Imports "Я" Us: Retail Chains as Platforms for Developing-Country Imports*

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Abstract: We use data from the Census of Retail Trade and the International Trade Commission to test the theory that big retail chains serve as a platform for imports from LDCs. Controlling for overall sector growth, Chinese and other LDC imports have increased disproportionately in retail sectors with the largest consolidation into chains over the period 1997-2002. Our estimation results imply that between 1997 and 2002 the marginal propensity to import from China was 3.3 times larger for the largest firms than for smaller retailers. The disproportionate growth of large retailers over this period explains 19% of the growth in consumer goods imports from China.

JEL Codes: F12, L11, L81

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1 Introduction

The retail sector is increasingly dominated by large retail chains. Between 1997 and 2002 sales of the top four retailers have increased in over 80% of retail sub-sectors.[1] While total (nominal) retail sales increased by approximately 20%, sales at the four largest firms in each sector increased by 35% on average. At the same time, imports of consumer goods have also increased dramatically, particularly imports from less developed countries (LDCs). Imports of consumer goods from China increased by 64% over this period; imports from Mexico increased by 43%; and imports from Central America (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua) increased by 34%. Moreover, anecdotal evidence suggest that larger retailers sell a disproportionate share of imported goods. For example, Wal-Mart handles 6.5% of U.S. retail sales but accounts for over 15% of U.S. imports of consumer goods from China (Basker and Van 2008). Additional suggestive evidence of this relationship comes from Bernard, Jensen, and Schott (forthcoming), who, using Customs records, find that one characteristic common to importing firms across all sectors in the economy (including retail) is that they tend to be large.

In this paper, we use data from the Census of Retail Trade and the International Trade Commission to test for a relationship between consolidation in the retail sector and the rise in imports of consumer goods from China and other LDCs. We find that sectors whose large firms grew fastest also increased their imports the most. Our estimation results imply that between 1997 and 2002 the marginal propensity to import from China was 3.3 times larger for the largest firms than for smaller retailers. Disproportionate growth of the largest retail firms has contributed to the rise in imports of consumer goods from LDCs; the growth rate of consumer goods imports from these sources would have been 19% lower had small and large retail firms grown at the same rate over this period.

This relationship between retailer (chain) size and imports is natural in the presence of

[1] We define a subsector as one of 72 6-digit NAICS retail codes. More details on this below.

economies of scale in retailing and economies of scale in importing. Economies of scale in importing from LDCs could arise from fixed costs in contracting with suppliers across large physical, institutional, and cultural differences. A retailer with relatively low sales volume will not find it profitable to incur such a cost and will prefer to purchase wares from domestic suppliers. In contrast, bigger retailers, selling higher volumes, can spread the fixed cost over many units. Cheaper imports prompt these retail chains to grow, again increasing imports. Because of economies of scale in retail, the expansion of the retail chain also lowers unit cost, reinforcing the positive relationship between retailer chain size and imports. (See Basker and Van 2008, for a formal model of this idea.)

In the absence of firm- or store-level data on the origin of goods sold, we use aggregate data on 72 retail sectors, such as florists, books stores, and drug stores, over a five year period from 1997 to 2002 to test whether sectors with the fastest growth in the size of the largest retailers are also the sectors with the fastest growth in sales of imported goods. We use a difference-in-difference specification to account for time-invariant differences between sectors. We assign imports of each of 42 product categories to sectors based on the sector's share of sales of each product. Our data on the size of retail firms, sector-level sales, and the distribution of product sales across sectors come from the Census of Retail Trade (CRT) for 1997 and 2002. Data on import values by product for each country of origin come from the U.S. International Trade Commission (USITC).

We use the difference-in-difference estimates to calculate marginal propensities to import from each additional dollar in sales revenue for large and small firms. The marginal propensity to import (MPI) from China and other LDCs is substantially higher for the largest retailer chains than for small retailers. The largest firms' MPI from China, for example, is about 10 cents per dollar of sales whereas the MPI for smaller retailers averages less than 3 cent per dollar of sales. Adjusting for the retailer's markup as much as doubles these MPIs.

Consistent with the idea of dual economies of scale in importing and retailing, these differences have increased over time. Over the period 1987–1992, when chains were smaller throughout the retail sector, the marginal propensity to import was lower for both small and large firms.[2] But, as in the later period, we find the large firms have higher MPIs from China, Central America, and LDCs as a whole than small firms.

The combination of large chains' higher propensities to import from LDCs and their higher growth rates explains a substantial share of increased imports of consumer goods from LDCs. Had growth been uniformly distributed across retail firms in each sector, import growth from both China and LDCs as a whole would have been 19% lower between 1997 and 2002. Over the earlier period, 1987–1992, the growth in imports from China would have been 12% lower and the growth in imports from LDCs as a whole would have been 14% lower. Central American imports stand out as having particularly benefited from the consolidation in the retail sector: the growth of imports from Central America would have been almost 25% lower throughout the study period had retail firms grown uniformly within each sector.

Despite the abundance of popular discussion surrounding the retail industry and international trade patterns, there is a dearth of empirical work relating these topics. Two recent innovative papers have explored different dimensions of this relationship. Campbell and Lapham (2004) use county-level data to show a relationship between U.S.-Canada exchange rate movements and the number of retailers operating in border counties. Evans and Harrigan (2005) find that the characteristics of the retailer can influence the pattern of international trade. Using proprietary data from a major chain of department stores, they establish that the retailer's demand for just-in-time deliveries influences its choice of source countries.

The rest of this paper is organized as follows. We provide a theoretical motivation for

[2] Between 1987 and 1992, the share of sales accounted for by the top four firms in each sector increased three percentage points, from 15.4% to 18.4%. Between 1992 and 1997 this figure increased another 4.5 percentage points, from 25.4% to 29.9%. The numbers for 1992 and 1997 are not comparable due to a change in the industry classification system that dramatically reduced the overall size of many sectors.

the analysis in Section 2. We describe the data in Section 3 and our empirical specification and results in Section 4. Section 5 uses earlier, noisier data to estimate the same relationship and finds qualitatively similar results with some informative differences. The counterfactual exercise is described in Section 6. Section 7 concludes with a discussion of possible interpretations of our results and their implications.

2 Theoretical Framework

In this section, we sketch a theory for the complementary relationship between imports and the size of retailers. The theory is based on two economies of scale: economies of scale in retailing and economies of scale in importing. These give rise to the *disproportionate* importing by the biggest retailers, in particular from developing countries. The ideas are based on a formal model by Basker and Van (2008) and are illustrated in the schematic shown in Figure 1.

The expansion of a retail chain that sells (some) imported products has a direct, mechanical, effect on imports: the new store has to be stocked, and serves as an additional platform for imports the chain is already selling. In addition, in the presence of economies of scale the higher volume moving through the expanded chain reduces its marginal cost and lowers each store's profit-maximizing price. This lower price increases sales (and therefore imports) at each location. The reduction in costs also increases profit at each location which makes the retailer choose to expand the chain further.

The third effect of the bigger retail chain is that the expansion of the market interacts with economies of scale in importing to induce more *types* of products to be purchased from low-cost producers. Consider a simple case in which there are two producers: domestic and foreign. The foreign producer is an LDC with lower variable (labor) costs but to source the product from the foreign producer a retailer has to incur a higher fixed cost than it would had it sourced from the domestic supplier. A "Mom and Pop" or small chain sources from the domestic producer because the fixed cost is prohibitive with a relatively small market. But as the retailer expands, its increased sales volume makes the tradeoff more attractive; eventually, the chain will incur the higher fixed cost and switch to the foreign (LDC) source where variable cost is lower.[3]

Over the past several decades, improvements in information and communications technologies, as well as reductions in the cost of data storage, have worked to increase a retail chain's optimal size.[4] Even small improvements in technology can have big differences in the size of retail chains and the LDC imports that flow through them through the feedback effect described above.

Trade liberalization in the form of lower tariffs on LDC imports, which lowers the marginal cost of imported products, also generates a feedback effect by disproportionately benefiting large chains and enabling them to expand even more. Lower marginal costs reduce the profit-maximizing retail price of the good (though the pass-through need not be full), increasing sales (of the imported product) at each store. This effect is stronger for retailers that already import many products. The lower marginal cost also increases profit at each store and induces the retailer to expand the chain further, an effect that is further amplified by economies of scale at the retail chain. These dual interacting economies of scale — in importing and in retailing — result in more types of goods being sourced from cheaper locations among the LDCs. The two scale economies amplify the effects of trade liberalization volume of trade beyond the direct price effect.

These two types of shocks — technological change and trade liberalization — tend to have stronger effects on the larger retail chains. Lower trade costs benefit the biggest retailers the most because these firms are already importing more. In addition, because of

[3]That market size matters to imports has been the subject of discussion dating back to Adam Smith and continuing with Belassa (1967) and Ethier (1979). The mechanism we describe here follows in spirit the model of Jones and Kierzkowski (1990).

[4]Doms, Jarmin, and Klimek (2004) use Census data to show that the largest retail firms make the biggest IT investments.

their high volume of sales, lower costs per unit creates a greater incentive for them to invest in better technologies that enable the chain to expand even further to better take advantage of cheaper imports. This form of “directed technical change” is designed to use the cheaper input, in this case imports, more intensively, in the spirit of Acemoglu (2002).

Technological improvements are also likely to benefit the bigger chains more than the small retailers since technology is a more important input for the bigger retailer. (The general increase in the size of chains, particularly large national chains, is documented by Jarmin, Klimek, and Miranda 2005). Better technology increases the competitive advantage of large chains over smaller retailers. Because the bigger retailers already import more, replacing a small retailer store with a chain store increases the platform for imports and by the mechanism we describe in this section, would increase the imports coming from the LDCs.

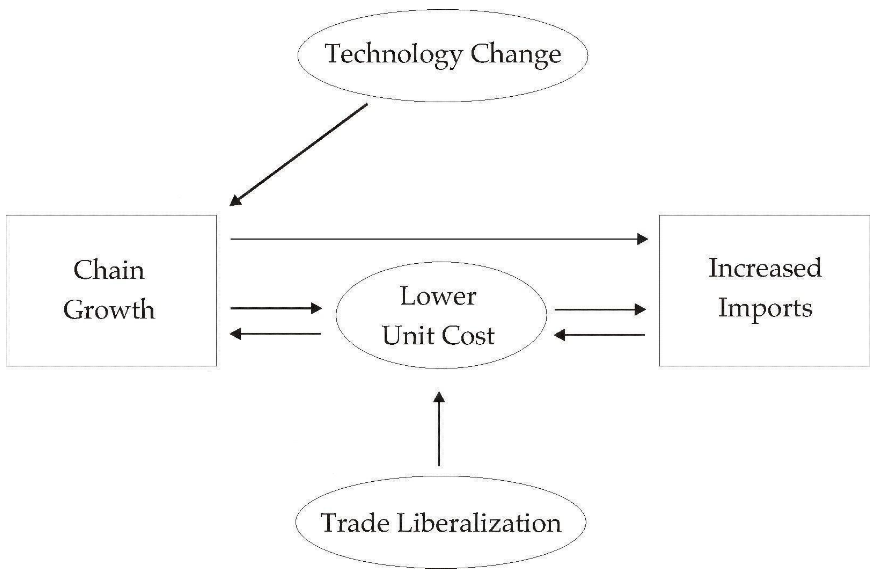

Figure 1. Interaction of Trade Liberalization and Technological Change

3 Data Construction

Our unit of analysis is a 6-digit retail sector, such as tire dealers (441320), pharmacies and drug stores (446110), children’s and infants’ clothing stores (448130), office supplies and stationery stores (453210), and pet and pet supplies stores (453910). There are 72 sectors in our data; a complete listing is in Appendix Table A-1.

There is no readily-available measure of imports by retail sector. To impute imports by sector we take a weighted sum of imports by product, using as weights the importance of each sector in selling the product. For example, because 40% of all toys were sold at toy stores in 1997, we allocated 40% of 1997 stuffed toy imports to toy stores. That same year 4.5% of toy sales were made in general merchandise stores, so we allocated 4.5% of stuffed toy imports to general-merchandise stores. Import figures by product are available at a very disaggregated level (HTS10) and we aggregate imports to broad categories to match them with retail sales data. For example, HTS10 code for alphabet blocks is one of 96 products classified under product code 20460, which includes toys, hobby goods, and games.

Import data come from the U.S. International Trade Commission (USITC) Trade DataWeb for each of 6,564 products by 10-digit Harmonized Tariff Schedule (HTS) codes, and allocated each HTS code to a product code.[5] $\mathbf{Imports}_{pt}$, the total import value of product p in year t, is calculated as

$$\mathbf{Imports}_{pt} \equiv \sum_{h \in p} \mathbf{Imports}_{ht}$$

where $\mathbf{Imports}_{ht}$ is the import value of HTS10 h in year t.

The Census of Retail Trade, conducted every five years in years ending in "2"and "7," includes dollar sales, by sector, for each of 38 broad product categories in 1997 and 2002 (Table 2 in U.S. Census Bureau various years b).[6] Examples of product categories include toys, hobby goods, and games; apparel (which includes men's, women's, and children's apparel, as well as accessories); hardware (which includes tools as well as plumbing and

[5]An additional 13,280 HTS10 codes were classified as intermediate goods. Our concordance from HTS10 to Product Codes is available upon request.

[6]Data from the 2007 Census are not yet available; the 1997 Census was the first to use the North American Industry Classification System (NAICS). Earlier Census data are available using the Standard Industrial Classification (SIC); see discussion below.

electrical supplies), and audio equipment (including musical instruments, radios, stereos, compact discs, records, tapes, audio tape books, and sheet music).[7]

To impute sector-level imports, we assign product imports to sectors based on the value of sales of the product accounted for by each sector:

$$\mathbf{Imports}_{st} \equiv \sum_{p} \omega_{spt} \mathbf{Imports}_{pt} \tag{1}$$

where ω_{spt} is the share of sector s in product p's sales:

$$\omega_{spt} \equiv \frac{\mathbf{Sales}_{spt}}{\mathbf{Sales}_{pt}}. \tag{2}$$

$\mathbf{Sales}_{spt}$ is the dollar value of sales of product p in sector s in year t and $\mathbf{Sales}_{pt}$ is the total dollar value of product p sales (across all sectors) in year t.

The data construction process is presented graphically in Figure 2.

Finally, we define the "size of the largest firms" as the dollar sales of the four largest firms in each sector (Table 6 in U.S. Census Bureau various years a).[8] We always control for the dollar sales of the sector since there is a mechanical relationship between sales at the four largest firms and sector-level sales. In 59 of the 72 sectors, the share of retail dollars spent at the top four firms in each sector increased between 1997–2002. The average increase was 6 percentage points. Among the thirteen sectors with decreased concentration the average decrease in the top-four firms' share was 2 percentage points.

[7] Basker, Klimek, and Van (2008) use the establishment-level Census data underlying this table to analyze product assortment at general-merchandise stores, and show that store belonging to larger chains sell more diverse items. To our knowledge, the data on product-level sales for other sectors have never been utilized in an academic study.

[8] By law the Census does not report data that can reveal the size of individual firms. Several other measures of firm size are available but the only one that is consistently available for all sectors is the largest-firm measure. Sales in firms with revenue above \$250 million, for example, are omitted in 55 of the 72 sectors in 1997 to prevent disclosure of individual firms' identities, and even the number of firms with sales exceeding \$250 million is missing for 18 of the sectors.

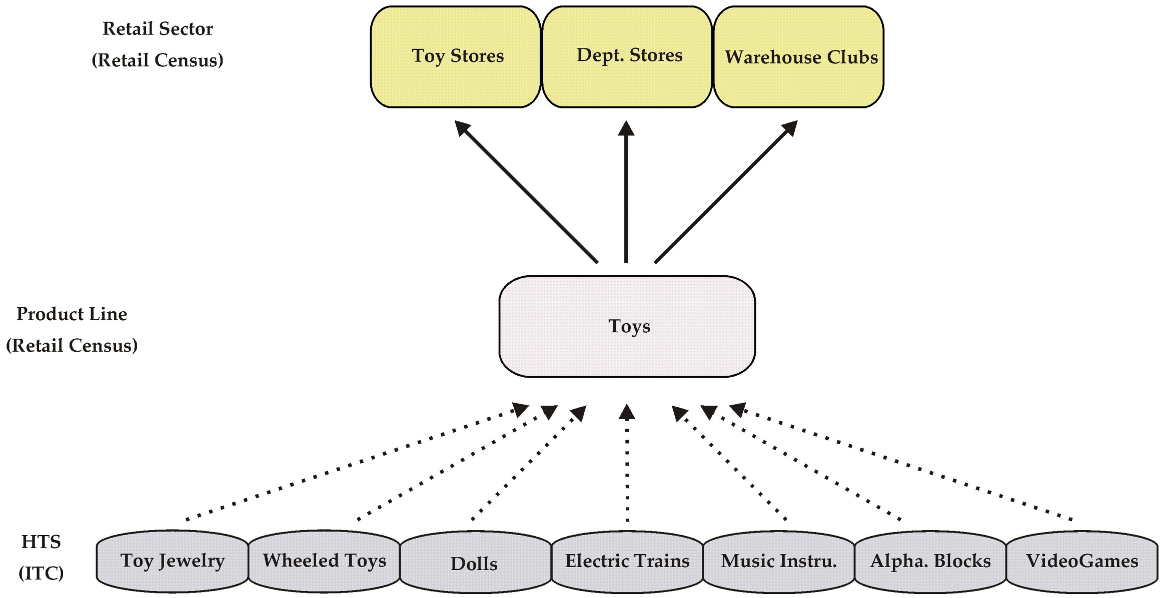

Figure 2. Constructing Sector Imports: Toy Stores

4 Estimation and Results

Combining the data on imports, sector sales, and the sales in the largest four firms, we estimate the following difference-in-difference equation:

$$\textbf{Imports}_{st} = \alpha_s + \delta_t + \beta\textbf{Top4}_{st} + \gamma\textbf{Non4}_{st} + \varepsilon_{st} \tag{3}$$

where $\textbf{Top4}_{st}$ is the sales amount in dollars by the largest four firms in sector s in year t; $\textbf{Non4}_{st}$ is the sales amount in dollars by all other firms in sector s in year t; α_s is a sector fixed effect, δ_t is a year fixed effect, and $\textbf{Imports}_{st}$ is the dollar share of imports attributed to sector s. We estimate this regression for the years 1997–2002, with sectors identified by 6-digit NAICS codes.

By including sector fixed effects in the regression we allow for the fact that sectors with larger dominant firms may import more (or less) than other sectors for reasons not related to our story. We also include a 2002 year dummy to capture the fact that both sales at the largest firms and imports have increased over time. (The year dummy also captures any changes in price level across time periods.) The coefficients β and γ represent, respectively, the marginal propensity to import by the top four firms and smaller firms.

We report results for imports from seven countries and regions: China, Asia (inclusive of China), Mexico, Central America (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), all non-rich non-oil countries, all rich countries, and the entire world. Following the 2007 World Bank definition of "high income" countries, non-rich countries are all world countries with gross national income per capita below $11,116.[9] Non-oil countries are defined as non-OPEC.[10] Non-rich non-oil countries are the intersection of non-oil and non-rich.[11]

Because sectors vary dramatically in size — the largest sector, new car dealers (NAICS 441110) has sales 5,000–10,000 times as large as the smallest sector, other fuel dealers (NAICS 454319) — a concern in the OLS regression is that large sectors, with large errors, are over-weighted relative to smaller sectors. Although we use robust standard errors (with ε_{st} clustered by sector) we explicitly correct for heteroskedasticity due to differences in sector size using weighted least-squares (WLS). In the WLS specification each observation is weighted by $\frac{1}{\mathbf{Sector}_{st}^2}$, the inverse of squared sector sales. This weighting is equivalent to dividing each observation by $\mathbf{Sector}_{st}$.

Table 3 reports both OLS and WLS estimates, as well as χ^2 statistics from Breusch-Pagan tests for heteroskedasticity related to sector size. In the unweighted regressions we reject the null of homoskedasticity with very high confidence for all regions; we cannot reject the null in the weighted regressions.[12]

[9] There are sixty high-income countries; see `http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20420458 menuPK:64133156 ~pagePK:64133150 piPK:64133175~theSitePK:239419,00.html`; accessed January 2007. All other countries are included in our non-rich region.

[10] OPEC members are Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

[11] Non-oil non-rich are non-rich countries excluding Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Libya, Nigeria, and Venezuela.

[12] The tests are performed using non-robust standard errors, but the standard errors reported in the table are robust. We continue to use robust standard errors in the weighted regressions because there are other potential causes of heteroskedasticity not addressed by the weighting scheme.

In the WLS specification (lower panel), we estimate the top-four firms' **Marginal Propensity to Import (MPI)** from China to be 9.74 cents per dollar of sales, as compared with 2.95 cents per dollar for non-top-four firms (first column). The difference of approximately 7 cents is different from zero at the 95% confidence level. In contrast, we estimate the top-four firms' MPI from all rich countries at only 2.94 cents per dollar of sales, as compared with 9.3 cents per dollar of sales for the non-top-four firms (second-to-last column).

These calculations lend themselves to a triple-difference (difference-in-difference-in-difference) interpretation. The ratio of top-four to non-top-four MPIs from China is 3.3 compared with a ratio of only 1.35 for world imports, and a ratio of 0.32 for imports from Rich countries. In other words, consistent with Basker and Van's (2008) model, large firms do not simply import more than smaller firms. Rather, large firms import disproportionately from China and other LDCs, not from rich countries.

These estimates help to explain why Hobby, Toy, and Game Stores (NAICS 451120) and Hardware Stores (NAICS 444130), both of which sold roughly $16 billion of goods in 2002, imported dramatically different quantities from China. Our calculations imply that the toy sector imported over $3 billion in goods from China that year whereas the hardware sector imported only approximately $650 million. The top four firms accounted for over 70% of sector sales in the toy sector that year; in the hardware sector the top four firms accounted for only about 13% of sales.

These marginal propensities to import are understated because import values do not account for any markup. If store-specific elasticities of demand range from approximately 2 (for DVDs, estimated by Chiou 2005) to 3 (estimate for aggregate demand elasticity at Wal-Mart from Basker and Van 2008) then 15–20% of the marginal sale at the largest retailers is spent on Chinese-produced goods, compared with 4–6% of the marginal sale at smaller retailers.

As an alternative for dealing with heteroskedasticity, we also estimate a log-log specification:

$$\ln(\mathbf{Imports}_{st}) = \alpha_s + \delta_t + \beta \ln(\mathbf{Top4}_{st}) + \gamma \ln(\mathbf{Non4}_{st}) + \varepsilon_{st} \tag{4}$$

Now, the coefficients β and γ can be interpreted as elasticities: respectively, the elasticity of imports with respect to sales at the top four firms and at all smaller firms. These elasticities, however, need to be interpreted with care, because the sales size of the top four firms may be smaller or larger than the sales size of the rest of the firms in the retail sector. On average over this period the top four firms account for 30% of sales in each sector, but their share of sector sales varies from under 10% to about 90%, depending on the sector. We convert the elasticity of imports with respect to sales into an MPI by firm size using the calculation

$$\begin{aligned} \mathbf{MPI}_{Top4} &= \beta \cdot \frac{\mathbf{Imports}}{\mathbf{Top4}} \\ \mathbf{MPI}_{Non4} &= \gamma \cdot \frac{\mathbf{Imports}}{\mathbf{Non4}} \end{aligned}$$

using mean and median values for Imports, Top4, and Non4.

The results, reported in Table 2, show that the MPI for the largest firms is higher than the MPI for smaller firms for most low-cost source countries; the relationship is reversed for rich (high-cost) source countries. We can reject equality of the marginal propensities to import by the two types of firms for China, Central America, and the sum of non-rich non-oil countries at the 5% level using both mean and median values.

Interpreting the results for Chinese imports, we find that the top four firms spend about five cents out of each dollar in sales on Chinese imports, compared with 0.6 – 0.7 cents per dollar of sales for smaller firms. Depending on whether we evaluate the MPIs at mean or median values the top-four firms' MPI is 7–9 times higher than smaller firms' MPI, a difference of 4–5 cents per dollar. As in the previous specification, the MPI ranks switch for rich countries, where non-top-four firms are estimated to have higher propensities to import than top-four firms.

Results from the log specification are consistent with the results from the dollar specification. Estimates of marginal propensities to import for both top-four and smaller firms are overall smaller, but the pattern, and the differences between the MPIs, remains the same.

Although we do not interpret β as quantifying a causal relationship — indeed, our theory says that the relationship between chain size, as proxied by the top-four sales, and imports is a two-way relationship — the results are strongly consistent with the theory.

Our results are a *lower bound* on the true relationship between firm size and import level due to the way we constructed the data. In all specifications the left-hand side variable, $\mathbf{Imports}_{st}$, is biased against us due to the method we use to construct the weights ω_{spt}. The weighted sum of Equation (1) implicitly assumes that imports of a product are distributed across sectors in proportion to the sales of that product. This assumption is at odds with our hypothesis, which predicts that imports will accrue disproportionately to sectors with larger firms, and guarantees that our estimated coefficients are closer in value than they would be if better data were available for this allocation.[13]

5 Historical Data

We would have liked to use a longer panel in our analysis, but that is not possible due to the Census switch from the Standard Industrial Classification (SIC) to NAICS between 1992 and 1997. Although a mapping from SIC to NAICS does exist, it is extremely noisy.[14]

[13] In addition, there may be mis-allocation of HTS codes to product codes due to the fact that some HTS codes contain both consumer and intermediate products (e.g., lumber, paper, foodstuffs). Because this type of error is constant over time it should increase the level of imports we calculate for some products and decrease the level we calculate for others, but not in a way that is correlated with the error term ε_{st}.

[14] In addition to the fact than many NAICS codes are created from *parts* of 4-digit SIC codes, and the data on the size of the top firms and product sales are at the 3-digit level, eleven of the 72 retail NAICS codes are mapped, in whole or in part, to wholesale rather than retail SIC codes. Since the Census of Wholesale Trade (CWT) uses a different product classification scheme than the Census of Retail Trade (CRT) the

We opted instead to use a short panel of SIC data — one observation from the late 1980s, the second from 1992 — to test whether the above relationship holds in the earlier data as well. A list of SIC codes and their descriptions is in Table A-2.

The period 1987–1992 is of interest in our context for several reasons. The period roughly coincides with Wal-Mart's famous "Buy American" campaign, which was launched in 1985 and pledged to 'buy American whenever we can" and to pay up to a 5% premium for U.S.-made goods (Zellner 1992). The campaign collapsed in late 1992 amid allegations by Dateline NBC that Wal-Mart was producing private-label clothes in Bangladesh, smuggling Chinese garments into the U.S. in excess of U.S. quotas, and placing imported clothes on racks marked "Made in the USA" (Gladstone 1992). However, China was not the main concern of American protectionists during this period. The North American Free Trade Agreement (NAFTA) was ratified in 1992 amid much controversy and ultimately substantially increased U.S. imports from Mexico (Romalis 2004). Responding to concerns about NAFTA, Ross Perot coined the phrase "giant sucking sound," referring to anticipated displacement of American jobs with Mexican jobs, during his 1992 Presidential bid.

We treat the historical data as secondary to the NAICS data for several reasons. First, the Economic Census for the late 1980s refers to 1987 but the earliest import data we could obtain from USITC were for 1989, so the match is imperfect. Second, at the 3-digit SIC level (for which we have Census data) there are only 41 sectors compared with the 72 6-digit NAICS codes available to us in the later data. Third, the mapping between products and sectors was less precise in the earlier period and required some imputation. We used as much as possible of the information available (total sales per sector, total sales per product, and information about sales in any specific product-sector combination or product-set of sectors combination) to impute the missing observations before aggregating

mapping between product codes is not 1-to-1, so several additional layers of noise would be introduced with this mapping.

the data to the final form. Given these data limitations, in particular the smaller number of observations and the mismatch between the years for which imports and sales are measured, we expect lower precision as well as attenuation bias in our coefficient estimates.

Despite these reservations, the historical data provide a check on our results and also a secondary test of the theory. Given the concern about trade with Mexico and Central America over this period, and given the smaller overall size of chains, we expect to find more action in these regions than in China and Asia in the earlier period.

The results from the historical analysis are shown in Table 3. They are consistent with our hypotheses. The MPIs are generally smaller, as are the differences between the top-four firms' MPI and other firms' MPI. The difference between the top-four firms' MPI and other firms' MPI is statistically significant for China, Central America, and Non-Rich Non-Oil countries at the 90% confidence level. Results from the log specification are shown in Table 4; the main difference here is that the MPIs for Chinese goods are no longer statistically different for top-four firms and non-top-four firms, but they are different for Mexican imports.

While the estimated historical MPIs cannot be compared directly to the current MPIs since the identity and size of the largest firms depends on sector definitions, which changed between 1992 and 1997, we can gain insights into changes in import patterns from a triple-difference look at the two sets of estimates. For example, the difference between the top-four and non-top-four MPIs for Chinese goods in the later period is 6.79 cents per dollar, whereas it is 5.7 cents per dollar in the earlier period. This change over time could be due to data issues, however, rather than to an increase in the relative marginal propensity of the top firms to import from China. However, comparing this difference to the difference between the later and earlier relative MPIs from Central America (0.53 cents per dollar in the later period, 1.28 cents per dollar in the historical data) indicates that the advantage of the largest retail chains in the earlier period was skewed towards Central America rather than China.

6 Counterfactual Exercise

A counterfactual exercise holding total sector growth fixed but allocating it uniformly across firms in each sector provides insight into the importance of economies of scale in the retail channel to the increase in imports over the study period. Holding fixed the total increase in sales in each sector, we ask how much imports would have increased if this sector-level growth had been uniform, that is, if sales at the top-four firms had increased at the same rate as sales in the smaller firms.

We calculate the counterfactual 1992 import level as

$$\textbf{Counterfactual Imports}_{s,1992} = \widehat{\alpha}_s + \widehat{\delta}_{1992} + \widehat{\beta} \cdot (\lambda_s \cdot \textbf{Top4}_{s,1987}) + \widehat{\gamma} \cdot (\lambda_s \cdot \textbf{Non4}_{s,1987}) \quad (5)$$

where λ_s is overall sales growth in sector s between 1987 and 1992, and the coefficients are estimated using Equation (3) with inverse sector weights.

The impact of the disproportionate growth of larger retailers on import growth between 1987 and 1992 is summarized in Panel A of Table 5.[15] While the growth in world imports is estimated to be very similar under the two scenarios — the difference is only 2% — we find that the growth in imports from Central America would have been 24% lower, and import growth from China would have been 12% lower. Overall, the growth in imports from non-rich, non-oil countries would have decreased by 14%, whereas import growth from rich countries would have been 15% higher.

The equivalent exercise using 1997 and 2002 data counterfactual is reported in Panel B of Table 3. We compare the actual increase in aggregate imports (summed across all sectors) with the increase that would have occurred had the sector growth been uniform, also summed across all sectors. Here too, only a small fraction — 6.5% — of the overall

[15] Predicted import growth using actual sector changes differs from actual import growth because we use the regression coefficients from the weighted regression to generate the predicted values. We use the same coefficient estimates to make both the actual and the counterfactual predictions.

difference in aggregate imports from all source countries is due to the change in the size distribution of firms. But the *distribution* of imports — which source countries are used the most — depends very strongly on the size distribution of firms. Nineteen percent of the increase in consumer-goods imports from China, 20% of increased imports from Mexico, and 25% of the growth in imports from Central America between 1997 and 2002 can be attributed — both directly and indirectly (through the feedback effect) — to increased concentration. In contrast, imports from rich countries would have been 28% *higher* had the distribution of sales growth been uniform across store sizes.

By using only the *differential* consolidation rates across retail sectors to identify the impact of consolidation, these figures underestimate the full effect of increased consolidation in the retail sector. Even so, the results provide insight into the "black box" of firm import decisions and the changes it has undergone over time. These results also underscore the point that both small and large retailers import — but they import from different places. Consistent with the theoretical model, the disproportionate growth of the largest retail firms has encouraged (and benefited from) rising imports from China and other LDCs.

7 Concluding Remarks

We use data from the Census of Retail Trade and the U.S. International Trade Commission to test for a relationship between the size of the largest retail firms in each sector and the value of imports the sector sells. Using a difference-in-difference specification to control for both time-invariant differences across sectors and overall growth of imports, we find disproportionate increases in imports from China and other less-developed countries (LDCs) in sectors in which the biggest chains grew most. A lower bound on the difference between the largest firms' marginal propensity to import from China — the share of an additional dollar in sales that is used to buy goods from China — and smaller firms' marginal propensity to import from China is about 7 cents per dollar, and close to 12 cents per dollar for LDCs as a whole. Put differently, the largest firms' marginal propensity to import from China and other LDCs is at least 3 times higher than that of smaller firms.

These differences in import propensities help explain the dramatic growth in imports of consumer goods from China and other LDCs over the past two decades. The largest retail firms have grown faster than smaller firms in almost every sector, thanks in part to their advantage in procuring cheap imports: the share of retail dollars spent at the top four firms in each sector increased in 82% of retail sectors between 1997–2002, and in 88% of sectors during the earlier period. Had retail firms grown uniformly, import growth from LDCs would have been 14% lower between 1987 and 1992 and 19% lower between 1997 and 2002.

The increase in imports from developing countries has contributed to low and falling prices for many consumer goods. Consumer prices have fallen dramatically in some of the sectors with the highest increase in imports from China between 1997 and 2002. At a time when the overall CPI rose by 14%, the CPI for computer hardware and software fell by 80% and 30% respectively, by 40% for televisions, and by more than 20% for toys.

Large chains have contributed to falling prices by facilitating substitution between high-cost imports and low-cost imports. All retailers sell imported products, but only the largest retailers have the resources necessary to pay the fixed costs associated with contracting directly with low-cost countries and are able to reap the benefit of substantially lower production costs. The consolidation in the retail sector has had only a small effect on the overall quantity of imports, but it has dramatically changed the *composition* of source countries for these imports.

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Table 1. Coefficient Estimates and Marginal Propensities to Import

	China	Asia	Mexico	Central America	Non-Rich, Non-Oil	Rich	World
				Unweighted Regressions			
Top4	0.0371***	0.0848***	0.0203***	0.0033**	0.0834***	0.0750***	0.1758***
	(0.0116)	(0.0189)	(0.0038)	(0.0013)	(0.0172)	(0.0246)	(0.0179)
Non4	0.0008	0.0814**	0.0283**	-0.0004	0.0354	0.1761*	0.2185***
	(0.0208)	(0.0348)	(0.0122)	(0.0010)	(0.0244)	(0.0894)	(0.0789)
F statistic	1.8261	0.0069	0.4002	4.4578	2.0152	1.2084	0.2858
p value (two sided)	0.1809	0.9340	0.5290	0.0383	0.1601	0.2754	0.5946
p value (one sided)	0.0904	0.4670	0.7645	0.0191	0.0801	0.6377	0.7973
χ^2 statistic	65.7062	88.3765	132.6773	16.0755	45.2372	450.4402	233.7182
p value	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
				Weighted Regressions			
Top4	0.0974***	0.1222***	0.0355***	0.0076**	0.1750***	0.0294*	0.2187***
	(0.0230)	(0.0296)	(0.0112)	(0.0034)	(0.0388)	(0.0154)	(0.0385)
Non4	0.0295*	0.0853***	0.0078	0.0023**	0.0589***	0.0930***	0.1616***
	(0.0156)	(0.0227)	(0.0051)	(0.0011)	(0.0203)	(0.0327)	(0.0294)
F statistic	5.0357	0.8557	4.0446	2.7014	6.1498	2.1878	1.2564
p value (two sided)	0.0280	0.3581	0.0481	0.1047	0.0155	0.1435	0.2661
p value (one sided)	0.0140	0.1790	0.0241	0.0523	0.0078	0.5718	0.1331
χ^2 statistic	0.0367	0.5445	0.3264	2.6975	0.0018	0.4810	0.4108
p value	0.8481	0.4606	0.5678	0.1005	0.9663	0.4880	0.5215

Each column represents a separate regression.
Each regression has 144 observations. Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
χ^2 statistic is for a Breusch-Pagan test for heteroskedasticity with respect to sector size

Table 2. Coefficient and MPI Estimates from Log Specification

	China	Asia	Mexico	Central America	Non-Rich, Non-Oil	Rich	World
	Coefficient Estimates						
ln(**Top4**)	0.6117***	0.2763**	0.2204	0.3688**	0.3632***	0.1925*	0.2714***
	(0.1730)	(0.1144)	(0.1413)	(0.1487)	(0.1017)	(0.1029)	(0.1006)
ln(**Non4**)	0.2201	0.4688**	0.5298**	0.0708	0.2893*	0.7770***	0.6631***
	(0.2314)	(0.1839)	(0.2051)	(0.2539)	(0.1675)	(0.1880)	(0.1619)
χ^2 statistic	2.8819	0.7757	2.3925	0.3577	2.0931	1.6785	2.0367
p value	0.0896	0.3785	0.1219	0.5498	0.1480	0.1951	0.1535
	Implied Marginal Propensity to Import at Mean Values						
Top4 MPI	0.0495	0.0690	0.0111	0.0036	0.0721	0.0497	0.1357
Non4 MPI	0.0072	0.0473	0.0108	0.0003	0.0232	0.0810	0.1339
F statistic	5.4977	0.3314	0.0100	3.2801	2.9624	0.4214	0.0140
p value (2-sided)	0.0218	0.5667	0.9208	0.0744	0.0896	0.5183	0.9063
p value (1-sided)	0.0109	0.2833	0.4604	0.0372	0.0448	0.7592	0.4532
	Implied Marginal Propensity to Import at Median Values						
Top4 MPI	0.0536	0.0873	0.0102	0.0009	0.0923	0.0531	0.1840
Non4 MPI	0.0058	0.0445	0.0074	0.0001	0.0221	0.0644	0.1350
F statistic	7.6190	1.2550	0.3418	4.3698	5.2803	0.0023	0.7514
p value (2-sided)	0.0073	0.2664	0.5607	0.0402	0.0245	0.9617	0.3890
p value (1-sided)	0.0037	0.1332	0.2803	0.0201	0.0123	0.9808	0.1945

Each column represents a separate regression.
Each regression has 144 observations. Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
χ^2 statistic is for a Breusch-Pagan test for heteroskedasticity with respect to sector size

Table 3. Coefficient Estimates and Marginal Propensities to Import, Historical Data

	China	Asia	Mexico	Central America	Non-Rich, Non-Oil	Rich	World
				Unweighted Regressions			
Top4	0.0696***	0.0657*	0.0094	0.0101***	0.1271***	-0.0261*	0.1032**
	(0.0196)	(0.0330)	(0.0071)	(0.0033)	(0.0400)	(0.0129)	(0.0442)
Non4	-0.0037	0.0021	0.0076	-0.0002	-0.0005	0.0128**	0.0136
	(0.0037)	(0.0106)	(0.0103)	(0.0005)	(0.0103)	(0.0059)	(0.0143)
F statistic	11.1824	2.6049	0.0135	7.7269	7.8038	5.9326	2.9551
p value (two sided)	0.0019	0.1150	0.9080	0.0085	0.0082	0.0198	0.0940
p value (one sided)	0.0010	0.0575	0.4540	0.0043	0.0041	0.5099	0.0470
χ^2 statistic	0.0016	0.2624	379.8574	0.0814	3.1068	0.4940	0.1958
p value	0.9683	0.6085	0.0000	0.7755	0.0780	0.4822	0.6581
				Weighted Regressions			
Top4	0.0757**	0.0870	0.0065***	0.0138**	0.1458***	-0.0001	0.1479*
	(0.0304)	(0.0572)	(0.0021)	(0.0055)	(0.0531)	(0.0327)	(0.0798)
Non4	0.0187*	0.0913**	0.0082***	0.0010	0.0372**	0.0609*	0.1206**
	(0.0098)	(0.0427)	(0.0022)	(0.0016)	(0.0176)	(0.0313)	(0.0507)
F statistic	2.5006	0.0034	4.1924	3.6955	2.7174	1.9010	0.0702
p value (two sided)	0.1223	0.9537	0.6635	0.0623	0.1077	0.1762	0.7925
p value (one sided)	0.0612	0.9768	0.8318	0.0311	0.0539	0.5881	0.3963
χ^2 statistic	3.0479	0.2976	0.2313	2.1985	1.5062	1.7977	0.6898
p value	0.0808	0.5854	0.6306	0.1381	0.2197	0.1800	0.4062

Each column represents a separate regression.
Each regression has 76 observations. Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
χ^2 statistic is for a Breusch-Pagan test for heteroskedasticity with respect to sector size

Table 4. Coefficient and MPI Estimates from Log Specification, Historical Data

	China	Asia	Mexico	Central America	Non-Rich, Non-Oil	Rich	World
				Coefficient Estimates			
ln(**Top4**)	0.2587**	0.1662***	0.3670***	0.5867***	0.3649***	0.0924	0.1913**
	(0.1225)	(0.0569)	(0.1014)	(0.1276)	(0.0934)	(0.0884)	(0.0842)
ln(**Non4**)	0.9681***	0.7646***	0.9032***	0.7697***	0.6766**	0.7726***	0.6809***
	(0.3030)	(0.0985)	(0.1841)	(0.2110)	(0.2502)	(0.1827)	(0.1807)
χ^2 statistic	3.0382	1.3951	0.0124	0.7128	0.9602	5.5427	3.6174
p value	0.0813	0.2375	0.9114	0.3985	0.3271	0.0186	0.0572
				Implied Marginal Propensity to Import at Mean Values			
Top4 MPI	0.0133	0.0666	0.0122	0.0046	0.0586	0.0424	0.1330
Non4 MPI	0.0098	0.0604	0.0059	0.0012	0.0214	0.0699	0.0934
F statistic	0.1500	0.0045	1.8816	10.0576	4.1111	0.5804	0.3926
p value (2-sided)	0.7007	0.9469	0.1784	0.0031	0.0499	0.4510	0.5348
p value (1-sided)	0.3504	0.4735	0.0892	0.0015	0.0249	0.7255	0.2674
				Implied Marginal Propensity to Import at Median Values			
Top4 MPI	0.0099	0.0744	0.0131	0.0029	0.0667	0.0445	0.1461
Non4 MPI	0.0060	0.0557	0.0052	0.0006	0.0201	0.0606	0.0847
F statistic	0.8208	0.7425	3.9390	13.3447	6.8987	0.0462	1.4785
p value (2-sided)	0.3708	0.3944	0.0546	0.0008	0.0125	0.8309	0.2317
p value (1-sided)	0.1854	0.1972	0.0273	0.0004	0.0062	0.9155	0.1159

Each column represents a separate regression.
Each regression has 76 observations. Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
χ^2 statistic is for a Breusch-Pagan test for heteroskedasticity with respect to sector size

Table 5. Predicted Import Growth under Actual and Counterfactual 2002 Firm Size Distribution

	China	Asia	Mexico	Central America	Non-Rich, Non-Oil	Rich	World
Panel A: Historical Data							
Actual	0.9351	0.3016	0.7883	0.3478	0.5831	0.1265	0.2509
Counterfactual	0.8183	0.3030	0.6009	0.3551	0.5014	0.1457	0.2456
Portion due to Change in Size Distribution	0.125	-0.005	-0.021	0.238	0.140	-0.152	0.021
Panel B: Current Data							
Actual	0.6784	0.3274	0.4193	0.3896	0.5070	0.1634	0.3065
Counterfactual	0.5507	0.3025	0.3331	0.2931	0.4119	0.2095	0.2865
Portion due to Change in Size Distribution	0.188	0.076	0.205	0.248	0.188	-0.282	0.065

A Data Description

Table A-1 lists the 72 NAICS sectors used in the analysis with their descriptions. Table A-2 lists the 41 SIC sectors used in the analysis with their descriptions.

Table A-1. NAICS Sectors, 1997–2002

NAICS	Description
441110	New car dealers
441120	Used car dealers
441210	Recreational vehicle dealers
441221	Motorcycle dealers
441222	Boat dealers
441229	All other motor vehicle dealers
441310	Automotive parts and accessories stores
441320	Tire dealers
442110	Furniture stores
442210	Floor covering stores
442291	Window treatment stores
442299	All other home furnishings stores
443111	Household appliance stores
443112	Radio, television, and other electronics stores
443120	Computer and software stores
443130	Camera and photographic supplies stores
444110	Home centers
444120	Paint and wallpaper stores
444130	Hardware stores
444190	Other building material dealers
444210	Outdoor power equipment stores
444220	Nursery and garden centers
445110	Supermarkets and other grocery (except convenience) stores
445120	Convenience stores
445210	Meat markets
445220	Fish and seafood markets
445230	Fruit and vegetable markets
445291	Baked goods stores
445292	Confectionery and nut stores
445299	All other specialty food stores
445310	Beer, wine, and liquor stores
446110	Pharmacies and drug stores
446120	Cosmetics, beauty supplies, and perfume stores
446130	Optical goods stores
446191	Food (health) supplement stores
446199	All other health and personal care stores

Table A-1. NAICS Sectors, 1997–2002 – Continued

NAICS	Description
447110	Gasoline stations with convenience stores
447190	Other gasoline stations
448110	Men's clothing stores
448120	Women's clothing stores
448130	Children's and infants' clothing stores
448140	Family clothing stores
448150	Clothing accessories stores
448190	Other clothing stores
448210	Shoe stores
448310	Jewelry stores
448320	Luggage and leather goods stores
451110	Sporting goods stores
451120	Hobby, toy, and game stores
451130	Sewing, needlework, and piece goods stores
451140	Musical instrument and supplies stores
451211	Book stores
451212	News dealers and newsstands
451220	Prerecorded tape, compact disc, and record stores
452110	Department stores (excluding leased departments)
452910	Warehouse clubs and superstores
452990	All other general merchandise stores
453110	Florists
453210	Office supplies and stationery stores
453220	Gift, novelty, and souvenir stores
453310	Used merchandise stores
453910	Pet and pet supplies stores
453920	Art dealers
453930	Manufactured (mobile) home dealers
453991	Tobacco stores
453998	All other miscellaneous store retailers (except tobacco)
454110	Electronic shopping and mail order houses
454210	Vending machine operators
454311	Heating oil dealers
454312	Liquefied petroleum gas (bottled gas) dealers
454319	Other fuel dealers
454390	Other direct selling establishments

Table A-2. SIC Sectors, 1987–1992

SIC	Description
521	Lumber and other building materials dealers
523	Paint, glass, and wallpaper stores
525	Hardware stores
526	Retail nurseries, lawn and garden supply stores
527	Mobile home dealers
531	Department stores
533	Variety stores
539	Miscellaneous general merchandise stores
541	Grocery stores
542	Meat and fish (seafood) markets
543	Fruit and vegetable markets
544	Candy, nut, and confectionery stores
545	Dairy product stores
546	Retail bakeries
549	Miscellaneous food stores
551	New and used car dealers
552	Used car dealers
553	Auto and home supply stores
554	Gasoline service stations
555	Boat dealers
556	Recreational vehicle dealers
557	Motorcycle dealers
559	Automotive dealers, not elsewhere classified
561	Men's and boys' clothing stores
562	Women's clothing stores
563	Women's accessory and specialty stores
564	Children's and infants' wear stores
565	Family clothing stores
566	Shoe stores
569	Miscellaneous apparel and accessory stores
571	Furniture and home furnishings stores
572	Household appliance stores
573	Radio, television, computer, and music stores
581	Eating and drinking places
591	Drug and proprietary stores
592	Liquor stores
593	Used merchandise stores
594	Miscellaneous shopping goods stores
596	Non-store retailers
598	Fuel dealers
599	Miscellaneous retail stores