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Geographically Disaggregated Import Data and Consumer Gains from Trade

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Abstract

This article examines the geographic concentration of manufacturing imports as they enter the United States. Variations in import shares at the U.S. Customs district level can be explained in part by the distances between the districts and the exporting countries, and in part by the districts' proximity to the U.S. consumers who will buy the imports. The patterns in the import data indicate that shipping costs within the United States affect consumption patterns for imported goods. They also identify the consumers that are likely to gain the most from trade liberalization—those living in the states closest to the most frequent ports of entry of imports. These patterns suggest that the geographically disaggregated data contain economically relevant information that could be incorporated into models of international trade.

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INTRODUCTION

Most models of international trade treat entire countries as the geographic unit of analysis. When they predict gains for consumers from an increase in import supply—for example, due to tariff liberalization—they are predicting that all consumers in the country will benefit, or at least that a representative consumer will benefit, without distinguishing between consumers who live in different parts of the country. This modeling simplification (sometimes called a *point market* assumption because it ignores the distances within the country) is a useful simplification in countries where the costs of shipping goods between different areas in the country are insignificant. However, in large and diverse countries like the United States, the impact of trade may vary significantly among regions. Evidence from commodity flows between states, including that cited in Hillberry and Hummels (2008), demonstrate that manufactured goods that are shipped within the United States do not travel far on average, probably to avoid incurring these shipping costs.[2]

Models that do not recognize the geographic segmentation of product markets within the country can miss a lot of diversity in economic outcomes. A reduction in tariffs, an increase in the productivity of the exporting country, or other factors that increase the supply of imports can generate gains for U.S. consumers by reducing the price of the imports and increasing the consumers' total purchasing power.[3] The magnitude of gains from a reduction in import prices is greater for consumers who spend a larger share of their income on imports. With geographically segmented product markets, it is likely that the expenditure share of imports (often called the import penetration rates) will vary significantly within the country. Consumers in areas with higher import shares—in states closest to the most frequent ports through which imports enter—will generally benefit the most from an increase in import supply.[4]

As a practical application, it is possible to improve estimates of the consumers' gains from trade liberalization by using geographically disaggregated data on import entry. For example, import data at the level of U.S. customs districts can be useful for quantifying the benefits to U.S. consumers of the U.S.-Korea Free Trade Agreement, which recently went into force. The agreement includes provisions to reduce tariffs on U.S. imports from Korea. These imports have been disproportionately concentrated in ports on the U.S. West Coast. In 2010, Korea supplied 4.40 percent of total U.S. imports in West Coast ports, compared to 1.32 percent of total U.S. imports in East Coast ports. These shares suggest that the consumer gains from trade under this

[2] Hillberry and Hummels analyze microdata from the 1997 U.S. Commodity Flow Survey. Hillberry and Hummels, "Trade Responses to Geographic Frictions," 2008.

[3] An increase in the supply of imports may also increase the variety of products available to the consumers.

[4] At the same time, domestic producers in areas with higher import shares will face a greater reduction in the local demand for their products.

agreement—the increases in their purchasing power—are likely to be much greater for consumers on the West Coast.[5]

The purpose of this article is to examine the patterns in the geographic concentration of manufacturing imports as they enter the United States and, in the process, demonstrate the usefulness of the geographically disaggregated import data. The next section discusses the geographically disaggregated data on U.S. manufacturing imports in 2010. The following sections analyze the regional shares of the imports, first by exporting country and then by industry.

DATA AND THE DEFINITION OF AN IMPORT REGION

The data analysis in this article focuses on the landed duty-paid value of U.S. manufacturing imports in 2010, disaggregated by exporting country, industry, and U.S. customs district.[6] The source of the import data is the U.S. International Trade Commission's Interactive Tariff and Trade DataWeb (DataWeb), which uses official data of the U.S. Department of Commerce (USDOC).[7] There are more than 40 customs districts in the 50 states and the District of Columbia.[8] Each district includes a combination of several ports that are located close to each other. In some districts, a district's ports are located in more than one state.

The data analysis also uses measures of state-level gross domestic product (GDP) in 2010. The source of the GDP data is the USDOC's Bureau of Economic Analysis (BEA).[9] BEA's state-level estimates of all-industry GDP serve as proxies for total consumer expenditures in the state.

Table 1 lists 27 import regions constructed for the purposes of this study by aggregating the U.S. customs districts and states. Each of the regions includes at least one customs district and at least one state. The regions combine the customs districts that have ports in the same state (for example, the Miami and Tampa districts are combined in the Florida region), and they also combine the states that have ports in the same customs district (for example, the Maine district includes ports in Maine and New Hampshire, and the Dallas district includes ports in Texas and Oklahoma). The districts are aggregated into these 27 regions in order to create a one-to-one correspondence between the state-level GDP data and the customs districts, which sometimes span several states.

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[5] It is straightforward to calculate the percentage change in a consumer's purchasing power due to a 1 percent reduction in the price of only one component of the consumption basket (in this case, imports from Korea). It is approximately equal to the component's share of the consumer's total expenditures.

[6] Industry classification is based on the three-digit codes in the North American Industry Classification System (NAICS).

[7] These data are publicly available at http://dataweb.usitc.gov.

[8] Annex C, Schedule D of the Harmonized Tariff Schedule of the United States (2010) lists the ports in each customs district. There are two additional customs districts in the U.S. territories of Puerto Rico and the Virgin Islands. This analysis does not include these two districts.

[9] These data are publicly available at http://www.bea.gov/regional/index.htm.

Table 1: Definition of the 27 U.S. import regions in the data analysis

U.S. import regions	Customs districts included (percent of the region's imports in 2010)	States included
Alaska	Anchorage (100)	AK
Arizona	Nogales (100)	AZ
Baltimore	Baltimore (78); Washington, DC (22)	DC, MD
Boston	Boston (100)	CT, MA
California	Los Angeles (74), San Diego (9),San Francisco (17)	CA, NV
Chicago	Chicago (100)	IL
Cleveland	Cleveland (100)	IN, KY, OH
Detroit	Detroit (100)	MI
Florida	Miami (65), Tampa (35)	FL
Great Falls	Great Falls (100)	CO, ID, MT, UT, WY
Hawaii	Honolulu (100)	HI
Maine	Portland (100)	ME, NH
Minnesota	Duluth (26), Minneapolis (27), Pembina (43), Milwaukee (3)	IA,MN,ND,NE,SD,WI
Mobile	Mobile (100)	AL, MS
New Orleans	New Orleans (100)	AR, LA, TN
New York	Buffalo (14), New York City (76), Ogdensburg (10)	NY
Norfolk	Norfolk (100)	VA, WV
N. Carolina	Charlotte (100)	NC
Oregon	Columbia-Snake (100)	OR
Philadelphia	Philadelphia (100)	DE, NJ, PA
Rhode Island	Providence (100)	RI
St. Louis	St. Louis (100)	KS, MO
Savannah	Savannah (100)	GA
Seattle	Seattle (100)	WA
S. Carolina	Charleston (100)	SC
Texas	El Paso (17), Laredo (39), Pt. Arthur (3), Dallas (15), Houston (26)	NM, OK, TX
Vermont	St. Albans (100)	VT

One limitation of the geographically disaggregated import data, and possibly a reason why they are rarely included in models of international trade, is that the data do not directly identify the location of the consumer of the imports.[10] The import data only identify a point along the path from the exporting country to the consumer—the point where the imports clear U.S. customs. After clearing customs, the imports can be shipped anywhere in the United States. However, as shown below, the correlation between regional import shares and regional GDP shares suggests that the location of an import's entry does provide economically relevant information: the import mostly benefits consumers within the region where it clears customs.

ANALYSIS OF THE REGIONAL SHARES OF THE EXPORTING COUNTRIES

Table 2 summarizes the distribution of import entry for the 50 countries that were the largest sources of U.S. manufacturing imports in 2010. The table reports the region and district with the largest share of total U.S. manufacturing imports from each of the exporting countries, as well as the size of these shares. The top regional shares range from 14.7 percent for Germany's relatively unconcentrated imports to 71.7 percent for imports from Mexico, which are much more concentrated. The top district shares range from 13.7 percent for imports from Germany to 56.9 percent for imports from Honduras. The district with the largest share is usually in the region with the largest share, but there are several exceptions (Australia, Iraq, Nigeria, and Peru). Within some regions, imports are highly concentrated in a single district. In these cases, the import shares of the top region and district are very similar. These include all of the single-district regions and some of the multidistrict regions.[11]

The region with the largest share of imports is often the region closest to the country of origin of the imports. This pattern suggests that differences in the costs of international shipping to different U.S. ports are important determinants of the location of import entry, and it explains why the location of import entry varies significantly across the countries of origin. For example, in table 2, Los Angeles receives the largest share of imports from all of the Asian countries, Detroit receives the largest share of imports from Canada, and Laredo, Texas, receives the largest share of imports from Mexico. Most imports from Latin America and the Caribbean clear customs in Florida. Imports from Europe typically clear customs in New York, as do imports from India, Pakistan, and Bangladesh.[12]

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[10] Blonigen and Wilson (2008) is an interesting example of a trade model that uses geographically disaggregated U.S. imports. However, the authors use these trade data to quantify port efficiency, not to estimate the consumer gains from trade. Blonigen and Wilson, "Port Efficiency and Trade Flows," 2008.

[11] Chicago is an example of a single-district region. New York is an example of a multidistrict region.

[12] Denmark and Ireland are the two exceptions among the European countries in table 2.

Table 2: Largest U.S. region and district for each exporting country in 2010

Exporting country	Region with the largest share of imports	Share of the region	District with the largest share of imports	Share of the district
Algeria	Texas	0.514	Houston	0.464
Australia	California	0.225	New York City	0.165
Austria	New York	0.187	New York City	0.165
Bangladesh	New York	0.328	New York City	0.324
Belgium	New York	0.311	New York City	0.309
Brazil	Texas	0.180	Houston	0.139
Canada	Detroit	0.418	Detroit	0.418
Chile	Florida	0.362	Tampa	0.338
China	California	0.381	Los Angeles	0.335
Colombia	Florida	0.528	Miami	0.486
Costa Rica	Texas	0.453	Houston	0.438
Denmark	Chicago	0.332	Chicago	0.332
Dominican Republic	Florida	0.581	Miami	0.521
Finland	New York	0.211	New York City	0.203
France	New York	0.218	New York City	0.210
Germany	New York	0.147	New York City	0.137
Honduras	Florida	0.571	Miami	0.569
Hong Kong	California	0.324	Los Angeles	0.279
India	New York	0.371	New York City	0.369
Indonesia	California	0.445	Los Angeles	0.385
Iraq	Texas	0.409	Los Angeles	0.286
Ireland	Chicago	0.196	Chicago	0.196
Israel	New York	0.474	New York City	0.472
Italy	New York	0.339	New York City	0.331
Japan	California	0.314	Los Angeles	0.218
Korea	California	0.317	Los Angeles	0.236
Kuwait	New Orleans	0.542	New Orleans	0.542
Malaysia	California	0.298	Los Angeles	0.189
Mexico	Texas	0.717	Laredo	0.496
Netherlands	New York	0.251	New York City	0.245
Nigeria	New Orleans	0.361	Savannah	0.380
Norway	New York	0.263	New York City	0.260
Pakistan	New York	0.329	New York City	0.327
Peru	Florida	0.173	New York City	0.143

Exporting country	Region with the largest share of imports	Share of the region	District with the largest share of imports	Share of the district
Philippines	California	0.470	Los Angeles	0.311
Poland	New York	0.326	New York City	0.258
Russia	Texas	0.303	Houston	0.284
Saudi Arabia	New Orleans	0.358	New Orleans	0.358
Singapore	California	0.279	Los Angeles	0.157
South Africa	New York	0.480	New York City	0.479
Spain	New York	0.344	New York City	0.340
Sweden	New York	0.224	New York City	0.217
Switzerland	New York	0.356	New York City	0.354
Taiwan	California	0.314	Los Angeles	0.220
Thailand	California	0.386	Los Angeles	0.299
Turkey	New York	0.306	New York City	0.298
United Kingdom	New York	0.192	New York City	0.152
Venezuela	Texas	0.461	Houston	0.402
Vietnam	California	0.482	Los Angeles	0.429

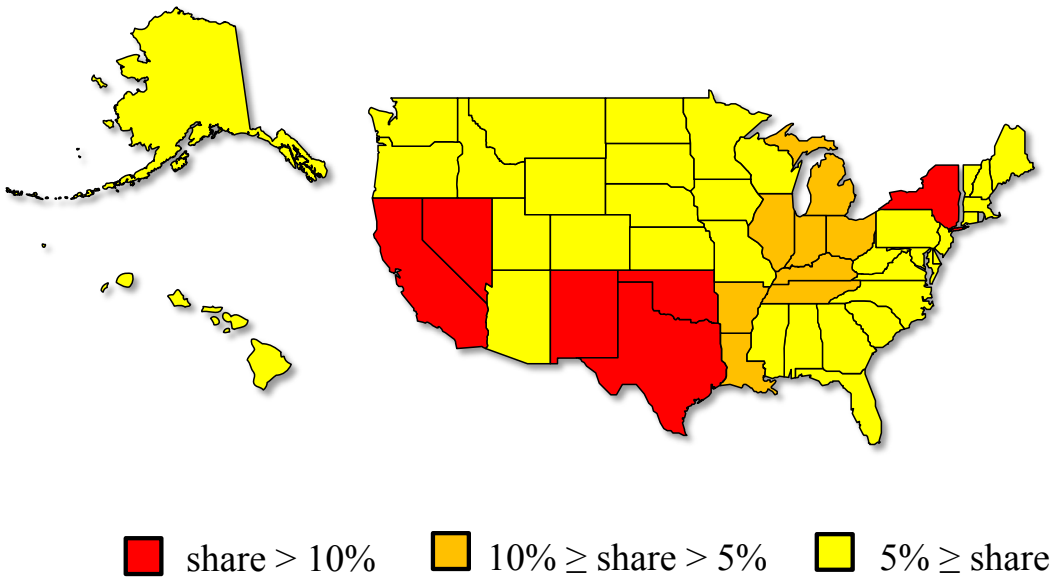
Source: Author's calculations based on 2010 data from the USITC DataWeb/USDOC.

For a second group of exporting countries, the distribution of import entry clearly reflects the location of the U.S. petroleum products industry's operations in the Gulf States. This is evident in table 2, even though the regional shares in this table are calculated for *total* manufacturing imports, not only petroleum products. Texas and New Orleans have the largest shares of imports from the major petroleum product exporters in table 2: Algeria, Brazil, Iraq, Kuwait, Nigeria, Russia, Saudi Arabia, and Venezuela.

ANALYSIS OF THE REGIONAL SHARES OF TOTAL U.S. MANUFACTURING IMPORTS

The next analysis examines the regional shares of total U.S. manufacturing imports in 2010, summing across all of the exporting countries. Figure 1 is a map of the United States that is color coded to indicate the share of imports that enters each of the 27 regions defined in table 1. The imports were moderately concentrated in California, in Texas and the states that border it, in New York, and to a lesser extent the Midwestern states.

Figure 1: Share of U.S. manufacturing imports in each import region in 2010



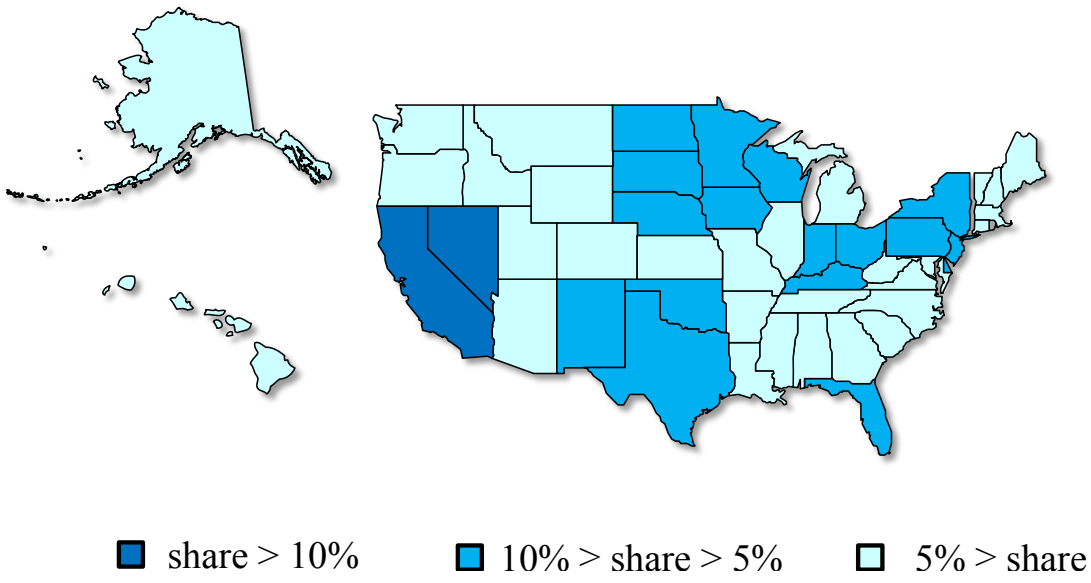
Source: Author's calculations based on 2010 data from the USITC DataWeb/USDOC.

As long as there are significant costs of shipping between the U.S. regions, the share of imports that enter each region should be positively correlated with the region's share of national expenditures (proxied by the region's share of U.S. GDP). There are two economic reasons why the shares *might not be correlated*. First, if the ports in the region simply serve as a gateway to the rest of the country (because the costs of shipping between the regions are relatively small), then the region's share of imports would not be closely correlated with the region's share of national expenditures. Second, there could be preference-based differences in the import shares of regional consumer expenditures if one relaxes the assumptions about demand that are conventional in trade models (i.e., that consumer preferences are identical and homothetic).

While the regional GDP shares in figure 2 are not a perfect match for the regional import shares in figure 1, they are positively correlated. Across the 27 regions, the correlation between the

regional import and GDP shares is 0.701. This pattern suggests that the costs of shipping between the regions are significant.

Figure 2: Share of U.S. gross domestic product in each import region in 2010



Source: Author's calculations based on 2010 data from the USITC DataWeb/USDOC.

Table 3 lists the regional shares that underlie these two maps.[13] The regional shares of imports range from less than 1 percent for Hawaii, Rhode Island, Vermont, and Maine to over 9 percent for California, Texas, and New York. The top 3 regions account for about 50 percent of total U.S. manufacturing imports; the top 10 regions, for about 80 percent. The regional shares of U.S. GDP range from close to zero for Vermont to over 13 percent for California.

[13] This analysis does not use the district-level import shares because they do not correspond one-to-one with the state-level GDP data.

Table 3: Comparison of regional import shares to regional GDP shares in 2010

Import region	Region's share of imports	Region's share of U.S. GDP	Difference in shares
California	0.201	0.136	0.066
Texas	0.158	0.098	0.060
New York	0.148	0.076	0.071
Chicago	0.066	0.044	0.023
Detroit	0.060	0.025	0.035
New Orleans	0.055	0.040	0.014
Savannah	0.043	0.027	0.016
Cleveland	0.041	0.061	–0.019
Florida	0.028	0.050	–0.022
Seattle	0.028	0.046	–0.018
Baltimore	0.023	0.027	–0.004
Philadelphia	0.022	0.075	–0.053
South Carolina	0.018	0.011	0.007
Minnesota	0.016	0.056	–0.040
Norfolk	0.014	0.033	–0.019
Boston	0.011	0.041	–0.030
Alaska	0.009	0.003	0.006
Arizona	0.008	0.017	–0.009
Oregon	0.008	0.013	–0.005
North Carolina	0.008	0.029	–0.021
Great Falls	0.007	0.034	–0.027
Mobile	0.007	0.018	–0.011
St. Louis	0.007	0.025	–0.018
Maine	0.004	0.008	–0.004
Vermont	0.004	0.002	0.002
Rhode Island	0.004	0.003	0.000
Hawaii	0.002	0.004	–0.003

Source: Author's calculations based on 2010 data from USITC DataWeb/USDOC and the BEA.

The final column of table 3 reports the difference between the import and GDP shares of each region. The largest differences are the exceptions that moderate the correlation of the shares: these regions are New York and California (with the largest positive differences) and Philadelphia and Minnesota (with the largest negative differences).

Table 4 provides another view of the data that more directly addresses the likely magnitude of the consumer gains from trade: it lists the ratio of imports to GDP within each of the 27 regions.[14]

Table 4: Ratio of imports to GDP within each region in 2010

Import region	Ratio of imports to GDP
Alaska	0.311
Detroit	0.262
Vermont	0.250
New York	0.210
Texas	0.175
South Carolina	0.175
Savannah	0.172
Chicago	0.164
California	0.161
New Orleans	0.148
Rhode Island	0.120
Baltimore	0.091
Cleveland	0.074
Oregon	0.068
Seattle	0.065
Florida	0.062
Maine	0.058
Arizona	0.053
Norfolk	0.046
Mobile	0.041
Hawaii	0.038
Philadelphia	0.032
Minnesota	0.031
North Carolina	0.030
Boston	0.029
St. Louis	0.029
Great Falls	0.023

Source: Author's calculations based on 2010 data from the USITC DataWeb/USDOC and the BEA.

[14] Again, the percentage change in a consumer's purchasing power for every 1 percent reduction in the price of imports, holding domestic prices constant, is approximately equal to the expenditure share of the imports.

DISTRICT SHARES BY MANUFACTURING INDUSTRY

The final calculations examine the import data by manufacturing industry (classified using the 3-digit NAICS code), aggregated across all of the exporting countries. Table 5 reports the region and districts with the largest and second-largest share of imports for each of the 21 industries, as well as the size of these district shares.

Table 5: Regional and district shares of U.S. imports in 2010 by industry

Manufacturing industry (NAICS code)	District with the largest share of imports	Share of the first district	District with the second-largest share of imports	Share of the second district
Food manufacturing (311)	New York	0.184	Los Angeles	0.103
Beverage and tobacco products (312)	New York	0.257	Los Angeles	0.091
Textile mills (313)	Los Angeles	0.209	New York	0.155
Textile product mills (314)	Los Angeles	0.246	New York	0.151
Apparel (315)	Los Angeles	0.332	New York	0.212
Leather products (316)	Los Angeles	0.414	New York	0.148
Wood products (321)	Seattle	0.123	Los Angeles	0.093
Paper products (322)	Detroit	0.147	Ogdensburg	0.100
Printing and publishing (323)	New York	0.171	Los Angeles	0.157
Petroleum products (324)	Houston	0.209	New Orleans	0.181
Chemicals (325)	Chicago	0.102	New York	0.102
Rubber and plastic products (326)	Los Angeles	0.215	Detroit	0.116
Nonmetallic mineral products (327)	Los Angeles	0.140	New York	0.131
Primary metals (331)	Detroit	0.111	New York	0.111
Fabricated metals (332)	Los Angeles	0.132	Chicago	0.104
Machinery (333)	Los Angeles	0.116	Chicago	0.103
Electronics (334)	Los Angeles	0.202	Chicago	0.118
Electrical equipment (335)	Los Angeles	0.196	Laredo	0.150
Transportation equipment (336)	Detroit	0.173	Laredo	0.136
Furniture (337)	Los Angeles	0.244	New York	0.111
Miscellaneous manufacturing (339)	New York	0.274	Los Angeles	0.213

Source: Author's calculations based on 2010 data from USITC DataWeb/USDOC.

CONCLUSIONS

This article has illustrated how differences in import and GDP shares across exporting countries, importing regions, and industries may help us to better understand the impact of the imports on consumers in different regions of the United States. The analysis shows that consumers in regions with higher import shares will generally benefit the most from an increase in import supply. The patterns in the geographically disaggregated imports suggest that the data contain economically relevant information that could be incorporated into models of international trade, including analyses of the benefits of trade agreements/liberalization.

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