

# Changing Patterns of Global Trade

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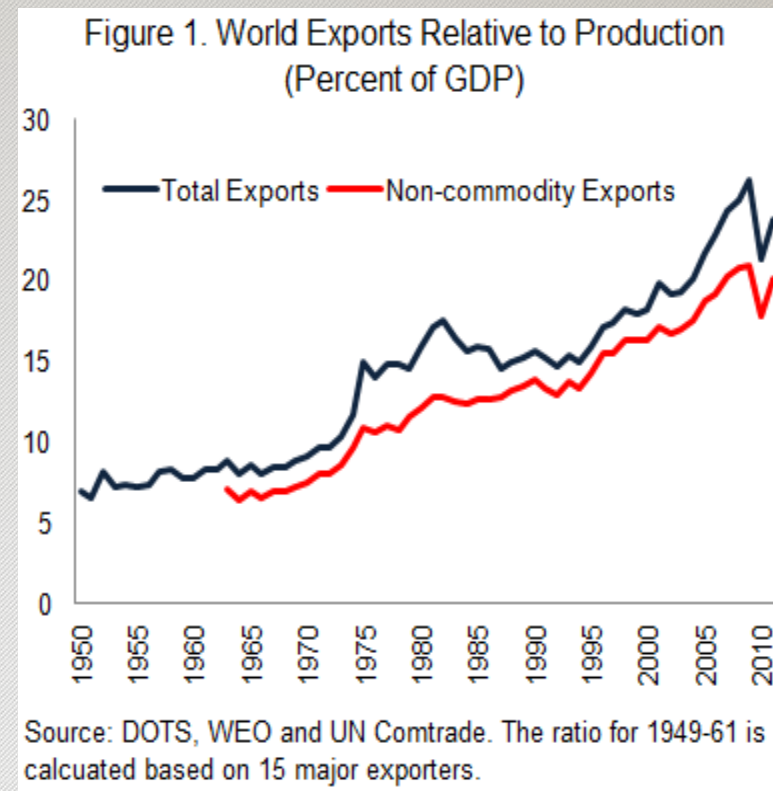
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# Global trade has grown significantly....

- World exports 26 percent of GDP in 2008
- Export growth driven by three (inter-related) factors:
  - Trade liberalization
  - Rise in vertical specialization
  - Income convergence





# Outline

## Three analytical approaches:

- Network analysis
- Value-added based analysis
- Rebalancing analysis based on a partial equilibrium approach



# Interconnectedness (1)

## Network analysis—two stage process

- Ranking by size and interconnectedness indicators
  - Size: exports, imports, overall trade, overall trade in percent of GDP
  - Interconnectedness: in-degree, closeness, betweenness, prestige
- Overall composite index =  $0.8 \text{ size} + 0.2 \text{ interconnectedness}$

# Interconnectedness (2)

Table 2. Jurisdictions with Systemically Important Trade Sectors: 1999-2009

1999				2009			
Jurisdiction	Interconnectedness			Jurisdiction	Interconnectedness		
	Overall Rank 1/	Size Rank	Rank 2/		Overall Rank 1/	Size Rank	Rank 2/
Germany	1	2	2	China,P.R.: Mainland	1	1	1
United States	2	1	6	United States	2	1	3
France	3	3	2	Germany	3	3	2
Japan	4	3	5	Netherlands	4	6	3
United Kingdom	5	5	2	Japan	5	4	8
Netherlands	6	8	1	France	6	5	6
Italy	7	7	7	Italy	7	7	7
Canada	8	6	12	United Kingdom	8	8	5
China,P.R.: Mainland	9	9	8	Belgium	9	9	11
Belgium	10	11	9	Korea, Republic of	10	10	10
China,P.R.:Hong Kon	11	9	18	Canada	11	12	13
Korea, Republic of	12	13	10	China,P.R.:Hong Kon	12	10	20
Spain	13	14	11	Spain	13	14	11
Switzerland	14	16	13	India	14	17	9
Singapore	15	14	22	Singapore	15	13	22
Malaysia	16	16	21	Russian Federation	16	16	21
Sweden	17	18	17	Switzerland	17	18	17
Thailand	18	22	16	Thailand	18	20	15
Denmark	19	24	15	Brazil	19	22	14
Mexico	20	12	44	Malaysia	20	20	19
India	21	25	14	Australia	21	19	29
Brazil	22	23	19	Sweden	22	25	17
Austria	23	19	29	Mexico	23	15	44
Ireland	24	20	27	Austria	24	24	25
Australia	25	21	25	Turkey	25	29	15

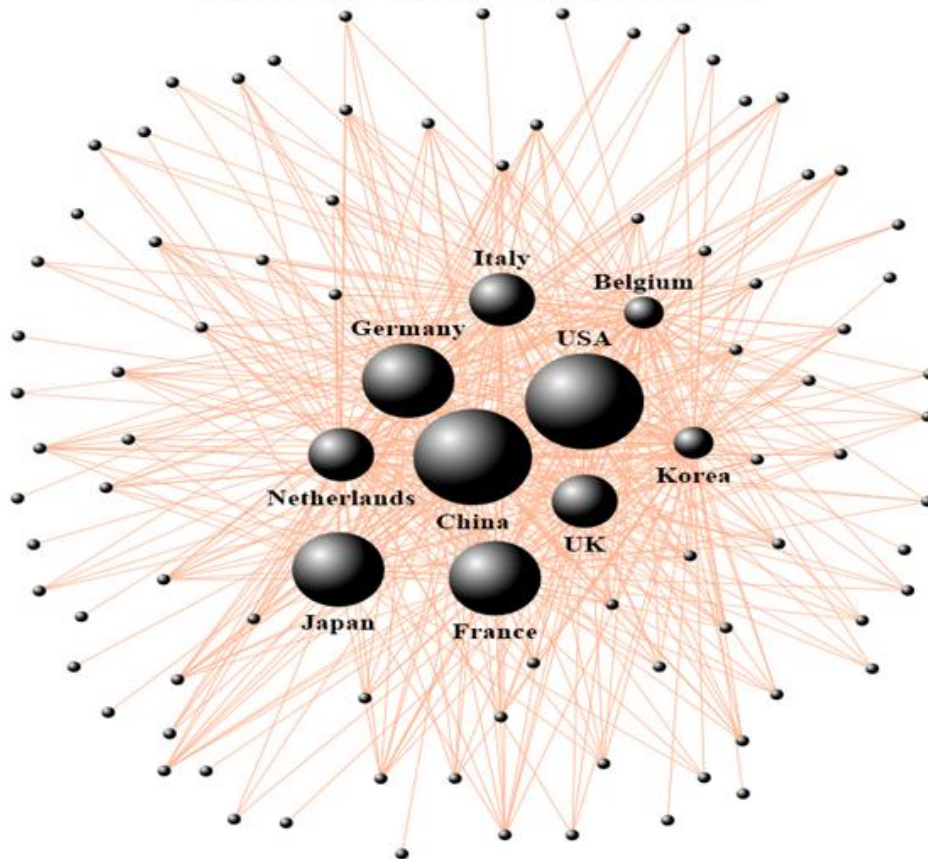
Source: Fund staff estimates.

1/ Weighted average of the size and interconnectedness rankings using a 0.7/0.3 weight breakdown, respectively.

2/ Excludes links representing less than 0.1% of each jurisdiction's GDP.

# Interconnectedness (3)

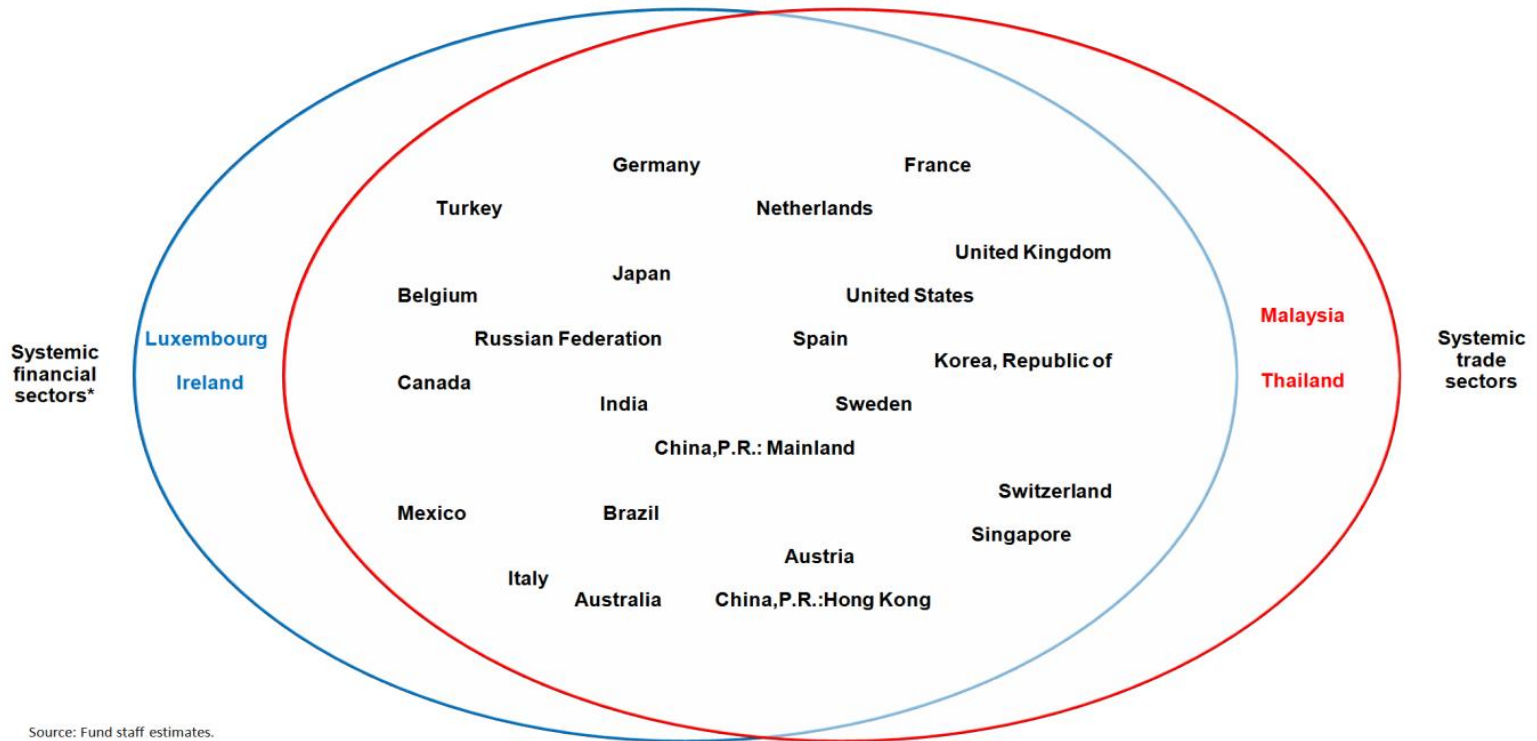
Box Figure 1.1. The Global Trade Network, 2009



Source: DOTS and Fund staff estimates.

# Interconnectedness (4)

Figure 8. Jurisdictions with Systemic Trade and Financial Sectors



Source: Fund staff estimates.

\* As identified in SM/10/235, Supplement 1, 8/27/2010

# Global Supply Chains (1)

- Vertical specialization has increased since mid-1990s....
- Contribution of FVA to exports growth also rising

Table 1. Share of Foreign Value Added (FVA) in Gross Exports

	HIY (2001) <sup>1</sup>		Update <sup>2</sup>	
	1970	1990	1995	2005
FVA share of gross exports	0.18	0.24	0.27	0.33
Growth in FVA share		31.3		21.5
Contribution of FVA exports to growth in exports/GDP		32.5		55.9

Source: Fund staff estimates using OECD input-output tables.

<sup>1</sup>Hummels, Ishii, and Yi (2001). 28 countries are included in HIY: Australia, Canada, China, EU15, Hong Kong SAR, Indonesia, Japan, Korea, Mexico, Taiwan Province of China, Malaysia, Singapore, Thailand,

<sup>2</sup>34 countries included in the update are: EU-15, Australia, Brazil, Canada, Switzerland, China, Czech Republic, Hungary, Indonesia, India, Israel, Norway, New Zealand, Poland, Russian Federation, Slovak Republic, Taiwan Province of China, Turkey, and the United States.





# Global Supply Chains (2)

- **Advanced economies upstream...**
- **EMEs downstream**

Table 3. Measures of Vertical Specialization across Borders: 2004

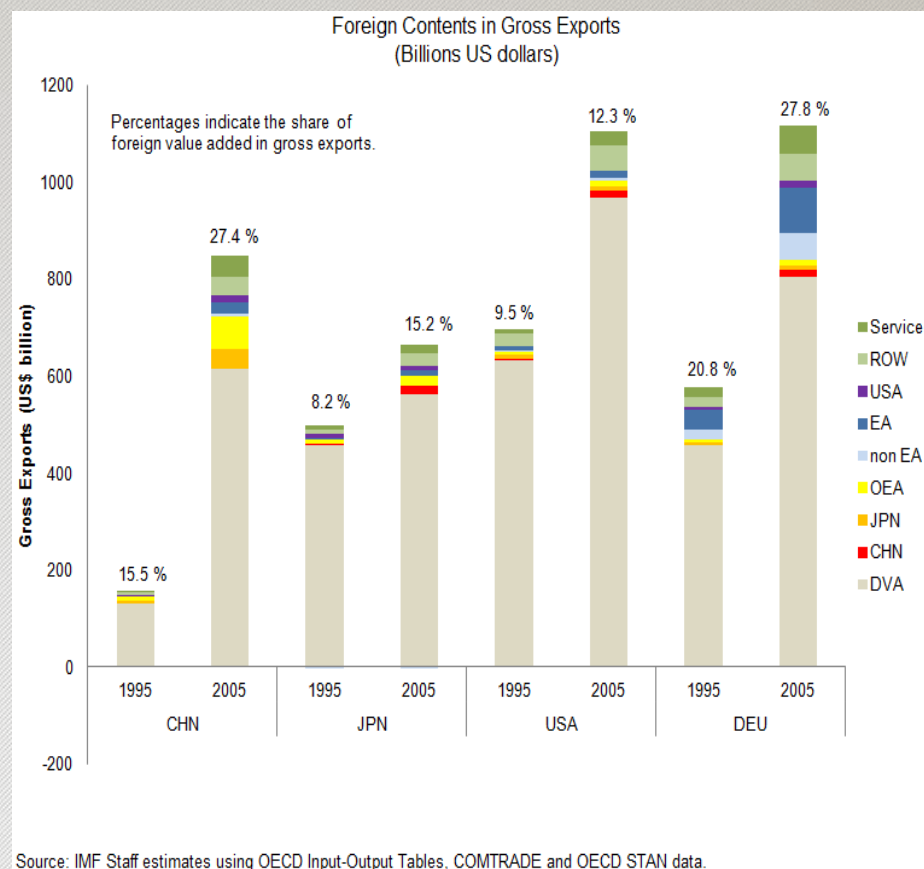
(1) Country	(2) Imported contents embodied in gross exports	(3) Indirect exports sent to third countries <sup>1</sup>	(4) Upstream or downstream position, (3)/(2)
<b>Advanced economies</b>			
EU-15	11.4	20.9	1.8
Japan	12.2	30.8	2.5
United States	12.9	26.9	2.1
<b>Asian Newly Industrialized Countries</b>			
Korea	33.9	23.1	0.7
Hong Kong	27.5	19.5	0.7
Taiwan	41.1	27.2	0.7
<b>Emerging</b>			
China	35.7	12.5	0.4
EU accession countries	30.8	11.3	0.4
Mexico	48.0	10.0	0.2

Source: Koopman and others (2010).

<sup>1</sup> Includes indirect exports that return to home country.

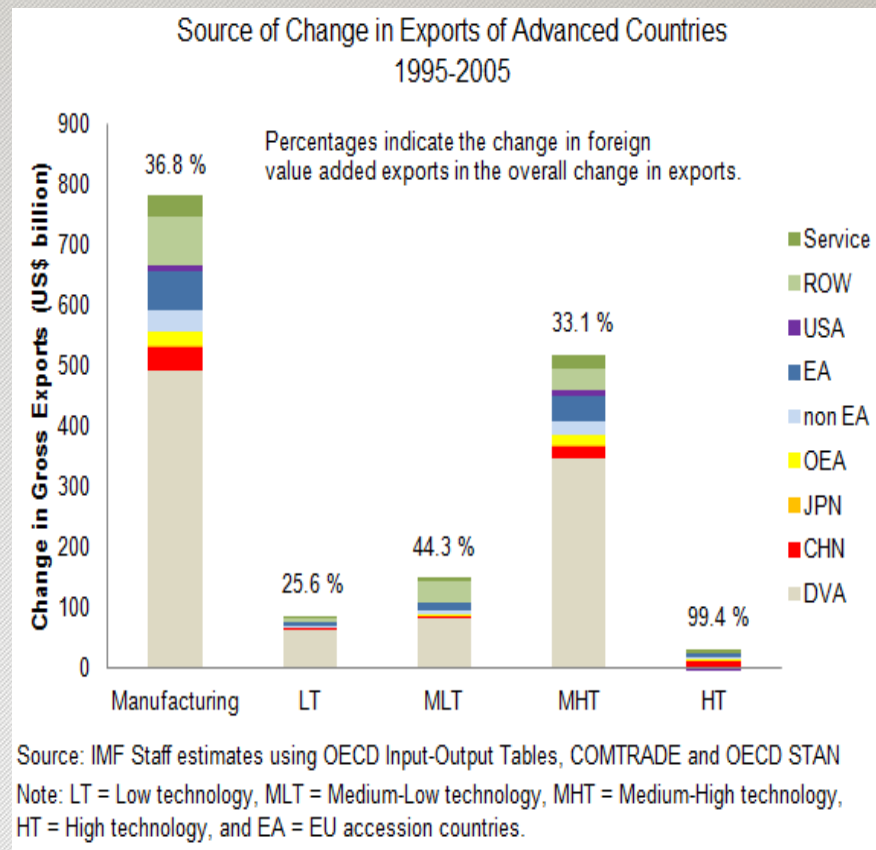
# Global Supply Chains (3)

- Vertical specialization increased especially for China...
- ....associated with regional concentration
- ...and rising share of Chinese FVA in advanced economies' exports



# Global Supply Chains (4)

- Growth in high technology exports in advanced economies entirely due to FVA....
- China's share of FVA is high in exports of high and med-high technology products



# Global Supply Chains (5)

## Regional characteristics:

- Dependence on regional power house
- Extent of processed value added flowing back to hub



Importance of upstream country in supply chain resilience to shocks

	Hub's VA Contained in Gross Exports		
	Total	In imports from the hub <sup>2</sup>	In imports from the neighbors <sup>1</sup>
China	8.0	6.8	1.2
Mexico	31.3	31.0	0.3
EU accession	17.5	17.3	0.2

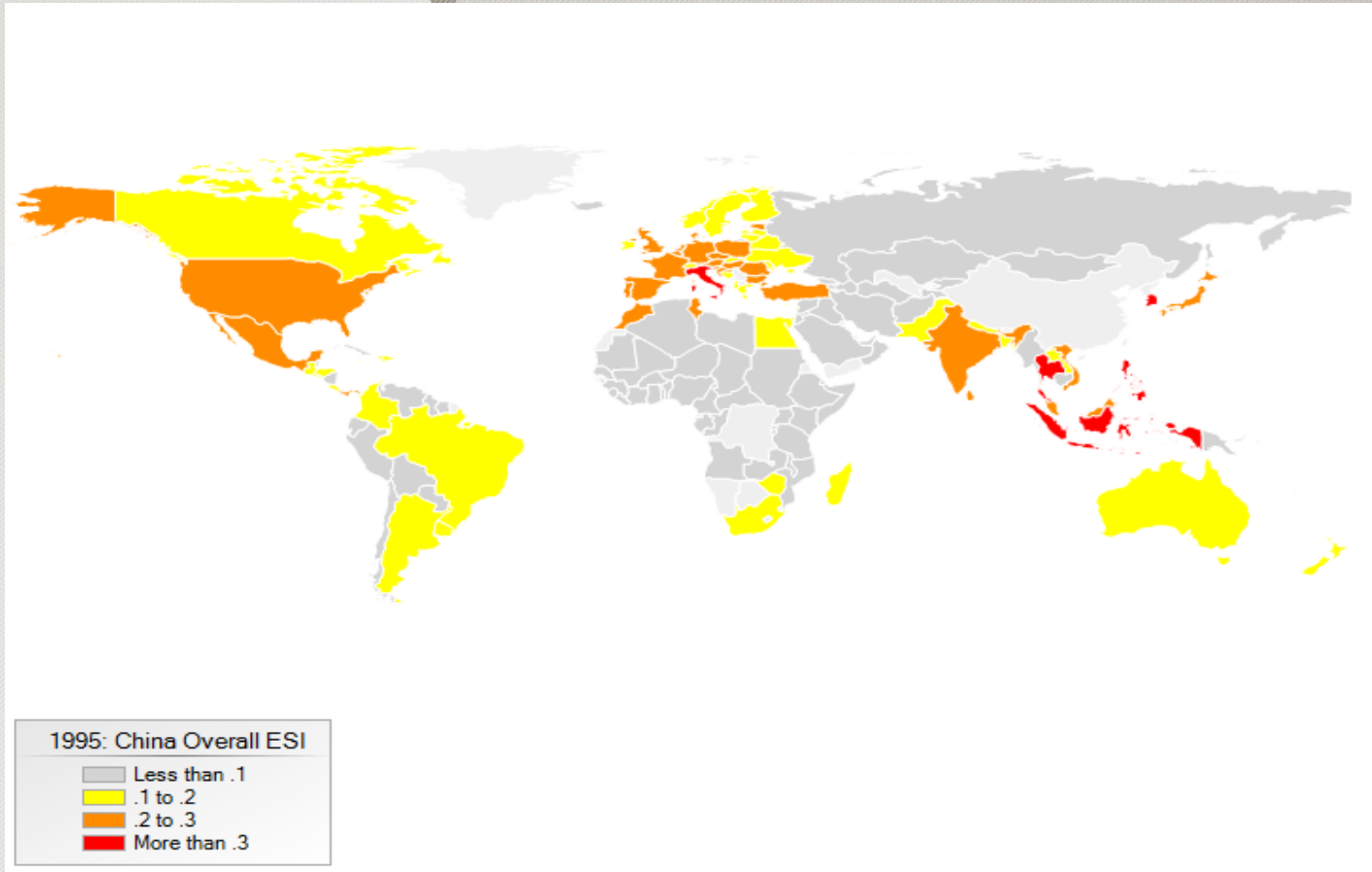
Source: IMF Staff estimates using Koopman and others (2010).

<sup>1</sup> For China, Australia, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, Vietnam, and the rest of E. Asia are included; for Mexico, Canada, Brazil, and Latin America are included; and for EU accession countries, EFTA, and Russia are included.

<sup>2</sup> For China, Mexico, and EU accession countries, hubs are Japan, the United States, and the EU respectively.

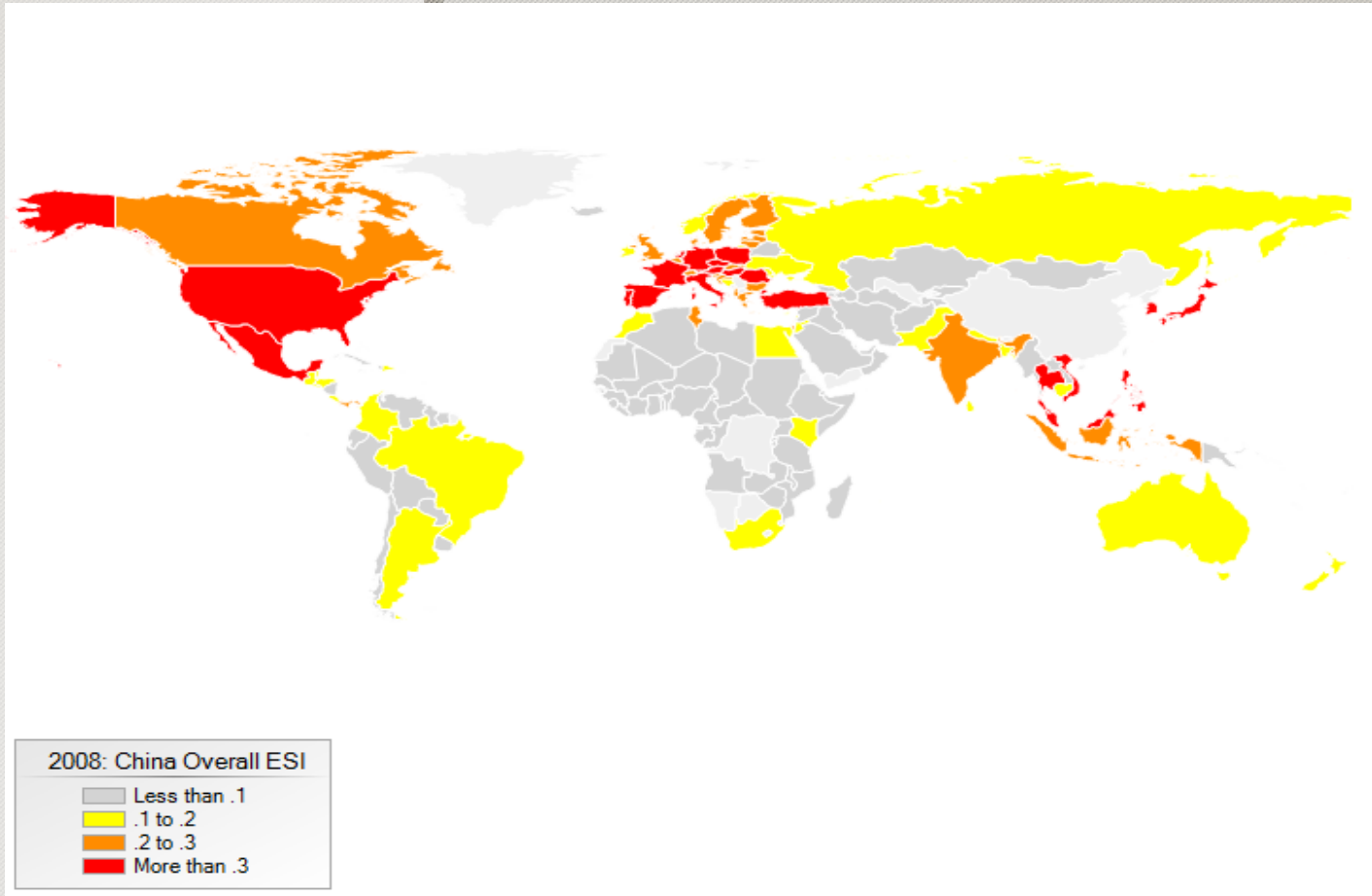


# Rising export similarity between EMEs and advanced economies...



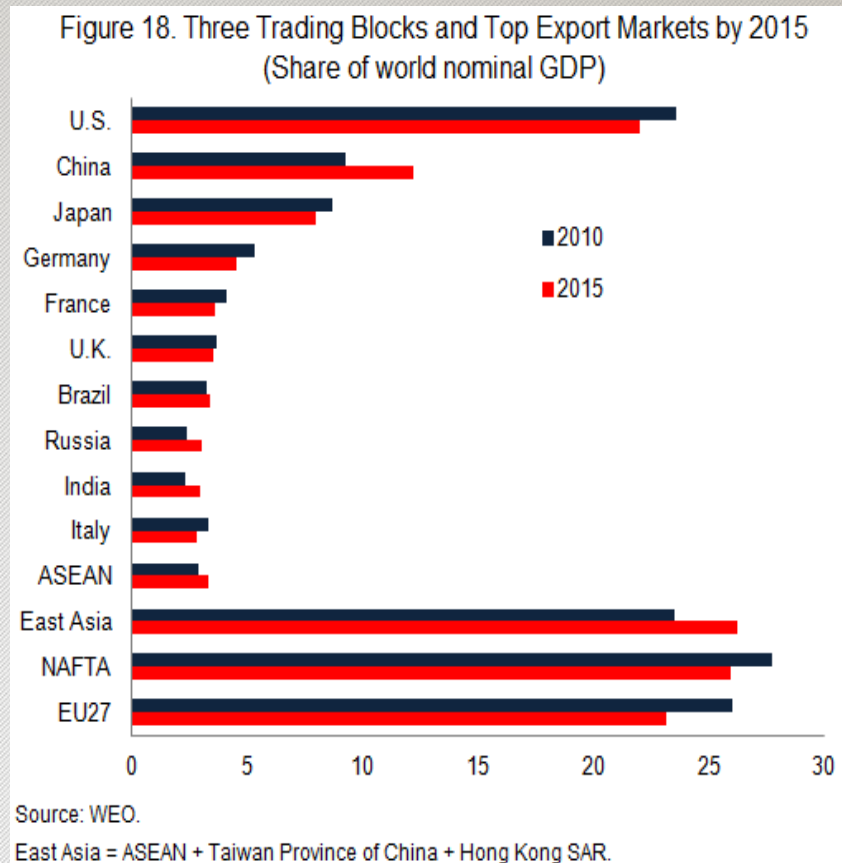


# Rising export similarity between EMEs and advanced economies...



# Implications for Trade Outlook

- Integration of rapidly growing EMEs likely to shift sources of global demand away from advanced economies
- Emergence of global supply chains may have changed the way trade responds to relative price changes





# Rebalancing: Model (1)

## Model

- Simple model combining partial equilibrium approach with I-O analysis to analyze the response of sectoral trade flows to changes in relative prices

## Two-steps

- Differences in import demand and substitution elasticities, and in imported content in production, result in shifts in sectoral trade structure;
- I-O tables to determine change in composition of import demand due to shift in export structure





# Rebalancing: Model (2)

## Data

- Imports at the 6-digit level 162 countries in COMTRADE
- Highly disaggregated micro-level trade elasticities: import demand elasticity HS 6-digit (Kee et al, 2008); substitution elasticity HS 2-digit (Broda and Weinstein, 2006)

## Simulation

- United States, Japan (10-percent depreciation); China and Euro Area (10-percent appreciation)

# Rebalancing: Aggregate Results

- Changes in relative prices result in sizable long-run responses in trade flows and rebalancing effects
- A downstream position in a supply chain cushions impact of relative price change on exports and imports
- Imperfect exchange rate pass-through likely to mitigate adjustment in trade flows to exchange rate changes
- Adjustment in trade flows gradual given high fixed costs in production and trade relationships

Table 6. Simulated Long-run Impacts of Relative Price Shocks on External Balances Based on 2008 Trade (Percent of national GDP, unless otherwise noted)

	Pre-shock	Post-shock <sup>1</sup>		Simulated impact (Percent change)	
		Perfect pass-through	Imperfect pass-through <sup>2</sup>	Perfect pass-through	Imperfect pass-through <sup>2</sup>
<b>Simulation 1: China</b> (Assumption: 10 percent appreciation)					
Current Account Balance	9.6	5.9	7.1		
o/w Merchandise Trade Balance	8.0	4.2	5.4		
Exports	31.7	28.9	30.0	-10.9%	-7.7%
Imports	-23.8	-24.7	-24.6	1.7%	1.3%
<b>Simulation 2: Euro Area</b> (Assumption: 10 percent appreciation)					
Current Account Balance	-1.7	-4.7	-3.9		
o/w Merchandise Trade Balance	-0.6	-3.6	-2.8		
Exports <sup>3</sup>	17.0	15.1	15.7	-12.7%	-8.9%
Imports <sup>3</sup>	-17.5	-18.6	-18.5	4.5%	3.7%
<b>Simulation 3: Japan</b> (Assumption: 10 percent depreciation)					
Current Account Balance	3.2	6.3	5.6		
o/w Merchandise Trade Balance	0.8	3.9	3.2		
Exports	15.3	17.5	16.7	17.0%	12.0%
Imports	-14.5	-13.5	-13.5	-4.5%	-4.5%
<b>Simulation 4: United States</b> (Assumption: 10 percent depreciation)					
Current Account Balance	-4.7	-2.4	-3.3		
o/w Merchandise Trade Balance	-5.8	-3.5	-4.4		
Exports	9.1	10.2	9.9	13.7%	10.4%
Imports	-14.9	-13.8	-14.3	-6.7%	-2.7%
<b>Memorandum items</b> (in USD billions):					
Nominal GDP <sup>4</sup>					
China	4,520	4,417			
Euro Area	13,616	13,374			
Japan	4,887	4,992			
United States	14,369	14,519			

Sources: WEO, DOTS, and Fund staff estimates.

<sup>1</sup> Trade levels implied in the long run by simulated relative international price shocks are in absence of other shocks.

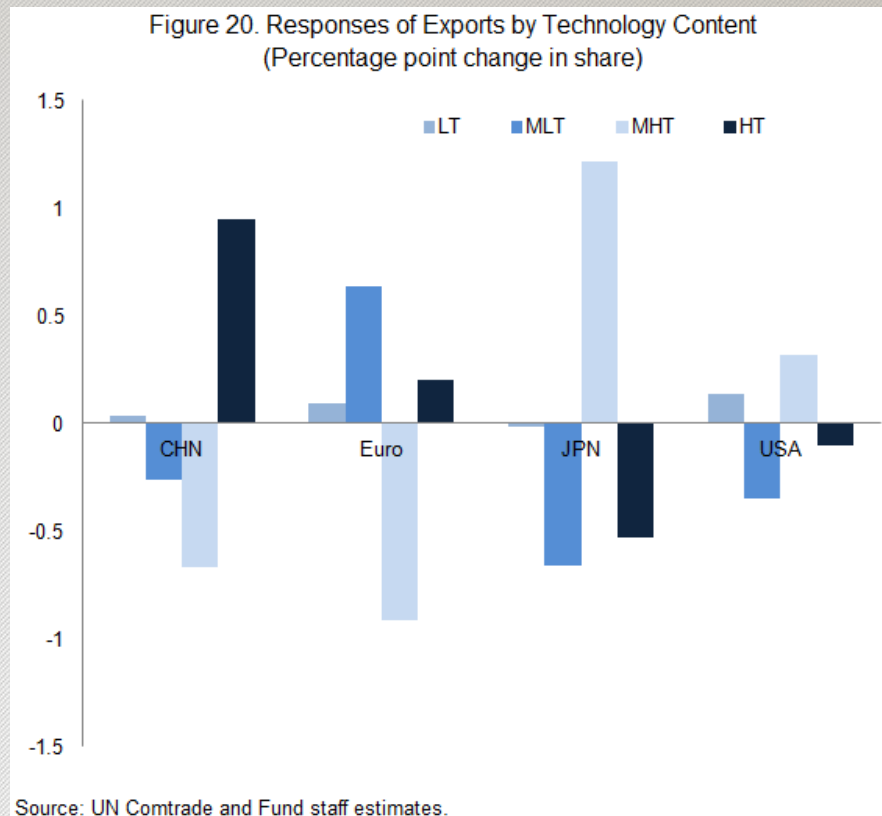
<sup>2</sup> Calculated using exchange rate to domestic price pass-through elasticities estimated by Goldberg and Campa (2005) and restricted to range from 0 to 1. The elasticity for simulation countries on the export side is calculated as a weighted average of import partners' individual elasticities.

<sup>3</sup> Euro Area trade data was obtained from the IMF Direction of Trade Statistics.

<sup>4</sup> Post-shock GDPs reflect changes due to changes in exports under perfect pass-through (see Appendix VI for more detail).

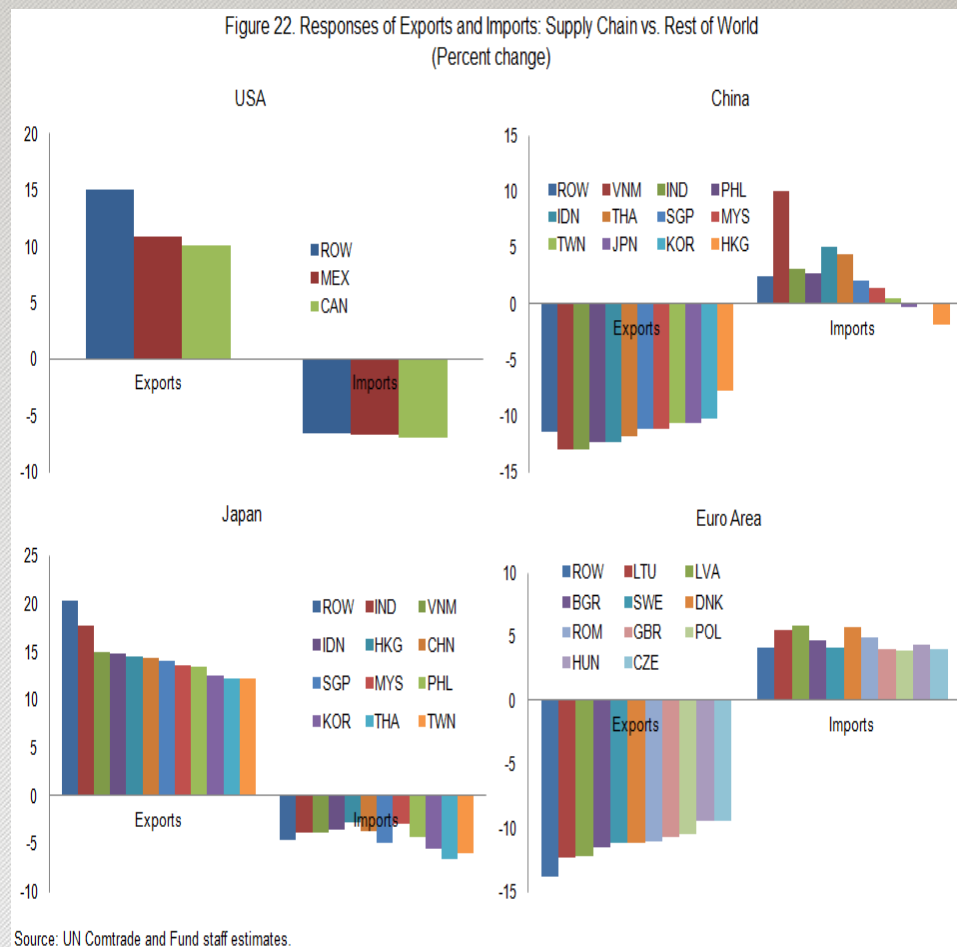
# Rebalancing: Sectoral Effects (1)

- An appreciation results in an increase in the share of high-technology exports in China and to a lesser extent in the Euro Area...
- A depreciation results in important shifts in the share of medium-high-technology exports in Japan and the United States



# Rebalancing: Sectoral Effects (2)

- Exports to supply chain partners are broadly resilient to relative price changes
  - cost of breaking up trade relationships may be particularly large in a supply chain
  - simulation countries dominant players in their regional supply chains in terms of volume and value of exports
- ... but suppliers of intermediates can be impacted severely when exports fall in response to exchange rate appreciation





# Policy Implications

- Increased interconnectedness strengthens trade spillover channels
- Growing importance of global supply chains further increases the international transmission of shocks, including policy-induced ones
- Rebalancing effects are relatively small in China due to its downstream position
- Real exchange rate shifts of the magnitude considered would not result in substantial reorganization of trading networks and production chains



# Future Research

- **Global Supply Chains 2.0**
  - REER using value added trade data
  - Trade interconnectedness using value added data
  - Demand spillovers along supply chain countries
  - Effects of demand fluctuations on protectionist pressures
- **Cluster-based surveillance**

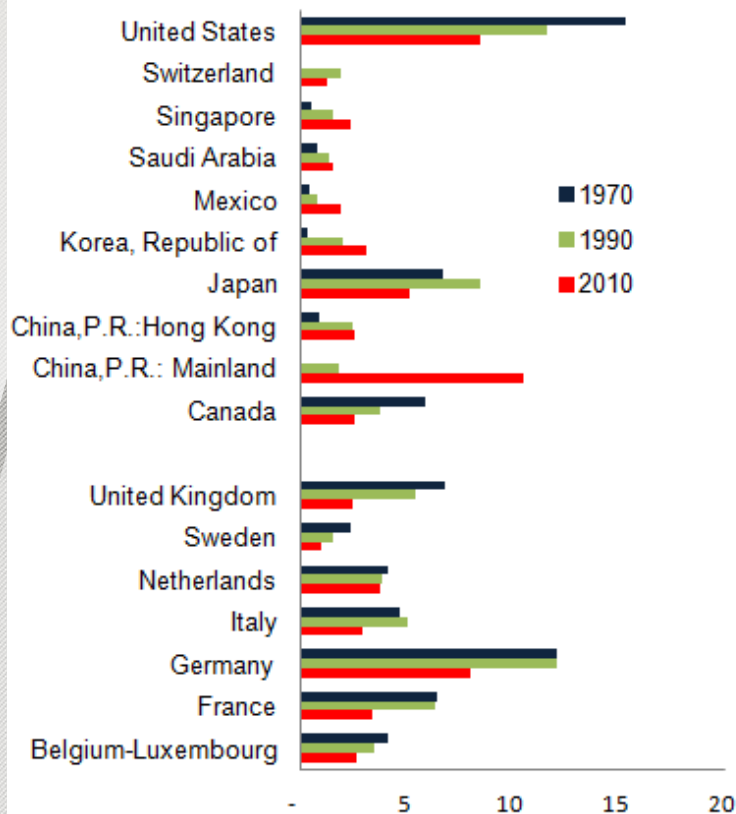


**Thank you**



# EMEs important players in global trade...

Figure 2. Exports of Key Players in International Trade  
(Percent of World Trade)



Source: DOTS.



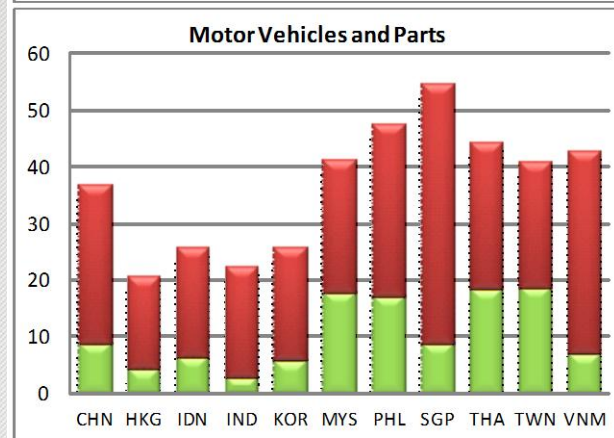
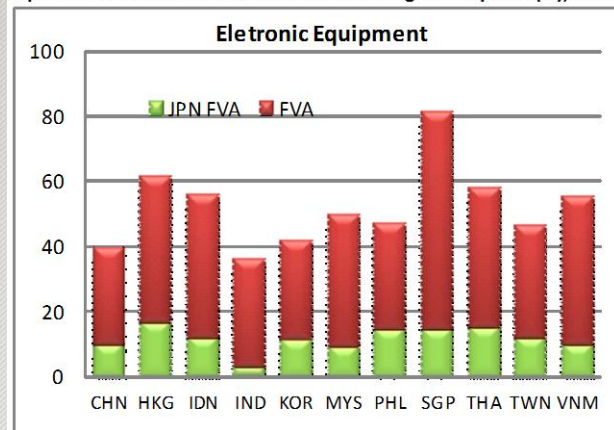
# Optional

- Japan is an important source of FVA in many Asian countries' exports



a disruption in production of sophisticated intermediate inputs may test resilience of supply chains

Japanese contribution to FVA in countries' gross exports (%), 2004



Source: Koopman and others (2010).