From Beijing to Bentonville: Do Multinational Retailers Link Markets? *

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Abstract

Four of the world's five largest retailers—Walmart, Carrefour, Tesco, and Metro—entered China after 1995, following new policies that allowed foreign retailers to participate more fully in the Chinese retail market. As each retailer added both stores and global procurement centers, they created unique footprints that caused Chinese cities to be differentially exposed to the activities of these global retailers. We exploit these differences to identify the effect of multinational retailer presence on city-country exports of retail goods. We find robust evidence that increased exposure to multinational retailers was followed by rising exports. Since the export expansions are not limited to the connections formed by the retailers' bilateral networks, our evidence suggests that the growing presence of global retailers operated, at least in part, by enhancing the general export capabilities of the affected cities.

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Keywords: multinational retailers, China, exports,

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1 Introduction

After many years of negotiations, in September 2012 India's Ministry of Commerce and Industry issued new rules for multi-brand retailers that allowed majority ownership entry by global retailers. The negotiations involved heated discussions about the effects of global retailer operations on small local retailers. From the early stages of the negotiations with the Indian government, Walmart argued that India would benefit from future export expansion if it allowed Walmart to expand its retail presence in India. The story as reported by *The Economist* (April 15, 2006) was that Walmart's procurement of goods in India would familiarize local suppliers with the requirements their products needed to meet if they were to be sold in export markets. To support its case, Walmart highlighted its previous experience in China. They might also have quoted from the *People's Daily Online* (April 22, 2002), an official newspaper in China, which commented that "the direct supply of 'made in China' products to foreign chain groups had become a key channel for their entry into the global market." Indeed, since estimates suggest that Walmart accounts for roughly 10% of all Chinese exports to the United States, the argument about retailer trade connections merits careful attention.[1] Thus, to evaluate whether global retailer expansion facilitates local export from host locations, this paper studies whether differences in export growth across Chinese cities was linked to the recent developments in the geographic spread of global retailers within China.

Multinational retailer activity in China is a new phenomenon that dates only from the mid-1990's. Of the five largest multinational retailers, France-based Carrefour (the second largest retailer worldwide and the largest in Europe) moved first, entering China in 1995. It was followed by US-based Walmart (the largest retailer in the world) and German-based Metro AG (fourth-ranked) in 1996. UK-based Tesco (fifth-ranked) was the last of the giant generalist retailers to enter in 1998.[2] For each of the global generalist retailers, locating in China served dual purposes; global retailer store operations enabled the retailers to sell products to Chinese consumers while they also allowed the retailers to use China as an important global base for international procurement.

To learn whether the growing presence of multinational retailers contributed to the expansion of Chinese city retailer good exports, we implement a difference in differences

[1] (Fishman, 2006, p. 103) reports that Walmart and its suppliers exported $18 billion to the US in 2004.

[2] Home Depot, which was the fourth largest retailer is excluded from our study because it is a specialist retailer in contrast with the other four firms, and because it did not enter China until 2006. Deloitte Global Powers of Retailing 2006 provides the ranking (available from `www.deloitte.com/assets/Dcom-Global/LocalAssets/Documents/dtt_ConsumerBusiness_GlobalPowers_021006(1).pdf`, p. 15).

estimation framework that adds measures of retailer presence to a regression model that is based on the standard gravity model of trade. Since each of the multinational retailers, i.e. Walmart, Carrefour, Metro and Tesco, set up global procurement centers (GPC) in China in addition to retail stores, we measure the intensity of retailer presence using city-level variables that reflect the number of retailer stores in each city and the proximity of each city to the nearest GPC. Our analysis of 1997–2005 city-country export data indicates that both forms of retail exposure were associated with increases in city exports. While the store and GPC location decisions were obviously not randomized, China's regulations prohibiting multiple stores in the same cities introduce some quasi-experimental variation. That combined with exogeneity tests, leads us to conclude that at least part of the positive association is likely to be causal.

Our work contributes to the newly emerging research that explores the effects of multinational retailers on international trade. In this area, Basker and Van have developed theory and evidence regarding the impact of multinational retailers on the imports of retailers' headquarters countries. The model in Basker and Van (2010b) shows how multinational retailers' economies of scale in both retailing and importing interact, thus creating incentives for large retailers to source products from distant, low-cost countries for sale in their headquarters' country stores. In support of their predictions, Basker and Van (2010a) provide empirical evidence suggesting that large US retailers affect US reliance on imports, since large US retailers have a higher marginal propensity to import for every dollar increase in sales than do smaller US retail chains. In contrast, since our paper takes the perspective of the countries that host affiliates of the multinational retailers, we focus instead on the retailers' impact on host country exports.

In addition, our paper is related to recent work in international trade evaluating the role of intermediaries in trade. Analysis in this area including Ahn, Khandelwal, and Wei (2011), Bernard, Jensen, Redding, and Schott (2010), and Blum, Claro, and Horstmann (2010) provides evidence that intermediaries connect firms to export markets that are more difficult to serve due to their distance or smaller size. In general, this evidence supports the view that intermediaries facilitate trade connections by reducing the fixed costs of entering new markets. Similarly, our finding that retailer presence is associated with enhanced city export capability, could arise if multinational retailers, and their GPCs in particular, perform a similar intermediary function in their promotion of Chinese products overseas.

Our project is also related to new research on the effects of multinational retailer presence on local firm productivity in host countries. For example, Javorcik and Li (2013) demonstrate that global retail chains' entry in Romania was associated with productiv-

ity improvements by Romanian supplier firms in the food industry. The mechanisms for such productivity improvements are described in Javorcik, Keller, and Tybout (2008)'s case study which chronicles how Walmart's entry in Mexico affected Mexican firms in the soap, detergent and surfactant industry. When Iacovone, Javorcik, Keller, and Tybout (2009) incorporate these mechanisms in a dynamic industry model their model predicts that Walmart's presence will increase the productivity of the supplying industry as a whole. However, in contrast with this work, which focuses on productivity spillovers, by studying whether the presence of multinational retailers affects host country *exports*, our work searches for additional channels of retailer influence on host economy performance.

More broadly, if we view the global expansion of multinational retailers as a unique form of foreign direct investment (FDI), our project is also related to the literature on the effects of FDI on the quality and productivity of local supplier firms. Such FDI productivity spillovers have been uncovered in Javorcik (2004) and Javorcik and Spatareanu (2009), based on evidence from Lithuania and Czech Republic, respectively. More recently, in work with Bangladeshi firm data, Kee (2011) shows that the presence of FDI firms is associated with better quality and new varieties of *local* intermediate inputs. Similar to the literature focusing on retailers' impacts, rather than focus on the quality and productivity of local suppliers, we focus instead on the effects of global retailer presence on local firm *exports*.

The remainder of the paper is structured as follows. First, to provide context and to motivate the analysis, the next section describes the procedures Metro and Walmart follow when they export Chinese products to their outlets outside of China. It also describes the key developments in China's recent deregulation of its retail markets. In section 3 we discuss the mechanisms and channels which have the potential to create a connection between the growth in global retailers' China activities and the growth of Chinese city exports. Section 4 explains how we measure retailer presence, and provides a summary view of recent changes in retailer exposure. Section 5 shows and discusses our econometric results. We conclude in section 6.

2 China's Retail Market

To motivate our research question and support our method of identification, we provide information on relevant features of China's retail market. First, to characterize the potential avenues for retailer effects on exports we present an overview of the purchasing procedures followed by Metro and Walmart in China. Next, we describe important changes that were implemented as China deregulated its retail market. Most notably, the

rules governing the phase-in of China's retail market opening explain why the four multinational retailers chose distinct locations as the initial base for their Chinese operations. For this reason, we exploit the resulting geographical and time diversity of the retailers' networks to identify how multinational retailer linkages affect international export development.[3]

2.1 Procurement Procedures

To provide insight into global retailers export procedures, we discuss notable aspects of Metro and Walmart's procurement practices in China. While there is little public information on the procurement practices of the other two retailers, there is no strong reason to believe that their procurement practices should differ dramatically from those of Metro and Walmart.

Metro uses the Chinese domestic market as a testing ground to evaluate the suitability of Chinese products for export. "Metro AG emphasizes the quality of products. The products which have entered Metro's procurement system will be sold in Chinese regional markets first. If they sell well, the products will be sold in all stores within China. At last they will be sold globally" (Wu, 2004, p. 74). Since this form of market testing benefits from the expansion of retailers' store networks, this statement suggests that the number of Chinese products exported through Metro's procurement system should increase as Metro expands its store presence in China.

Walmart Global Procurement (WMGP), established in Shenzhen in 2001, facilitates the purchase of Chinese goods by Walmart's outlets outside of China. WMGP regularly looks for new products and inquires about prices.[4] After WMGP classifies the products, it sends information by email to the buyers at all Walmart outlets. The outlet buyers then decide what products their stores may need and which should be explored during their "buying trips." This procedure is time consuming. Outlet buyers routinely meet two to three times each year in China. Before the buyers arrive in China, WMGP prepares the required samples. The staff at WMGP mark the product's price and features on each sample but cover the manufacturer's name. In other words, when outlet buyers make their initial purchase decisions they do not know which firms manufacture the samples they are viewing. During the meeting, the buyers privately decide which products to buy with little input from the WMGP staff. Afterwards, the buyers and the WMGP staff discuss the price and other order details. Next, since WMGP contacts the manufacturing

[3]Further differences in the retailers' geographic networks are identified by the differential geographic store presence of the four retailers in countries outside of China.

[4]We translated these procedures a from a report on the (now defunct) website `www.jamoo.net`.

firms and starts negotiations, the outlets' buyers have little or no direct contact with the manufacturers. Finally, once the order is placed, WMGP handles the order's logistics. They check the factory to verify that there are no problems such as child labor, or excessive overtime. They also check product quality at least twice—once during production and once after production. Finally, WMGP contacts shipping companies and prepares export documents, including letters of credit.

These procurement procedures suggest that Chinese local suppliers may benefit from the presence of global procurement centers of multinational retailers. In particular, it appears that local Chinese firms may benefit from having their products introduced to purchasers in multiple foreign markets, with no advance payment of market-specific fixed costs. In addition, through the interaction with global procurement centers, Chinese suppliers will gain an understanding about the nature of international quality or safety standards that they need to meet when serving international customers. They may also learn about the general preferences of foreign consumers. While this information is useful for Chinese manufacturers who wish to export to a specific destination, the information may also assist firms in managing exports to other similar foreign markets. As a vice-minister of the SETC (State Economic and Trade Commission) emphasized in his remarks at the International Retailers Global Sourcing Fair, "Chinese enterprises will also learn from the fair the quality and packaging standards required by *international markets*, and will upgrade their technologies accordingly" (People's Daily Online, April 23, 2002). Each of these benefits suggest that the presence of global procurement centers in China will increase China's exports of retail goods.

2.2 Deregulation of Retailing in China

Our estimation strategy exploits differences in the location and timing of retailer presence across Chinese cities to identify the effects of retailer presence on Chinese city exports of retail goods. Thus, it is important to understand the entry location decision process. To this end, we summarize the elements of China's retail market deregulation that caused the retailers to differentially enter Chinese regions.

China's economic liberalization included a number of policy changes that lowered the barriers facing multinational retailers who wanted to operate in the Chinese retail market. Two facets of the policy development, which we summarize in Table 1, merit emphasis. First, during the period 1992–1995, foreign retailers were allowed to operate in only 11 designated areas, and each area was permitted to host only one or two foreign retailers. This policy was especially limiting, since the maximum of two foreign retailers was also

applied to retailers with headquarters in Hong Kong, Taiwan, and Macau, who were also deemed as foreign under this policy rule. This policy limiting entry by foreign retailers helps explain why Walmart, Tesco, Metro and Carrefour were forced to make different entry locations as they made their first entry to the Chinese retail market. Carrefour's 1995 placement of a hypermarket[5] in Beijing made it the first multinational retailer to enter China. In 1996, Walmart established its first super-center in Shenzhen, while Metro opened its first cash and carry store in Shanghai. Finally, Tesco entered the Chinese retail market when it set up its first store in Shanghai in 1998.

The second important point highlighted in Table 1 is that majority foreign-owned joint ventures of retailer chains were only conditionally permitted to enter between 1999 to 2004. The condition was that large quantities of domestically-made goods be exported through the retailer's distribution channels. This requirement meant that multinational retailers had another direct incentive to export Chinese products through their procurement systems, since exports helped them to gain the right to more freely operate their stores in China's *retail* market. All these restrictions were lifted after 2005.

Table 1: Deregulation of Foreign Retailers in China's Retail Market

Restrictions	1992–1995	1995–1999	1999–2004	After 2005[3]
Geographic	6 cities and [1] 5 Special [2] Economic Zones	–	provincial capitals	lifted
Operational				
retail/wholesale	retail only	wholesale allowed	–	lifted
single/chain	single only	chain only allowed in Beijing	chain stores allowed	lifted
Percentages of Goods purchased within China	$\geq 70\%$	–	–	lifted
Ownership	joint venture minority stake	–	joint venture chains majority ownership allowed subject to conditions	lifted
Permission	entry must be approved by both state and local governments	–	–	only local gov't permit is needed

Source:Wang and Zhang (2006, p. 295)
"–" implies no regulation is changed. 1.Beijing, Shanghai, Tianjin, Guangzhou, Dalian, and Qingdao. 2. Shenzhen, Zhuhai, Shantou, Xiamen, and Hainan. 3. Since December 11, 2004.

[5]A hypermarket or superstore is a retail self-service establishment offering a broad range of food and non-food products (`http://stats.oecd.org/glossary/`).

3 Mechanisms

Several potential mechanisms explain how the expansion of multinational retailer activities in China may have increased China's exports.

First, multinational retailers may affect information and search costs in a way that enhances the exports of retailer products. In particular, while China has a reputation for producing products at a low cost, informational frictions as described by Rauch and Trindade (2003) may prevent buyers outside of China from identifying the particular Chinese suppliers that carry products with the attributes, quality and reliability they seek.[6] For this reason, multinational retailers may reduce the fixed costs of export by expanding local firms' knowledge and awareness about export opportunities and export practices. Alternatively, if the salient fixed costs are borne by international purchasers outside of China, as large multinational retailers purchase goods from China, firms in other foreign countries may learn how to locate and identify Chinese suppliers who produce high quality goods at reasonable prices and also start importing their products from China. Finally, if fixed costs of exporting decline as Chinese producers gain information and insights from their observation of multinational retailers, a larger number of local Chinese suppliers will find exporting profitable, even if their productivities are unchanged. Thus, this mechanism would also support a region's multilateral export capability.

Second, as Javorcik et al. (2008) and Javorcik and Li (2013) emphasize, the entry of multinational retailers is likely to increase the competitive pressures faced by suppliers in host countries. Ultimately, as multinational retailers require suppliers to lower their prices and/or upgrade their products, high-cost suppliers will be driven out of the market while suppliers that remain in operation will do so through efficiency improvements such as labor-shedding or innovation. In a dynamic model that formalizes this intuition, Iacovone et al. (2009) show how the entry of a multinational retailer (e.g. Walmart), due to the superior bargaining power of multinational retailers compared with local retailers, changes the price menu faced by all suppliers. Under the new price menu, marginally profitable suppliers are driven out of the market while surviving local firms undertake investments that allow them to improve their productivity. As a consequence of these im-

[6]Thus, if the presence of multinational retailers in China provides information which reduces the Chinese supplier uncertainty about foreign market opportunities, or foreign purchasers' uncertainty about the location and availability of suitable Chinese producers, the new information may increase the frequency of successful matches and may even increase the intensity of searches in China. In related work, Hausman and Rodrik (2003)'s comparison of country-product export profiles suggests the importance of information in trade, by demonstrating that countries that are similar in their sources of comparative advantage, nonetheless specialize in exporting very different product portfolios.

provements, a larger share of local suppliers achieve productivity levels that enable them to export profitably given the fixed costs of exporting.

Third, Javorcik and Li (2013) note that the entry of multinational retailers induces local firms to improve their retail technologies and international management practices. If local firms become more efficient as suppliers they may reallocate their distribution cost savings to production. In addition, it is also possible that the activities associated with the multinational retailer allow local Chinese suppliers to reduce their costs as they achieve economies of scale.

Fourth, local firm export capability may be enhanced if local suppliers of intermediate inputs allow their domestic customers to purchase the better quality and new varieties of intermediate inputs requested by their multinational retail customers. The managing director of LSI's Bangladesh operations speaks directly to this point. According to the interview by Kee (2011), LSI upgraded its accessory production and expanded its product range to meet the demands of the FDI firms it served. In turn, the manager noted that "LSI always shares the market intelligence we learned from our FDI garment clients regarding the latest product requirements and fashion trends with our other clients. Thus, the domestic garment firms that buy from us can further improve themselves based on the information." Similarly, as multinational retailers enter China, they not only work directly with local suppliers but also deal with local intermediate suppliers directly or indirectly. Although it is hard to imagine that suppliers willingly share information with their competitors, it is natural to expect that intermediate suppliers are eager to show their domestic customers new or better products in order to attract customers. Therefore, the presence of multinational retailers is likely to improve the quality and variety of intermediate inputs, which in turn will have a positive effect on local export capability.

Fifth, since multinational retailer activities may create bilateral information networks with distant markets, China's exports may be increased as bilateral information links are generated. For example, when managers in the multinational retailers' purchasing centers or retail stores learn about local Chinese suppliers they may convey information about newly discovered products or contacts to their stores outside China. Because information related to suppliers or products is shared *systematically* only with other affiliates in the retailer's global operations, this mechanism suggests that the presence of multinational retailers will increase the exports only for city-country pairs which are linked by affiliates of the same retailer at each end. In other words, if firm-specific network linkages are important, we predict that multinational retailers will facilitate exports from Chinese cities where these retailers have stores or nearby global procurement centers, to destination countries where the multinational retailers have established stores. Naturally, the

multinational retailer network effect is a "bilateral effect." Such trade-augmenting effects would arise as in Rauch and Trindade (2002), though in this case the distinct network of retailer store operations play a role that is analogous to the network effects that arise from patterns of Chinese ethnic migration. If bilateral network effects are important, the growing presence of multinational retailers will expand exports of the Chinese localities that host the retailers, but the resulting trade expansion will only expand exports to countries that also host affiliates of the same retailer.

4 Data

Our study of retailer effects exploits variation in retailer expansion that accounts for differences in the geographic spread (within and outside of China), the timing of entry and expansion, and the nature of retailer operations (stores versus procurement centers). To fully capture these developments in multinational retailer exposure, we combine three longitudinal data sets: a data set tracking information on the four retailers' store distributions in China, a data set following the retailers' store networks outside of China, and a data set compiling the distribution of global procurement centers in China.

The worldwide store distributions for each of the four multinational retailers were collected from the retailers' annual financial reports. Each retailer typically manages a number of store formats. In addition to the big-box retail format that sells the widest range of retail goods, many of the four retailers also operated specialty stores that offered more limited sets of products such as electronics or apparel. In constructing our explanatory variables, the retailer store variables are based solely on the retailers' operation of their main format stores. We exclude the specialty and convenience stores since the goods sold in the specialty and convenience stores often differ from those sold in the large-format retail stores. In addition, the sales areas in the main format stores are usually much larger than those handled by the other formats. In their annual reports, the four retailers use different names for their main format stores: Carrefour—hypermarket; Metro—cash and carry; and Walmart—super-center *and* Sam's Club. However, since Tesco's financial reports do not include information on its store formats, our retailer measures for Tesco are based on Tesco's total store count by location.

The changing geographic presence of the four retailers within China was collected from different sources. Information on store presence was obtained from the Chinese web site *linkshop*.[7] This site provides information on the location and opening date for each

[7](`http://www.linkshop.com.cn`) is a Chinese website that focuses on the retail industry. Store information for each retailer was gathered by searching the site using each retailer's name in Chinese.

new retail stores that was established by the multinational retailers.[8] Carrefour, Metro, and Walmart's stores in China were almost exclusively of the retailers' main format.[9] Store presence is measured by store counts for each retailer. However, in the case of new store entrants, we instead use the fraction representing the time left in that year from the date of the stores opening as our measure of store presence. We used Chinese and English language media reports to gather information on the opening of the four retailers' global procurement centers in China. The web sources for these data are listed in the Appendix. When we code our GPC variables, GPCs are classified as present in their year of entry if they entered in the first half of the year. GPCs established in July or later are coded as present beginning with year following their establishment.

To illustrate the growth in multinational retailer presence for the four major retailers, Figure 1 shows the retailer activities for the beginning and end years in our sample, 1996 and 2005. In 1996, the retailers were concentrated in China's three large cities—Beijing, Shanghai, and Shenzhen. By 2005, the retailers had expanded their store operations to China's second-tier cities, and their procurement centers had expanded to include inland as well as their original coastal locations. These changes in the retailers' geographic footprints greatly reduced the distances separating China's major cities and the global procurement centers of the four retailers. More important, the map for 2005 shows that each retailer had a unique geographic presence within China. It is this feature of the retailers' expansion that we utilize to identify the effects of retailer presence on local Chinese export, as well as the importance of retailer-specific bilateral linkage effects.

Chinese export data are collected and recorded by the Customs General Administration of the People's Republic of China.[10] A unique feature of the Chinese data is its identification of the origin city in China as well as the destination country. This information is especially useful, as it allows us study how Chinese *city* exports responded to changes in the geographic spread and density of multinational retailers. We constructed a measure of retail exports by classifying each 4-digit (harmonized system) good according to whether it contains products that are likely to be available at retailer stores such as Walmart. We classified goods as retail liberally with the main focus being to remove raw

[8]This data source does not provide similar information on the time and location of store closings. However, on average the *linkshop* website captures all but 7.6% of the store counts given in retailers' 1996–2005 financial reports. Further, since the financial reports do not provide information on store locations in China, we can not use the financial reports to gain additional information on stores operated in China.

[9]The only exception is Walmart's opening of two neighborhood stores in Shenzhen, Guangdong. One was opened in June 2001. The other was opened in late December 2005.

[10]This data set was used under the license to the Center for International Data at the University of California, Davis.

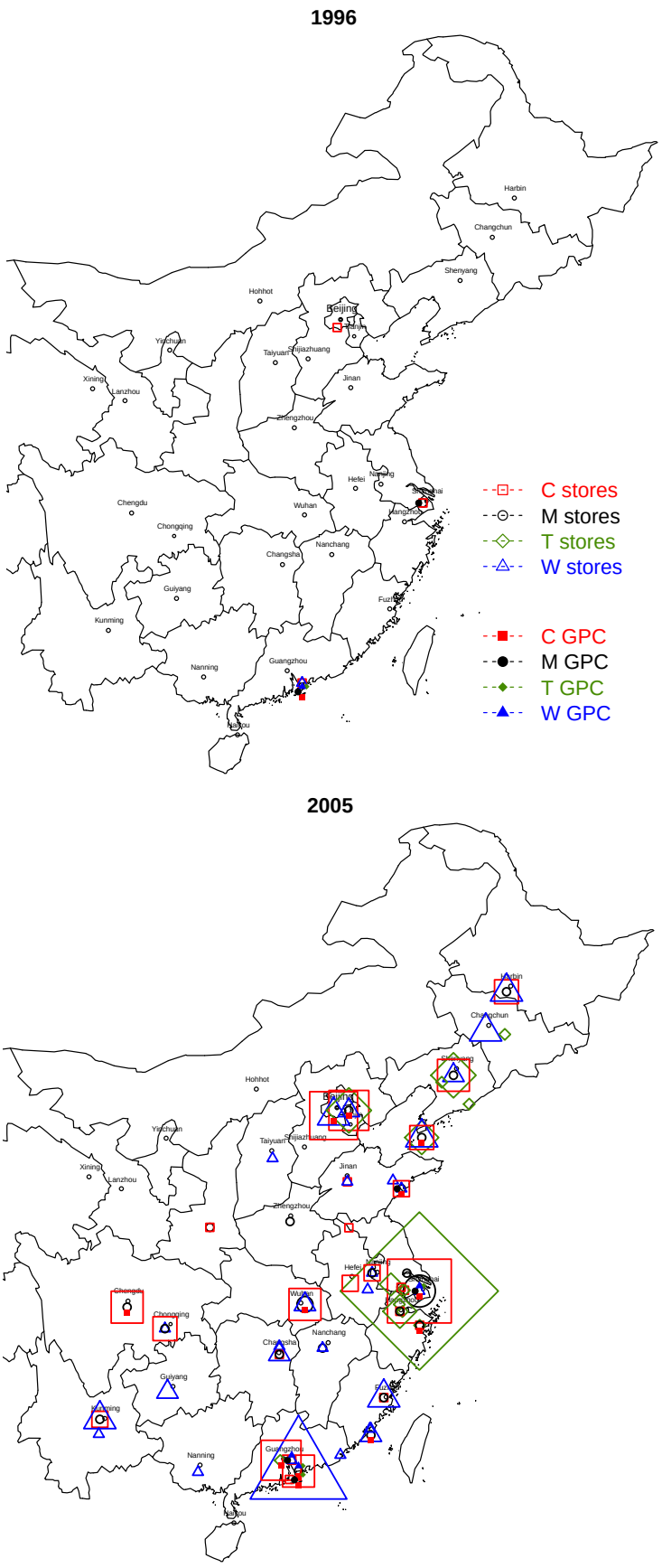

Figure 1: Operations of the Four Multinational Retailers in China

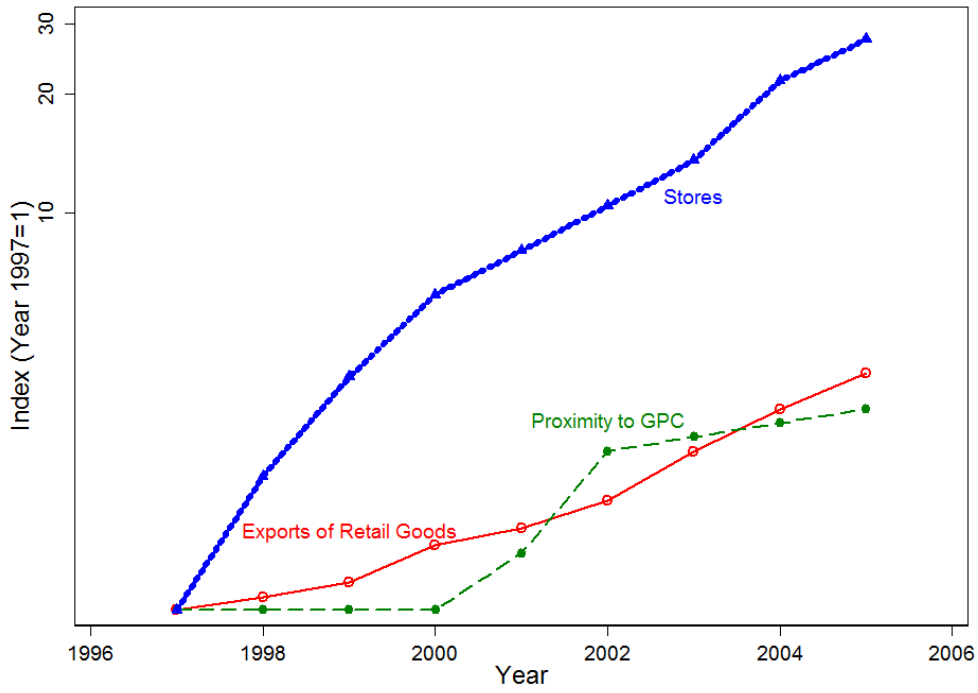

Figure 2: Trends in multinational retailer presence and exports in Chinese cities

commodities and industrial goods that would be never be sold at Walmart (e.g. turbine engines). After connecting the city-level export data to the retail/non-retail concordance, we aggregated the exports of retailer goods over city-country pairs by year. Thus, our dependent variable captures the annual city-destination country retail export values for the years 1997–2005. Retail goods constitute 56%–61% of exports by the 35 cities in our sample in this period. The data sources for the remaining control variables are reported in the appendix.

Over our sample period, exports of retail goods increased at a rapid and sustained pace. At the same time, the expansion of retailer presence in China was more rapid yet. To show the coevolution of the retailer and export series, Figure 2 illustrates the changes over time in Chinese cities' proximity to global procurement centers, the number of retailer stores, and exports of retail goods. Procurement center proximity is measured by $\sum_{r=1}^{4} \frac{1}{D_{ort}}$, where D_{ort} which is the distance from city o to the nearest GPC of retailer r.[11] Retail stores sum the city-specific counts for each of the four retailers. Each point in the figure represents the mean when the variable is averaged across all cities in that year. Each

[11]For cities that have a global procurement center, the distance is calculated by inner distance using the formula $D = 0.376*(\text{area in sqm})^{\frac{1}{2}}$, where the variable area refers to the total area of the city.

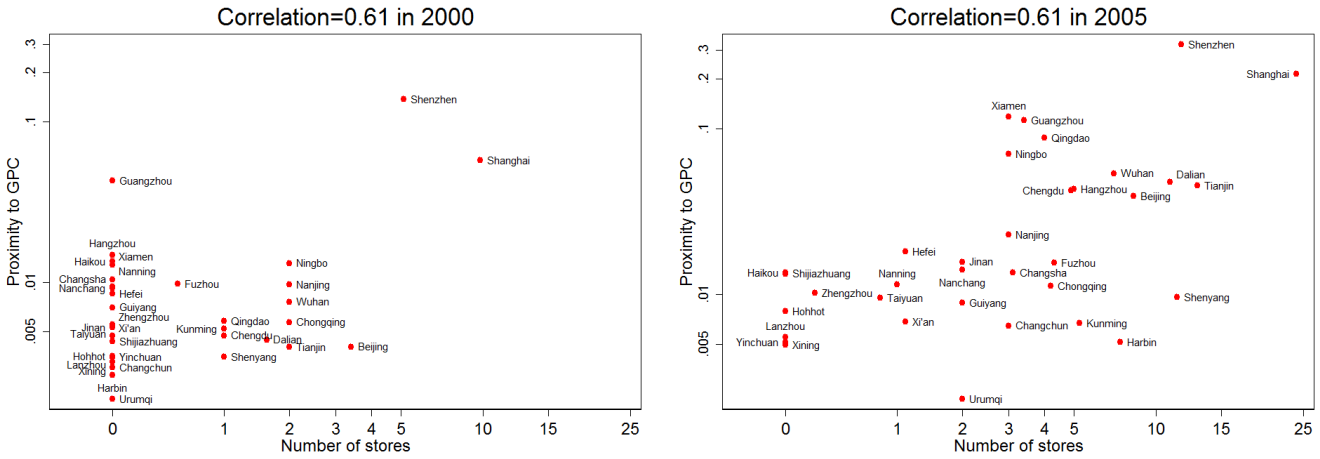

Figure 3: Correlations between Global Procurement Centers and Retail Stores in China

series, which is expressed as an index relative to its 1997 value (set equal to 1), grew substantially during the sample period.

Our two bilateral retailer measures share a common component, which is the number of stores outside China. Thus, if retailer expansion for stores and global procurement centers within China evolved uniformly and constantly over geographic space, our bilateral store and GPC variables would suffer from collinearity. For this reason, we examined the correlation between our GPC and store measures before we moved to estimation. For the years 2000 and 2005, Figure 3 displays individual city values of retail store counts, $\sum_r n_{ort}$, and proximity, $\sum_r \frac{1}{D_{ort}}$. Each point in the figure is labeled with the city's name. Since the correlation between the two key measures is not especially high in any of the individual years, this alleviates concerns about collinearity. Figure 3 also shows that as time progressed, the plots shifted upwards and to the right, which implies on average that cities served by an increasing number of retailer stores also experienced improved proximity to procurement centers.

5 Results

In this section we test whether a growing exposure to multinational retailers had a positive effect on city exports. We measure exposure as (a) proximity of the city to global procurement centers and (b) counts of multinational-owned retail stores in the city. We explore a number of potential dimensions for retailer effects. First, we test whether the export effects are retailer-specific and geographically limited to multinational retailers'

headquarters countries. We also test whether the impact is driven by the each retailer's bilateral network connections which link each retailer's geographic footprint in China with the retailer's network of international stores outside of China. Other specifications estimate whether multinational retailer presence elevates city exports to all destinations outside of China.

The regressions we estimate take a common general form:

$$\ln X_{odt} = \beta_1 \text{GPC}_{od,t-k} + \beta_2 \text{RS}_{od,t-k} + \text{controls}_{ot} + \text{fixed effects} + \varepsilon_{odt}, \tag{1}$$

where X_{odt} denotes exports of retail goods from origin (city) o to destination (country) d in year t (1997–2005). The city level controls are log population and the log of the gross value of industrial output per capita (abbreviated "output pc"). We cluster standard errors at the city level to account for the fact that our retailer presence measures are city-specific though time-varying, and to address potential serial correlation issues raised by Bertrand, Duflo, and Mullainathan (2004).

Our specifications of GPC and RS mainly involve lags of $k = 1$ periods. These lags are motivated by descriptions of Walmart and Carrefour's procurement procedures. Delays in the initiation of exports are likely because firms must take a number of steps in advance of the formation of any sales contracts. Walmart's procurement centers need to assemble information on potential manufacturers, send product lists to the buyers in their overseas stores, collect feedback from potential buyers, and arrange business trips. Not surprisingly, a spokeswoman for Carrefour China notes that "it usually takes us half a year, even a year, to clinch a deal"(China Daily, October 14, 2006). After contracts are signed, a further time lag may ensue as manufacturers prepare to manufacture the products requested in their new orders. The time-intensity of these activities, and the sequential aspect of the process, imply that there will be a non-trivial time lag between the opening of retailer global procurement centers or stores and the emergence of new trade generated by retailer connections. To reflect the time delays that are inherent in the procurement process, our specifications use retailer presence variables that are lagged one period.

The specifications we estimate differ in sample, set of fixed effects, and the construction of GPC and RS, i.e. the retailer presence variables. By considering a variety of different ways to "cut" the data, we intend to show which aspects of the retailer effect are robust determinants of trade.

5.1 Retailer-specific regressions

We begin our analysis by estimating effects of retailer presence on exports to the individual countries where the multinational retailers are headquartered. This exploits the fact that each retailer has a dominant retail position in its headquarters country where it possesses an extensive retail store network and long-standing experience in the management of the retailer's headquarters country operations.

We expect that any export effects should be especially strong for Chinese city-level exports shipped to the retailers' headquarters countries. Thus, we test how Chinese exports to France were related to the geographic spread of Carrefour in China, while the examination of exports to Germany, the United Kingdom and the US, are linked in turn to the geographic spread of Metro, Tesco, and Walmart. Thus, equation 1 is modified so that the dependent variable is $\ln X_{ot}^{h}$ where h is the respective home of retailer r. For each retailer, GPC_{ot}^{r} is then defined $\ln 1/D_{or,t}$, the log of a city's distance to the nearest GPC of retailer r. RS_{ot}^{r} is defined as $\ln(1 + n_{ort})$, where n_{ort} is the count of retail stores owned by retailer r from country h.[12] These regressions examine, for example, whether expansion of Walmart in a Chinese city allowed the city to export more retail goods to the U.S. than did other Chinese cities that were not similarly exposed to a growing Walmart presence.

The first four columns of Table 2 present difference-in-difference estimation results that estimate how exposure to the headquarters' country multinational retailer affected city exports shipped to France, Germany, the United Kingdom and US. For each of the destination country regressions, with the exception of Germany, we link growth in city exports to developments in city exposure to procurement centers and retail stores run by the destination country's main retailer.[13]

Each regression shows that city proximity to global procurement centers has a positive and significant association with city exports to the retailers' headquarters countries. In two of the four cases, the country regressions also reveal a positive association between global retailer store expansion in Chinese cities, and the subsequent growth in city-level exports to the retailers' headquarters country. Given the functional form we used for stores, the 0.667 coefficient for Metro implies that the first store established in a city increases retail good exports to Germany by $\exp(0.667 \ln 2) - 1 = 59\%$. The second store

[12] We have also estimated the specifications that follow redefining RS_{ot}^{r} as an indicator for $n_{ort} > 0$. This change has no effect on the signs of store effects and generally leads to similar or higher significance levels for positive coefficients.

[13] When we examine Chinese city exports to Germany, we can only estimate a coefficient for the effect of Metro retail store expansion in China, because there is too little variation in Metro's global procurement activities to provide identification. After Metro set up its global procurement center in Shanghai in 1995, it didn't set up any further global procurement centers in mainland China until it created a new center in Dongguan, Guangdong in 2004.

Table 2: Effects of procurement centers and stores on city bilateral exports

	(1) FRA	(2) DEU	(3) GBR	(4) USA	(5) 4 countries	(6) 50 countries
$GPC^{Carrefour}_{o,t-1}$	0.205^{b}				0.0762	0.0731^{c}
	(0.0769)				(0.0497)	(0.0376)
$RS^{Carrefour}_{o,t-1}$	0.159				0.0541	0.119
	(0.301)				(0.126)	(0.0941)
$GPC^{Metro}_{o,t-1}$		.			.	.
		.			.	.
$RS^{Metro}_{o,t-1}$		0.667^{a}			0.399^{a}	0.335^{a}
		(0.156)			(0.122)	(0.111)
$GPC^{Tesco}_{o,t-1}$			0.401^{a}		0.0991	0.0485
			(0.138)		(0.0631)	(0.0481)
$RS^{Tesco}_{o,t-1}$			0.265^{b}		-0.0813	-0.0272
			(0.114)		(0.0745)	(0.0401)
$GPC^{Walmart}_{o,t-1}$				0.160^{b}	0.281^{a}	0.223^{a}
				(0.0624)	(0.0741)	(0.0563)
$RS^{Walmart}_{o,t-1}$				-0.245	0.000	0.0357
				(0.146)	(0.126)	(0.0825)
ln population$_{ot}$	-0.364	-0.175	-0.387	-0.127	-0.0785	-0.0185
	(0.572)	(0.450)	(0.447)	(0.218)	(0.361)	(0.149)
ln output pc$_{ot}$	-0.0107	0.159	-0.111	0.159^{c}	-0.0480	0.0649
	(0.197)	(0.110)	(0.134)	(0.0860)	(0.0858)	(0.0737)
Constant	18.80^{a}	13.00^{a}	23.13^{a}	14.95^{a}	21.40^{a}	14.60^{a}
	(5.921)	(3.987)	(4.773)	(2.765)	(3.113)	(2.142)
year FE	Yes	Yes	Yes	Yes	No	No
city FE	Yes	Yes	Yes	Yes	No	No
city-country FE	No	No	No	No	Yes	Yes
country-year FE	No	No	No	No	Yes	Yes
N	315	315	315	315	1260	14141
R^2	0.118	0.288	0.341	0.607	0.337	0.257
groups	35	35	35	35	140	1716
RMSE	0.614	0.360	0.434	0.317	0.435	0.817

Note: $GPC^{r}_{ot} = \ln 1/D_{or,t}$ and $RS^{r}_{ot} = \ln(1 + n_{ort})$. Standard errors in parentheses are clustered at the city level with ^{a}, ^{b}, and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

increases trade by 31%. In unreported results where we used an indicator for store presence, the first store augments bilateral exports by $\exp(0.367) - 1 = 44\%$. It is important to note that these magnitudes are larger than the effect sizes found in the subsequent estimations. In the regressions where stores are significant, adding the first store increases trade by 10–20%.

We re-estimate columns (1)–(4) with *non-retail* exports as a falsification test.[14] None of the estimated GPC or store coefficients has a 5%-significant effect on the amount of non-retail exports and only one of the seven coefficients is significant at the 10% level. This suggests that the findings reported in Table 2 do not simply reflect a general surge in exports in the cities chosen by the multinational retailers.

While the first set of regressions suggests that retailer activity in China fostered city exports to the retailers' headquarters countries, the use of individual country regressions for each major retailer limits us to the use of a basic estimating equation that controls for city fixed effects, but does not allow us to control for time invariant factors at the city-country level that may be correlated with export levels and retailer activities. Thus, to remove concern about city-country pair fixed effects that could give rise to our initial results, we pool the export data for our four headquarters' countries, and add city-country fixed effects to our estimating equation. While the new specification also tests how expansion of the four global retailers affected city exports, the use of a single data panel provides the further benefit of allowing us to estimate common coefficients for basic variables such as city output and city population, as well as the fixed effects. The formation of a single data panel also enables us to include a richer set of fixed effects: thus we now add country-year fixed effects to capture country-level variation in the demand for Chinese exports over time in addition to our inclusion of city-country fixed effects.

Since the new specification tests how the activities of all four retailers affected city exports to the full set of headquarter's destination countries, we might expect smaller coefficients on the retailer variables. However, while the coefficient reduction is qualitatively apparent for all but one retailer, our new results displayed in Column 5 of Table 2 reveal a positive association between the individual retailer's expansion in China's cities, and subsequent expansion of city exports. Further, the coefficients for Metro's Chinese stores and Walmart's global procurement centers are both positively and significantly associated with city exports. The estimates imply that a 1% increase in Metro's store presence in a Chinese city increased the city's exports by 0.40%. Similarly, the results imply that a 1% increase in a city's exposure to Walmart's global procurement centers raised the city's exports by 0.28%. In results reported online, we find that lagging by two years (instead

[14] We thank an anonymous referee for this suggestion.

of one) gave mainly similar results, with the notable exceptions that the GPC effects for Carrefour and Tesco became statistically significant in column 5.

To test whether retailer effects on city retail exports were equally strong in other destinations outside of the global retailers' headquarter's countries, we extended our estimation framework to our project's full set of destination countries. Similar to column 5, the estimated coefficients reported in column 6 imply that the effects of individual retailer presence are smaller in magnitude than those estimated in the first four columns of Table 2. However, while the estimated retailer effects in the pooled setting are generally smaller in size, the lack of statistical significance for a number of the individual retailer coefficients prevents definitive comparison of the single destination and pooled sample coefficient magnitudes.

5.2 Cross-retailer spillover effects

Our retailer-specific coefficients from Table 2 do not make it clear whether retailer presence raises exports to the home country only or whether it expands city exports more broadly. We therefore modify our specification to evaluate whether retailer presence in China had an especially strong effect on city-level exports to the global retailers' headquarters countries. As before, we start by individually examining Chinese city exports to the countries that hosted the headquarters for each of the global retailers—France, Germany, the United Kingdom and the U.S. However, in each specification, we now have two sets of retailer measures. Namely, in each column the retailer's own stores or global procurement centers are labeled with the superscript "major" while the measures for the other retailers' presence are denoted by the superscript "other." In the case of Germany, for example, this implies that the changing retail activities of Metro are mapped into the variables labeled "major" while the changing retail activities of the other 3 global retailers are mapped into the measures denoted by "other." Formally, defining $\mathbb{I}_{rd}$ as an indicator for retailer r being headquartered in destination d, the GPC variables are defined as

$$\text{GPC}_{odt}^{\text{major}} = \ln\left(\sum_{r=1}^{4}\frac{\mathbb{I}_{rd}}{D_{ort}}\right) \quad \text{and} \quad \text{GPC}_{odt}^{\text{other}} = \ln\left(\sum_{r=1}^{4}\frac{1-\mathbb{I}_{rd}}{D_{ort}}\right). \tag{2}$$

Similarly, the retail store variables are defined as

$$\text{RS}_{odt}^{\text{major}} = \ln\left(1+\mathbb{I}_{rd}n_{ort}\right) \quad \text{and} \quad \text{RS}_{odt}^{\text{other}} = \ln\left(1+\sum_{r=1}^{4}(1-\mathbb{I}_{rd})n_{ort}\right). \tag{3}$$

Table 3 displays the results for the new specification. In the first four regressions that evaluate exports to each of the major retailer's headquarters country, we find that five retailer presence coefficients are positive and significant. The coefficients suggest that Walmart and Tesco's retailer activities in China promoted exports to their respective home countries but Carrefour's did not. In contrast France seemed to increase its retail goods imports as a result of the non-French retailers whereas the US and Germany did not receive such "spillover" effects.

Table 3: Major and other retailer export spillovers

	(1) FRA	(2) DEU	(3) GBR	(4) USA	(5) 4 countries
$GPC^{major}_{o,t-1}$	0.0603	.	0.369^a	0.148^a	0.217^a
	(0.0736)	.	(0.120)	(0.0526)	(0.0532)
$GPC^{other}_{o,t-1}$	1.172^b	0.221^a	0.158	0.0566	0.195^a
	(0.434)	(0.0754)	(0.1000)	(0.0879)	(0.0704)
$RS^{major}_{o,t-1}$	0.00525	0.476^a	0.199	-0.262^c	0.0741
	(0.280)	(0.157)	(0.126)	(0.141)	(0.108)
$RS^{other}_{o,t-1}$	0.297	0.0622	0.273	0.0399	0.157
	(0.234)	(0.0876)	(0.181)	(0.0969)	(0.100)
ln population $_{ot}$	-0.314	0.0560	-0.0980	-0.0562	-0.0878
	(0.600)	(0.453)	(0.437)	(0.253)	(0.369)
ln output pc_{ot}	-0.125	0.0737	-0.177	0.142	0.00517
	(0.216)	(0.0910)	(0.127)	(0.0876)	(0.0865)
Constant	26.95^a	15.72^a	24.51^a	15.37^a	19.44^a
	(7.489)	(3.391)	(4.257)	(2.766)	(3.020)
Year FE	Yes	Yes	Yes	Yes	No
City FE	Yes	Yes	Yes	Yes	No
Country-year FE	No	No	No	No	Yes
City-country FE	No	No	No	No	Yes
N	315	315	315	315	1260
R^2	0.158	0.339	0.380	0.609	0.312
groups	35	35	35	35	140
RMSE	0.602	0.348	0.422	0.317	0.443

Note: Standard errors in parentheses are clustered at the city level with ^{a}, ^{b}, and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

While the country-specific results are intriguing, they are based on a specification that is just difference in differences. By pooling the data for the four headquarters countries,

and constraining the major and other effects to be the same across all destinations, we can achieve a sharper identification. As shown in the last column of Table 3 we now find that the estimated coefficients for all of the global retailer measures are positive. In the case of global procurement centers, the coefficients on the "major" and "other" measures are both significant at the 1% level. Testing for equality of the coefficients on the "major" and "other" global procurement center variables yields an F-statistic with a p-value of 0.68, which does not reject equality of the "major" and "other" coefficients. A similar test comparing the coefficient estimates on the "major" and "other" versions of the city stores variables, yields a p-value of 0.34. Thus, neither of these tests rejects the null hypothesis of coefficient equality for the "major" and "other" measures of retailer activity. In other words, the pro-export benefits accruing to the Chinese retail expansion by each country's headquartered firm are indistinguishable in magnitude from the pro-export effects associated with global retailer expansion managed by firms that are headquartered in other countries.

Our results suggest that "major" and "other" firm retailer expansions in China have equally powerful effects on Chinese city retail exports. We therefore adopt measures of retailer exposure that are city-specific aggregates of the activities of all four global retailers. The new versions of GPC are RS are specified as

$$\text{cityGPC}_{ot} = \ln\left(\sum_{r=1}^{4} \frac{1}{D_{ort}}\right) \quad \text{and} \quad \text{cityRS}_{ot} = \ln\left(1 + \sum_{r=1}^{4} n_{ort}\right). \tag{4}$$

The results for this specification are displayed in the first column of Table 4. The coefficient estimates imply that a 1% increase in $\text{cityGPC}_{o,t-1}$ is associated with a 0.21% increase in city exports, while the estimated coefficients imply that a 1% increase in $\text{cityRS}_{o,t-1}$ boosts city exports by 0.17%.

While our estimation framework implicitly assumes that the full benefits of global retailer proximity are realized exactly one year after the exposure to global retailers, we can think of circumstances where the realization of the full effect may take more or less than a year. For example, if a global procurement center is established at the beginning of the year, and an export deal is initiated along with the creation of the procurement center, the export expansion may emerge in the same year as the procurement center's establishment. Accounting for this possibility requires that the addition of contemporaneous retailer activity measures in the regression specification. In contrast, if time lags based on negotiation are accompanied by lags related to information gathering and logistics, the effects of retailer presence may require more than one year to be fully incorporated into changes in trade flows. Addressing this possible scenario requires the addition of retailer

measures that are lagged two years.

In addition, while we add two-year lags of the global retailer variables to capture export spillovers that operate with a delay, we also have econometric reasons for adding a second lag. In particular, we need to address the possibility that the *lagged* explanatory variable is correlated with the error term. If this is the case, our assumption of strict exogeneity conditional on the unobserved effects is violated, and estimates from our fixed effect specification may be inconsistent. According to Wooldridge (2010, p. 322), if lagged explanatory variables are correlated with the error term, we can treat the lack of strict exogeneity by including lags as a distributed lag model. When we take this approach, the estimates displayed in column 2 of Table 4, reveal that the contemporaneous $GPC_{o,t}$ and both 2-year lagged retailer variables are statistically significant. The test that all the GPC and RS variables in column 2 have no effect can be rejected with a p-value of 0.006. Running the same regression on non-retail exports, the corresponding p-value is 0.131. These results continue to support our main finding that a growing presence of multinational retailers in a city has a positive impact on the city's retail good exports.

Finally, while our results suggest that global retailer activity stimulates Chinese city exports, we evaluate whether our results stem from reverse causality. In our context, this issue is relevant if multinational retailers base their future location choices for global procurement centers and stores on unobserved past shocks to city exports. As noted by Wooldridge (2010, p. 322) such a scenario is problematic since it implies that the error term is correlated with future realizations of the independent variable. To test for strict exogeneity conditional on unobserved effects we add future measures of our retailer measures.[15] Under the assumption of strict exogeneity conditional on unobserved effects, the coefficient on future measures should not differ significantly from zero. When we add future measures of our retailer variables to the final column of Table 4, the F-statistic equals 1.14 and the p-value is 0.333. Thus, potential concern that reverse causality drives our results is mitigated by the fact that the coefficients on the future terms are not significantly different from zero.

5.3 Bilateral effects based on global store networks

Our initial regressions consistently demonstrate that retail exports originating from Chinese cities that experienced the strongest growth of global retailer operations grew more rapidly than the exports shipped by more lightly exposed Chinese cities. Indeed, since our key retailer variables are measured at the city level, our examination of city-country

[15]For details of the strict exogeneity test, refer to Wooldridge (2010, p. 325)

Table 4: Retailer city presence on bilateral exports

	(1) t=1	(2) all t	(3) w/ F.1
cityGPC$_{ot}$		0.164^{a}	0.111^{b}
		(0.0534)	(0.0466)
cityRS$_{ot}$		0.0508	-0.0126
		(0.0764)	(0.0723)
cityGPC$_{o,t-1}$	0.207^{b}	-0.0165	-0.0150
	(0.0792)	(0.0514)	(0.0464)
cityRS$_{o,t-1}$	0.167^{b}	-0.0410	-0.0458
	(0.0768)	(0.0554)	(0.0537)
cityGPC$_{o,t-2}$		0.150^{b}	0.138^{b}
		(0.0633)	(0.0594)
cityRS$_{o,t-2}$		0.201^{b}	0.178^{b}
		(0.0769)	(0.0708)
cityGPC$_{o,t+1}$			0.0792
			(0.0589)
cityRS$_{o,t+1}$			0.0271
			(0.0728)
ln population$_{ot}$	-0.114	-0.0640	-0.0681
	(0.145)	(0.140)	(0.124)
ln output pc$_{ot}$	0.152^{b}	0.101	0.130^{b}
	(0.0661)	(0.0693)	(0.0543)
Constant	11.34^{a}	12.99^{a}	12.45^{a}
	(1.802)	(1.934)	(1.625)
Country-year FE	Yes	Yes	Yes
City-country FE	Yes	Yes	Yes
N	14141	14141	13954
R^2	0.247	0.252	0.260
groups	1716	1716	1715
RMSE	0.822	0.819	0.810

Note: Standard errors in parentheses are clustered at the city level with ^{a}, ^{b}, and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

export data suggests that the local presence of multinational retailers fostered improvements in local Chinese city export capability.

However, since multinational retailer firms have large global store networks, we now ask whether city export expansion facilitated by local global retailer growth was primarily driven by *truly* bilateral effects which were tied to the global network structures of the retailer firms. For example, if retailer effects are multilateral, when a city gains a Walmart global procurement center or an increase in local Walmart stores, the new exposure to Walmart's Chinese retail activity will help the city to expand its exports to all global locations. In contrast, if the benefits of multinational retailer exposure are bilateral and based on the global footprint of the retailers' operations, increased contact with Walmart in China should instead increase the city's exports to other countries which are also served by Walmart's network, and the effect should be especially strong in promoting exports to country destinations where Walmart has the most extensive store networks. Since the policy prescriptions for the retail sector depend on the nature of trade growth, it is important to determine whether the export expansion due to global retailer presence applies generally to all destinations, or whether it is bilaterally pinned down by the global retailer's international store network.

To search for evidence that retailer expansion creates bilateral effects that are transmitted via the retailers' global networks, we now redefine the retail exposure measures as follows:

$$\text{GPC}_{odt} = \ln\left(1 + \sum_{r=1}^{4} \frac{n_{drt}}{D_{or,t-1}}\right) \quad \text{and} \quad \text{RS}_{odt} = \ln\left(1 + \sum_{r=1}^{4} n_{drt} n_{or,t-1}\right). \tag{5}$$

In contrast with our multilateral measures that were based only on retailer activity within China, generation of our bilateral measures requires further information on the retailers' stores outside China. The unique geographic patterns of retailer store presence in destination markets is captured by the number of stores that each retailer r has in country d in year t, or n_{drt}. The bilateral variables specify the China-side variables, D_{or} and n_{or}, lagged one year behind the destination n_{dr} to capture the idea that the more suppliers were contracted with in year $t-1$, the greater the opportunity to sell their goods at the retailers network of stores in other countries a year later. This mirrors our decision to used lagged values of Chinese retailer activities in our regression specification for multilateral effects, due to the time lags that naturally characterize the formation of new export sales.

In the first column of Table 5 our gravity form regression that controls for city-country and year fixed effects is consistent with typical gravity regressions: city-country trade is increasing in origin city output, and in destination country income. Further, consistent

Table 5: Bilateral retailer presence on bilateral exports

	(1)	(2)	(3)	(4)	(5)
	Bilateral retailer effects			Comparison	Mundlak
$GPC_{od,t-1}$	0.122^{c}	0.379^{a}	-0.0724	0.218^{b}	-0.0724
	(0.0711)	(0.105)	(0.0965)	(0.0972)	(0.0963)
$RS_{od,t-1}$	0.0384^{c}	0.0634^{a}	0.0129	0.0345	0.0129
	(0.0217)	(0.0209)	(0.0195)	(0.0219)	(0.0195)
$cityGPC_{o,t-1}$				0.167^{b}	-0.0953
				(0.0748)	(0.0686)
$cityRS_{o,t-1}$				0.106	-0.237
				(0.0844)	(0.168)
mean($GPC_{od,t-1}$)					1.149^{a}
					(0.199)
mean($RS_{od,t-1}$)					0.153
					(0.118)
ln $population_{ot}$	-0.389^{b}	-0.312^{b}		-0.139	-2.287^{a}
	(0.154)	(0.125)		(0.137)	(0.389)
ln output pc_{ot}	0.222^{a}	0.176^{b}		0.138^{b}	-0.0148
	(0.0755)	(0.0691)		(0.0670)	(0.196)
ln $population_{dt}$	3.017^{a}				
	(0.840)				
ln GDP pc_{dt}	1.068^{a}				
	(0.109)				
Constant	-9.660^{b}	10.38^{a}	14.41^{a}	11.56^{a}	22.64^{a}
	(3.727)	(1.955)	(0.0719)	(1.808)	(5.519)
Year FE	Yes	No	No	No	No
City-country FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	No	Yes	Yes	Yes	Yes
City-year FE	No	No	Yes	No	No
N	14022	14141	14141	14141	14141
R^2	0.157	0.245	0.305	0.249	0.300
groups	1714	1716	1716	1716	1716
RMSE	0.857	0.823	0.798	0.821	0.799

Note: Standard errors in parentheses are clustered at the city level with ^{a}, ^{b}, and ^{c} respectively denoting significance at the 1%, 5% and 10% levels. In column 5, the city-year unobserved heterogeneity is controlled for by using Mundlak approach.

with the presence of retailer bilateral effects, the estimates show that retailer procurement and store activities in China both had a positive and significant association with city-country exports. If we control more fully for time variation in destination country absorption of Chinese exports, by using country-year fixed effects in the second column estimation, we again uncover a positive and significant association between retailer activity in China and city-country exports. However, if the estimation equation is augmented to include city-time fixed effects, the estimated retailer coefficients displayed in column 3 no longer reveal any association between bilateral retailer links and city-country retail exports. The loss of significance for the coefficients $\text{GPC}_{od,t-1}$ and $\text{RS}_{od,t-1}$ may reflect the fact that year to year variation in the bilateral retailer variable was driven to a great extent by the large changes in the retailers' activities across Chinese cities, and to a smaller degree by the more modest year to year changes in the global retailers' activities outside China. Nonetheless, the decline in significance is of concern, since the explanatory power captured by the city-year fixed effects could stem instead from unobserved city variation in economic factors (labor skill, demographics, industrial linkages) that influenced Chinese city export growth.

While we have searched in turn for evidence that multilateral or bilateral retailer linkage effects enhance Chinese city retail exports, we have not provided any direct comparisons of these alternative mechanisms. Thus, in column 4 of Table 5 we simultaneously include both multilateral and bilateral measures of retailer presence in our specification. Since our multilateral measures $\text{cityGPC}_{o,t-1}$ and $\text{cityRS}_{o,t-1}$ record city-year levels of retailer activity, we drop the city-year fixed effects from this specification due to collinearity. The new results suggest that city exports are enhanced by both multilateral and bilateral GPC connections. In the case of retail stores, the multilateral and bilateral coefficients are both positive, but neither is statistically significant.

Though estimation suggests that both multilateral and bilateral retailer effects are relevant, we remain concerned about the correlation between city-year unobserved effects and our retailer measures. To examine whether city-level heterogeneity in export capability was correlated with the evolution in retailer variables, we follow the Mundlak (1978) approach suggested by Wooldridge (2010, p. 332). Mundlak uses a linear projection to represent unobserved factors. Suppose city o has unobserved factors, which would take the form $c_o = \psi + \overline{w_o}\xi + a_o$, where $\overline{w_o}$ refers to the average of time-varying variables w_{ot}. [16] The term a_o is assumed to have zero mean and to be uncorrelated with $w_o = (w_{o1}, ..., w_{oT})$

[16] In our case, the heterogeneity that we are worried about is at the the city-year level. All variables other than the ones already defined at the city-year level need to be taken averages across countries, which includes our bilateral retailer measures and dummies.

and the time-invariant variables in the data panel. Mundlak plugs c_o into the original estimating equation and evaluates the coefficient ξ on the $\overline{w_o}$ term. The hypothesis $H_0 : \xi = \mathbf{0}$ is used to determine whether the heterogeneity c_o was correlated with the time averages of w_{ot}. Since the F statistic is 6605.37, our column 5 results imply that ξ significantly differs from zero. Thus, the Mundlak technique implies that the estimates in column 4 are inconsistent, casting renewed doubt on the support for bilateral effects.

5.4 Two-step test for multilateral effects

While bilateral retailer effects appear to disappear when we include origin city-year fixed effects, the sensitivity of the bilateral coefficients may be caused by the fact that year to year changes in the global retailers' China-based activities were dramatic, while year to year changes in the global retailers' overseas activities were much less pronounced. For this reason, the fact that the dominant source of variation in the bilateral measures is based on city-year changes in retailer presence could explain why we fail to find significant retailer coefficients when we include origin city-year effects. To gain further insights regarding the contributions of retailer presence to city export capability, we take a new estimating approach that uses information on the timing of retailer activities, to determine whether retailer entry appears to change city export capability.

Recall, when we include city-year fixed effects in our regressions, the fixed effects capture retailer export spillover effects that are city-year specific, as well as the effects of all unobserved city-year developments that influence city export growth. Thus, since city-year fixed effects reflect overall developments in city-level export capability, we now test whether changes in global retailer activities provide information about subsequent innovations in city-level export capability.

To perform this analysis, we estimate the specification

$$\ln X_{odt} = \alpha_{ot} + \beta_1 \text{GPC}_{odt} + \beta_2 \text{RS}_{odt} + \gamma_{dt} + \delta_{od} + \varepsilon_{odt} \tag{6}$$

and extract the estimated coefficients for each city-year fixed effect.[17] As this regression has ot fixed effects, no other ot-specific variables can be included. Destination-year and bilateral fixed effects, $\gamma_{dt} + \delta_{od}$ remove the need for variables such as destination GDP or distance.

Each city-year coefficient, $\hat{\alpha}_{ot}$, can thus be used as a unit of observation as we create a data panel of city-year export capabilities, which we analyze in a second stage regression

[17] Similar techniques have been used in Baker and Fortin (2001) and Helpman, Itskhoki, Muendler, and Redding (2012).

which tests whether global retailer expansion in China enhanced multilateral exports.

$$\hat{\alpha}_{ot} = \theta_1 \text{cityGPC}_{o,t-1} + \theta_2 \text{cityRS}_{o,t-1} + \text{controls}_{ot} + \phi_o + \phi_t + \nu_{ot}. \quad (7)$$

The coefficients θ_1 and θ_2 are estimates of the multilateral effects of retailer presence in/near a city. To maintain consistency with the timing conventions from the previous regression analyses, the retailer presence measures used in the second stage regression, cityGPC and cityRS, are both lagged one period. The estimating equation also includes as controls each city's population and output per capita. Finally, the estimation framework includes city fixed effects, ϕ_o, and year effects, ϕ_t. The second-stage error term is ν_{ot}.

Our results, which are reported in Table 6 uncover a positive association between our measures of city export capability and global retailer presence. In the first column, we simply regress the estimated city-year fixed effects on the two city presence measures—cityGP$_{o,t-1}$ and cityRS$_{o,t-1}$. Since both coefficients are positive and statistically significant the regression suggests that retail store or procurement presence improves city-level export capability.

According to Saxonhouse (1976), when estimated parameters are utilized as dependent variables, ordinary least square estimation is unbiased though the estimates will be inefficient in the presence of heteroskedasticity. To deal with this problem, we follow Saxonhouse (1976) and weight all variables for each observation by the inverse of the estimated standard error of the dependent variable from the first stage regression. Under this approach, less precisely estimated city fixed effects are given smaller weights in the second stage regression. Notably, as shown in the second column of Table 6, our general conclusion that local multinational retailer presence has a positive effect on city export capability is not altered by the use of Saxonhouse's weighting technique.

To further explore the timing of retailer effects, we add both contemporaneous and additional lags of the two city retailer measures. Notably, the new regression results, which are displayed in the third column of Table 6, continue to show a positive association between local retailer presence and city exports. Finally, to alleviate concerns about the exogeneity of the retailer effects, in the last column of Table 6 we added the one-year forward measure of retailer presence. In particular, if positive shocks to city export propensity have a positive effect on multinational retailer's city location choices in China, the forward retailer measure will have a positive coefficient, and the assumption of exogeneity will be rejected. However, since our estimation does not uncover any statistically significant coefficients for forward retailer measures, the assumption of strict exogeneity is not rejected, and the potential for feedback can be eliminated as a serious concern.

Table 6: City retailer effect on city-year exports

	(1) L.1	(2) weighted	(3) All	(4) F.1
cityGPC$_{ot}$			0.138^{b}	0.111^{b}
			(0.0584)	(0.0492)
cityRS$_{ot}$			0.0524	-0.0220
			(0.0865)	(0.0916)
cityGPC$_{o,t-1}$	0.230^{a}	0.202^{b}	-0.0124	-0.0120
	(0.0832)	(0.0816)	(0.0616)	(0.0575)
cityRS$_{o,t-1}$	0.166^{c}	0.160^{c}	-0.0598	-0.0677
	(0.0833)	(0.0816)	(0.0645)	(0.0677)
cityGPC$_{o,t-2}$			0.154^{b}	0.133^{b}
			(0.0685)	(0.0645)
cityRS$_{o,t-2}$			0.222^{b}	0.203^{b}
			(0.0846)	(0.0817)
cityGPC$_{o,t+1}$				0.0423
				(0.0617)
cityRS$_{o,t+1}$				0.0309
				(0.0786)
ln population$_{ot}$	-0.132	0.0107	0.0400	0.0280
	(0.181)	(0.159)	(0.155)	(0.145)
ln output pc$_{ot}$	0.139^{c}	0.258^{b}	0.212^{b}	0.248^{b}
	(0.0727)	(0.0966)	(0.104)	(0.0927)
Constant	-2.402	-5.513^{c}	-3.976	-5.957^{b}
	(2.091)	(2.880)	(3.122)	(2.871)
N	315	280	280	275
R^2	0.897	0.896	0.904	0.914
RMSE	0.253	0.236	0.229	0.219

Note: Standard errors in parentheses are clustered at the city level with ^{a}, ^{b}, and ^{c} respectively denoting significance at the 1%, 5% and 10% levels. City fixed effects and year fixed effects are controlled for in four columns. In the last three columns, each observation is weighted by the inverse of the standard error.

Thus, the results from Table 6 consistently suggest that Chinese city-year improvements in export capability were indeed enhanced by local growth of global retailer activities.

6 Conclusion

In recent years deregulatory trends have enabled global retailers to expand their international operations. While this development has given them access to a wider set of consumers, multinational retailers have argued that there are reciprocal benefits for the host country's exporters. We use evidence from China's recent deregulation, which opened its market to the operations of global retailers, to evaluate the multinational retailer's claim.

To test how retailer activities affected retail exports, we use a fixed effects bilateral trade equation to explain Chinese city-country retail exports. China provides a rich testing ground, since the entry of the four major global retailers—Walmart, Carrefour, Tesco, and Metro—allows us to test how differential exposure to retail activities affected China's city-country exports of retail goods. China's 1990 policies constrained retailer entry on a location-by-location basis, such that differences in the retailers' initial Chinese entry locations were shaped by Chinese regulations, rather than responding entirely to economic conditions. This is not a full substitute for true experimental variation so we should be cautious in drawing causal inferences. We take some comfort in the fact that the leads of the retailer variables are not statistically significant.

While we work with a number of specifications, each of our tests examines how city exposure to retailer stores and proximity to global procurement centers affected city exports. Our results imply that a 1% increase in proximity to global procurement centers was associated with a 0.21% increase in city exports, while a 1% increase in the number of retailer stores in a city increased city exports by 0.17%. We searched for evidence that the effects of retailer presence are most beneficial in elevating exports to countries that headquarter the retailers. For example, does French-headquartered Carrefour's presence in a Chinese city have an especially strong effect on the city's exports to France? The data suggest that city presence of other retailers is equally beneficial. In other words, we cannot reject that retail expansion of non-French Walmart, Metro and Tesco boosted city exports to France to the same extent as did Carrefour. Our finding that retailer presence is associated with enhanced city export capability, suggests that multinational retailers, and their procurement centers in particular, may serve as intermediaries in the promotion exports, similar to the recent findings of Ahn et al. (2011), Bernard et al. (2010), and Blum et al. (2010), and the broader explanation of contacts and trade modeled by Chaney (2013).

We also test how bilateral retailer effects formed by connections between a retailer's China presence and the same retailer's activities in other countries affected city-country retail exports. We find some evidence of a positive association between city-country exports and city-country retailer linkages, but that effect becomes statistically and economically insignificant after controlling for origin-year effects. On the other hand, the multilateral effects of retailer presence are robust across several different estimating strategies. Thus, we conclude that the benefits of retailer expansion are due mainly to their impact on the export capabilities of China's cities.

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Appendix

Chinese Export Data

We use the Chinese trade transaction data which are collected by China's Customs General Administration and used under the data license of the Center of International Data at the University of California, Davis, to form our dependent variable: city-country exports of retail goods. The export data record standard information including the 8-digit product identifier, shipment value and quantity and country destination. In addition, Chinese customs regulations also require exporting firms to list the city of production/origin for their products.[18] Due to this requirement, all export transactions have a four-digit geographic code which identifies the source location in China. Since the four-digit codes provide information at a level that is finer than the city level, we are able to use the export origin codes to generate city-country export measures. However, since our project tracks the export of retailer goods, we first identify the 8-digit Chinese product codes that represent retailer goods. Thus, we aggregate over all retail export transactions to generate a panel of city-country-year observations of retail exports.

Following common practice in the gravity literature, our econometric analysis relies on full sets of source and destination fixed effects to capture unobserved, but important, time-invariant export determinants. In this setting, we identify retailer bilateral effects by exploiting time variation in retailer city or bilateral city-country presence. For this reason, our data sample covers information on the fifty destination countries that were a part of the major global retailers' international store networks (countries listed in Table 7). In other words, our data set is based on destination countries which hosted at least one retailer store during the sample period. In 2005, this group of countries accounted for 73% of China's export transactions, and more than 88% of Chinese exports in value.

[18] Reporting provision Article 6 (`http://english.customs.gov.cn/publish/portal191/tab3972/info70093.htm`) stipulates that exporting firms provide information on the country of final destination, country of consignment, and domestic origin location for export goods.

Table 7: Country List

Argentina	Austria	Belgium	Bulgaria
Brazil	Canada	Switzerland	Chile
Colombia	Costa Rica	Czech Republic	Germany
Denmark	Spain	France	Britain
Greece	Guatemala	Hong Kong	Honduras
Croatia	Hungray	Indonesia	India
Ireland	Italy	Japan	Korea
Luxembourg	Morocco	Moldova	Mexico
Malaysia	Nicaragua	Netherlands	Poland
Puerto Rico	Portugal	Romania	Russian
Singapore	El Salvador	Slovakia	Sweden
Thailand	Turkey	Taiwan	Ukraine
United States	Vietnam		

Table 8: City List

Beijing	Tianjin	Shijiazhuang	Taiyuan
Hohhot	Shenyang	Dalian	Changchun
Harbin	Shanghai	Nanjing	Hangzhou
Ningbo	Hefei	Fuzhou	Xiamen
Nanchang	Jinan	Qingdao	Zhengzhou
Wuhan	Changsha	Guangzhou	Shenzhen
Nanning	Haikou	Chengdu	Chongqing
Guiyang	Kunming	Xi'an	Lanzhou
Xining	Yinchuan	Urumqi	

Table 9: Data Source of Global Procurement Centers in China

Retailer	Year	Month	Province	City	Source	Accessed on
Walmart	1981			Hongkong	http://walmartstores.com/Media/Investors/1981AR.pdf	May-22-2009
Walmart	2001	12	Guangdong	Shenzhen	The World's biggest corporation in the global economy, P237	
Walmart	2002	10	Shanghai	Shanghai	The World's biggest corporation in the global economy, P302	
Walmart	2003		Guangdong	Dongguan	The World's biggest corporation in the global economy, P307	
Carrefour	1994	6		Hongkong	www.fccihk.com/member/member.asp?Item=93-5k[1]	Jul-3-2008
Carrefour	2002	9	Shanghai	Shanghai	http://www.cnad.com/html/Article/2004/0521/20040521133727692591.shtml	Jun-1-2009
Carrefour	2001	11	Guangdong	Guangzhou	http://media.news.sohu.com/27/74/news147137427.shtml	May-22-2009
Carrefour	2001	7	Guangdong	Shenzhen	http://english.peopledaily.com.cn/english/200107/26/eng20010726_75861.html	Nov-10-2007
Carrefour	2002		Beijing	Beijing[2]		
Carrefour	2002	1	Tianjin	Tianjin	http://news.enorth.com.cn/system/2002/01/18/000247686.shtml	Nov-12-2007
Carrefour	2004		Liaoning	Dalian	http://www.linkshop.com.cn/web/Article_News.aspx?ArticleId=33220&ClassID=91	Nov-11-2007
Carrefour	2002	5	Shandong	Qingdao	http://news.xinhuanet.com/chanjing/2002-05/22/content_404360.htm	May-22-2009
Carrefour	2002	3	Hubei	Wuhan	http://www.cnhubei.com/aa/ca52528.htm	Nov-11-2007
Carrefour	2002		Fujian	Xiamen[2]		
Carrefour	2002	6	Zhejiang	Ningbo	http://baike.baidu.com/view/18119.htm	Jun-9-2009
Carrefour	2005		Sichuan	Chengdu	http://www.sh360.net/firm/Firm094/7500.html	Nov-10-2007
Carrefour	2005	10	Zhejiang	Yiwu	http://info.china.alibaba.com/news/detail/v5000180-d5607305.html	Jun-10-2009
Carrefour	2006	4	Sichuan	Chongqing	http://www.sh360.net/firm/Firm094/7500.html	Jun-10-2009
Metro	1976			Hongkong	http://www.globalsources.com/PEC/PROFILES/GEMEX.HTM	May-22-2009
Metro	1995		Shanghai	Shanghai[3]		
Metro	2005		Shandong	Qingdao	http://www.linkshop.com.cn/web/Article_News.aspx?ArticleId=38047&ClassID=90	Jun-10-2009
Metro	2004		Guangdong	Dongguan	http://www.qdsf.gov.cn/n241/n243/n283/7637.html	Jun-11-2009
Tesco	1971			Hongkong	http://www.globalsources.com/PEC/PROFILES/TESCO.HTM	Jul-10-2008
Tesco	2001		Shanghai	Shanghai	http://www.globalsources.com/PEC/PROFILES/TESCO.HTM	Jul-10-2008
Tesco	2004		Guangdong	Shenzhen[4]	http://www.deloitte.com/dtt/cda/doc/content/DTT_DR_China21Century.pdf	Jun-11-2009

Note: 1. Another website states it was established in 1996. (Source: http://www.kompass.com/en/HK004101). 2. For Carrefour, Beijing and Xiamen are frequently reported in the media reports with the other 9 cities (Tianjin, Dalian, Qingdao, Wuhan, Ningbo, Guangzhou, Shenzhen, and Kunming) as 10 global procurement centers of Carrefour in China (http://www.shandongipc.gov.cn/zxcontent.asp?id=25976, accessed on May 22, 2009.). However, no report about them as individuals has been found. Since the openings of the other eight procurement centers were all in 2002. Year 2002 is taken as the year in which these two procurement centers were established. 3. Metro came to China in 1995, cooperating with JinJiang Group to establish Metro JinJiang Cash & Carry Co. Ltd (http://www.metro-cc.com/servlet/PB/menu/1075005_l2/index.html). There has been also a statement that the operation in Metro AG in China is highly centralized(http://www.linkshop.com.cn). To be conservative, year 1995 is applied. 4. With www.sourcing.org.cn/en/Article_Show.asp?ArticleID=593.

Data Sources for Control Variables

Table 10: Data Sources for Control Variables

Variable	Source
Countries' GDP and populations	World Bank Development Indicators
Chinese provinces' GDP and populations	China Data Online
The longitudes and latitudes of country capitals	CEPII
The longitudes and latitudes of province capitals	Map of World website
Chinese city land areas	China Data Online
Chinese ports	Lloyd's ports of the world (1995)