The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade

David Autor, David Dorn, and Gordon Hanson, *Annual Review of Economics*, 2016

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ECON 860 – International Trade Theory
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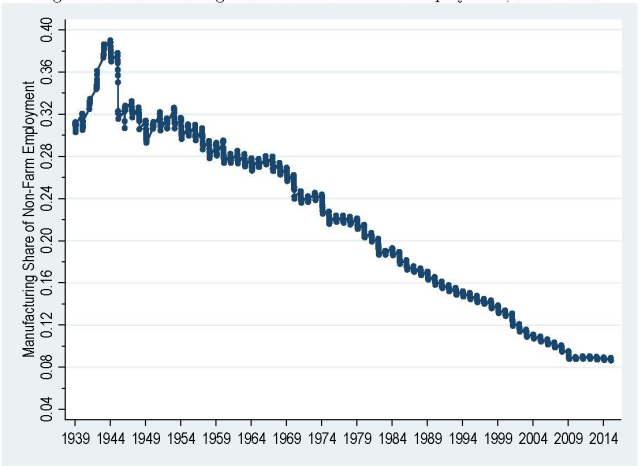
- Strong consensus in economics towards free trade. Even as evidence emerged in 1980s and 1990s of gaps between skilled and unskilled workers, this was explained empirically as more of a technology shock than a trade shock.
- Even when workers did lose their jobs due to trade, they should be able to reallocate easily to other industries. Short-to-medium run gains from trade should be positive.

Figure 1

Figure 1: Manufacturing Share of U.S. Nonfarm Employment, 1939 - 2015



Source: FRED Economic Data https://research.stlouisfed.org/fred2/graph/?g=1Gor

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Rise of Chinese Manufacturing

- Rise of China has challenged the consensus on trade and wages. Distributional effects (theory has recognized) and adjustment costs (theory has tended to downplay) have been relatively large.

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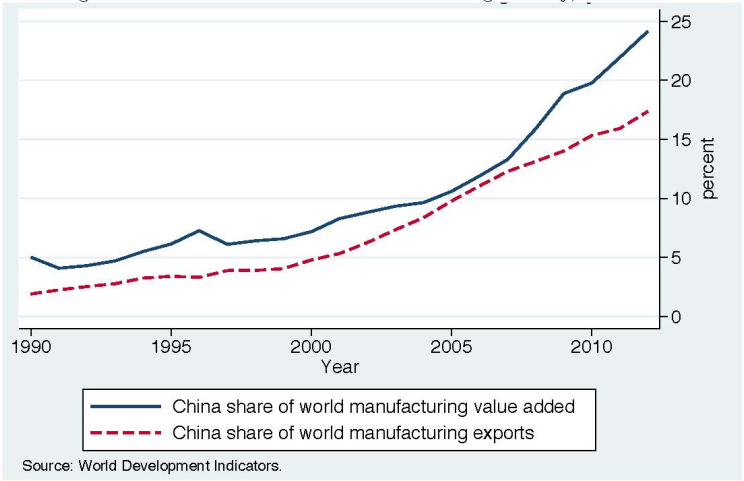
- Many pundits were pessimistic about China's chances as recently as late 1980s due to turmoil from Tiananmen Square incident
- Reformers gained upper hand in early 1990s, and manufacturing activity in China exploded, especially in Special Economic Zones on the east coast. Number of SEZs increased from 20 in 1991 to 150 in 2010.
- Chinese share of world manufacturing exports grew from 2.3% in 1991 to 18.8% in 2013.

Figure 2

Figure 2: China's Share of World Manufacturing Activity, 1990 - 2012



Source: World Development Indicators.

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- The rise of China is importance both because of its magnitude and the relative paucity of natural experiments in international trade. (E.g. NAFTA was caused by foreign investment as much as it caused foreign investment.)

Why We Should Study China

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- China's relative degree of isolation under Mao, which created a lot of opportunity for China to catch up.
- Manufacturing was at the heart of its economic turn-around, as opposed to raw materials – large positive supply shock in manufacturing and large demand shock for raw materials.

Figure 3.A

Figure 3: The Evolution of China's Imports and Exports

A. Exports Minus Imports as a Share of GDP for China

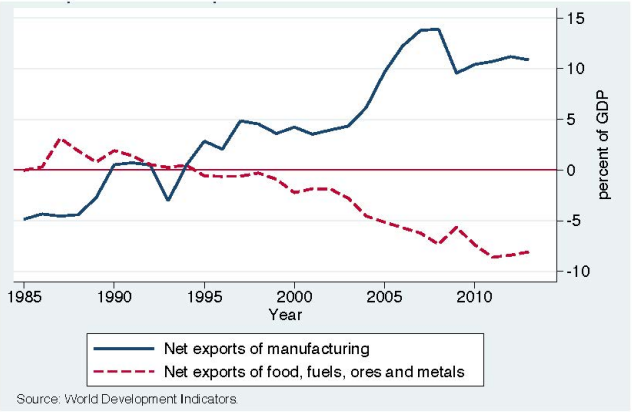
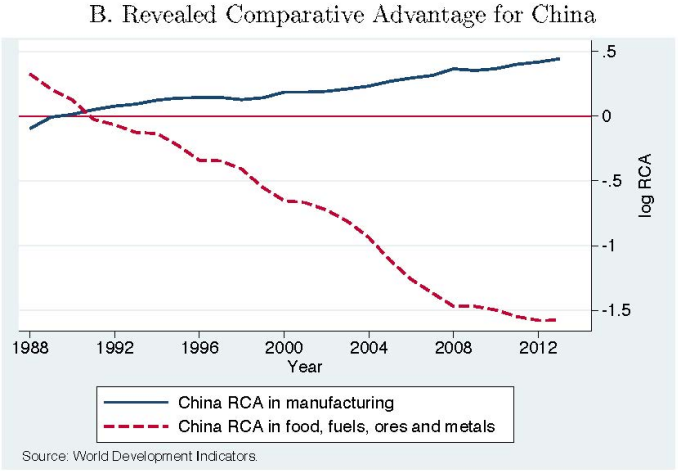


Figure 3.B


B. Revealed Comparative Advantage for China
.5
0
-.5
-1
-1.5
log RCA
1988
1992
1996
2000
2004
2008
2012
Year
China RCA in manufacturing
China RCA in food, fuels, ores and metals
Source: World Development Indicators.

The Global Factory

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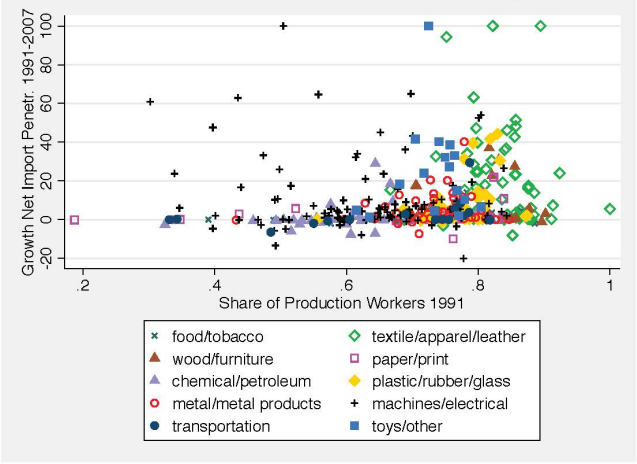
- In 1992, China moved from a comparative disadvantage to comparative advantage in manufactures, and from a comparative advantage to disadvantage in primary products.
- However, as noted by Figure 4, China's net import penetration varied substantially across industries. Because of this variation, U.S. industries, and the regions in which they locate, vary widely in their exposure to import competition from China.

Figure 4

Figure 4: ΔChina-U.S. Net Import Penetration in Detailed Manufacturing Industry, 1991 - 2007



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- WTO membership meant that China liberalized many state-owned manufacturing firms and got steadier access to raw materials, helping productivity growth.

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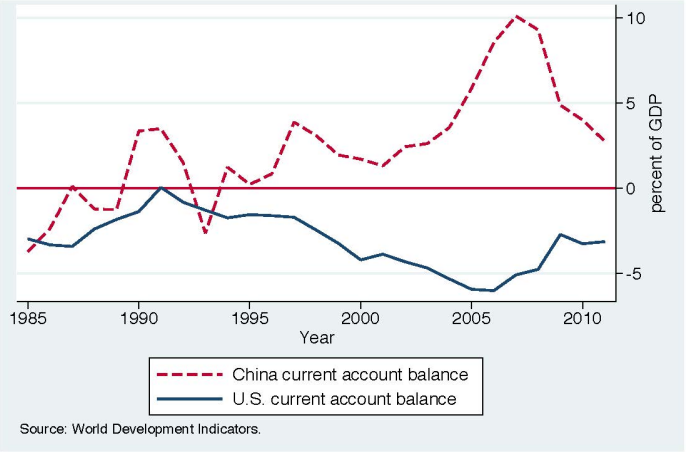
- Trade imbalances complicate the standard trade model. Under balanced trade, U.S. workers shift from import-competing to export-oriented industries.
- With a large trade deficit, workers in import competing industries have to leave the traded goods sector and possibly the workforce entirely.
- At some point in the future, Chinese savings would fall, consumption would rise, and the trade flows would go in the other direction.

Figure 5

Figure 5: U.S. and China Current Account Balances (% of GDP) 1985 - 2012



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- Model proposed in this paper follows a trend of incorporating gravity-type structures, which allows for tractable descriptions of labor mobility between regions or industries.
- If there are frictions to worker mobility, then there are potentially several margins through which trade shocks could affect labor markets.

A Bare Bones Model

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- Begin with an assumption of complete geographic labor immobility. Variation in regional exposure to foreign competition comes from differences in regional industry specializations.

Gravity-Like Trade

Trade has a gravity-type structure – total demand by the U.S. aggregate economy for traded output produced in U.S. region i is:

$$X_i = \sum_k \frac{A_{i,k}\tau_{i,k}^{-\theta}}{\Phi_k} E_k \tag{1}$$

where $A_{i,k}$ is the production capacity of industry k in region i, $\tau_{i,k}$ is an iceberg transportation cost to ship goods from region i in industry k to the U.S. market, θ is the trade-cost elasticity, E_k is aggregate U.S. expenditure on industry k, and $\Phi_k = \sum_{i'} A_{i'}\tau_{i',k}^{-\theta}$ is a competitiveness index for the U.S. market in industry k.

Change in Regional Output

If there is a change in traded output in regions that supply the U.S., we can derive the impact on region i by totally differentiating equation (1):

$$\hat{X}_i = \sum_k \phi_{i,k}\hat{E}_k - \theta\hat{w}_i + \sum_k \phi_{i,k}\hat{A}_k + \sum_k \phi_{i,k}\sum_{i' \neq c} \rho_{i',k}\hat{A}_{i',k} - \sum_k \phi_{i,k}\rho_{c,k}\hat{A}_{c,k} \qquad (2)$$

where c indexes China, $\phi_{i,k} = \frac{X_{i,k}}{X_i}$ is the share of industry k in region i's total sales to the U.S. market, and $\rho_{i,k} = X_{i,k}E_k$ is the share of region i in total U.S. expenditure on industry k. Also, assume that $\hat{A}_{i,k} = \hat{A}_k - \theta\hat{w}_i$ (i.e. local productivity changes are reflected in national productivity changes and local wage changes).

The China Shock

- We are primarily interested in the last part of equation (2), which captures the growth of China's productive capacity on traded output in U.S. region i. Rewrite this as:

$$\sum_k \phi_{i,k} \rho_{c,k} \hat{A}_{c,k} = \sum_k \phi_{i,k} \left[\frac{X_{c,k} \hat{A}_{c,k}}{E_k} \right] \tag{3}$$

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  which is the weighted average exposure of region i to changes in U.S. industry import penetration mandated by changes in Chinese production capabilities.

- Because weights $\phi_{i,k}$ vary across regions of the U.S., the exposure to Chinese traded goods varies across U.S. regions.

Identifying the Reduced-Form Impact of the China Trade Shock

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- The first term in equation (1) is $\sum_k \phi_{i,k} \hat{E}_k$, which is the regional exposure to U.S. industry demand shocks. Reduced form regressions of regional outcomes on regional trade exposure might be contaminated by U.S. product demand shocks.

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- Following Autor, Dorn, and Hanson (2013), this paper instruments for the growth in U.S. imports from China with the growth in Chinese imports in other high-income markets.

Table 1

Table 1: Imports from China and Other Developed Economies 1991 – 2007 (in Billions of 2007$), and their Correlations with U.S.-China Imports

	United States	Japan	Germany	Spain	Australia
Δ Chinese Imports (Bil$)	303.8	108.1	64.3	23.2	21.5
No. Industries with Import Growth	385	368	371	377	378
Correlation w/ U.S.-China Imports	1.00	0.86	0.91	0.68	0.96
	8 Non-US Countries	Finland	Denmark	New Zealand	Switzerland
Δ Chinese Imports (Bil$)	234.7	5.7	4.7	3.8	3.3
No. Industries with Import Growth	383	356	362	379	343
Correlation w/ U.S.-China Imports	0.92	0.58	0.62	0.92	0.55

Correlations of imports across 397 4-digit industries are weighted using 1991 industry employment from the NBER Manufacturing database.

Instrumental Variables Strategy

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- Results did not change much, so they believe that it is not a major concern.

Wage Changes from Shocks

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- One can estimate equation (2) without this term, in which case the reduced form result captures the effect on region i directly through changes in output, or indirectly through wages.
- Or, one can use $\hat{w}_i$ as a dependent variable in a regression.

Change in National Industry Productivity

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- Autor, Dorn, and Hanson (2013, 2015) note that there is near zero correlation between technological change and exposure to trade with China across U.S. local labor markets.
- So there is little to no omitted variables bias from excluding this.

Production Capacity in Other Countries

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- If these change in response to changing supply conditions from China, excluding them from a reduced-form regression still captures the effect of changes in Chinese production capacity.
- The specification in (2) does not allow for input-output linkages. The model will not capture the effect of a change in final goods production in the U.S. on production of intermediate inputs in the U.S..