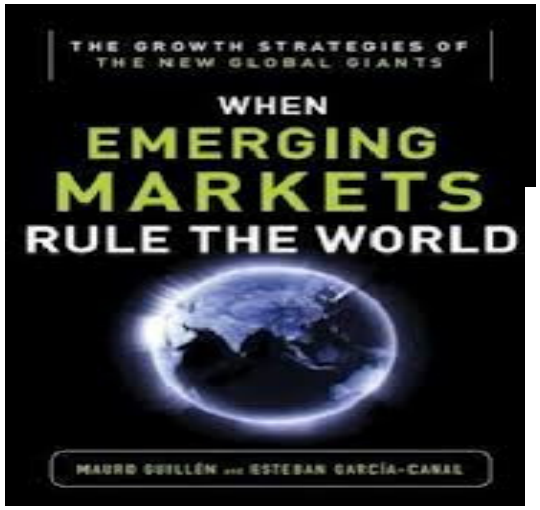
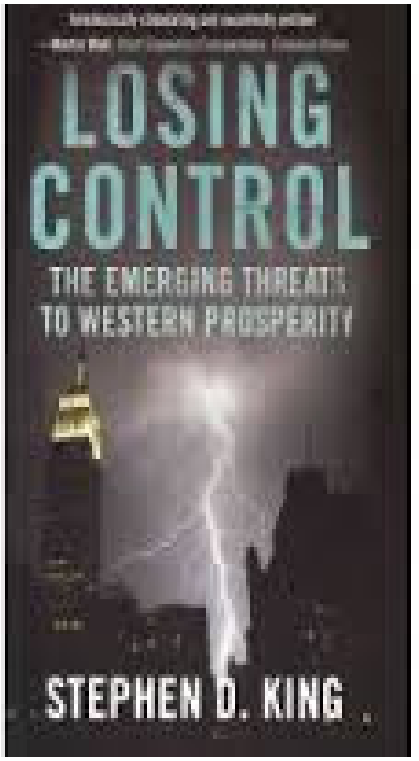
Few Years Back: Emerging Markets in Fashion







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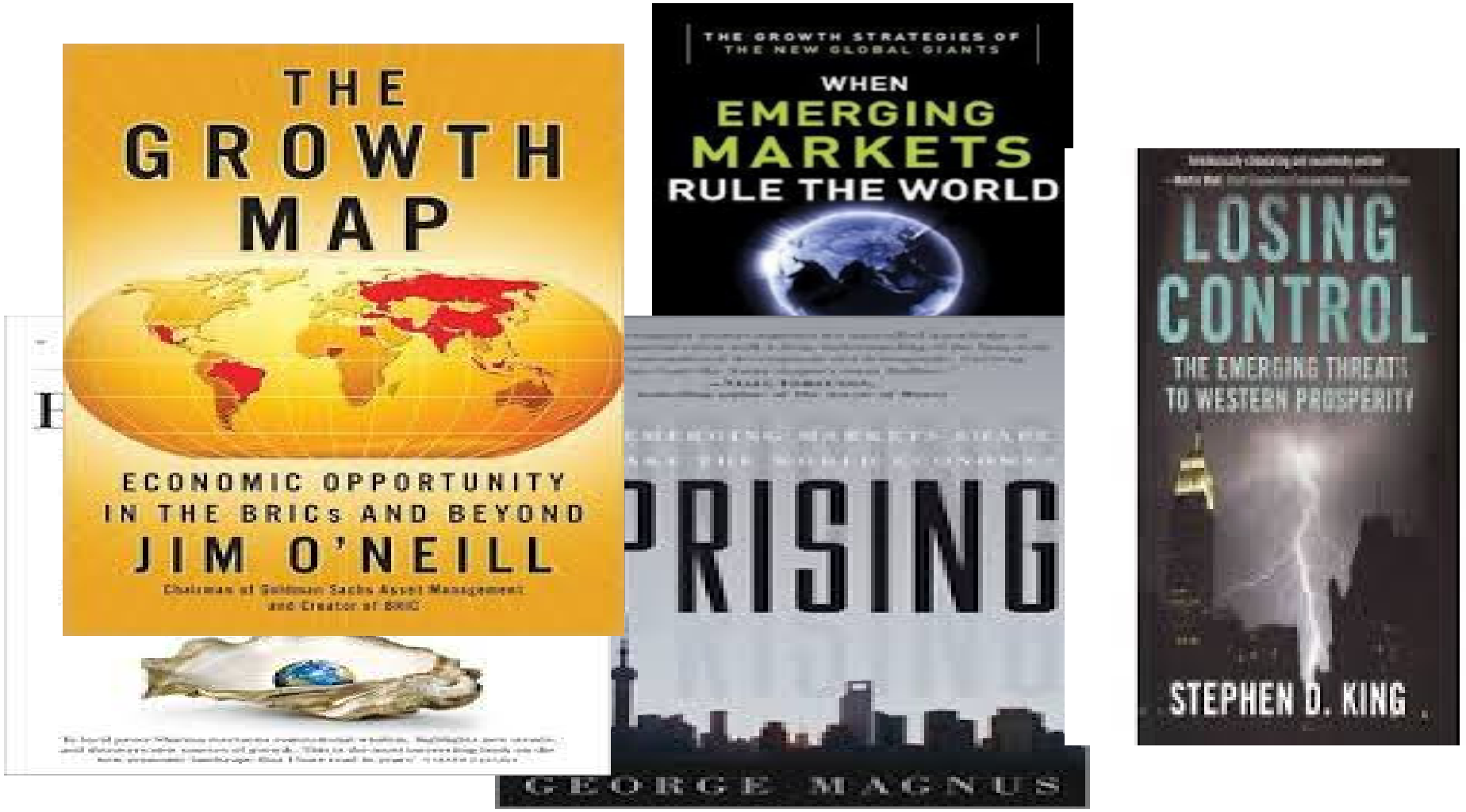

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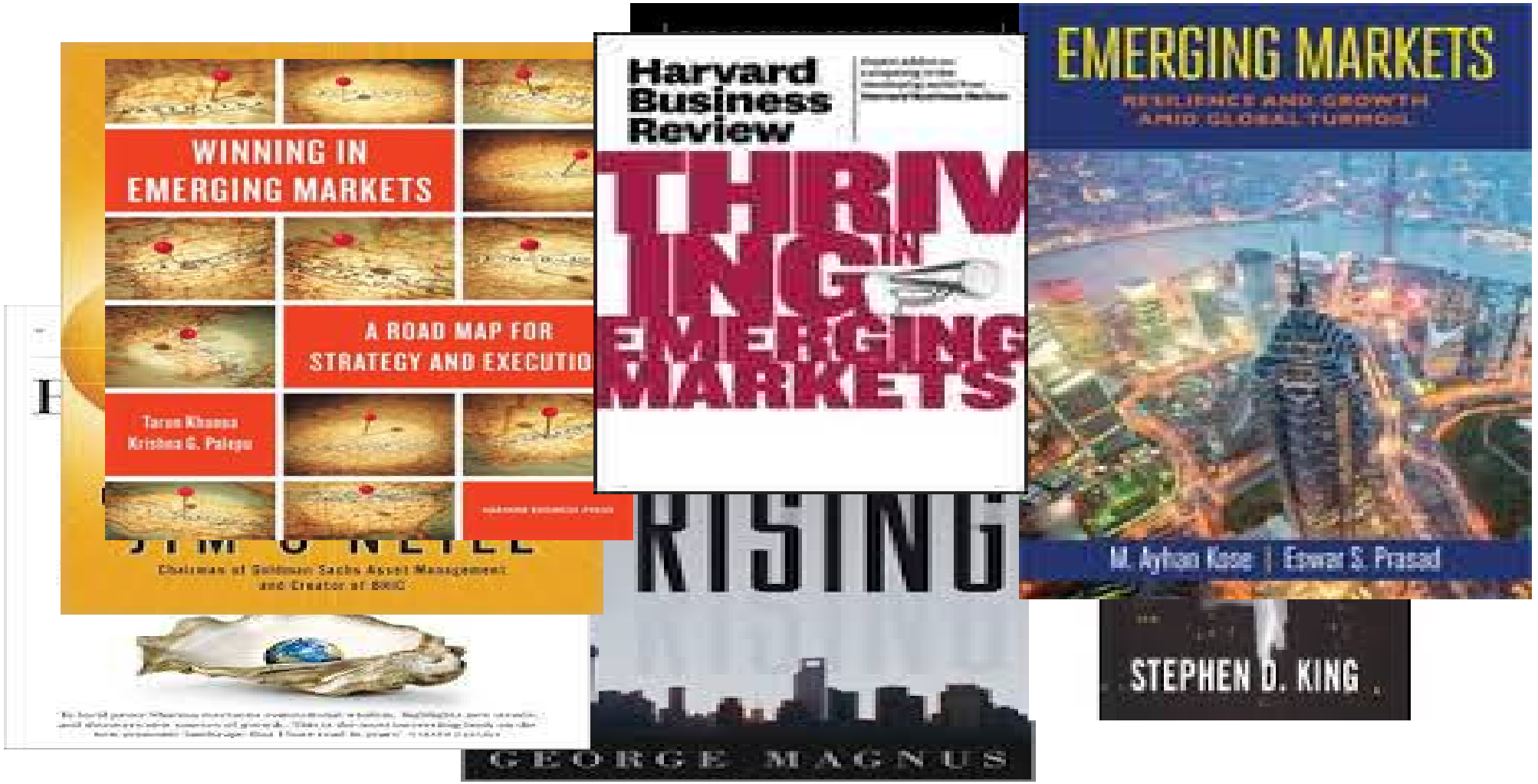
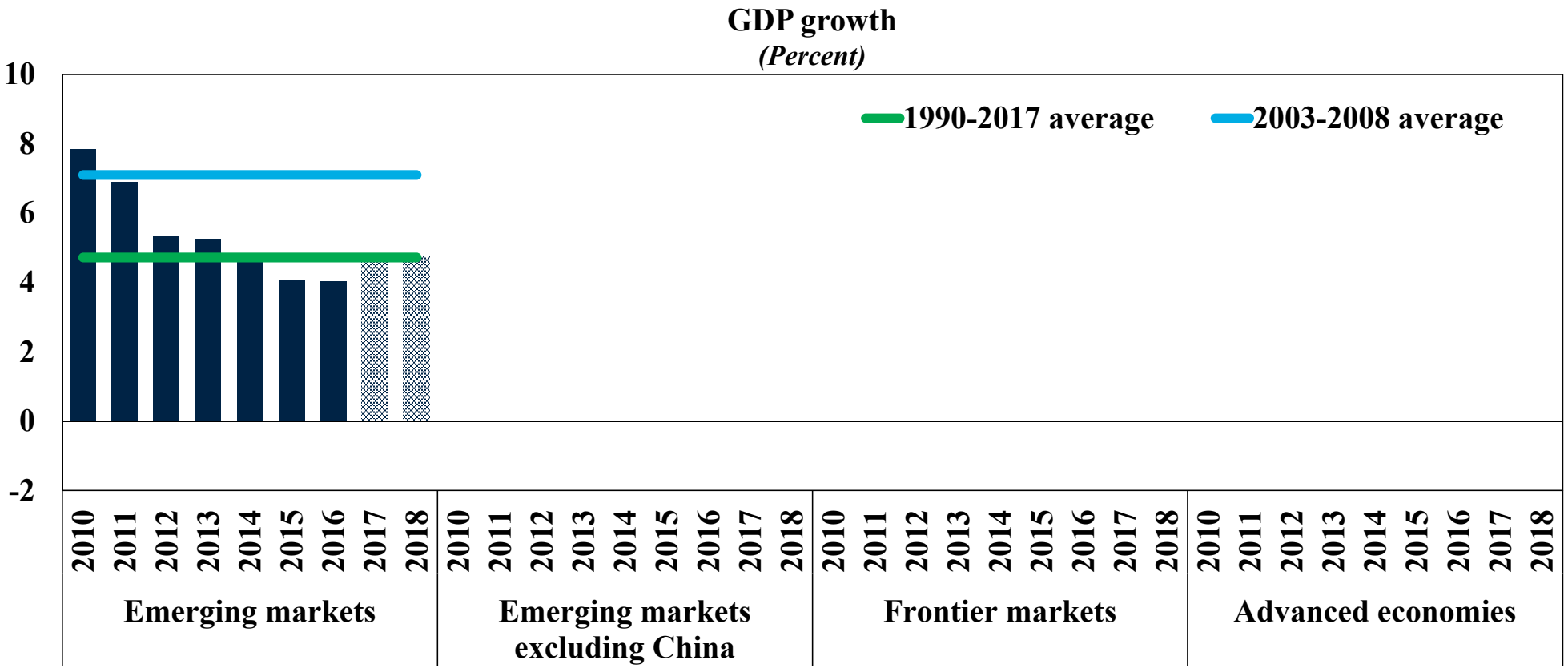


Growth in Emerging Markets:
On the Rise again but after Synchronous Slowdown since 2010



Source: World Bank.
Note: Weighted average growth.

Growth in Emerging Markets:
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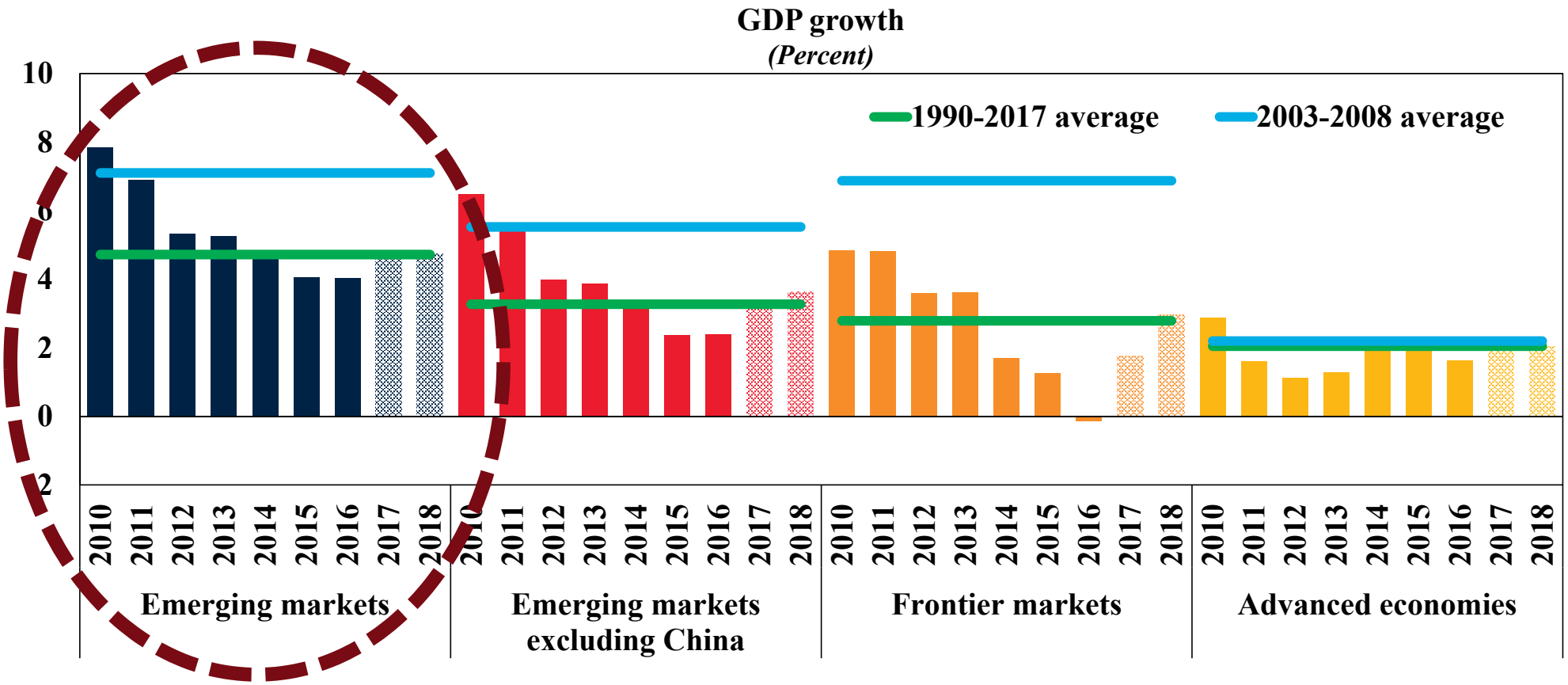

Source: World Bank.
Note: Weighted average growth.

Growth in Emerging Markets After a Golden Era:
How Large are Spillovers from Major Emerging Markets?

- *IMF: Emerging markets slowdown has pushed global economy to edge of recession.* ***City AM, October 2015***

- *It is clear that a slowdown in China will affect the global economy.*
  Raghu Rajan, May 2016

- *World Bank: The global economy is increasingly vulnerable to a sharp slowdown as troubles in emerging markets mount…* ***The WSJ, June 2016***

Road Map: Four Questions

1. Who are the major emerging markets? *EM7 (seven largest emerging market economies) play an important role in the global economy*

2. What is a simple approach to measuring spillovers from EM7? *A Bayesian VAR model; identification motivated by the standard small open economy model; quarterly data*

3. How large are growth spillovers from EM7? *Significant (0.9 ppt decline in EFM and 0.6 ppt decline in global growth); Smaller than spillovers from advanced economies (up to 3 times)*

4. How large are growth spillovers from individual EM7?
China has the largest spillovers

Country Classification - 1

Advanced markets (AM, 27)						Emerging markets (EM, 23)				
G7		Other advanced markets								
Canada*	Japan*	Australia	Hong Kong SAR, China	Netherlands	Sweden					
France*	United Kingdom*	Austria	Iceland	Norway	Switzerland					
Germany*	United States*	Belgium	Ireland	New Zealand						
Italy*		Denmark	Korea, Rep.	Portugal						
		Finland	Luxembourg	Singapore						
		Greece	Malta	Spain						

Frontier markets (FM, 40)									

Note: The table shows the list of countries and their classification. Emerging markets (EM) include economies that currently are, or have been for most of their recent history, middle-income countries with a long established record of access to international financial markets. Frontier markets (FM) include economies that are usually smaller and less developed than EM and, in the view of investors, considerably riskier (although economies undergoing extreme economic or political instability are excluded). Technically, the EM and FM classification in this paper consolidates the ones independently developed by FTSE and S&P. The advanced markets (AM) category follows the IMF classification. Countries with an asterisk are the ones included in the model estimation. G7 and EM7 represent the major AM and EM economies respectively.

Country Classification - 2

Advanced markets (AM, 27)						Emerging markets (FM, 23)				
						EM7		Other emerging markets		
						Brazil*	Mexico*	Chile*	Morocco	Saudi Arabia
						China*	Russia*	Colombia	Pakistan	South Africa*
						India*	Turkey*	Czech Republic*	Peru*	Thailand*
						Indonesia*		Egypt	Philippines*	United Arab Emirates
								Hungary*	Poland*	
								Malaysia*	Qatar	

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Country Classification - 3

Frontier markets (FM, 40)									
Argentina	Bolivia	Cote d'Ivoire	Gabon	Honduras	Kenya	Mongolia	Panama	Serbia	Uruguay
Azerbaijan	Botswana	Croatia*	Georgia	Jamaica	Kuwait	Namibia	Paraguay*	Sri Lanka	Venezuela
Bahrain	Bulgaria*	Ecuador	Ghana	Jordan*	Lebanon	Nigeria	Romania*	Tunisia	Vietnam
Bangladesh	Costa Rica*	El Salvador	Guatemala	Kazakhstan	Mauritius	Oman	Senegal	Ukraine	Zambia

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France*	**United Kingdom***	Austria	Iceland	Norway	Switzerland	**China***	**Russia***	Colombia	Pakistan	**South Africa***
Germany*	**United States***	Belgium	Ireland	New Zealand		**India***	**Turkey***	**Czech Republic***	**Peru***	**Thailand***
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Major Emerging Economies - EM7:
Thinking Beyond G7

- **G7:** Group of Seven major advanced market economies (AM)
- **EM7:** Group of Seven major emerging market economies (EM)
- **EFM:** Emerging and Frontier Market economies

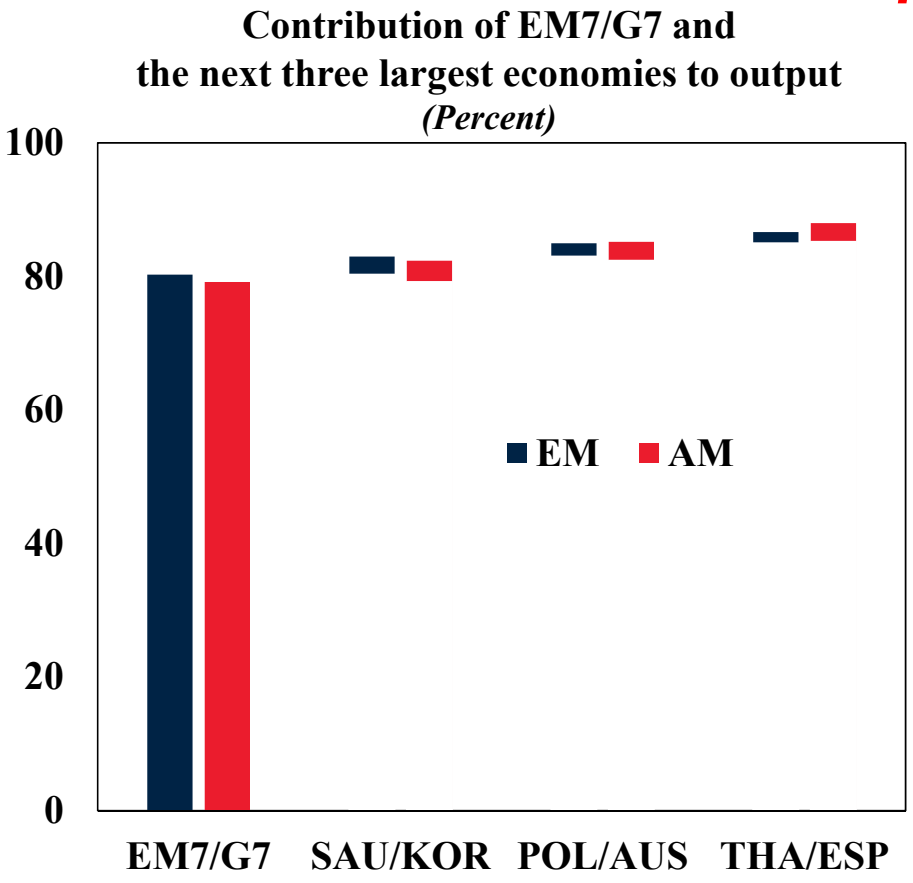
- **EM7:** China (36.6), Brazil (10.7), India (9.2), Russia (8.1), Mexico (5.4), Turkey (4.5), and Indonesia (4.2) (share of EM; 2010-17 average)

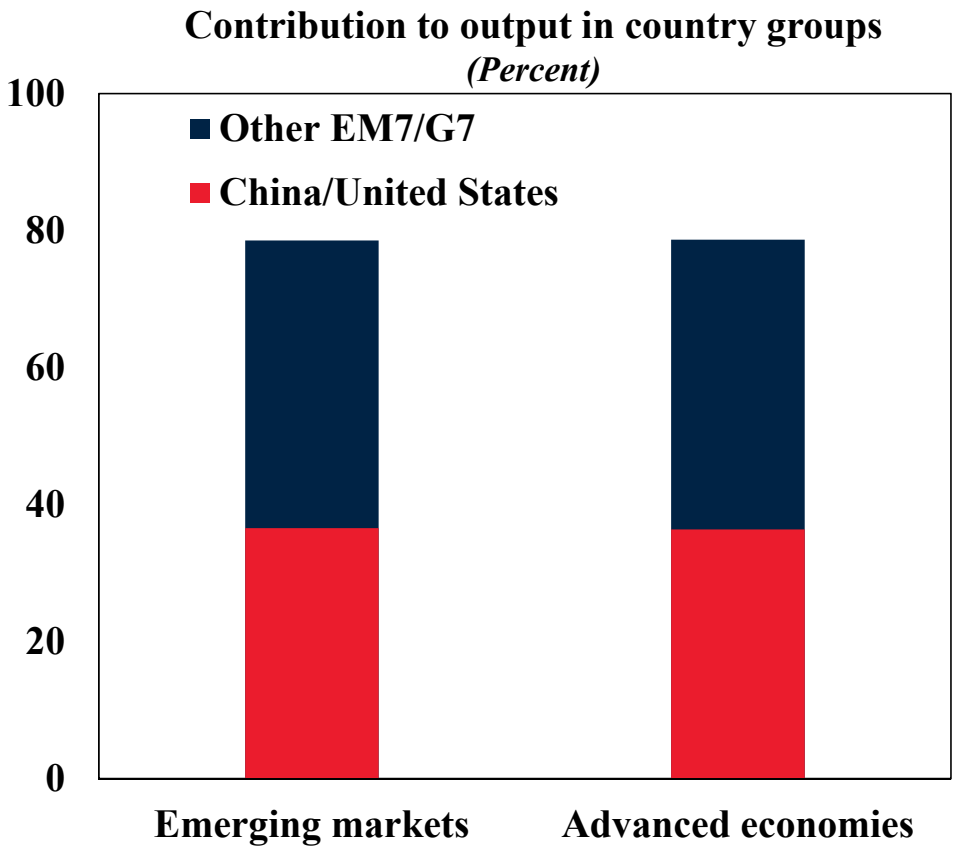
- Roughly 80 percent of total output in their respective groups (mkt exchange rates)

- Major sources of AM and EM integration into the global economy

- Net-commodity importers, more specifically net-oil importers (as a group)

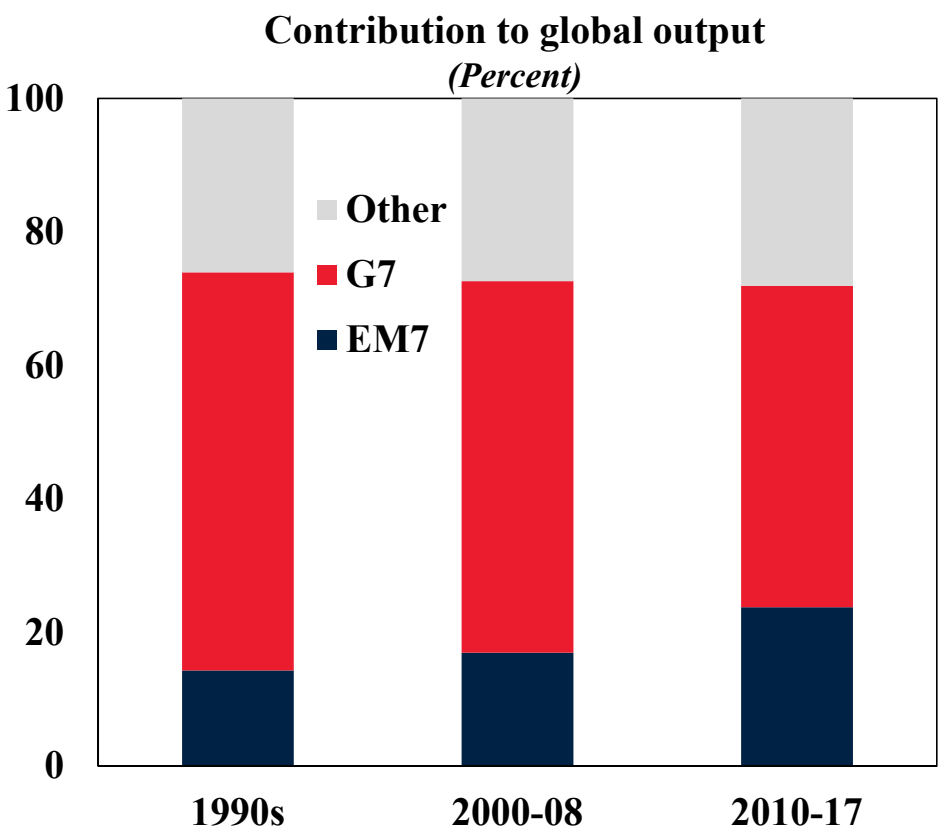
Contribution of EM7 and G7 in Own Groups:
Important!

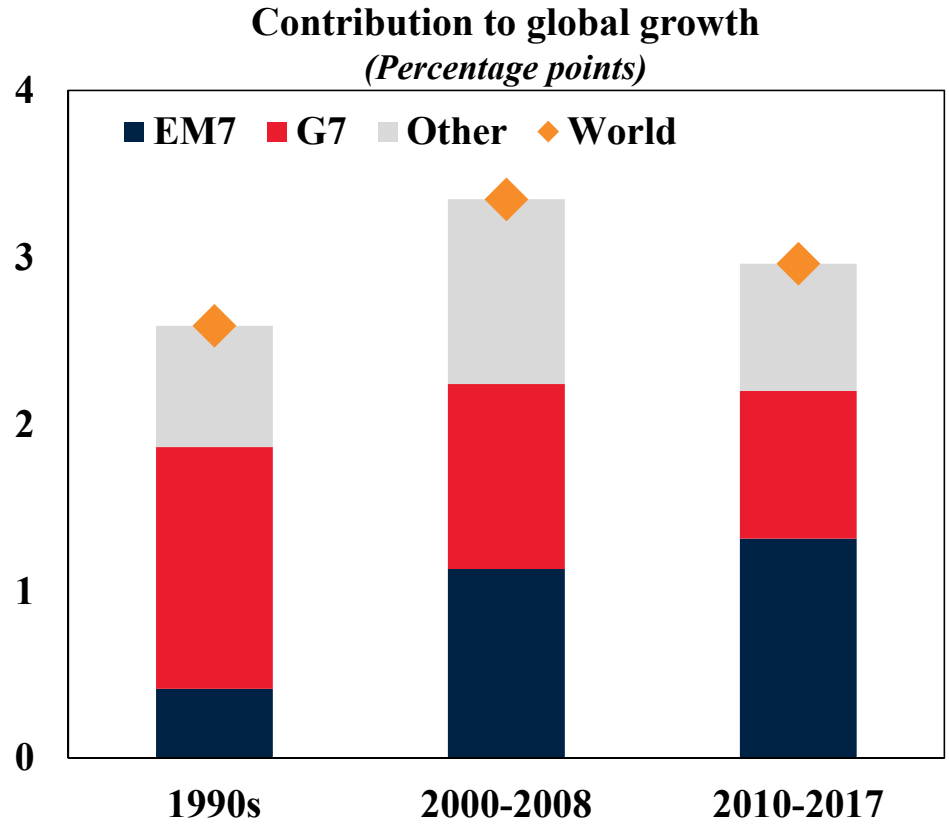




Source: World Bank staff estimates.
Note: The blue bars show the EM output share of EM7 and those of the next three largest EM: Saudi Arabia (SAU), Poland (POL), and Thailand (THA). The red bars show the AM output share of G7 and those of the next three largest AM: Korea Republic (KOR), Australia (AUS), and Spain (ESP). The EM group includes 23 countries. The AM group includes 37 countries.

Global Role of EM7:
Increasing!





Source: World Bank.
Note: EM7 includes Brazil, China, India, Indonesia, Mexico, the Russian Federation and Turkey. G7 includes Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. Output is measured in U.S. dollars at market exchange rates. Right Panel. Red bars show the share of EM7 (G7) in output in emerging markets (advanced economies). Blue bars show the output share of other EM7 (G7) members. Data refer to averages over 2010-17 and cover 23 emerging markets and 27 advanced economies as defined in Huidrom, Kose, and Ohnsorge (2017).

Road Map: Four Questions

2 What is a simple approach to measuring spillovers from EM7? *A Bayesian VAR model; identification motivated by the standard small open economy model; quarterly data*

Related Work

- Extensive literature on spillovers from AM: Stock and Watson (2005), Kose, Otrok and Whiteman (2008), Diebold and Yilmaz (2015).
- Existing work focuses on individual EM7 with a regional perspective: Ahuja and Nabar (2012, China), Alturki, Espinosa-Bowen, and Ilahi (2009, Russia), and Adler and Sosa (2014, Brazil).
- Large literature on spillovers among AM using multi-country DSGE models: BKK (1992, JPE); Ambler, Cardia and Zimmermann (2002); De Walque, Smets, and Wouters (2005).
- Large literature on sources of business cycle in EM using small open economy DSGE models: Mendoza (1995); Kose (2002); Uribe and others (2010, 2017)
- Less theoretical work that looks at spillovers between advanced and emerging markets, and among emerging markets: Comin et al (2014)

Contribution

- A lot of work on spillovers from AM (or ROW) to EM
- No *systematic empirical analysis* of spillovers from major EM (EM7)
- This paper:
  - Presents a systematic analysis of spillovers from EM7 using a large dataset and compares with those from G7.
  - Provides ground work for DSGE models that feature both AM and EM.

Empirical Approach: *Model*

- A Bayesian vector autoregressive (VAR) model with recursive identification
- The model: $\boldsymbol{y_t = a_0 + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_l y_{t-l} + u_t}$
- $\boldsymbol{y_t}$ includes (in this order): **G7 growth**, the **U.S. interest rate**, **EMBI**, **EM7 growth**, **oil price**, and **other EFM** (Emerging and Frontier Markets) **growth**
- The ordering is based on the presumed exogeneity, or predetermination of variables where more exogenous variables are ordered first.
- Consistent with the standard small open economy DSGE model.

Empirical Approach: *Identification*

- $\boldsymbol{y_t}$: G7 growth, the U.S. interest rate, EMBI, EM7 growth, oil price, and other EFM growth

- G7 growth shocks affect EM7 growth within the same quarter, whereas shocks to EM7 growth can affect G7 growth only with a lag of at least one quarter

- Global financial conditions are assumed to be relatively exogenous to EM7, and hence U.S. interest rates and EMBI are ordered before EM7 growth.

- Oil price is after EM7 growth because oil prices are relatively endogenous to EM7 growth given some of them are a major source of demand for key commodities including oil

Empirical Approach: *Estimation*

- **Estimation.** Bayesian techniques
- **Prior – 1:** Longer lags are more likely to be close to zero than shorter lags
- **Prior – 2:** For each variable, lags of its own are more important than lags of rest of the variables in the VAR system
- Inferences based on 2000 Monte Carlo draws; Lag length of four quarters

Database

- Sample: G7 economies, EM7 economies, 16 other EFM over the period 2000Q1 – 2015Q2.
- Real GDP: Ilzetzki, Mendoza, and Vegh (2013), OECD and Haver.
- EMBI: J.P. Morgan.
- U.S. interest rate: 10 year yields; Bloomberg.
- Oil price: Average of 3 major indices, World Bank Pink Sheet.

- Variables are appropriately transformed to yield stationary series.
- Aggregate GDP growth (e.g. EM7 growth) are obtained by aggregating country growth rates using the respective GDP shares.

Country Classification *(30 with * in the estimation)*

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Road Map: Four Questions

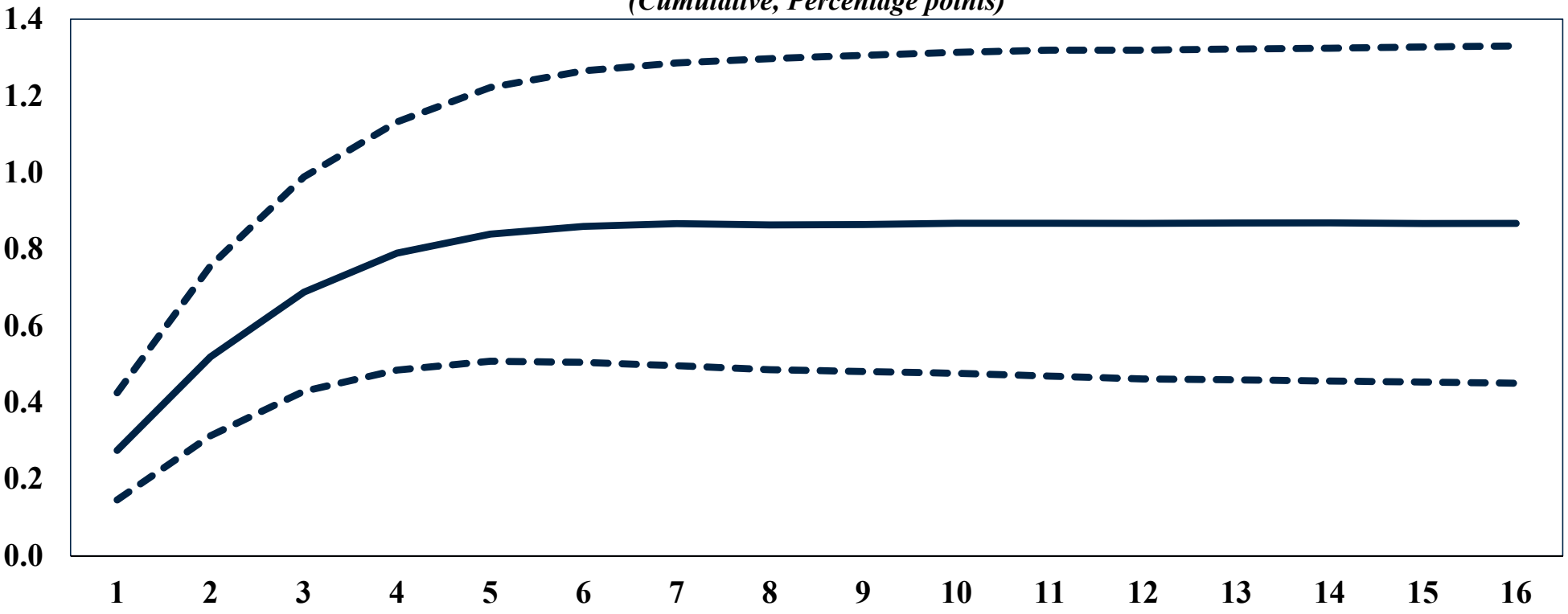
3

How large are growth spillovers from EM7? ***Significant (0.9 ppt decline in EFM and 0.6 ppt decline in global growth); Smaller than spillovers from advanced economies (up to 3 times)***

Spillovers from EM7 to Other EFM: *Significant*

Impact of a 1-percentage-point increase in EM7 growth on growth in other EFM

(Cumulative, Percentage points)

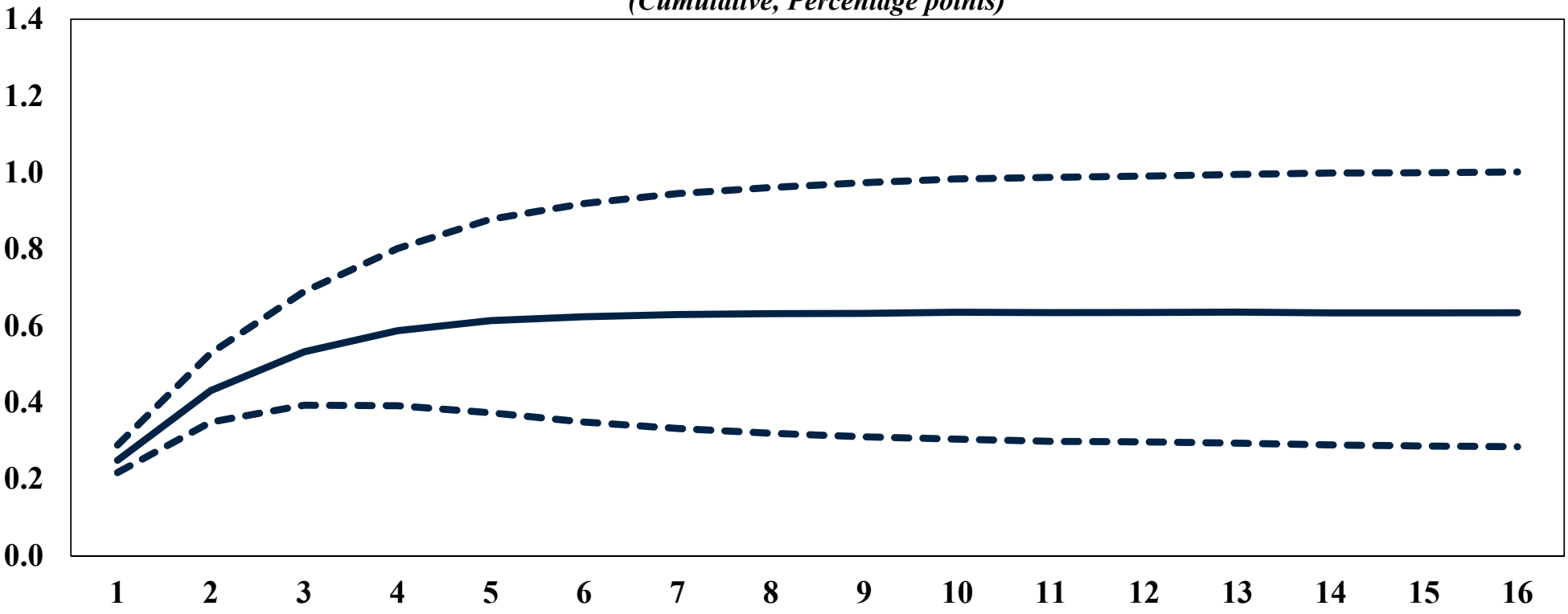


Source: World Bank staff estimates.

Note: Other EFM refers to the group of emerging and frontier markets excluding EM7. The graphs show the cumulated impulse responses at different horizons due to a 1 percentage point increase on impact in EM7 growth. Solid lines represent medians, and dotted lines represent 16-84 percent confidence bands.

Global Impact:
Significant but Smaller than Impact on Other EFM

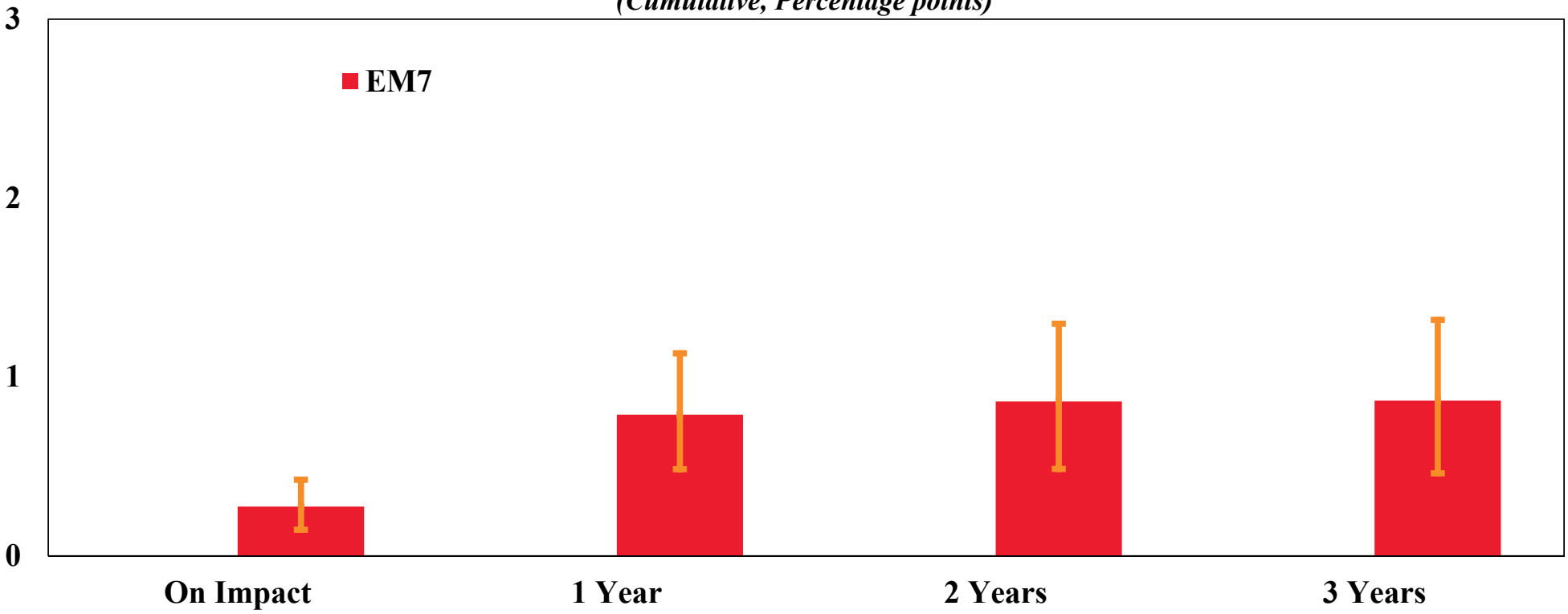
Impact of a 1-percentage-point increase in EM7 growth on global growth
(Cumulative, Percentage points)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses at different horizons due to a 1 percentage point increase on impact in EM7 growth. Global is GDP weighted average of the response of EM7, other EFM, and G7 responses. Solid lines represent medians, and dotted lines represent 16-84 percent confidence bands.

Spillovers from EM7 to Other EFM:
Still Smaller than Those from G7

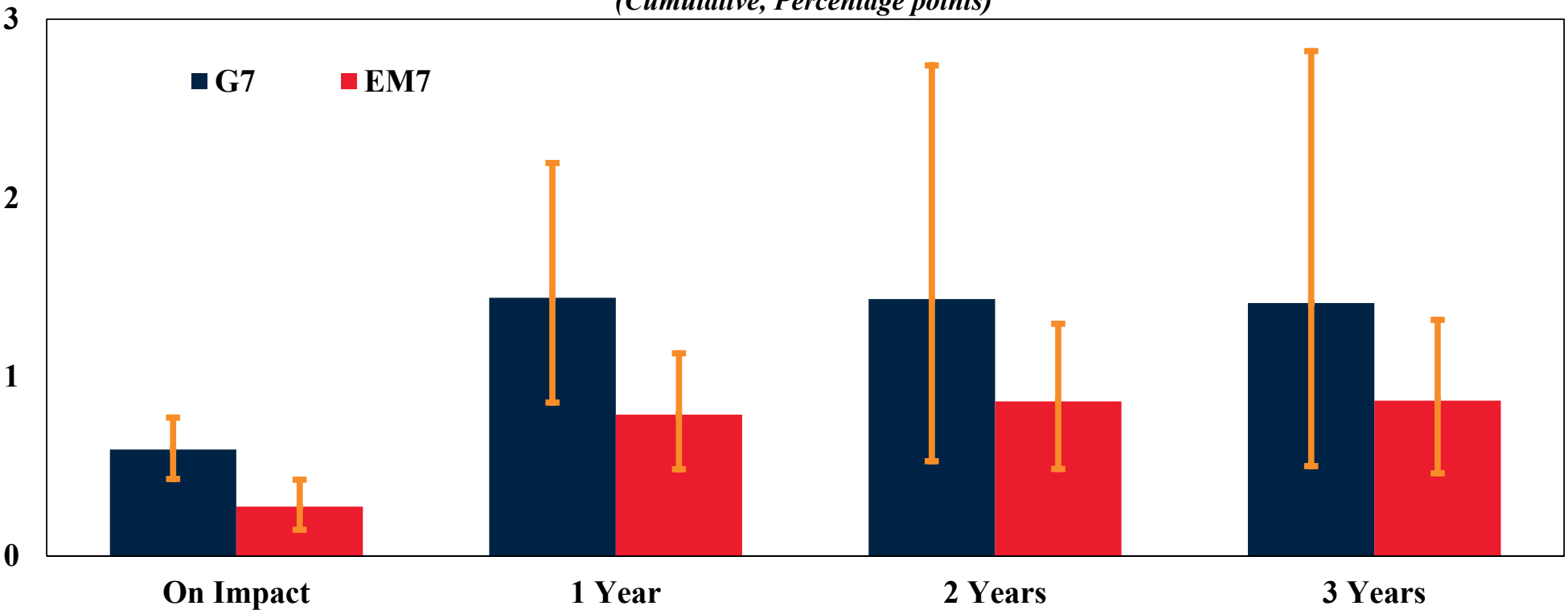
Impact of a 1-percentage-point increase in EM7 and G7 growth on growth in other EFM
(Cumulative, Percentage points)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses of growth in other EFM, at different horizons, due to a 1 percentage point increase on impact in G7 and EM7 growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

Spillovers from EM7 to Other EFM:
Still Smaller than Those from G7

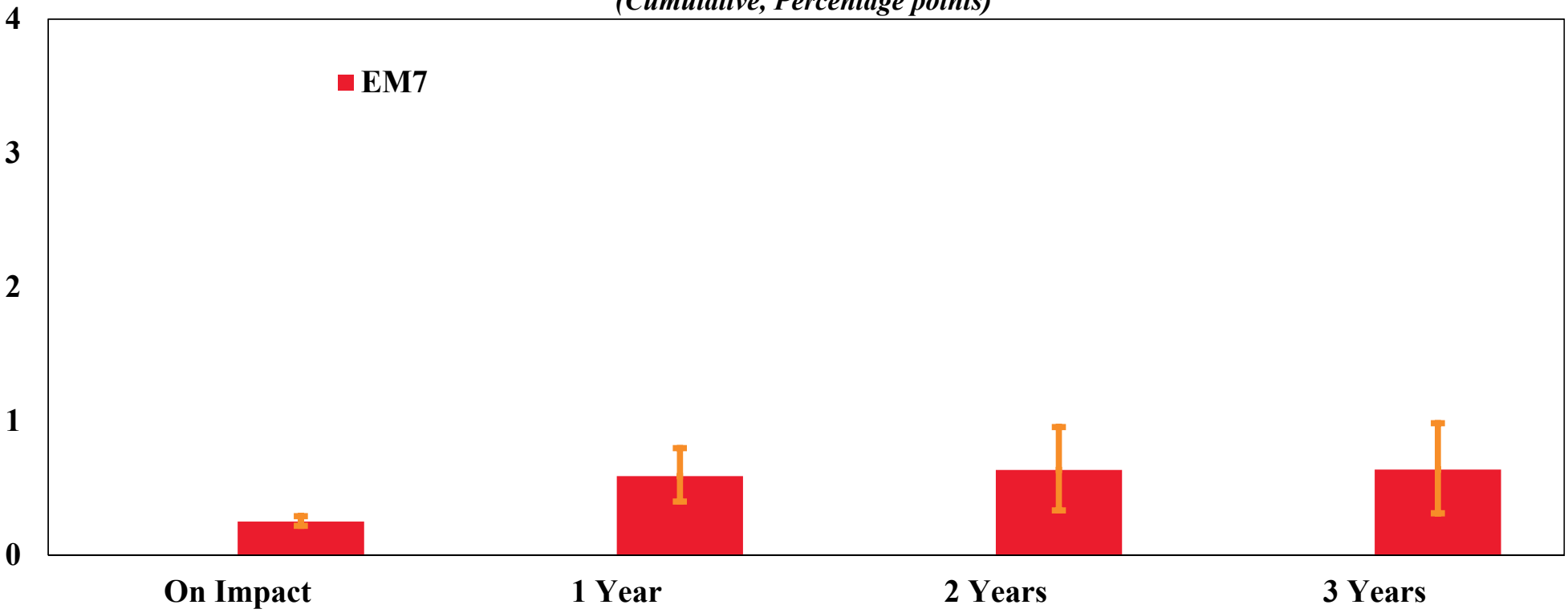
Impact of a 1-percentage-point increase in EM7 and G7 growth on growth in other EFM
(Cumulative, Percentage points)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses of growth in other EFM, at different horizons, due to a 1 percentage point increase on impact in G7 and EM7 growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

Spillovers from EM7 to Global Economy:
Smaller than Those from G7

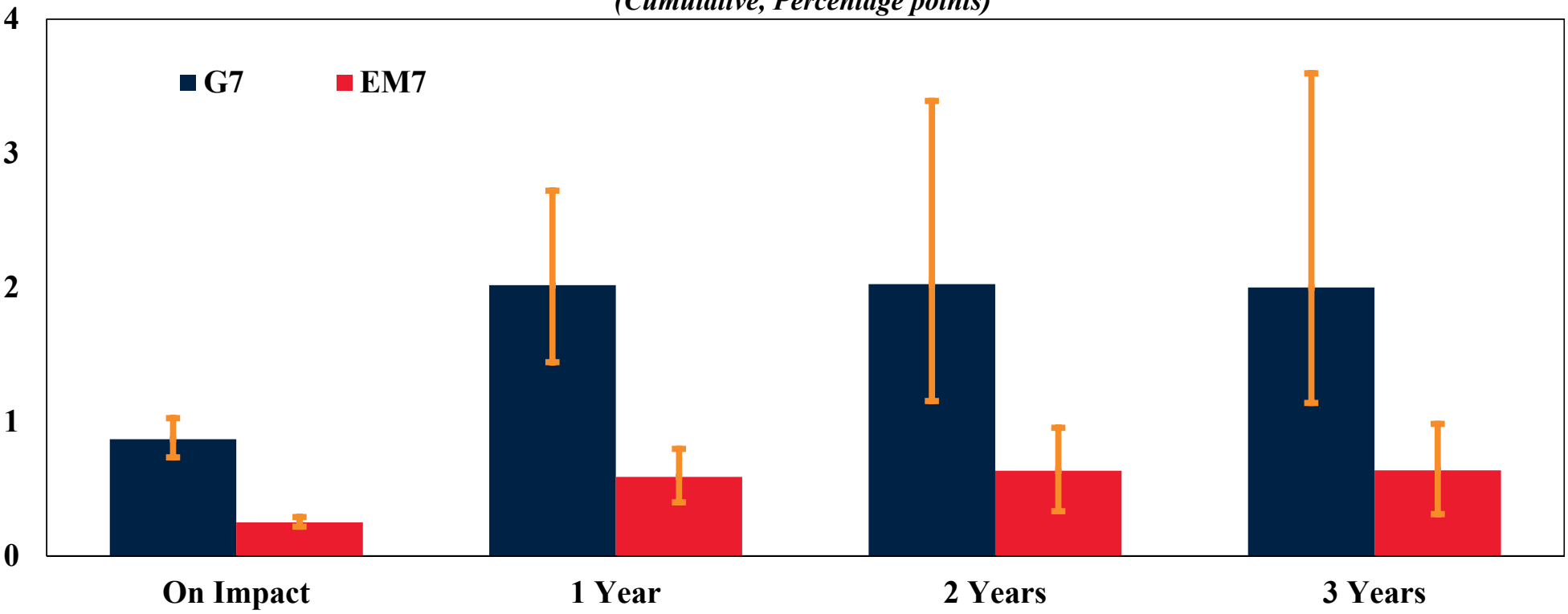
Impact of a 1-percentage-point increase in EM7 and G7 growth on global growth
(Cumulative, Percentage points)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses of global growth, at different horizons, due to a 1 percentage point increase on impact in G7 and EM7 growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

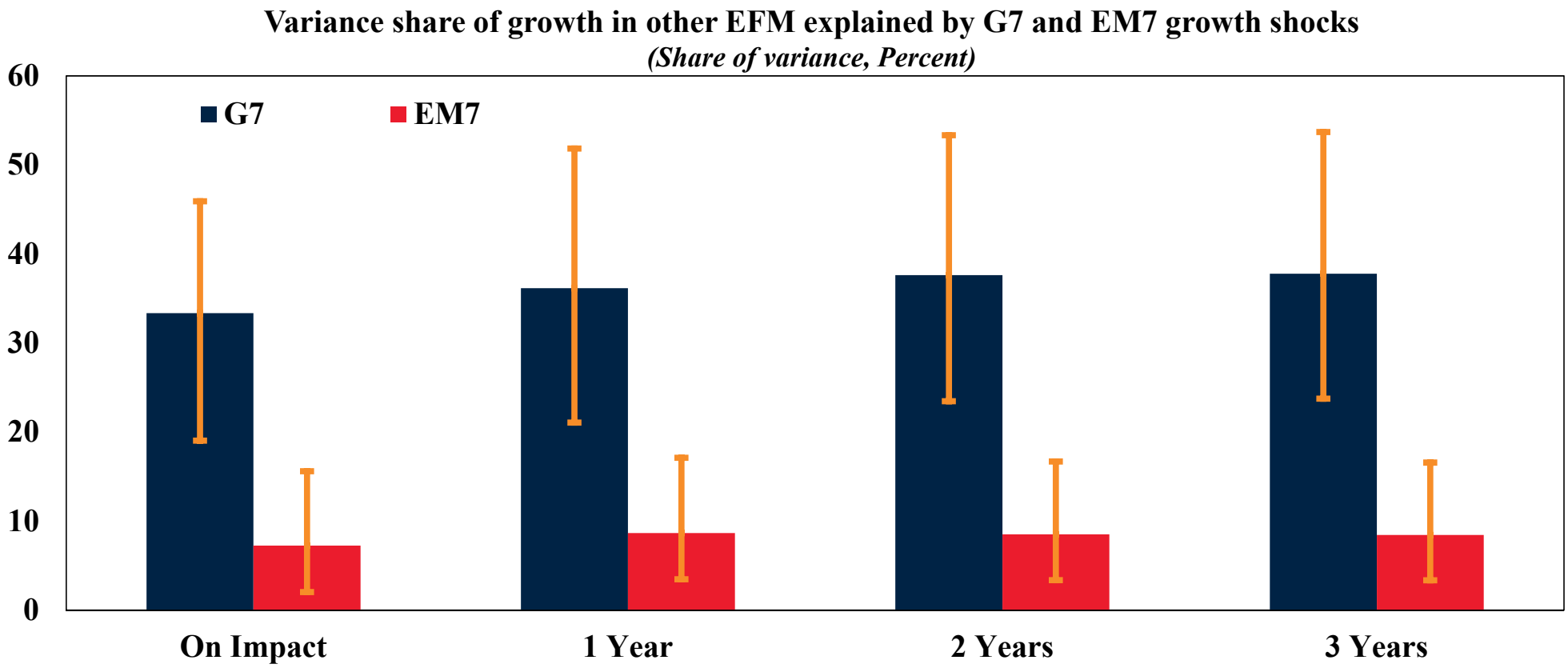
Spillovers from EM7 to Global Economy:
Smaller than Those from G7

Impact of a 1-percentage-point increase in EM7 and G7 growth on global growth
(Cumulative, Percentage points)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses of global growth, at different horizons, due to a 1 percentage point increase on impact in G7 and EM7 growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

Shocks in EM7 vs G7:
EM7 Explain Smaller Variance of Output Growth



Source: World Bank staff estimates.
Note: The graphs show the variance share of growth in other EFM, at different horizons, explained by shocks to G7 and EM7 growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

Road Map: Four Questions

4 **How large are growth spillovers from individual EM7?**

China has the largest spillovers

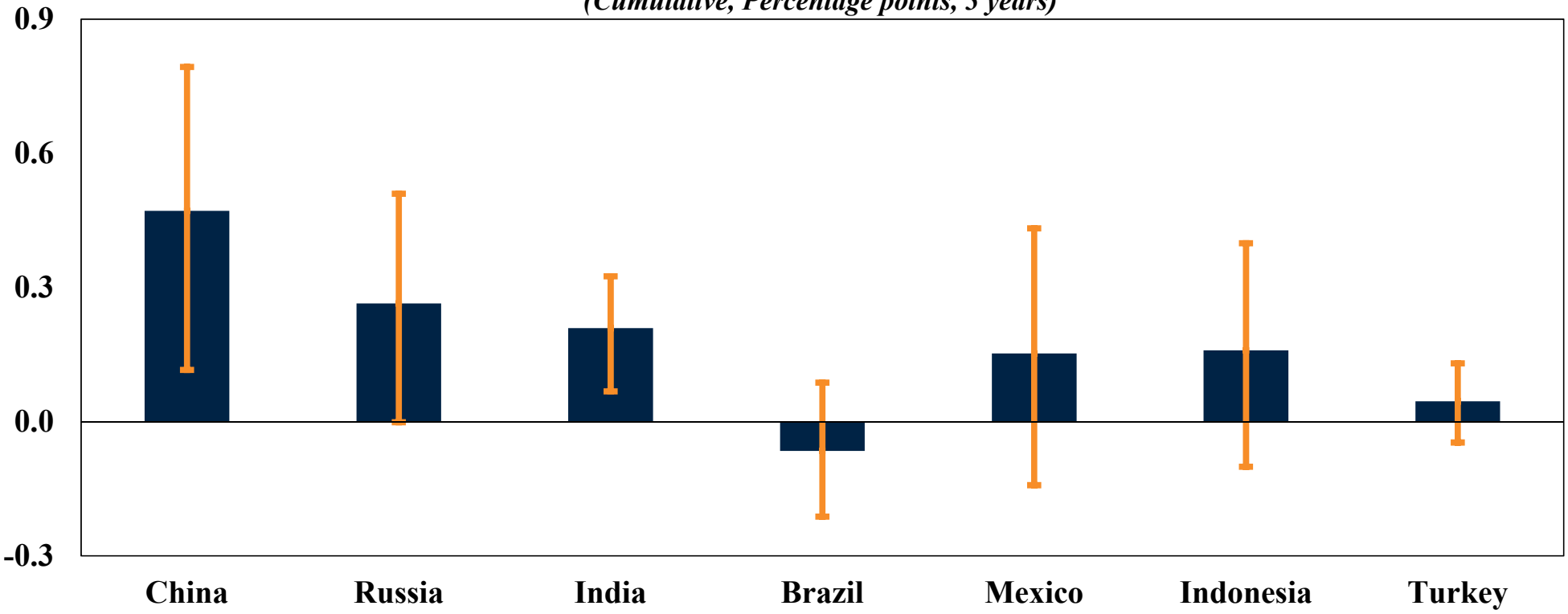
Individual Impact: Two Models

- Baseline (aggregate) model
- Country-Specific Model

China:
Largest Growth Spillovers

Impact of a 1-percentage-point increase in growth in each of EM7 on growth in other EFM

(Cumulative, Percentage points, 3 years)



Source: World Bank staff estimates.

Notes: The graph shows cumulated impulse responses of growth in other EFM at the end of three years due to a 1 percentage point increase on impact in growth in each of EM7. These results are from the aggregate VAR model. Solid bars represent medians, and the error bands represent 16-84 percent confidence bands.

Country-Specific Models

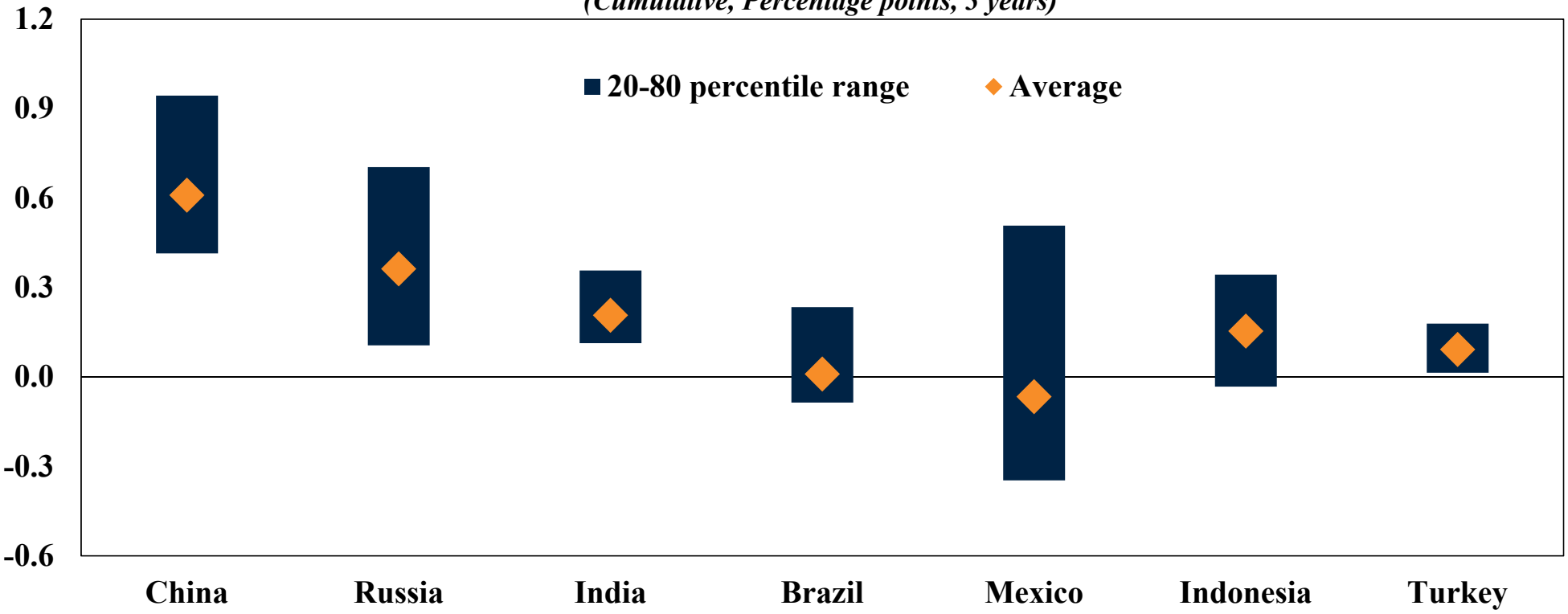
- Similar model as in the baseline but the model is estimated for each EFM country (*spillover destination*), one at a time

- To estimate spillovers from EM7, the following variables are included in the VAR, in this order: G7 growth, EMBI, EM7's growth (*spillover source*), trade-weighted commodity prices, EFM growth (*spillover destination*), and EFM real effective exchange rate

- Since the model is country-specific, country-specific controls are also included. This results in a better empirical description of the small open economies included in the sample

Spillovers from China:
Largest and Permeate Globally

Impact of a 1-percentage-point increase in growth in each of EM7 on growth in other EFM
(Cumulative, Percentage points, 3 years)

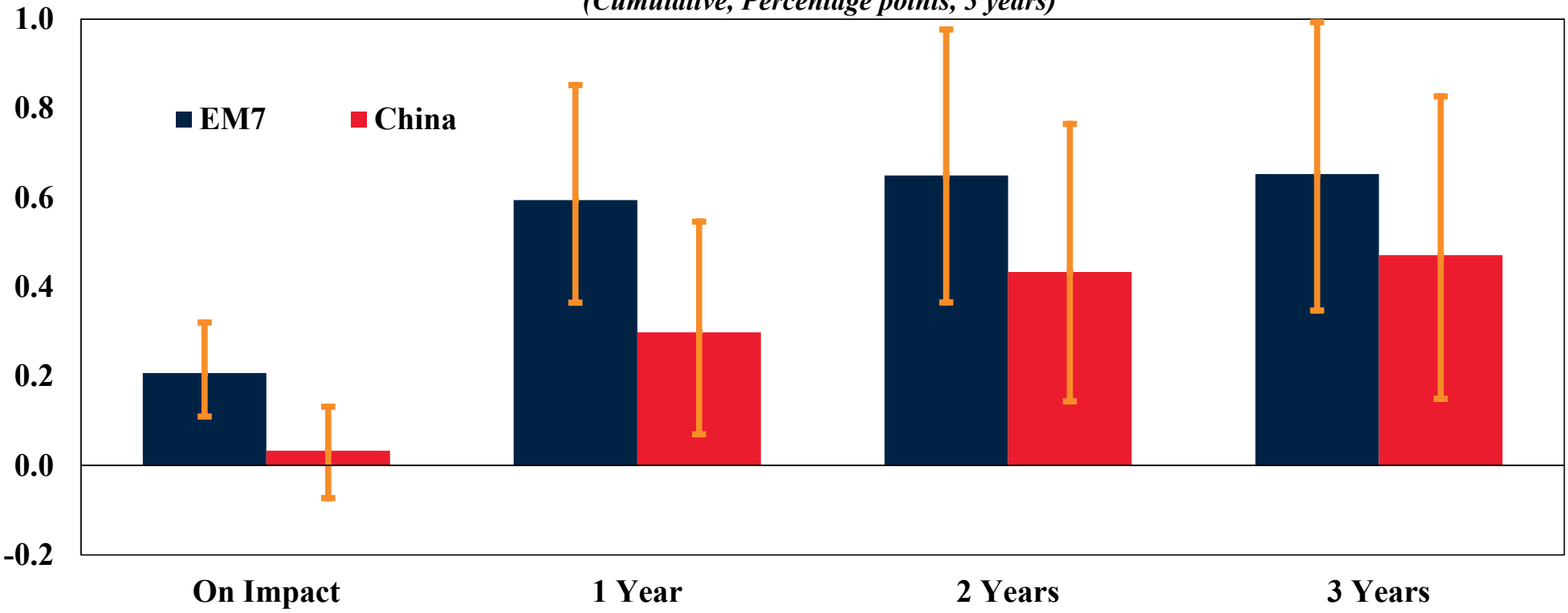


Source: World Bank staff estimates.
Note: The graph shows the cumulated impulse responses at the end of three years due to a 1 percentage point increase on impact in growth in each of EM7. These results are from the country models. For each spillover source country, the bar denotes the 20-80 percentile range of the responses of other EFM economies and the orange diamond denotes the cross-sectional average response.

China vs EM7 Growth:
China Spillovers Dominant

Impact of a 1-percentage-point increase in growth in EM7 and China on growth in other EFM

(Cumulative, Percentage points, 3 years)



Source: World Bank staff estimates.
Note: The graphs show the cumulated impulse responses of growth in other EFM, at different horizons, due to a 1 percentage point increase on impact in EM7 and China's growth. Solid bars represent medians, and error bars represent 16-84 percent confidence bands.

Robustness Exercises - 1

- We check our headline results using a variety of specifications:
  - Include a dummy for the global financial crisis of 2008-09
  - Controlling for oil prices
  - Estimate using IP series instead of GDP
  - Estimate spillovers to each destination EFM (with country-specific controls) one at a time. Then, the spillover estimates are aggregated using their respective GDP shares to yield aggregate EFM
  - Use common factors to represent “aggregate” growth dynamics in each of the country groups
  - Spillovers from BRICS as an alternative grouping for major EM

Robustness Exercises - 2

Impact of a 1-percentage-point increase in growth in EM7 on growth in other EFM

(Percentage points)

	On impact	1 year	2 years	3 years
Aggregate model (baseline)	**0.28** [0.15 0.43]	**0.79** [0.48 1.13]	**0.86** [0.49 1.3]	**0.87** [0.46 1.32]
Global financial crisis dummy	**0.26** [0.14 0.4]	**0.78** [0.52 1.07]	**0.84** [0.53 1.18]	**0.85** [0.54 1.19]
Controlling for oil prices	**0.28** [0.15 0.4]	**0.87** [0.58 1.18]	**1.34** [0.93 1.81]	**1.55** [1.04 2.17]
Industrial production series	**0.39** [0.1 0.7]	**0.97** [0.4 1.6]	**0.93** [0.3 1.6]	**0.93** [0.3 1.6]
Country model	**0.26** [-0.07 0.59]	**0.81** [0.26 1.41]	**0.88** [0.23 1.58]	**0.89** [0.24 1.62]
Factor-augmented model	**0.28** [0.01 0.57]	**0.54** [0.17 0.96]	**0.52** [0.1 0.94]	**0.51** [0.09 0.95]
Spillovers from BRICS	**0.20** [0.08 0.34]	**0.69** [0.39 0.98]	**0.80** [0.43 1.16]	**0.80** [0.42 1.2]

Source: World Bank staff estimates.

Note: The table shows the cumulated impulse responses of growth in other EFM, for different horizons, due to a 1 percentage point increase on impact in EM7 growth. These are from the alternative specifications of the aggregate model. Bolded denote the medians and the numbers in brackets are the 16-84 percent confidence bands. Global financial crisis dummy: includes a dummy for the global financial crisis of 2008-09; Controlling for oil prices: oil prices are treated as an exogenous regressor in the model; Industrial production series: estimates are based on IP growth; Country model: spillover estimates for the individual EM excluding EM7 economies from the country models are aggregated by GDP weights; Factor-augmented model: estimates are based on the common factor (first principal component) each of G7, EM7, and other EFM economies; Spillovers from BRICS: estimates are based on spillovers from BRICS.

Road Map: Four Questions

1. Who are the major emerging markets? *EM7 (seven largest emerging market economies) play an important role in the global economy*

2. What is a simple approach to measuring spillovers from EM7? *A Bayesian VAR model; identification motivated by the standard small open economy model; quarterly data*

3. How large are growth spillovers from EM7? *Significant (0.9 ppt decline in EFM and 0.6 ppt decline in global growth); Smaller than spillovers from advanced economies (up to 3 times)*

4. How large are growth spillovers from individual EM7?
   China has the largest spillovers

Many Avenues for Future Research

- ***Channels of transmission.*** Explore the nature of shocks and underlying channels (trade, finance, uncertainty, confidence) by which spillovers from the EM7 propagate in a DSGE model

- ***Regionals Spillovers.*** Examine spillovers within regions from the largest EM

- ***Shocks vs spillovers.*** Estimate spillovers while explicitly controlling for common shocks in a Dynamic Factor Model


Emerging
markets

To where?

Select Publications by World Bank Prospects Group

- ***Global Economic Prospects*** – ***January 2018*** ***(Weak Potential Growth)***
- ***Commodity Markets Outlook*** – ***April 2018***

- ***Slowdown in Emerging Markets: Rough Patch or Prolonged Stagnation?*** – *December 2015*
- ***Weakness in Investment Growth: Causes, Implications and Policy Responses*** – *March 2017*
- ***Asset Prices and Macroeconomic Outcomes*** – *November 2017*
- ***Macroeconomic Implications of Financial Imperfections*** – *November 2017*

Questions & Comments
Thanks!

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