IMPORT ENTRY AND REGIONAL DISTRIBUTION IN THE U.S. FURNITURE MARKET

David Riker

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Abstract

We document the volume of furniture imports that entered different regions of the United States in 2019, and then develop an economic model that explains the location of import entry. These decisions are complex and inter-related: the profitability of entering each region depends on the others entered. Regional import entry affects the availability of imports to consumers in different parts of the country. We calibrate the model and then use it to simulate how the number of regions with import entry and the regional distribution of consumer price effects vary depending on the magnitude of domestic and international trade costs, fixed costs of importing into each region, and other parameter values. In this way, we explain the patterns that we observe in the 2019 import data. The simulations demonstrate the link between the number of regional entries (observable in the data) and the geographical distribution of consumer price effects (not directly observable).

Key Words: consumer benefits from imports, sub-national regions, economic geography

JEL Codes: F12, F14, F17, R12, R15, R32

David Riker, Research Division, Office of Economics
david.riker@usitc.gov

1 Introduction

Consumers benefit from the availability of imported goods and are generally worse off when tariffs restrict imports. There is an extensive literature on how reducing tariffs and other barriers to trade benefits consumers in the United States, including Feenstra and Weinstein (2017). Recent research in this area has focused on how significant *increases* in tariff rates have imposed new costs on U.S. consumers. Examples include Amiti, Redding and Weinstein (2019), Fajgelbaum, Goldberg, Kennedy and Khandelwal (2019), and Amiti, Redding and Weinstein (2020).

The consumer benefits from imports are not evenly distributed across the United States if the imports are not equally available in all parts of the country. The geographic distribution of consumer benefits is rarely addressed in the literature. Most models of international trade implicitly assume that the United States is a single, nationally integrated product market, because it is difficult to model product market segmentation within a country. However, the country is vast, and its product markets are geographically segmented by domestic shipping costs. The benefits to consumers from the availability of imports vary across the country depending on where the imports enter and on the magnitude of domestic and international trade costs.

It is difficult, however, to *measure* the differences in import availability across the country. There are no direct data on the ultimate destinations of U.S. imports. We only observe where they enter the country. If the country were a nationally integrated market, it would not matter where the imports entered, and we would expect entry to be consolidated in the ports that minimize the sum of international and domestic distribution costs. Instead, patterns in the data on U.S. imports suggest that there is significant geographical segmentation of product markets within a country.

In this paper, we focus on U.S. imports of furniture for several reasons. First, the furniture industry has been reshaped by an expansion of international trade and a shift in the outsourcing practices of its multinational firms. Drayse (2008) discuss the importance of global value chains in the industry. Bucini, Coro and Micelli (2013) document the large U.S. firms increasingly focus on marketing and distribution activities, rather than production, in the United States, and this might be reducing the fixed costs of import entry. Furniture is now imported from a diverse set of countries in Asia, North America, and Europe. Second, furniture has relatively high domestic shipping costs, reflected in its low value-to-weight ratio, so domestic distances segment the U.S. furniture market. Finally, furniture is a final good rather than an intermediate input, so consumers are directly affected by the availability of furniture imports.

In our analysis of U.S. furniture import data, we divide the 48 contiguous states and the District of Columbia into eight sub-national regions. We find that many foreign countries directly exported to all eight regions in 2019, even when we analyze import data at the level of narrowly defined products. For countries that exported to a smaller number of U.S. regions, imports were usually concentrated in regions with major markets or in the region closest to the exporting country.

We explain the patterns in the import data with a structural model of international and sub-national trade. The location of import entry depends on the relative magnitudes of domestic and international trade costs and fixed costs of entering each region. The model illustrates three themes. The first theme is that direct import entry in most of the regions suggests that domestic shipping costs are high relative to fixed costs of entering a region. Otherwise, import entry would be concentrated in a small number of regions to achieve economies of scale.

The second theme is that consumer benefits from imports may be higher or lower as the number of entry regions increases, depending on the underlying cause of broader entry. Higher fixed costs always lead to less entry and higher prices to consumers, but high domestic shipping costs can lead to broader regional import entry but higher pirces to consumers.

The third theme is that entry regions are more likely to be close to the exporting country, to minimize international shipping costs. Differences in international shipping costs to different regions affect import availability across the country.

Our modeling framework and data analysis provides a framework for translating patterns in the regional import data into inferences about the regional distribution of consumer benefits from the imports. By incorporating fixed costs they can more realistically model the determinants of regional import entry. We contribute to a relatively small literature that examines the regional effects of imports on U.S. consumers when there is geographical segmentation of product markets. Rosenbaum and Reading (1988), which focuses on market structure in the geographically segmented U.S. cement industry, is an important early example. As we noted above, there is a much larger literature, including Autor, Dorn and Hanson (2013), that examines the local effects of imports but does not take into account the geographical segmentation of product markets.

Our analysis is most directly related to Riker (2017), which also focuses on U.S. imports of furniture, and Riker (2020), which focuses on U.S. imports of electrical equipment. Both of these papers assume that consumers view imports of the same product that enter through different regions as imperfect substitutes. In contrast to this "love of variety" specification of import demand, the model in this paper assumes that the different distribution paths are perfect substitutes, and consumers choose the single least cost distribution path among available options. Another important difference is that we focus on the implications of region-specific fixed costs on import entry decisions. With this focus, we build on the large literature on entry into export markets and extensive margins of trade when there are fixed costs of entry, including Melitz (2003), Hummels and Klenow (2005), Helpman, Melitz and Rubinstein (2008), and many related studies. In our case, the extensive margin is the number of sub-national regions with direct import entry rather than the number of export destination countries.

The rest of this paper is organized in four parts. Section 2 reports the regional patterns in U.S. furniture import data in 2019. Section 3 presents the modeling framework. Section 4 calibrates the model and reports the results from a series of model simulations. Section 5 concludes.

2 Patterns in the Furniture Import Data

In this section, we summarize the regional patterns in U.S. imports of furniture in 2019. Furniture imports include the first 26 six-digit codes in Chapter 94 of the Harmonized Tariff Schedule (HTS). We analyze the import data at the six-digit level to ensure that we are comparing similar products that vary only in the location of import entry and the cost of delivering to consumers in different parts of the country. The four codes with the largest landed duty-paid value of imports in 2019 were Other Wooden Furniture (HTS code 940360), Other Metal Furniture (940320), Wooden Furniture for Bedrooms (940350), and Upholstered Wooden Frame Seats (940161). These four codes collectively accounted for slightly over half of total furniture imports in 2019.

We aggregate the 48 contiguous states and the District of Columbia into the eight regions in Table 1.

Table 1: States in Each Region

Region	States Included
New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Mid East	Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania
Southeast	Arkansas, Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee, Virginia, West Virginia
Great Lakes	Illinois, Indiana, Ohio, Michigan, Wisconsin
Plains	Iowa, Kansas, Minnesota, Missouri, North and South Dakota, Nebraska
Southwest	Arizona, New Mexico, Oklahoma, Texas
Rocky Mountain	Colorado, Idaho, Montana, Utah, Wyoming
Far West	California, Nevada, Oregon, Washington

The import data report the district where the imports entered the United States (technically, where the imports cleared customs). A district is a group of neighboring ports of entry. There were 42 U.S. customs districts in 2019, and 38 were located in the 48 contiguous states or the District of Columbia. We aggregate these 38 districts to the level of the eight regions, based on the concordance from districts to regions in Table 2.[1]

Table 3 reports the share of the total landed duty-paid value (LDPV) of furniture imports in 2019 within each HTS code, as well as the share of countries that exported products in the code to six or more of the eight U.S. regions. There was significant variation across the codes in the share of countries with import entry in six or more regions, and this share was positively correlated with the code's share of total U.S. furniture imports.[2]

Table 4 summarizes the geographical distribution of the furniture imports. It reports the

[1] The eight regions are based on the BEA regions. However, the Far West region in our model does not include the relatively isolated states of Alaska and Hawaii.

[2] The correlation between these two measures is 0.627.

Table 2: Customs Districts in Each Region

Regions	**Districts**
New England	Boston MA, Portland ME, Providence RI, St. Albans VT
Mid East	Buffalo NY, New York NY, Ogdensburg NY, Philadelphia PA Baltimore MD, Washington DC
Southeast	Charleston SC, Charlotte NC, Miami FL, Mobile AL, New Orleans LA, Norfolk VA, Savannah GA, Tampa FL
Great Lakes	Chicago IL, Cleveland OH, Detroit MI, Milwaukee WI
Plains	St. Louis MO, Duluth MN, Minneapolis MN, Pembina ND
Southwest	Dallas-Ft. Worth TX, Houston-Galveston TX, Laredo TX, Nogales AZ, Port Arthur TX, El Paso TX
Rocky Mountain	Great Falls MT
Far West	Los Angeles CA, San Diego CA, San Francisco CA, Seattle WA, Columbia-Snake OR

share of the LDPV of furniture imports that entered each region in 2019. The large share of imports that entered the Far West region reflected the economic size of that region, the fact that two of the top three sources of the U.S. imports (and five of the top ten sources) were countries in Asia, and the region's relative isolation from the rest of the United States.

Table 5 depicts the country composition of U.S. furniture imports. It reports the LDPV of these imports from the top 20 exporting countries in 2019. These 20 countries collectively accounted for 97% of the value of U.S. imports of furniture. China, by far the largest, accounted for 42% of total imports.

Table 3: Imports by HTS Code in 2019

HTS Codes	**Description**	**Share of Total Value of Imports (%)**	**Six or More Regions (%)**
940110	Seats for Aircraft	1.04	57.32
940120	Seats for Motor Vehicles	0.42	73.68
940130	Swivel Seats with Variable Height	4.08	83.33
940140	Seats Convertible into Beds	0.57	68.18
940152	Seats of Bamboo	0.01	30.00
940153	Seats of Rattan	0.23	52.46
940159	Seats of Cane, Osier, and Similar Materials	0.06	43.75
940161	Upholstered Wooden Frame Seats	10.92	97.99
940169	Non-Upholstered Wooden Frame Seats	1.13	90.58
940171	Upholstered Metal Frame Seats	1.63	90.28
940179	Non-Upholstered Metal Frame Seats	2.23	93.10
940180	Seats without Wooden or Metal Frames	0.50	96.43
940190	Other Parts of Seats	7.99	96.58
940210	Dentists' and Barbers' Chairs	0.17	41.18
940290	Medical and Dental Furniture	2.58	71.82
940310	Metal Furniture for Offices	2.53	85.04
940320	Other Metal Furniture	13.25	100.00
940330	Wooden Furniture for Offices	2.56	90.23
940340	Wooden Furniture for Kitchens	5.08	91.43
940350	Wooden Furniture for Bedrooms	11.44	94.33
940360	Other Wooden Furniture	16.54	100.00
940370	Other Furniture of Plastics	2.66	96.60
940382	Furniture of Bamboo	0.05	26.92
940383	Furniture of Rattan	0.08	41.51
940389	Other Furniture	2.30	82.27
940390	Parts of Furniture	9.85	100.00

Table 4: Regional Share of the Value of Imports in 2019

Import Regions	**Share of Imports into the Lower 48 States and DC (%)**
New England (NE)	1.00
Mid East (ME)	14.77
Southeast (SE)	19.79
Great Lakes (GL)	12.30
Plains (PL)	3.10
Southwest (SW)	19.20
Rocky Mountain (RM)	0.98
Far West (FW)	28.87

Table 5: Imports by Exporting Country in 2019

Exporting Countries	**LDPV of Furniture Imports ($ billion)**
China	22.63
Mexico	8.43
Vietnam	7.80
Canada	4.19
Italy	1.31
Malaysia	1.29
Taiwan	1.20
Indonesia	0.92
Germany	0.82
United Kingdom	0.74
India	0.63
Poland	0.47
France	0.38
Thailand	0.30
Japan	0.28
Brazil	0.26
Korea	0.25
Philippines	0.20
Spain	0.15
Turkey	0.14

The breadth of regional import entry varied significantly across product codes and across exporting countries. Table 6 reports the frequency of the number of regional entries within each six-digit HTS code, for imports from countries in the top 20 and for all other countries. Imports were much more likely to directly enter all eight regions if they were from a top 20 exporting country. The link between the geographical dispersion of import entry and the scale of a country's total exports of furniture to the United States suggests the importance of fixed costs of directly importing into each region, as we discuss in the next section on modeling.

Table 6: Frequency of the Numbers of Entry Regions in 2019

Numbers of Regions with Import Entry	**Frequency for Top 20 Exporting Countries (%)**	**Frequency for All Other Exporting Countries (%)**
1	1.06	10.64
2	1.40	11.63
3	1.79	11.51
4	5.18	11.47
5	6.48	13.95
6	14.36	16.88
7	18.15	12.58
8	51.58	11.35

Finally, the entry regions usually reflected proximity to the exporting country. Table 7 reports the share of the furniture HTS codes with import entry into each region. (The region abbreviations in the column headers are defined in Table 4.) The large exporters at the top of the table had higher shares across all of the regions. The share was usually higher for the region that is closest to the exporting country. For imports from China and Vietnam, the closest region is the Far West. For imports from Mexico and Canada, it is the Southwest and Great Lakes regions, respectively.[3] The table also reflects differences in the sizes of

[3]Drayse (2011) examines furniture exports from Canada in depth.

the markets in the regions: the relatively small New England, Rocky Mountain, and Plains regions were less likely to report direct import entry of specific furniture codes.

Table 7: Shares of Imports Entering Each Region

Region	**NE** (%)	**ME** (%)	**SE** (%)	**GL** (%)	**PL** (%)	**SW** (%)	**RM** (%)	**FW** (%)
Exporter								
China	92.3	100.0	100.0	100.0	92.3	100.0	96.2	100.0
Mexico	34.6	57.7	76.9	65.4	42.3	88.5	38.5	92.3
Vietnam	76.9	96.2	100.0	92.3	76.9	96.2	69.2	100.0
Canada	76.9	88.5	76.9	92.3	84.6	61.5	80.8	88.5
Italy	80.8	100.0	96.2	88.5	76.9	100.0	76.9	100.0
Malaysia	46.2	65.4	76.9	73.1	61.5	65.4	61.5	73.1
Taiwan	53.8	69.2	76.9	84.6	73.1	73.1	57.7	92.3
Indonesia	69.2	84.6	92.3	76.9	65.4	84.6	57.7	88.5
Germany	76.9	92.3	92.3	84.6	69.2	80.8	76.9	84.6
United Kingdom	73.1	96.2	96.2	92.3	73.1	84.6	65.4	88.5
India	61.5	100.0	96.2	80.8	65.4	80.8	53.8	100.0
Poland	61.5	84.6	76.9	76.9	30.8	76.9	38.5	76.9
France	57.7	100.0	92.3	92.3	42.3	100.0	61.5	100.0
Thailand	38.5	76.9	84.6	73.1	61.5	61.5	42.3	96.2
Japan	19.2	80.8	76.9	80.8	34.6	53.8	11.5	100.0
Brazil	34.6	73.1	96.2	57.7	15.4	61.5	23.1	57.7
Korea	19.2	69.2	73.1	69.2	23.1	53.8	15.4	76.9
Philippines	30.8	80.8	88.5	73.1	26.9	46.2	23.1	88.5
Spain	57.7	88.5	92.3	76.9	50.0	69.2	61.5	80.8
Turkey	53.8	88.5	76.9	76.9	50.0	73.1	19.2	76.9

3 Modeling Framework

Next, we develop an economic model that predicts regional import entry based on the magnitudes of several types of distribution costs. The model also divides the country into eight regions. Regional import entry decisions are interdependent. The profitability of entering each region depends on whether there is entry into other regions, because entry regions are substitutes for each other as distribution paths to consumers in each part of the country. For this reason, each exporter is making one joint decision about its set of entry regions (among all potential combinations) rather than eight independent regional entry decisions.

The model focuses on imports of a specific product j from foreign country f. There is a fixed cost of entering each region. The magnitude of this fixed cost is a fraction γ_j of aggregate national expenditure on product j, E_j. This is very similar to the specification of fixed costs of exporting to each country in Melitz (2003) and Helpman et al. (2008), but with more geographical disaggregation of product markets. In the Melitz (2003) and Helpman et al. (2008) models, the fixed costs of exporting are specific to each destination country. In our model, they are specific to each entry region within the destination country.

There are two types of variable trade costs, international and domestic. The international trade cost from country f to entry region r is represented by ad valorem factor $s_{jfr} > 1$. This includes shipping costs, duties, and other import charges. With eight regions, there are eight alternative international routes from each source country f. International trade costs are standard features of trade models.

Domestic shipping costs, on the other hand, are not standard features of trade models, but they can be important determinants of the geographical distribution of consumer effects within the importing country. The domestic shipping cost from import entry region r to consumption region m is represented by ad valorem factor $s_{jrm} \geq 1$. With eight regions, there are 28 distinct inter-regional domestic shipping distances. We assume that domestic shipping costs are the same in both directions.[4] To limit the number of parameters and calibrate the model to available sub-national data, we impose a simplifying restriction on the form of domestic shipping costs: we assume that s_{jrm} is log-linear in the distance between the two regions when region r is different from region m.

$$s_{jrm} = (d_{rm})^{\alpha_j} \tag{1}$$

d_{rm} is the distance from region r to region m and $\alpha_j > 0$. We assume that s_{jrm} is equal to one if r and m are the same region.

Product j is differentiated by country of origin (or by firm, with different firms producing in different countries), with constant elasticity of substitution σ_j. For imports of product j from country f, there is perfect substitution between the alternative distribution paths. Consumers in region m choose distribution through the entry region that provides the lowest cost path for delivering from f to m, among the regions that have import entry.[5] Consumers allocate a constant share of their total expenditures to the products of the industry.[6] Foreign suppliers are monopolistic competitors, and their variable profits are a fraction $\frac{1}{\sigma}$ of their revenues. Their net profits are the difference between variable profits and their fixed cost of import entry. Foreign suppliers decide not only whether to export to the domestic market but also the regions that they will directly enter.

With eight regions, there are 255 potential regional import entry combinations. The total number of entry regions, N_{jf}, can range from one and eight. Equation (2) is a foreign firm's net profits if it enters all eight regions and supplies consumers in all regions.

[4] Representing a country as eight locations is clearly an over-simplification for most countries, including the United States, but it is more realistic than assuming that the destination country comprises a single, nationally integrated region.

[5] In contrast, the model in Riker (2020) has a different demand structure, with "love of variety" across entry regions.

[6] This is the common Cobb-Douglas assumption that the elasticity of substitution between the products of different industries is equal to one.

$$\pi_{jf}\ [N_{jf}=8] = \sum_m \left(\frac{b_{jf}\ E_{jm}}{\sigma_j} \ \left(\frac{p_{jf}\ s_{jfm}}{P_{jm}}\right)^{1-\sigma_j} \right) \ - 8\ \gamma_j\ E_j \tag{2}$$

p_{jf} is the producer price of j from f. E_{jm} is aggregate expenditure on the product in consumer region m, E_j is the sum of E_{jm} across all of the regions indexed by m, and P_{jm} is the CES price index for the industry in region m. E_{jm} and P_{jm} are exogenous variables in the model.[7] The profitability of export sales in each region depends on the availability of imports from all exporting countries and domestic products. Competition from other suppliers to region m is reflected in region m's price index P_{jm}.

Equation (3) is the firm's net profits if it directly enters a single region, r, but still supplies consumers in all eight regions (indexed by m).

$$\pi_{jf}\ [N_{jf}=1] = \left(\frac{b_{jf}\ E_{jr}}{\sigma_j} \ \left(\frac{p_{jf}\ s_{jfr}}{P_{jr}}\right)^{1-\sigma_j} - \ \gamma_j\ E_j \right) + \sum_{m\neq r} \frac{b_{jf}\ E_{jm}}{\sigma_j} \ \left(\frac{p_{jf}\ \min_r \left[s_{jfr}\ (d_{rr'})^{\alpha_j}\right]}{P_{jm}}\right)^{1-\sigma_j} \tag{3}$$

Equation (4) is the firm's net profits if it enters multiple regions indexed by r, does not enter directly regions indexed by r', and supplies consumers in all of the regions.

$$\begin{aligned}\pi_{jf}\ [1 < N_{jf} < 8] = &\sum_r \frac{b_{jf}\ E_r}{\sigma_j} \ \left(\frac{p_{jf}\ s_{jfr}}{P_{jr}}\right)^{1-\sigma_j} \ - \ \left(\sum_r \gamma_j\ E_j\right) \\ &+ \ \sum_{r'} \frac{b_{jf}\ E_{jr'}}{\sigma_j} \ \left(\frac{p_{jf}\ \min_r \left[s_{jfr}\ (d_{rr'})^{\alpha_j}\right]}{P_{jr'}}\right)^{1-\sigma_j}\end{aligned} \tag{4}$$

Given the firms' profit-maximizing regional import entry decisions, we can calculate the regional distribution of consumer benefits. The delivered cost to consumers depends on the region where the imports enter, international trade costs to that region, and domestic shipping costs from the entry region to the consumer. Equation (5) is the minimized delivered

[7] This "small exporter" assumption is a common simplifying assumption in international trade models, including Handley and Limão (2015).

cost of imports of product j from country f that are delivered to consumers in region m, relative to the foreign producer price p_{jf}, calculated for the path of least cost distribution given the set of regions with import entry (indexed by r).

$$\tilde{c}_{jfm} = \min_{r} \left[s_{jfr} \ (d_{rm})^{\alpha_j} \right] \tag{5}$$

Consumers benefit from lower delivered costs of imports. For a given number of regions with import entry, higher domestic shipping costs increase delivered costs of the imports. However, higher domestic shipping costs *also* increase the number of regions with import entry. The net effect is that delivered costs may rise or fall as domestic shipping costs rise.[8]

In the next section, we calibrate the model to U.S. data and illustrate this ambiguity in a series of simulations. A reduction in the fixed costs of entering each region increases the number of regions with import entry as long as there is not already entry into all eight regions, and so it lowers the delivered costs to consumers. In contrast, an increase in domestic shipping costs always increases the number of regions with import entry, but it has an ambiguous effect on delivered costs.

4 Model Calibration and Simulations

We calibrate the model to inter-regional distances and regional expenditures within the United States. Aggregate expenditures in each of the eight regions are from U.S. Bureau of Economic Analysis (BEA) Regional Accounts, with an adjustment to the Far West region that removes Alaska and Hawaii.[9] The aggregate expenditure measure that we use in the model is total personal consumer expenditure on furnishings and durable household equip-

[8] In a simpler model with an exogenous set of entry regions, rather than a set that is endogenously responding to domestic shipping costs, higher domestic shipping costs would unambiguously increase delivered costs.

[9] The data are publicly available at `apps.bea.gov/iTable/index_regional.cfm`.

ment by state (BEA series SAEXP1). We sum state-level expenditures to calculate regional expenditures using the concordance from states to regions in Table 1. The price index for each region is also from BEA Regional Accounts. It is the regional price parities index for goods by state (BEA series SARPP), averaged over the states within each region. We set the value of σ equal to 2.5, which we estimate according to the methodology in Ahmad and Riker (2020), using 2017 Economic Census data for the U.S. furniture industry (NAICS code 337). For the international trade cost factor, we use the ratio of the landed duty-paid value to the customs value of furniture imports from China into the districts in each region.

Tables 8 through 10 report simulations estimates in a consistent format. Each row reports an alternative simulation for a different combination of domestic shipping costs (α_j), fixed costs of regional import entry (γ_j), and foreign producer prices (p_{jf}). The first three columns specify the parameter inputs. The fourth column reports the equilibrium number of regions with import entry. The next eight columns indicate whether there is import entry into each of the eight regions. The final three columns report a regional expenditure-weighted average of delivered cost across the regions (relative to p_{jf}), the minimum delivered cost to a region, and the maximum delivered cost to a region. The tables include combinations of parameter inputs that generate the full range of entry outcomes, from entry into a single region to import entry into all eight regions.

Table 8 focuses on simulations that vary p_{jf}, the producer price of j. Comparing the simulations from the top row to the bottom row, a reduction in producer prices, interpreted as an increase in the competitiveness of exporters in country f, always increases the number of regions with import entry (N_{jf}) and reduces the weighted average delivered cost of imports ($\tilde{c}_{jfm}$) or leaves the delivered cost unchanged. This is consistent with the positive correlation between the total scale of imports from a country and the number of regions with import entry in the data analysis in Section 2.

Table 9 reports simulations that vary γ_j, the parameter representing the magnitude of these

Table 8: Simulations that Vary Foreign Producer Prices

α_j	γ_j	p_{jf}	N_{jf}	**NE reg**	**ME reg**	**SE reg**	**GL reg**	**PL reg**	**SW reg**	**RM reg**	**FW reg**	**average** $\tilde{c}_{jfm}$	**min** $\tilde{c}_{jfm}$	**max** $\tilde{c}_{jfm}$
0.1	0.01	1.0	5	No	Yes	Yes	Yes	No	Yes	No	Yes	1.44	1.24	2.39
0.1	0.01	0.9	6	No	Yes	Yes	Yes	Yes	Yes	No	Yes	1.38	1.24	2.39
0.1	0.01	0.8	7	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	1.33	1.24	2.39
0.1	0.01	0.7	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.29	1.24	1.34
0.1	0.01	0.6	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.29	1.24	1.34

fixed costs of entering each region. A reduction in fixed costs always increases the number of regions with entry and reduces average delivered cost or leaves the delivered cost unchanged.

Table 9: Simulations that Vary Fixed Costs of Import Entry

α_j	γ_j	p_{jf}	N_{jf}	**NE reg**	**ME reg**	**SE reg**	**GL reg**	**PL reg**	**SW reg**	**RM reg**	**FW reg**	**average** $\tilde{c}_{jfm}$	**min** $\tilde{c}_{jfm}$	**max** $\tilde{c}_{jfm}$
0.1	0.01	1	5	No	Yes	Yes	Yes	No	Yes	No	Yes	1.44	1.24	2.39
0.1	0.02	1	4	No	Yes	Yes	Yes	No	No	No	Yes	1.59	1.24	2.53
0.1	0.03	1	3	No	Yes	Yes	No	No	No	No	Yes	1.76	1.24	2.53
0.1	0.04	1	1	No	No	Yes	No	No	No	No	No	2.27	1.30	2.84
0.1	0.05	1	1	No	No	Yes	No	No	No	No	No	2.27	1.30	2.84

Finally, the simulations in Table 10 demonstrate that an increase in domestic shipping costs (α_j) increases the number of regions with entry, but may increase or reduce the average delivered cost of the imports. The effect is non-monotonic, first rising as α_j increases and then falling as α_j increases still further. For this reason, the number of regions with import entry and the average delivered cost can move in different directions.

Table 10: Simulations that Vary Domestic Shipping Costs

α_j	γ_j	p_{jf}	N_{jf}	**NE reg**	**ME reg**	**SE reg**	**GL reg**	**PL reg**	**SW reg**	**RM reg**	**FW reg**	**average** $\tilde{c}_{jfm}$	**min** $\tilde{c}_{jfm}$	**max** $\tilde{c}_{jfm}$
0.0	0.01	1	1	No	No	No	No	No	No	No	Yes	1.24	1.24	1.24
0.1	0.01	1	5	No	Yes	Yes	Yes	No	Yes	No	Yes	1.44	1.24	2.39
0.2	0.01	1	7	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	1.43	1.24	4.63
0.3	0.01	1	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.29	1.24	1.34
0.4	0.01	1	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1.29	1.24	1.34

The simulations in Table 10 also demonstrate that proximity to the exporting country becomes more relevant as domestic shipping costs decline. With zero domestic shipping costs, imports are concentrated in the region with the smallest international shipping cost. Since the simulations are specifically calibrated to international trade costs on U.S. imports of furniture from China, the Far West is the closest region.

The simulations in Table 10 suggest that the common modeling assumption of a nationally integrated product market with no domestic shipping costs is problematic. The resulting geographical concentration of import entry (in the first row of Table 10) does not fit the patterns in the import data in Section 2, and this assumption misses the uneven distribution of consumer benefits across the regions.

5 Conclusions

There are many observable factors that help to determine the geographical distribution of consumer benefits from imports, though the distribution itself cannot be directly observed. These factors include domestic shipping costs, international shipping costs, regional market size, and patterns of regional import entry. The common modeling assumption of a nationally integrated product market is unrealistic and misses the uneven geographical distribution of the consumer benefits from imports.

By interpreting available import data within a theoretical framework with region-specific fixed costs of import entry, we are able to draw inferences about the relative magnitudes of the domestic and international distribution costs and the resulting regional distribution of consumer benefits from imports.

The model analyzes an extensive margin of trade that is missing from models of international trade that lack sub-national distinctions: if there are higher domestic shipping costs, then imports will expand as the number of regions with import entry expand but will contract as the amount of imports entering each region contracts.

Calibrated simulations identify the combinations of domestic shipping costs and fixed costs of import entry that generate the patterns that we see in recent data on U.S. furniture imports.[10] The data suggest that region-specific fixed costs and domestic shipping costs are high relative to international shipping costs in the furniture industry.

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[10]The modeling framework could also be applied to other imported products and to more disaggregated sub-national regions, depending on data availability.

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