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Midwest manufacturing and trade with China

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U.S. trade with China has grown dramatically in recent years. The growth in imports, in particular, has raised some challenges for domestic manufacturers competing against lower-cost Chinese production. At the same time, households benefit from falling prices for imported goods, firms benefit from falling prices on intermediate components and parts, and U.S.-domiciled multinationals benefit from selling to and investing in the burgeoning Chinese market.

1. Import penetration of Chinese goods to U.S. regions

Regions	IP level* 2001	IP level* 1997	Percent change 1997–01
East North Central	.023	.014	65.6
West North Central	.023	.014	65.0
South Atlantic	.024	.015	56.7
West South Central	.025	.016	58.9
East South Central	.027	.016	63.1
Mountain	.028	.017	63.3
Pacific	.031	.020	56.8
Middle Atlantic	.032	.021	53.1
New England	.039	.025	55.8
United States	.027	.017	59.5

*Figures are rounded to 1/1,000. IP is import penetration.

As U.S. imports from China have climbed in recent years, some domestic manufacturers have voiced concerns about competing against low-cost Chinese goods in the U.S. market. At the same time, however, U.S. households benefit from falling prices for imported goods; firms benefit from falling prices on intermediate components and parts; and U.S.-domiciled multinationals benefit from selling to and investing in the burgeoning Chinese market. This *Chicago Fed Letter* examines our growing trade relationship with China, especially as it relates to the Midwest manufacturing economy.[1]

China's growth

Although the accuracy of Chinese gross domestic product (GDP) data is questionable, there is little doubt that China is experiencing rapid growth. Reported GDP growth averaged 9%–10% annually during the 1980s and 1990s.[2] China has been able to sustain much of this growth recently, when many of the world's economies have slipped below trend.

An increased openness to trade and investment has led China's growth. Since 1990, China's exports have grown at an annual pace of 14%; imports have grown apace.[3] Foreign direct investment (FDI) in China has averaged $44 billion per year since 1995, originating from developed countries on every continent.[4]

Prior to the 1980s, very little trade and FDI could be observed between China and developed countries. However, economic reforms beginning in 1978 launched China onto a robust path of export-led industrial growth and urban development. These reform efforts reached a milestone with China's entry into the World Trade Organization (WTO) in 2001. WTO membership promises greater attractiveness for China as a domicile for FDI, along with access to the markets of other member countries. In return, China has to comply with the rules of WTO membership, including nondiscriminatory tariff schedules on imports and the protection of intellectual property.

To date, China's internal policies have favored the build-up of domestically owned, mostly state-owned, industrial plants. In addition, China has selectively

encouraged FDI, especially in manufacturing. Many of these FDI operations produce goods that serve the Chinese market, but many more are platforms to export goods back to their country of origin or to other markets. Indeed, trade statistics for China are difficult to interpret because, for one thing, re-export of goods is quite common. For some products, such as computers and other electronics, high-value-added components are shipped into China from countries such as Taiwan and Japan for further processing and ultimately re-exported. Typically, this processing takes advantage of the very low relative wages in China. This sometimes leads to double counting of underlying export values from China. From the U.S. perspective, much of what we see as imports from China—especially in electronics—has other Asian country origins embedded in its value.

U.S. trade with China

From 1997 to 2002, trade volumes (combined exports and imports) between the U.S. and China increased at an average annual pace of 12.5%, reaching $147 billion last year. In comparison, trade with America's North American Free Trade Agreement (Nafta) partner, Mexico, increased at a pace of 6.3% annually. As a result, in 2002 China became our fourth largest trading partner after Canada, Mexico, and Japan.

Both exports and imports have grown rapidly, but China's imports into the U.S. have easily outpaced U.S. exports to China. Since 1989, the nominal dollar value of U.S. imports from China has multiplied more than eightfold, reaching $125 billion in 2002, allowing China to surpass Japan for the first time. China's manufactured exports to the U.S. represented 10.8% of manufactured imports for 2002.[5]

What has been the impact of rising imports on domestic U.S. manufacturing production? We sometimes think of rising imports as displacing production at home. Rather than displacing domestic production, however, rising imports may serve rising demand for some types of goods in the home country. So too, imports can consist of intermediate components that become embodied in domestic production of a final good. To the extent that such components are most cheaply sourced overseas, they may help keep domestic production competitive for the final good in the domestic market, or even allow domestic producers to export the final good to third country markets.

To understand the extent that domestic production is being superceded by imports, economists measure "import penetration" as the ratio of imports from abroad relative to the domestic market, where the domestic market includes goods purchased in the home country, regardless of whether the goods are produced at home or abroad. We use an index that ranges between zero and one, with a value of zero meaning that all domestic purchases are produced at home and a value of one meaning that all domestic purchases are produced abroad. For 2001, we estimate China's manufactured imports to be 2.7% of the U.S. domestic market—defined as domestic production plus imports—up from .4% in 1989.[6]

There are several reasons to believe that the growth in import penetration overstates the potential displacement of U.S. manufacturing production by imports from China. This is especially so when we consider that, owing to China's economic growth, *exports* from the U.S. to China have also expanded, lifting domestic production beyond what it otherwise would have been. Exports to China grew from 0.5% of U.S. manufacturing output in 1989 to 1.5% by 2002.[7] In addition, low-cost imports from China have restrained price increases and raised the real income of U.S. households, allowing them to purchase more goods—both domestic and foreign. An additional factor that is not easy to quantify is the extent to which China's exports to the U.S. are substituting for exports that would otherwise have entered the U.S. market from alternative low-cost countries.

U.S. manufacturing output growth has been weak, and year-over- year job growth in manufacturing has been negative for over three years. However, the bulk of the current U.S. manufacturing weakness cannot be attributed to rising imports and outsourcing. The overhang of excess capital goods investment and other production capacity continues to weigh on the pace of orders for new manufactured goods, as does the shallow U.S. economic recovery from the 2001 downturn. Moreover, flagging economic growth in developed countries in Asia, South America, and Europe continues to hold back U.S. exports. Most importantly, over the longer term, manufacturing jobs have grown at a slower pace than jobs in services, largely because productivity gains in manufacturing have exceeded those in most service industries.

China functions for Asian manufacturing companies much as Mexican *maquiladora* plant locations do for many U.S. producers.

It is also important to note that, so long as it is based on real production cost differences between the U.S. and China, import displacement frees up resources and workers in low-value production to pursue higher-value and higher-skilled activities in the U.S. economy, thereby raising average wages and living standards. Developed nations specialize in producing a rich variety of goods and services, trading with each other, and thereby sustaining mutually high standards of living. One measure of the maturity of the trade relationship between developed countries is the Grubel–Lloyd Index, which measures the degree of intraindustry trade as a proportion of all trade. Between the U.S. and the UK, France, and Canada, for example, these indexes are quite high. For the U.S. and China, the index is lower, but it climbed significantly between 1989 and 2001.[8]

China and the Midwest

How important has China's emergence as a major trading partner been for the Midwest economy? One would expect growth in China's imports to have penetrated the region's domestic markets because the Midwest economy is more highly concentrated in manufacturing than other U.S. regions.[9]

We construct measures of China's import penetration for the range of finely disaggregated U.S. manufacturing industry sectors. Then, we compare overall import penetration between the U.S. and the Midwest by weighting these industry-specific national measures of import penetration by the employment importance of each industry in the Midwest.[10] We find that the penetration of Midwest manufacturing by Chinese production remains smaller than at the national level. For 2001, we estimate Chinese trade penetration of the Midwest to be 2.3% versus 2.7% for the whole domestic U.S. market (figure 1).[11] These average levels of import penetration put into perspective that China remains, on average, a small-to-moderate player in many U.S. (and Midwest) markets for manufactured goods.

However, China has become a dominant player in individual product categories, especially those that are very labor intensive. In particular, our estimates for 2002 suggest a Chinese market share for the U.S. of over one-half for certain categories of dolls and stuffed toys, fur and leather apparel, and women's handbags.

These are not product categories in which the Midwest specializes. Still, many small Midwest manufacturers have begun to voice concerns about the difficulty of competing on price with production operations in China. These concerns may derive from several sources. In particular, the manufacturing sector is hurting in the U.S., with output and employment performing below trend since late 2000. It may also be that the Midwest's industry base has only recently begun to experience significant import competition from China (figure 1). For the 1997–2001 period, we estimate that the Midwest experienced relatively higher growth in import penetration from China than other U.S. regions—a 65.6% increase from its base, compared with 55.8% for New England, and 53.1% for the Middle Atlantic (see figure 1). Furthermore, the product categories that contributed the most to the climb in estimated import competition include "all other motor vehicle parts," a category that is of critical importance to the Midwest. Other important categories that have seen strong import growth are institutional and metal furniture (especially in Michigan), printed circuit assembly, and household appliances.[12]

To illustrate the price pressures currently being experienced by U.S. auto parts suppliers, automakers have reportedly been asking suppliers for the "China price" on their purchases.[13] Some suppliers have been asked to relocate or outsource at least some operations to China—either to better serve customers overseas or to stay price-competitive in domestic sales.

So far, overseas shifts of factories and capital from the U.S. to China have been substantial, but far from extraordinary. U.S. flows of foreign direct investment into China have climbed rapidly, doubling since the mid-1990s.[14] However, for 2002, this FDI accounted for just 8% of total FDI into China, with countries of the Pacific basin investing much more in aggregate. In particular, FDI from Hong Kong, Japan, Korean, and Taiwan accounted for 42% last year. For these countries, investment represents a way to cut costs and stay competitive. Often, their production operations involve reshipments and trade across multiple countries, with components and parts sent to China for (labor-intensive) assembly or further processing and then shipped home or exported overseas. In this way, China functions for Asian manufacturing companies much as Mexican *maquiladora* plant locations do for many U.S. producers.[15]

Likely because of its distance from the U.S., China has not tended to function as a platform for U.S. manufacturers to produce goods for the U.S market. In the latest reported year, 2000, only 13% of the sales of U.S. multinationals producing in China were shipped back to the U.S. Instead, two-thirds of their products were sold to the Chinese market. The pattern is even more pronounced for machinery and chemicals, both of which are important industries in the Midwest. However, some U.S. FDI affiliates in China may serve to contract with China-owned plants for export to the United States. This phenomenon is not reported on nor has it been investigated to date.

With its robust development and rapid growth, China has become a growing market for U.S. (and Midwest) exports. But while U.S. exports to China have grown rapidly since 1988, they as yet comprise only 1.5% of the value of U.S. manufacturing production. Some regions, such as the Far West, have parlayed their concentration in computing equipment and other electronics up to a 3.6% production share. However, the Midwest exports only .6% of its manufacturing production to China.

Conclusion

China's rapid economic growth has benefited U.S. consumers. And, for some U.S. companies, the opening up of the Chinese market represents an opportunity for growth in exports of U.S. manufacturing goods and services, or for investment and production in China. At the same time, the growth in imports from China is challenging domestic producers to lower costs to remain competitive.

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[1] We define the Midwest here as Illinois, Indiana, Michigan, Ohio, and Wisconsin, which is also known as the East North Central region.

[2] The World Bank, 2003, *ICT's China at a Glance*. Others estimate China's growth at 7%–8% per annum.

[3] ibid.

[4] Ministry of Foreign Trade and Economic Cooperation of the People's Republic of China.

[5] U.S. Census Bureau, "U.S. international trade in goods and services," No. FT-900, annual revisions issues.

[6] China's import penetration is measured as: $M(China)/(VS - X + M)$, or the ratio of Chinese imports to total domestic U.S. market, where X = all U.S. manufactured exports, M = all U.S. imports of manufactured goods, and $M(China)$ = imports of manufactured goods from China. *VS*, the value of manufactured shipments in the U.S., is reported by the U.S. Census Bureau, *Census of Manufactures* and *Annual Survey of Manufactures*.

[7] GDP by industry from the U.S. Bureau of Economic Analysis, U.S. Department of Commerce.

[8] The index is based on the ratio of net to gross trade across for each industry, averaged across all industries (at a country level):

$$GL = 1/n\,\Sigma(1 - |X_i - M_i|/(X_i + M_i)).$$

[9] As measured by GDP by industry (and gross state product for states), the Midwest concentration in manufacturing exceeded the nation by 46% in 2001.

[10] Specifically, import penetration in state i = Sum over all industries j MP^i, where $MP^i = L^{ij} \times MP^j$ and L^{ij} = state i's share of its own manufacturing employment employed in industry j, and MP^j = U.S. import penetration of good j.

State-level industry employment is drawn from the U.S. Dept. of Commerce, *County Business Patterns*, available (and used here) at the four-digit SIC (Standard Industrial Classification) level and the six-digit NAIC (North American Industrial Classification) level.

This regional weighting of national penetration ratios assumes that 1) local industries sell into the U.S. market, and 2) employment by industry accurately reflects industry production in each state.

Imports and exports by country, which are mapped from international harmonized system categories into SIC and NAIC codes, are reported at http://data.econ.ucdavis.edu/international/. Also see Robert C. Feenstra, John Romalis, and Peter K. Schott, 2002, "U.S. imports, exports, and tariff data, 1989–2001," National Bureau of Economic Research, working paper, No. 9387, December.

[11] The import penetration (IP) measure that we calculate above does not take into account the size of the manufacturing base in each region. In view of this, we weighted the regional IP by an index value based on the share of each region's overall GDP in the manufacturing sector. The import penetration thereby increased in regions with more concentrated manufacturing relative to the nation and decreased in regions with less concentrated manufacturing. The largest change was in the East North Central region; the IP measure increased by 38%, making that region's import penetration among the highest in the country. By contrast, the IP of the Mountain region decreased by 34% and ranked toward the bottom.

[12] We corroborate these numbers by examining average annual growth in U.S. imports from China for both the U.S. and Midwest (top industries are proxied by rankings of industry employment in the region). For an aggregate of the import categories for the 30 most prominent categories measured at both four-digit level and five-digit level product codes, we find greater import growth in the Midwest than in the nation.

[13] See Robert Sherefkin and David Sedgewick, 2003, "Ford, GM push vendors toward China: 'World price' frenzy threatens U.S. jobs," *Crains Automotive News*, June 23, pp.1, 38.

[14] Chinese agencies report annual FDI figures four times higher than reported by U.S. agencies.

[15] A recent theme has been that Mexico is losing favor as a location of production to China. See "The sucking sound from the East," in *The Economist*, July 26, 2003, pp. 35–36. Domestic automakers often have labor-intensive parts of their production value chain, such as the wiring of interior consoles on automobiles for example, performed in Mexico and shipped back north for final installation into the automobile.