



CHINA SPILLOVERS: NEW EVIDENCE FROM TIME-VARYING ESTIMATES*

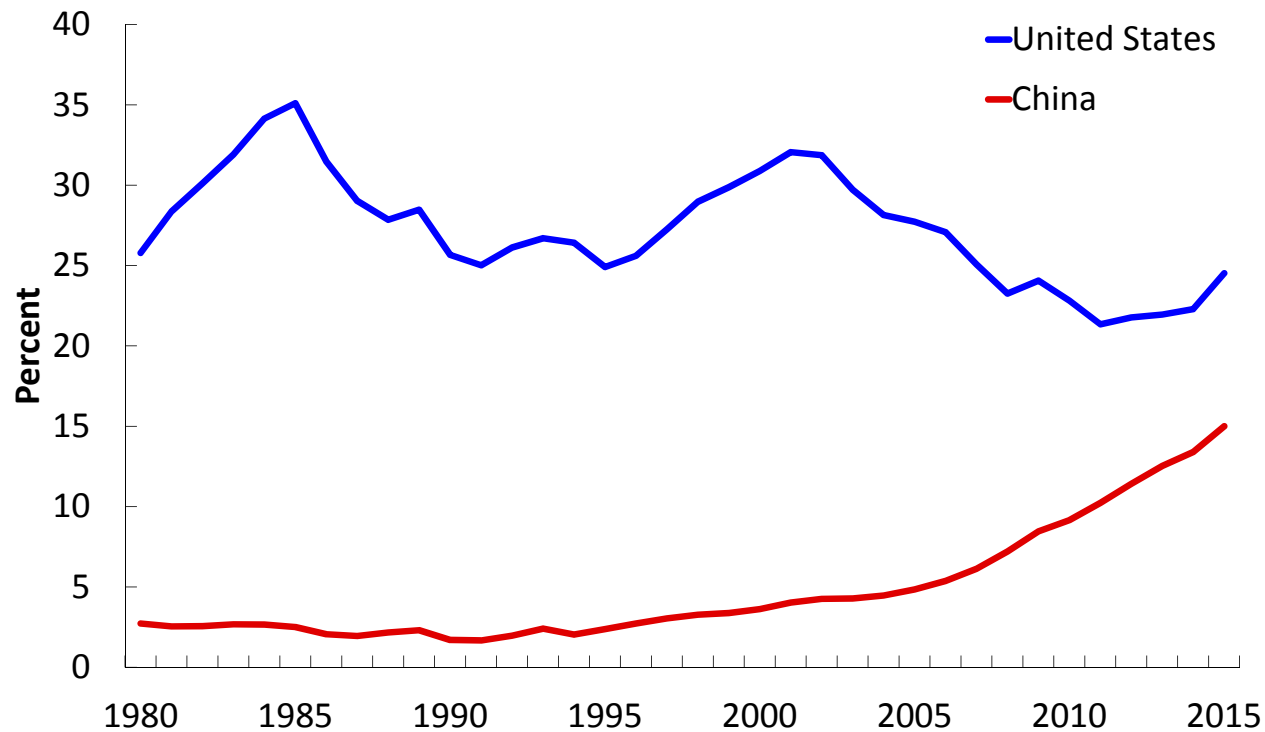
ECB-April 26-27, 2016

Davide Furceri (IMF), João Tovar Jalles (IMF), Aleksandra Zdzienicka (IMF)

*usual disclaimer applies

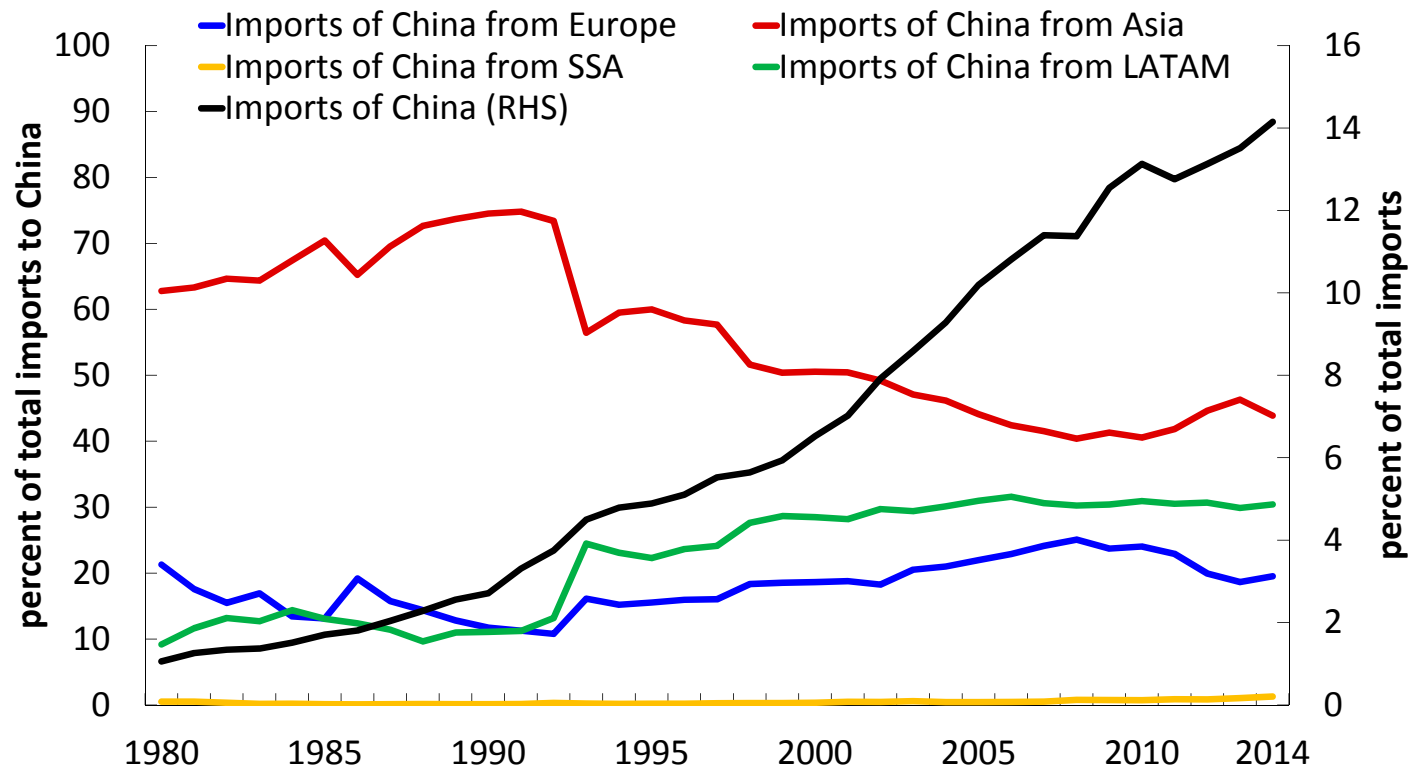
Motivation (I)

World has become more globalized: China's share in World GDP has increased from close to 3 percent in 1980 to 15 percent in 2015, as a result of the launch of its “reforms and opening-up” strategies back in 1978.



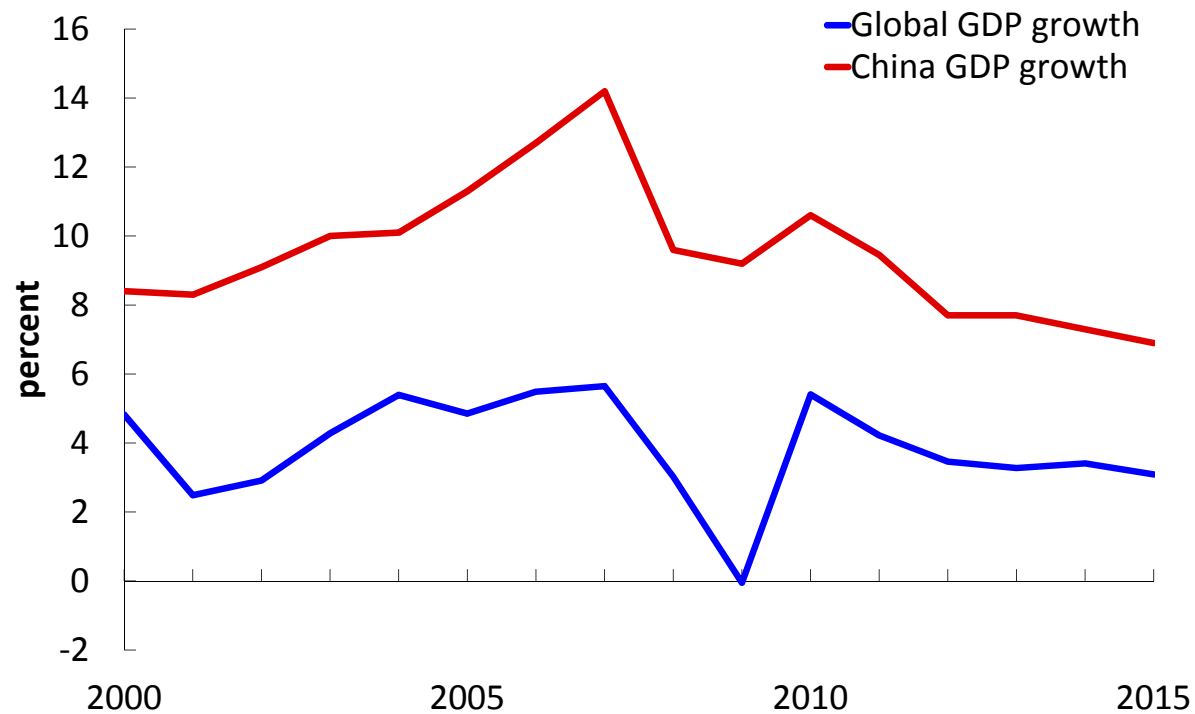
Motivation (II)

China's imports from the rest of the World have increased from about 1 percent to 14 percent over the same period



Motivation (III)

China has been the leading contributor to global economic growth and a stabilizing driver of its evolution since the recent Global Financial Crisis



Motivation (IV)

- The recent gradual slowdown have raised concerns about global developments:
 - some say it can possibly lead to a worldwide recession (Buiter 2015);
 - others (e.g. Krugman) suggest that, given its still limited role in the world, even a significant slowdown in China is unlikely to have such large effects on the rest of the World.
- Recent events suggest that the magnitude of spillovers has increased, not only through trade linkages, but also through its effects on commodity prices.
- The recent increase in underlying vulnerabilities in several EMEs (WEO, 2016) as well as in global risk aversion, may amplify the extension of the spillover effects from a slowdown in China's growth.

Contribution

- Several studies have mostly looked at spillover effects in a static framework. This is the first paper that estimates time-varying measures of spillovers for a large set of economies, including emerging market ones.
- Second, this paper overcomes the major limitation of existing studies assessing the transmission channels of spillovers that rely on cross-country regressions and are not able to account for country- and time-specific spillover determinants.

Research questions

Q1: IMPACT - Do China growth shocks have material effects elsewhere? Which regions/groups of countries are more affected?

Q2: STABILITY - Have spillovers increased over time?

Q3: DETERMINANTS - What are the transmission channels?

Identifying growth shocks

- Growth shocks for China are identified, for a given year, as the deviation from the average growth for China over the entire period and from average growth for all countries in the sample in that year (Morgan, Rime and Strahan, 2004; Giamone, Lenza and Reichlein, 2008; WEO, 2013):

$$\Delta y_{it} = \alpha_i + \gamma_t + \varepsilon_{it}$$

- Different variants of shocks, for robustness checks:
 - *actual growth rate of China's real GDP*
 - *residuals of a specification similar to baseline but without country-fixed effects*
 - *forecast errors of China's real GDP growth*
 - *deviations of China's real GDP growth forecast errors from the average growth forecast errors for all countries in the sample*



Q1: China Spillovers around the World

Methodology

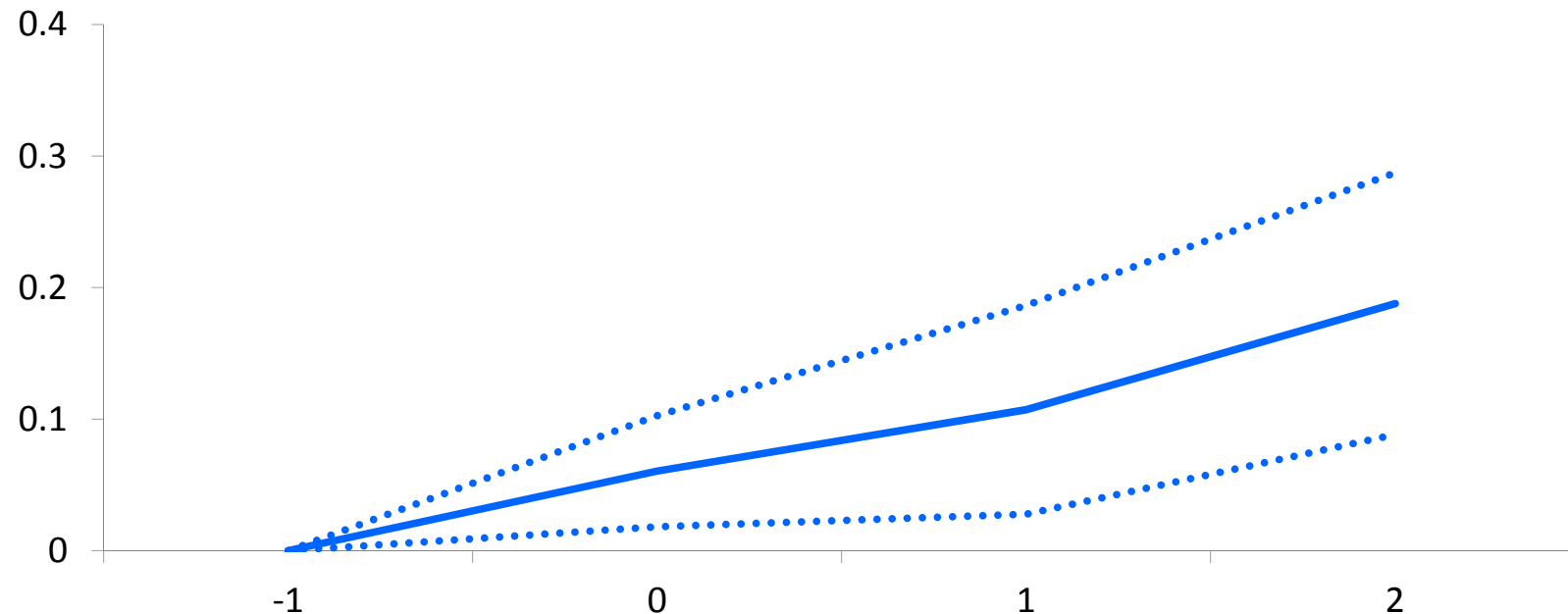
- Local projection method (Jorda, 2005) to estimate the average dynamic response of real GDP in each other country i to growth shocks originating from China:

$$y_{i,t+k} - y_{i,t-1} = a_i + \beta_i^k \varepsilon_{C,t} + \delta(L)\Delta y_{it} + u_{it}$$

- The coefficient β_i^k measures the spillover effect of a 1 percent change in China's growth at each time horizon k for each country i .
- **Sample:** unbalanced sample of 187 countries from 1980 to 2014
- Panel estimates with cluster robust S.E.
- Several advantages:
 - *IRFs derived using ARDL alternative (Romer and Romer, 1989) tend to be sensitive to the choice of the number of lags, making the IRFs potentially unstable;*
 - *Confidence bands are easily computed using the standard deviations of the estimated coefficients and Montecarlo simulations are not required.*

China spillovers across the world

Output response to 1% shock-entire sample (%)



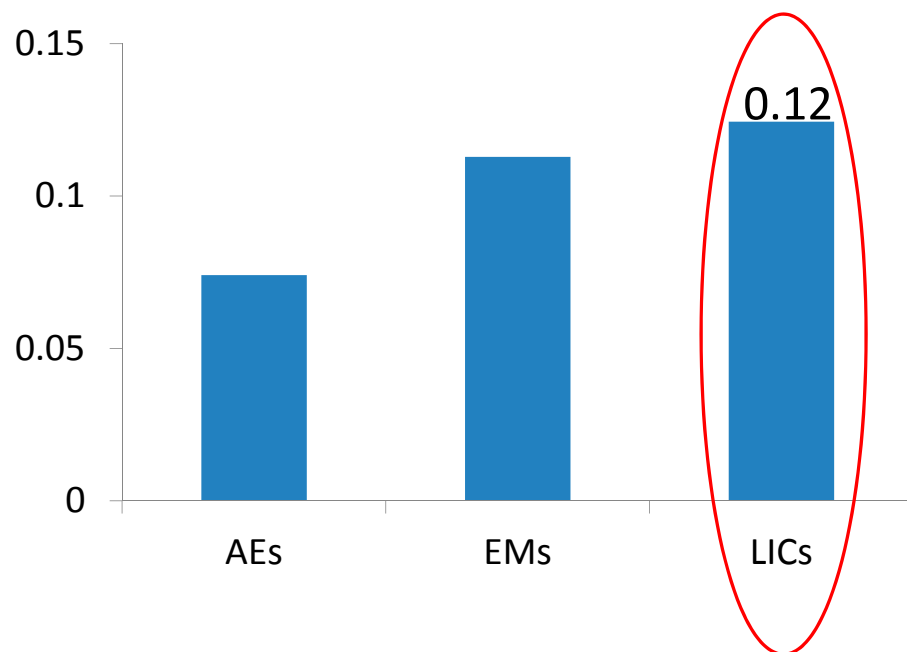
Note: $t=0$ is the year of the shock; dotted lines denote 90 percent confidence bands.

- Contemporaneous increase in output of 0.06 percent; medium-term effect of 0.2 percent.
- Robust to: different shocks, lag structures, sets of controls, 5-year averages.

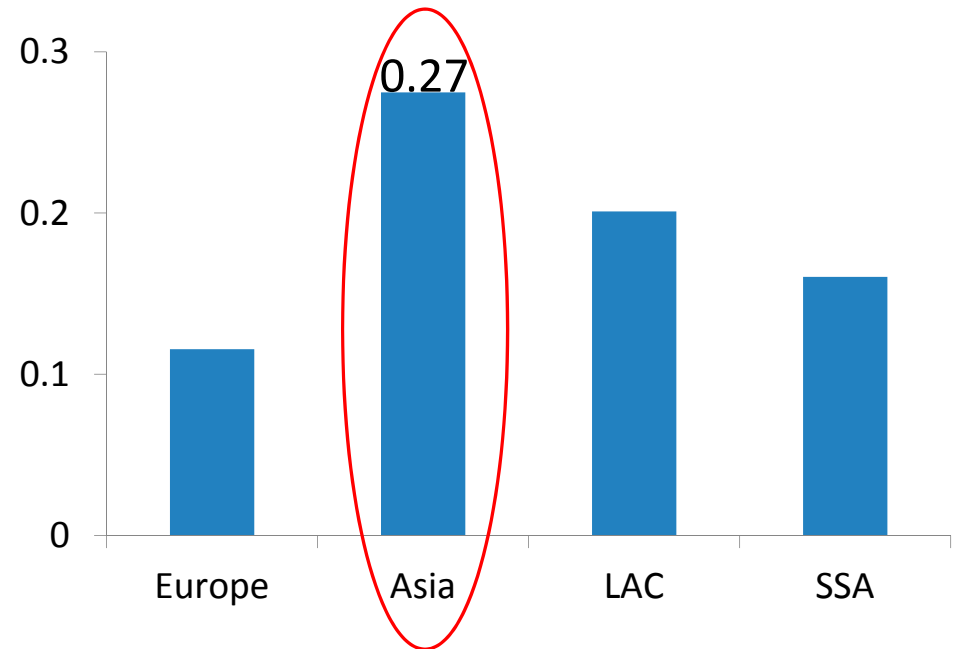
China spillovers across the world

One year-ahead output response to 1% shock (%)

Panel 1. Effect across income groups



Panel 2. Effect across regions





Q2: Evolution of Spillovers over Time

Methodology

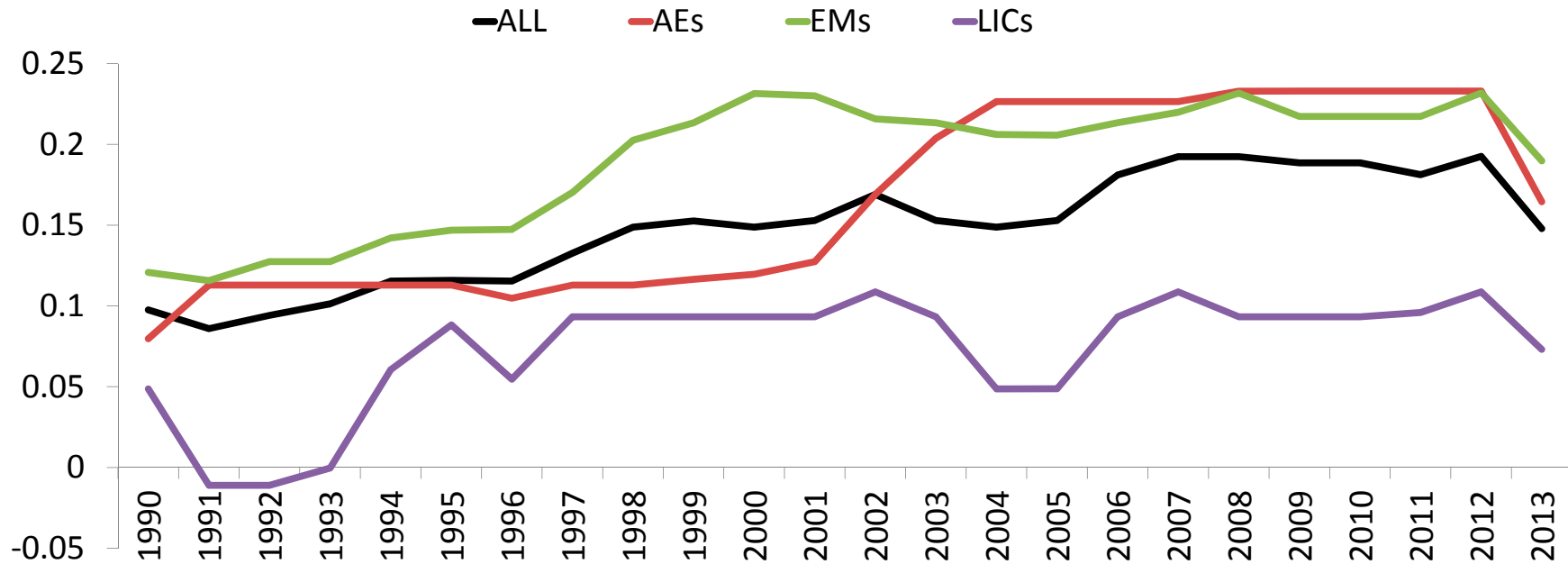
- Varying-coefficient method by Schlicht (1985, 1988) to estimate how spillovers vary over time:

$$\beta_{it}^k = \beta_{it-1}^k + v_{it}^k$$

- **Sample:** balanced sample of 148 countries from 1990 to 2014
- Country-by-country estimates
- Several advantages compared to other methods (Aghion and Marinescu, 2008):
 - *allows using all observations in the sample to estimate the degree of spillover in each year;*
 - *changes in the magnitude of spillover in a given year come from innovations in the same year, rather than from shocks occurring in neighboring years;*
 - *it reduces reverse causality problems*

Results

Output response to 1% shock-entire sample (%)
Median country





Q3: Determinants of Spillovers

Methodology

- Panel approach to estimate the importance of various macroeconomic factors in affecting the magnitude of spillovers:

$$\hat{\beta}_{it}^k = \delta_i + \gamma_t + \boldsymbol{\theta}'\mathbf{X}_{it} + \epsilon_{it}$$

X_{it}: time-varying macroeconomic variables (trade with China)

- **Sample**: unbalanced sample of 148 countries from 1990 to 2014
- Estimator: WLS
- Two variants :
 - *excluding country-fixed effects, to capture the effect of observed country-specific factors, such as whether a country is a commodity exporter*
 - *excluding time-fixed effects, to capture the effect of observed factors that are common across countries, such as the share of China's value added in industry*

Determinants (I)

Regressors	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Export to China (% of GDP) (log)	1.333*** (0.284)	1.191*** (0.262)	2.055*** (0.265)	1.105*** (0.265)	1.350*** (0.323)	0.929** (0.402)	0.983** (0.451)
Commodity exporters		0.022*** (0.001)		0.022*** (0.001)			
Manufacturing exporters			0.044** (0.019)	0.043** (0.018)			
China's Industry value added (% of GDP)					-0.033 (0.294)		-0.136 (0.516)
VIX (log)						0.002 (0.013)	0.000 (0.015)
Country FE	Yes	No	No	No	Yes	Yes	Yes
Time Fe	Yes	Yes	Yes	Yes	No	No	No
Observations	3,236	3,213	3,236	3,213	3,236	1,846	1,846
R-squared	0.604	0.091	0.027	0.092	0.604	0.788	0.788

- Main transmission channel in affecting China's growth spillovers is the share of exports to China in a country's GDP. Net exports (not shown) also yield similar results.

Determinants (II)

Regressors	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Value added exports to China (log)	0.062*** (0.019)	0.090* (0.052)	0.168*** (0.054)	0.133** (0.052)	0.119*** (0.017)	0.084*** (0.014)	0.077*** (0.014)
Commodity exporters		0.024*** (0.002)		0.023*** (0.002)			
Manufacturing exporters			0.146*** (0.024)	0.125*** (0.023)			
China's Industry value added (% of GDP)					-0.069 (0.232)		0.745*** (0.185)
VIX (log)						0.004 (0.005)	0.014** (0.006)
Country FE	Yes	No	No	No	Yes	Yes	Yes
Time Fe	Yes	Yes	Yes	Yes	No	No	No
Observations	918	918	918	918	918	663	663
R-squared	0.962	0.116	0.048	0.144	0.959	0.984	0.984

- The larger the value of goods a country exports to China the higher the growth spillover effect to that country.

Summary of Results (I)

- Growth shocks in China have statistically significant effects on output in other countries with the peak effect materializing typically two years after the shock >>> *1 percentage point negative growth shock in China decreases, on average, output in other economies by about 0.2 percent.*
- Spillovers are larger in neighboring (Asian) countries as well as in emerging market and developing economies.
- Spillovers have significantly increased over time, particularly since the beginning of the 2000s. This increase has been broad-based.

Summary of Results (II)

- Trade linkages seem to be the main transmission channel.
- Spillovers are larger in commodity exporters and in countries that mostly export manufactures to China.
- Some evidence points to the fact that spillovers have been driven by the increase in the value added share of industry in China—suggesting an important role of rebalancing going forward—, and that are amplified during periods of high global uncertainty.

Further work

- Quarterly data;
- Exploring other determinants: exchange rate regimes, country's initial level of vulnerability, financial linkages;
- Different aggregate demand components (investment vs. consumption).



THANK YOU

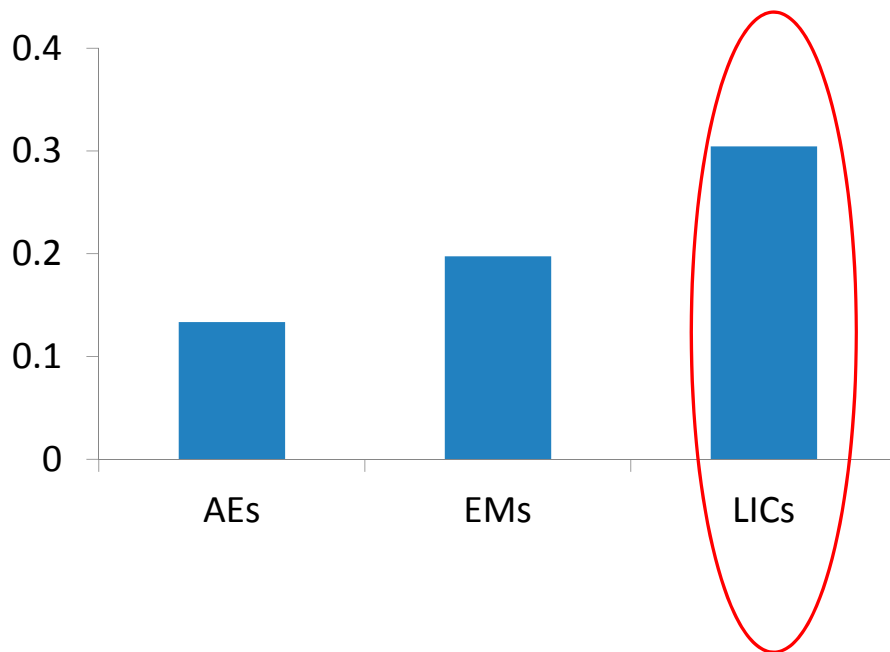
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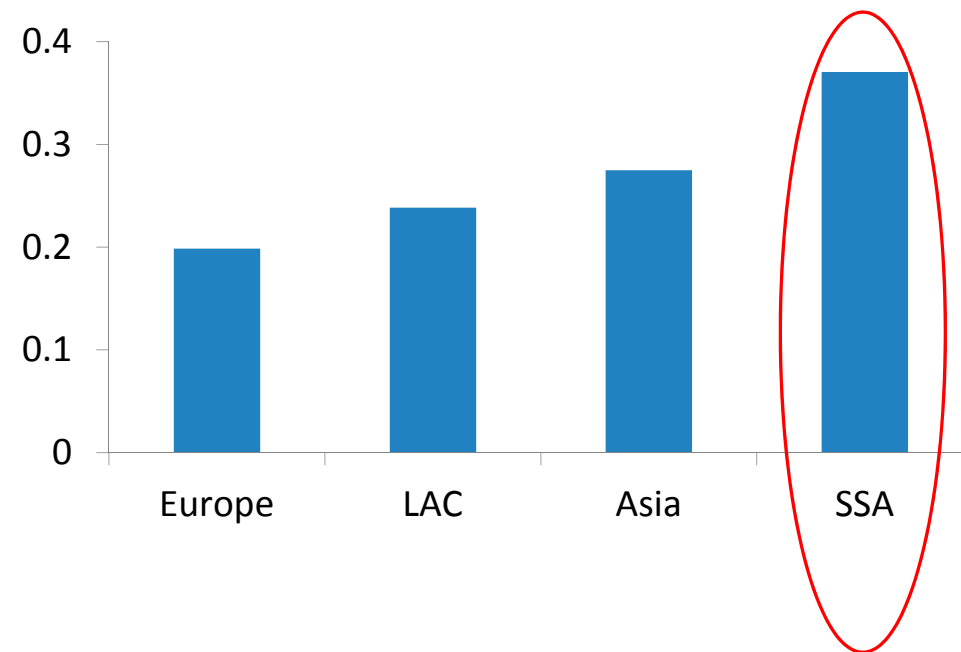
China spillovers across the world

Peak output response to 1% shock (%)

Panel 1. Effect across income groups



Panel 2. Effect across regions



Summary Statistics

Variables	Observations	Mean	Standard Deviation
Export to China (% of GDP) (log)	3496	0.049	0.034
Value added exports to China (log)	1140	0.089	0.215
Commodity exporters	3504	5.083	6.559
Manufacturing exporters	4512	0.074	0.262
China's Industry value added (% of GDP)	4324	0.459	0.016
VIX (log)	2632	3.018	0.298

Data Sources and Definitions

Variables	Description	Source
Export to China (% of GDP) (log)	Exports from China to other countries in percent of GDP	DOTS-IMF
Value added exports to China (log)	Value added of exports to China in USD	DOTS-IMF
Commodity exporters	Commodity exporter, fuel and non-fuel	WEO
Manufacturing exporters	Export earnings from manufacturing	WEO
China's Industry value added (% of GDP)	Industry value added in percent of GDP in China	DOTS-IMF
VIX (log)	VIX index	