

Trade and Global Value Chains

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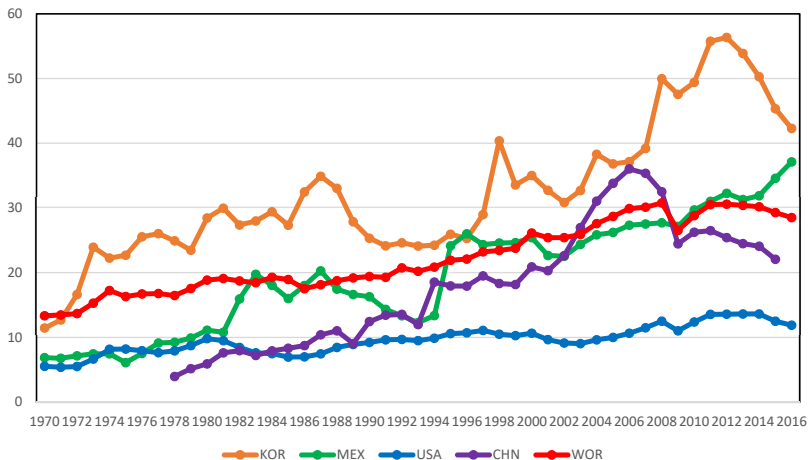
¹The views expressed here are those of the author and are not necessarily reflective of views of the Federal Reserve Banks of Dallas and Minneapolis, and the Federal Reserve System.

Topics

- Growth of International Trade and Global Value Chains
- Growth of Global Value Chains and Inequality

Growth in International Trade

Export Share of GDP (%)



- World exports as share of GDP was about 2.5 times higher in 2008 than in 1970.

Source: OECD, World Bank

Growth of Global Value Chains

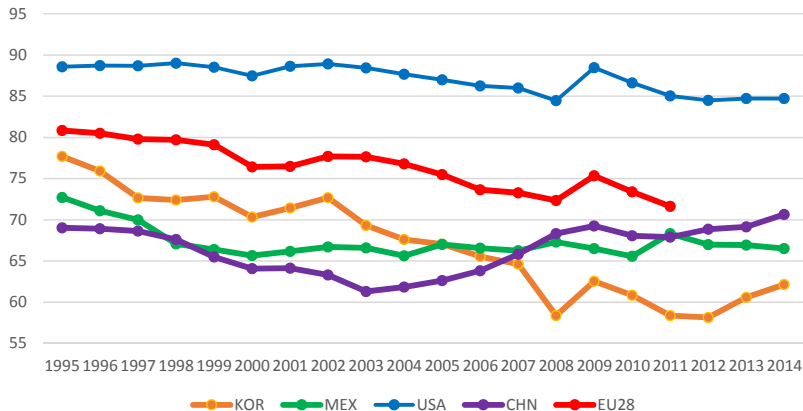
- Key feature of the trade growth has been increase in “vertical specialization” or “global value chains”
 - ▶ One definition of global value chains: Imported intermediate inputs used to produce output, and some fraction of output is subsequently exported
 - ★ Good’s production process involves multiple national border crossings
- Two measures of global value chains consistent with above definition:
 - ▶ Value-added exports
 - ▶ “Upstreamness” of a country or industry from final demand

Value-Added Exports

- Measures domestic value-added embodied in exports
 - ▶ Usually reported as share of total (gross) exports
 - ▶ $1 - \text{value-added export share} = \text{extent of foreign value-added embodied in domestic goods that are exported (i.e., multiple national border crossings)}$
- Calculated with data from input-output tables
 - ▶ If country relies heavily on special economic zones (SEZs) for exports, calculations based on input-output tables may underestimate value-added exports

Global Value Chains: Value-Added Share of Exports

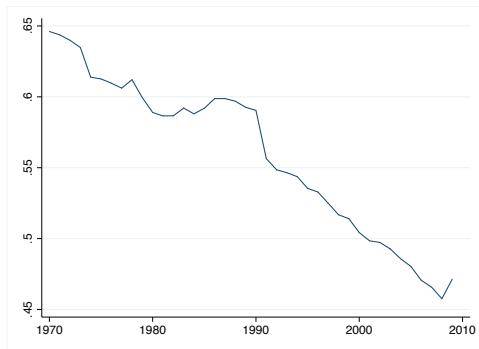
Value-Added Share of Exports (%)



- Value-added share of export has been declining in most countries, indicating increased prevalence of global value chains (GVCs)

Source: OECD

Global Value Chains: Value-Added Share of Exports in Manufacturing



- World-wide, between 1970 and 2009, value-added share of:
 - ▶ manufacturing exports fell from about 65 percent to 47 percent.
 - ▶ total exports fell from about 85 percent to 75 percent.

Source: Johnson and Noguera (2016)

Upstreamness of Production

- Measures “distance” of production from final demand (e.g., consumption or investment)
- Greater upstreamness implies greater fragmentation of production, which is consistent with increased global value chains
- Calculated with data from input-output tables
- Antras and Chor (2017) report that upstreamness in the world increased by about 10 percent between 1995 and 2011

Global Value Chains and Inequality

- This section draws from research with Eunhee Lee (U. of Maryland): “Global Value Chains and Inequality with Endogenous Labor Supply”

Global Value Chains and Inequality: Motivation

- GVCs are increasingly prevalent in global economy
- Past empirical research has found that when pairs of countries reduce trade barriers with each other, typically both countries experience increase in skill premium
 - ▶ These findings are inconsistent with dominant theoretical framework and mechanism (Heckscher-Ohlin and Stolper-Samuelson)
- GOAL: Develop theoretical framework with GVCs and endogenous labor supply, and use it to evaluate quantitative effect of lower U.S.-China trade barriers (from China joining WTO) on skill premium

Global Value Chains and Inequality: Framework

- Production occurs in multiple, sequential stages
 - ▶ Occupational inputs (value-added) and composite intermediate good needed to produce each stage.
 - ▶ Downstream stages also require upstream stage good as an input
- Workers vary in their type, e.g., college-educated, non-college educated. Within each type they have skills in different sectors and occupations – they choose sector and occupation that maximizes their wage income (Roy model)
- Each stage can be sourced in a different country
 - ▶ International trade is subject to trade barriers (political, technological, etc.)
 - ▶ Comparative advantage determines which country produces which stage of which good and exports it to which destination
- Model delivers implications for skill-premium (college wage divided by non-college wage) in response to reductions in trade barriers
 - ▶ Framework has several transmission mechanisms operating through comparative advantage across goods, sectors, and workers.

Global Value Chains and Inequality: Taking the Model to the Data

- Three “countries”: U.S., China, and Rest-of-World (ROW)
- Two stages of production
- Three sectors: Agriculture and mining, manufacturing, and services
- Five occupational inputs (varying by tasks characteristics)
- Two worker types (varying by education)
- Parameters calibrated to be consistent with other studies, as well as with key facts about U.S., China, and Rest-of-World (in each sector and for each occupation)
- Benchmark counterfactual: Reduce bilateral U.S.-China trade costs by 50 percent – designed to capture China’s entry into WTO

Global Value Chains and Inequality: Benchmark Result and Intuition

Table: Baseline Change in the Skill Premium (%)

	China	USA	ROW
Baseline	1.81	0.95	-0.08

For China:

- Sector-level comparative advantage implies decline in skill premium:
 - ▶ China has comparative advantage in manufacturing sector production.
 - ▶ Less educated workers in China have comparative advantage in manufacturing.
- Stage-level comparative advantage implies increase in skill premium:
 - ▶ China has comparative advantage in downstream production
 - ▶ Downstream production in China is high-skilled occupation intensive
 - ▶ Highly educated workers have comparative advantage in high-skilled occupations

Global Value Chains and Inequality: Discussion

- Our results show that stage-level effect dominates sector-level effect in China
- For U.S., both sector-level comparative advantage and stage-level comparative advantage lead to increase skill premium
- Hence, owing to presence of GVCs, when trade is liberalized, both countries specialize in their comparative advantage stages, and these specialization patterns – in conjunction with usual sectoral specialization – lead to increase in skill premium in both countries
- Skill premium increases implied by our model can account for about one-third of increase in China's skill premium between 2000 and 2007, and about one-fifth of increase in U.S. skill premium in the 2000s.

Conclusion

- Many of world's important trade issues involve GVCs in some way
 - ▶ Trade liberalization can lead to increased skill premium in both countries if mediated by GVCs
 - ▶ Owing to GVCs, U.S. protectionist policies vis-a-vis Canada and Mexico could backfire
 - ★ Work by de Gortari (2018) indicates about half of U.S. imports from Mexico contain U.S. value-added

Appendix 1: Global Value Chains and Inequality, Main Results

Table: Baseline and Other Counterfactual Changes in the Skill Premium (%)

	China	USA	ROW
Baseline	1.81	0.95	-0.08
No Ricardian	2.64	-2.74	2.83
Standard HO	0.54	-0.38	-0.04
Restricted Roy	6.38	0.68	-0.17
No GVC	0.42	-5.38	0.49
No Roundabout	0.81	0.60	0.02

Appendix 2: Slowdown in International Trade

World trade as share of GDP declined in 2014-2016. It is highly unusual that trade does not grow faster than GDP during period of overall positive GDP growth. Two related facts:

- China's export share of GDP has been falling since 2004, even as its share of world GDP and of world exports have continued to rise
- As countries undergo structural change, the services sector becomes more important. Services are less-traded than manufactured goods. Lewis, Monarch, Sposi, and J. Zhang (2018) shows that including for structural change is just as important as lower global trade costs in understanding the evolution of global trade shares over the past several decades
 - ▶ Possible that some of the recent trade slowdown reflects longer-term trends in structural change