Do the Biggest Aisles Serve a Brighter Future? Global Retail Chains and Their Implications for Romania

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Abstract

During the past two decades many countries have opened their retail sector to foreign direct investment (FDI), yet little is known about the implications of such liberalization for their economies. Using a unique dataset combining outlet-specific information on global retail chains with a panel of Romanian manufacturing firms, this study sheds some light on this question. The results suggest that the expansion of global retail chains leads to a significant increase in the total factor productivity (TFP) in the supplying manufacturing industries: a ten percent increase in the number of foreign chains' outlets is associated with a 2.4 to 2.6 percent boost to the TFP in the supplying industries. The decomposition of the aggregate productivity in the supplying industries suggests that the boost to performance is driven by both within-firm improvements and between-firm reallocation. Both changes are found to be associated with the expansion of foreign chains. These conclusions are robust to a variety of specifications and supported by evidence from a firm-level survey. They suggest that the opening of the retail sector to FDI may stimulate productivity growth and improve allocation efficiency in manufacturing industries and thus provide another piece of evidence in favor of services liberalization.

JEL classifications: F23, F14, L81, D24

Keywords: global retail chains, productivity, services liberalization, foreign direct investment, backward linkages, reallocation, allocation efficiency

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1. Introduction

During the past two decades many countries, including some developing economies, have opened their retail sector to foreign direct investment (FDI). This liberalization has facilitated a rapid expansion of global retail chains. For instance, Wal-Mart, the world's largest retail chain and the largest company, had 2,913 outlets in 13 countries outside the United States in 2007, ten of which were in the developing world. In the same year, French retailer Carrefour, the second largest retailer in the world and the largest in Europe, operated 8,688 outlets in 28 foreign countries, including 20 developing countries.

The entry of global retail chains may transform the retail sector in the host economies and, more importantly, may affect the supplying industries. Global retail chains differ from indigenous retailers not only in terms of scale but also in terms of their access to global sourcing networks, advanced technologies and modern management strategies. Their entry often changes the landscape of the retail sector in the host country through increased concentration and modernization.[1] Moreover, their expansion may have implications for supplying industries in terms of lowering distribution costs, stimulating economies of scale, and increasing competition due to a greater ability of foreign retailers to source products from abroad. The competition effect may in turn encourage productivity improvements and innovation among suppliers. It may allow more innovative and productive firms to grow at the expense of those with obsolete technologies and thus improve allocation efficiency. Some of these effects have been documented in a recent case study describing the effects of Wal-Mart's entry on detergent producers in Mexico (Javorcik et al. 2008).

Despite the growing importance of global retail chains and the potentially large implications of FDI inflows into the retail sector, little effort has been devoted to understanding how the entry of global retailers may affect the host economy.[2] This study takes a step towards filling the gap in the literature by examining how the opening of the Romanian retail sector to FDI affected manufacturing industries.

[1] See Reardon and Berdegue (2002) and Dries et al. (2004).

[2] The existing work on the retail sector and supermarket chains in the context of developing countries provides broader insights into the development of modern retailing (see Reardon and Berdegue 2002, Reardon et al. 2003, Dries et al. 2004, Swinnen et al. 2006, Minten et al. 2006). These studies, however, do not distinguish between foreign chains and domestic retailers and hence, do not clarify the potential impact of FDI inflows in the sector. An exception is the contemporaneous study by Iacovone et al. (2011). The literature focusing on the effects of expansion of indigenous retail chains in industrial countries is more advanced but examines mostly the effects on other retailers and consumers (see Basker 2005a and b, 2007, Foster et al. 2006, Jia 2008).

We motivate our analysis with the findings of a recent survey of manufacturing firms conducted by the World Bank in Romania. Its results indicate that the entry of foreign retail chains intensified competition in the upstream manufacturing industries and encouraged innovation among suppliers of foreign retailers.[3] The results of the survey also suggest that the suppliers of global retailers exhibit superior productivity. Strikingly, no evidence of superior performance is observed one year before firms start doing business with a foreign retailer.

To investigate the implications of entry of global retail chains, we combine a unique dataset on Romanian outlets of foreign retail chains with a panel data on manufacturing firms operating in Romania during the period 1997-2005. Romania is a very good setting for our study. The country's opening to FDI is a relatively recent phenomenon, so our analysis covers both the period before and after the entry of foreign retailers. And the large size of the country allows us to take advantage of their uneven geographical expansion.

Our analysis relies on the differences in the speed of the expansion of global retail chains across 42 Romanian counties and the fact that only some industries should be affected by the chains' presence. More specifically, for each county we calculate a measure of access to foreign retailers. It is defined as the sum of the number of foreign outlets in all counties in Romania (including the county in question) weighted by the inverse of their distance to the county where the manufacturer in consideration operates. We also construct an alternative measure based on the selling space of each outlet. We then relate the TFP of manufacturing firms to the proxies for access to foreign chains and ask whether industries producing goods carried by supermarkets are affected differently by the foreign chains relative to other industries. To address possible endogeneity of foreign chains' expansion across counties, we allow for arbitrary county-year specific shocks that might have made expansion to one county more attractive than expansion into another county in a given year.

We find that the performance of upstream industries is positively correlated with access to foreign retailers. The magnitude of the effect is economically meaningful. A ten percent increase in the number of foreign chains' outlets in Romania is associated with a 2.4 to 2.6

[3] About 60 percent of the respondents reported that entry of foreign retail chains into their city increased competition in the market, mainly through improving access to imports and stimulating emergence of new competitors. About 70 percent of firms *supplying* global retail chains reported increasing their market share, product diversity, frequency of product innovation and quality of packaging *after* they started doing business with global retailers. In contrast, only 13 percent of firms *not supplying* global retail chains reported an increase in their market share. The corresponding figures for increases in the product diversity, innovation and package were 31, 41 and 37 percent, respectively.

percent increase in the productivity in the supplying industries. These conclusions hold when we use alternative measures of performance: labor productivity and the TFP measure taking into account the simultaneity bias between unobserved productivity shocks and input choices (Ackerberg et al. 2006). They become stronger for the subsample of domestic firms. They are robust to controlling for industry-level concentration, imports and exports and to including a time trend specific to the upstream industries. Our findings are further confirmed in specifications in first and long differences.

The second part of our analysis focuses on identifying drivers of the aggregate productivity gains in the supplying industries. We decompose the aggregate productivity in the upstream industries and in the other industries into the average productivity and the covariance between a firm's share of industry output and its productivity. Increases in the average productivity represent improvement within individual firms, while increases of the covariance capture improvement due to reallocation of market shares towards more efficient producers. The results suggest that during the period under study the aggregate productivity increased faster in the supplying industries (where it rose by 16.4 percent) than in the other industries (where it increased by 5.3 percent). In the supplying industries, about half of the productivity increase was driven by changes in the average performance of firms and about half by the reallocation of market shares. In other industries, the contribution of the within-firm changes was much higher (82 percent).

We then link the aggregate productivity gains through both channels to the presence of global retail chains. We regress the aggregate productivity and its two components at the 3-digit-industry-county-year level on the access to foreign chains interacted with an indicator variable for the supplying industries. We control for industry-county fixed effects and county-year fixed effects. To make the results more representative of the national level we weight all observations by the number of firms observed in a county-industry group. We find a positive and statistically significant relationship between the interaction term and the aggregate productivity, the average productivity and the covariance, though this last result appears to be less robust. Our findings are consistent with the presence of global chains facilitating increases in aggregate productivity in the supplying industries through both within-firm changes and reallocation. They suggest that FDI in the retail sector may help bring manufacturing firms closer to the efficiency frontier and channel resources to more productive producers.

Our paper contributes to the empirical literature on the link between openness and firm performance. While there exists substantial empirical evidence on the effect of liberalizing trade in goods (see for instance Pavcnik 2002, Trefler 2004, Amiti and Konings 2007), much less is known about the effects of services liberalization. The notable exceptions are Arnold et al. (2010 and 2011). These studies examine the implications of services liberalization using firm-level data from the Czech Republic and India, respectively, and find that services sector reform boosts the performance of downstream manufacturing firms. The former study concludes that allowing foreign entry into services industries is the key channel through which the effect takes place, while the latter study compares the effects of liberalizing banking, insurance, tele-communications and transport sectors.

This study differs from Arnold et al. (2010 and 2011) by considering the effect of services liberalization on *upstream* (rather than *downstream*) industries. Although the retail sector does not belong to backbone services, it acts as the critical intermediary between consumers and producers. Our approach is tailored to its character and is inspired by the literature on the spillovers of FDI through backward linkages.[4] Moreover, our unique dataset on foreign retailers allow us to exploit not only the inter-temporal but also the cross-regional variation in the variable of interest, which has not been used in the services liberalization literature. We also go beyond the existing studies by examining the relative contribution of within-firm changes and between firm reallocation to the aggregate productivity gains and linking them to developments in a services industry.

Although most countries have abolished the barriers to FDI in manufacturing, many governments are still reluctant to allow unrestricted foreign presence in services, concerned about its implications. Our results suggest that opening of the retail sector to FDI may stimulate productivity growth in upstream manufacturing, and thus they provide another piece of evidence in favor of services liberalization.

Our paper also adds to the emerging literature on allocation efficiency. Recent research has suggested that there is considerable allocation inefficiency across firms in developing countries. This strand of literature finds that such misallocation has led to substantive aggregate productivity loss and that it helps explain a large portion of productivity gap between developing

[4] This literature documents positive productivity spillovers from FDI in *manufacturing* to indigenous firms in upstream industries (see Javorcik 2004, Blalock and Gertler 2008, and Javorcik and Spatareanu 2008 and 2009). See Görg and Greenaway (2004) for a review.

countries and more advanced economies (Banerjee and Duflo 2005, Restuccia and Rogerson 2008, Hsieh and Klenow 2009, and Bartelsman et al. 2009). Greater openness to trade has been shown to act as a stimulus intensifying domestic competition and facilitating productivity-enhancing reallocation across firms (Melitz 2003, Pavcnik 2002, Fernandes 2007, and Harrison et al. 2011). Our study finds that the entry of foreign retail chains can also act as a factor increasing allocation efficiency in upstream industries.

This study is structured as follows. Section 2 discusses the channels through which presence of global chains may affect supplying industries and presents evidence from a recent World Bank enterprise survey. Section 3 describes the data, while section 4 briefly discusses the expansion of global retailers in Romania. The link between the expansion of global retailers and the productivity of the supplying sectors in Romania is examined in Section 5. Section 6 focuses on the drivers of the aggregate performance: within-firm changes and reallocation and investigates whether they were associated with the expansion of foreign retailers. The last section presents conclusions.

2. Implications of Global Retail Chains for the Supplying Industries in the Host Country

The entry of global retail chains may affect the performance of firms in the supplying industries of the host economy through several channels. First, it may increase competitive pressures on suppliers. As suggested by the evidence from the advanced countries, especially from the United States, large retail chains with a national reach tend to replace single-unit local retailers and capture increasingly larger market shares (Foster et al. 2006). When foreign retail chains become more important, their bargaining power vis a vis suppliers strengthens. Moreover, thanks to their extensive international sourcing networks, global retail chains often have the option of importing products rather than purchasing them locally. This stronger position (relative to other retailers operating in the host country) allows global retail chains to require suppliers to lower prices and/or improve their products. This in turn induces suppliers to become more efficient.[5]

Second, entry of global retail chains possessing cutting-edge retail technologies and familiar with the best international practices may help lower distribution costs faced by suppliers.

[5] Additionally, if the presence of global retail chains forces local retailers to lower their prices, they are likely to pass the price pressure onto their suppliers. Thus we would expect that entry of global retail chains will affect all producers in the supplying industries and not just firms directly supplying global retailers.

Instead of sending their products to a large number of small retailers, suppliers may deliver larger shipments to several retail outlets. Thanks to computerized inventory systems used by global retail chains, suppliers may be better informed about changes in demand and may be better able to tailor their products to the expectations of consumers.[6] Thanks to saving on employee time and the usage of capital (e.g. truck fleet) when arranging distribution and planning production, suppliers may produce more output with the same amount of labor and capital and thus achieve a higher productivity level.

Third, by allowing suppliers to reach a larger market through their regional, national and international presence, foreign retailers may stimulate economies of scale in the supplying industries.

Finally, by imposing higher quality standards, giving access to high sales volumes for favored suppliers and sharing useful point-of-sale information on demand patterns with suppliers, foreign retailers can facilitate the productivity-enhancing reallocation process by which the more innovative and productive supplying firms see their market shares increase at the expense of lesser performers.

In sum, by increasing competitive pressures on suppliers, cutting distribution costs and offering easier access to information and a larger market, global retail chains may stimulate productivity growth in the supplying industries through within-firm improvements and reallocation.

Anecdotal evidence supports the view that entry of global retail chains has profound implications for the supplying sectors in the host country. For instance, Mexican-owned detergent producers have reported introducing incremental improvements to their products in order to avoid drastic price cuts demanded by Wal-Mart (Javorcik et al. 2008). Wal-Mart has also been reported to provide its suppliers with full and free access to real-time data on how their products are selling. Suppliers can plan production runs earlier and offer better prices (Economist 2001). Tesco, among others, tracks every purchase through its Club card and can use this information to help its suppliers test and adapt innovations (The Boston Consulting Group 2007).

[6] Foster et al. (2006) discuss the impact of the information technology revolution on the retail trade sector. For example, adoption of systems that electronically link cash registers to scanners and credit card processing machines allows stores to increase services and sales without increasing personnel, change prices easily and track the success of their pricing strategies for individual items.

The results of a 2008 enterprise survey of manufacturing firms conducted in Romania by the World Bank paint a similar picture. Fifty-eight percent of enterprises indicate that entry of foreign retail chains into the respondent's city has increased the level of competition (Figure 1a). The same fraction of respondents believe that competition from imports has increased because foreign retail chains sell a lot of imported products. Sixty-two percent indicate that entry of foreign retail chains has led to emergence of new competitors, and 42 percent indicate that it has eliminated some competitors. As the impact of foreign retail chains is likely to vary depending on the sector of operation of a Romanian respondent, Figure 1b presents responses of firms that are likely to be affected the most, namely firms manufacturing food and beverage products. The percentage of firms reporting an increase in the level of competition is the same as for all sectors, though respondents appear to be affected more by emergence of new competitors than by competition from imports. In all cases, the vast majority of respondents reports that the effects are felt within two years after entry of foreign retail chains.

The survey results also suggest that Romanian suppliers of foreign retail chains are strongly affected by the appearance of foreign retailers. Figure 2a lists the self-reported changes in a firm's market share and product characteristics that took place after the surveyed firm started supplying one or more foreign retail chains. Figure 3a presents the reported impact of entry of foreign retail chains into the respondent's city on the companies that do not supply foreign retail chains. The difference between the patterns presented in the two figures is striking. While 71 percent of suppliers report an increase in their market share, 73 percent of non-suppliers report no change. Similarly, while 71-72 percent of suppliers report increasing the diversity of their products, an increase in the frequency of product innovation and an improvement in the quality of packaging, the corresponding figures for non-suppliers are only 31, 41 and 37 percent, respectively. When the sample of respondents is restricted to just firms manufacturing food and beverages, a similar pattern is observed (see Figures 2b and 3b).

Finally, when we combine the information on the surveyed firms with their balance sheet data from *Amadeus* database, we find that suppliers of global retailers exhibit superior performance relative to other firms in their industries. This is true when their performance is measured using labor productivity or TFP defined in two different ways. Depending on the performance measure used, the supplier premium ranges from 14 to 28 percent and is statistically significant in all cases. Interestingly, the supplier premium is not present in the year prior to the

firm starting to supply a global retain chain. The patterns are very similar when we focus on all suppliers or just those active in food and beverage manufacturing (see Appendix I for details). Although we think of these estimates as capturing summary statistics, rather that pinning down a causal effect, we find them to be suggestive of productivity improvements taking place during the time firms supply global retail chains. They provide a good motivation for our core analysis.

3. Data

Our study examines the link between the expansion of global retail chains and developments in the supplying industries in the context of Romania. Focusing on Romania has three advantages. The first advantage is the availability of high quality and comprehensive firm-level data. We have time-varying information on 513,554 companies operating in Romania during the period 1997-2005, of which 64,767 belong to manufacturing industries.[7] The second advantage is the timing of the entry of global retailer chains. They started entering Romania only in the late 1990s which means that our data cover both the pre- and the post-entry period. The third advantage is that Romania is a large country with a population of 22 million and an area about 238,000 km^2. Thus, in our econometric analysis, we are able to rely not only on inter-temporal but also on cross-regional variation in the presence of foreign chains.

The main data source for our study is the commercial database *Amadeus* published by Bureau van Dijk. *Amadeus* contains information on about 9 million public and private companies in 38 European countries. It reports location, contact information, industry classification, and standard financial statements.

A new version of the *Amadeus* database is released several times a year. Each release of the database captures firms operating in the last year included in the release and provides information on their operations for about ten years prior to the release. The database adequately captures new entrants who can be identified based on when they start reporting or based on their year of incorporation. When building the sample of manufacturing industries and the sample of retail firms, we start with the universe of Romanian firms, including one person companies, from the 2007 release of the database. To make sure that we adequately capture exiting firms, we use six earlier versions of the database released in 1998, 2001, 2002, 2003, 2004 and 2005. For instance, if a firm exited in 2004 and was dropped from the 2005 and 2007 release, we will

[7] The data set contains information on firms of all sizes, including those with one employee.

capture it in our data set thanks to using the earlier releases. Thus our data set is an unbalanced panel which includes new entrants as well as exiting firms.

To identify global retail chains, we use information on company name, industry classification and ownership from *Amadeus*, which we cross check against the information on major international retail chains in the *World Retail Data and Statistics 2006/2007* and *European Marketing Data and Statistics* published by the Euromonitor International, Economist Intelligence Unit (EIU) Industry Briefing *Romania: Consumer Goods and Retail Background*, the *GAIN Report* by USDA Foreign Agriculture Service and *Dun & Bradstreet Business Report*. We identify 9 global retail chains operating in Romania over 1997-2005. Their names and characteristics are listed in Table 1. Detailed data on the presence of global retail chains in different Romanian regions were obtained by contacting each retail chain directly. We were successful at collecting information on the opening date of all stores, their location and selling space for 7 of the 9 chains operating in Romania. We did not manage to obtain data for Kaufland, which entered Romania during the last year of the sample (and because of using lags would not have been included in our analysis anyway), and Mega Image which is one of the smaller entrants.

When defining the sample of manufacturing industries, we focus on establishments that report the basic information including the value of total assets, turnover and employment, or 320,373 observations on 64,767 companies. We drop observations with negative values of total assets and interpolate missing values for output and input variables. The resulting sample consists of 299,236 observations on 55,673 firms, or 93 percent of the original sample. Next, we exclude observations with unusually large fluctuations in output and input variables (i.e., we drop the top and bottom one percent of the distribution of changes in each variable). We also drop observations for years prior to 1997.[8] We are left with 256,679 observations on 53,402 firms. We also exclude observations for which the firm's age (a covariate in our model) is missing.[9] This leaves us with 250,950 observations on 52,138 firms, which is the sample used to analyze the impact on labor productivity. When we focus on the TFP as the outcome of interest, we drop observations with unusual fluctuations in the TFP measures. We end up with 221,236

[8] Information for the pre-1997 period is available only for a small number of firms. From our conversations with Bureau van Dijk, we understand that this is due to the coverage of the database being extended in the late 1990s. Thus to avoid a sample selection bias, we decided to focus on the period starting in 1997.

[9] Dropping a firm's age as a covariate and keeping these observations in the sample would not affect the conclusions of this paper.

observations on 49,552 companies or 245,568 observations on 51,929 companies depending on the TFP measure used.[10]

We deflate output by the producer price index (PPI) for the 3-digit NACE sector, obtained from the *Statistical Yearbook of Romania*. We measure labor input as the number of employees, and capital as deflated tangible fixed assets. The capital deflator is a simple average of PPI from five NACE sectors.[11] We define material inputs as material costs deflated by the weighted average of PPI of the supplying sectors, with the weights defined based on the input-output matrix for year 2000 provided by the Statistical Institute of Romania. Wages are deflated by the consumer price index from the IMF's *International Financial Statistics* (IFS).

Finally, we also use information on imports and exports obtained from the UN's *COMTRADE* database. We concord 4-digit HS codes with the 4-digit NACE codes. We convert the data into Romanian lei using the average annual exchange rate from the IFS and deflate the figure by the GDP deflator from the IFS.

4. Expansion of Global Retail Chains in Romania

Compared to other Central and Eastern European countries, the retail sector in Romania was a late bloomer in terms of FDI inflows. The first entry of foreign retail chains into the Czech Republic, Hungary, and Poland took place in the early 1990s, and a broader expansion of these chains occurred around the mid-1990s. The first entry of global retail chains into Romania, however, did not take place until 1997 when the German chain Metro opened its first Metro Cash & Carry outlet in Bucharest. It took another two years before other large European retailers entered Romania. Only since year 2000, Romania has seen rapid expansion of foreign retailers, including Carrefour from France, REWE from Germany, and Cora from Belgium (Table 1). From 1999 to 2001, the number of their outlets increased fivefold, from 5 to 27. From 2001 to 2005, the number again tripled and reached 86. The total selling space of global retail chains increased 10 times from 43,000 square meters in 1999 to 463,000 square meters in 2005.

Following the trend observed in other transition economies, foreign chains rapidly became dominant players in the Romanian retail sector, in which there were few significant

[10] We are not concerned about state ownership because according to the Romanian Statistical Yearbook (2002), only 0.0038% of all enterprises in manufacturing, construction, trade and other services were majority state owned in 2002.

[11] These are: machinery and equipment; office, accounting, and computing machinery; electrical machinery and apparatus; motor vehicles, trailers, and semi-trailers; and other transport equipment.

domestic players (EIU 2005). In 1999, foreign chains employed around 1,400 workers, invested 44 million dollars in capital stock and generated 5.5 percent of total retail sales. In 2005, they had a total workforce of more than 18,900, a total capital stock of 844 million dollars and generated 3.27 billion dollars in sales, accounting for about 22.2 percent in total retail sales (Table 2).

The expansion of global retail chains in Romania was not uniform across regions. The area around the capital city Bucharest, especially its outskirts, was their initial target. The Western region, close to Hungary, also attracted a lot of entry in the initial period (Table W1 in the web Appendix). In 2005, the regional distribution of outlets was still uneven. There were 16 and 19 outlets in Bucharest and the West, respectively, but only 4 outlets in the Northeast and 3 in the Southwest (Figure 4).

Global retail chains differ from other retailers operating in Romania. They are much larger in terms of employment, capital stock and sales and enjoy larger market shares. They are also more capital intensive, which is consistent with the anecdotal evidence suggesting that global retailers tend to be leaders in adopting advanced retail technologies, from large sales rooms and warehouses to computerized inventory tracking systems. They also have higher sales per worker, real wage per worker, and value added per worker. However, there does not appear to be any differences in terms of profitability measured by return on assets and return on sales. The larger size of global retailers (relative to domestic competitors) suggest that they may have greater bargaining power vis a vis suppliers while at the same time offering them access to a larger market and lower costs.

During the period under consideration, Romanian retail sector also witnessed high rates of job churching and market reallocation, followed by a sizable increase in labor productivity. Following the analysis on the retail sector in the United States by Foster et al. (2006), we estimate the gross expansion and contraction rates of employment and output of Romanian retail sector for 1997–2005.[12] The results show very high rates of job churning and significant market reallocation (Table W2 in the web Appendix). We find that during the nine year period studied, expanding establishments have yielded a gross rate of expansion of 158 percent for employment and 162 percent for output. At the same time, contracting establishments yielded a gross rate of

[12] The expansion rate is measured as the weighted average of the growth rates of expanding firms, including the contribution of entering firms. The contraction rate is defined as the weighted average of the growth rates of contracting firms, including exiting firms. See Foster et al. (2006) for details on the methodology.

contraction of 62 percent for employment and 64 percent for output.[13] Entry and exit play a critical role in the reallocation: 62 percent of employment expansion was due to entry of new firms, while 23 percent of employment contraction was accounted for by exiting firms. For turnover expansion and contraction, the corresponding figures are 55 and 19 percent, respectively. Further, out results document a sizeable (17 percent) increase in labor productivity in the retail sector and show that entry of new firms and expansion of more productive firms at the expense of lesser performers was the main driver behind this development (Table W3 in the web Appendix).

Overall, the presence of global retail chains has brought significant changes to the landscape of the retail sector in Romania. In the next section, we explore the implications of their presence on the performance of the supplying industries, which is the main objective of this study.

5. Impact on the Total Factor Productivity in the Supplying Industries

5.1 Identifying Assumptions

We take advantage of cross-regional variations in our analysis of the relationship between the presence of global retail chains and the performance of the supplying industries. Our identifying assumption is that the impact of global chains' entry should be felt most strongly in close proximity to their stores and that the effect should weaken with distance. We base this assumption on the following facts. First, while Romania is the third largest country in Central and Eastern Europe, its rail and road networks are among the least extensive in transition countries hindering development of national distribution systems. Second, the distribution system in Romania is underdeveloped as very few professional distributors are in operation. Foreign retailers find it difficult to find distributors with the required skills and capital base (EIU 2004, 2006). Third, one of the global retailers confirmed that the company does not use a centralized procurement system in Romania and that each outlet independently sources goods for sale. This suggests that individual stores are more likely to source locally than nationally. Fourth, producers located close to outlets of global retail chains may be better informed about the type of

[13] For comparison, Foster et al. found gross expansion rates of 69.2% for employment and 71.5% for output and contraction rates of 54.6% for employment and 45.5% for output in the US retail sectors over 1987-97.

products sold by the chains, their characteristics and pricing, and thus more likely to supply the chains.[14]

Our second identifying assumption is that entry of a global retail chain should only affect the supplying industries. Industries supplying consumer products to supermarkets may become more productive due to various forces working through the channels described in section 2. Other industries, for instance those producing industrial inputs, should not be impacted. As food and beverages are the most popular goods sold in all formats of supermarkets, we narrowly define upstream or supplying industries as food and beverage manufacturing and focus on the impact of global retail chains' expansion on these industries. We identify the relevant industries based on products listed on the web pages of retailers operating in Romania and match them with 3-digit industry codes in the NACE classification.[15] According to the Romanian input-output matrix for year 2000, 31 percent of all purchases of the retail and wholesale industries originated in the food and beverages sector.[16]

For our analysis to be meaningful, we would like to make sure that the affected industries are represented in majority of the counties. This is indeed the case. All industries are spread across all Romanian regions. In particular, manufacturing of fruit and vegetable products is represented in 37 of 42 counties in 1998 and 40 counties in 2004; manufacturing of dairy products existed in 41 counties; and the remaining four industries are spread across all 42 counties.

Ideally, we would like to base our analysis on plant- rather than firm-level data. Unfortunately, plant-level information is not available to us. In the case of firms that own plants in multiple regions, the presence of global retailers will be measured with error which is likely to bias our estimates toward zero, making it more difficult to find a statistically significant effect.

[14] Our identification strategy, based on geographical proximity, should work best for goods that are expensive to transport. We will examine this question in our robustness checks and show that this is indeed the case.

[15] Our list of the supplying industries includes: production, processing and preserving of meat and meat products; processing and preserving of fruit and vegetables; manufacture of dairy products; manufacture of grain mill products, starches and starch products; manufacture of other food products; manufacture of beverages. Hereafter, we refer to these industries as the food sector.

[16] We are aware of the fact that some industries producing non-food consumer products may also be affected by entry of some (though not all) global retail chains. An earlier version of this study focused on industries manufacturing fast moving consumer goods (rather than just food) and produced qualitatively similar results. However, as we have no way of identifying non-food products sold by each chain, we choose to focus on manufactured food products. This means that our results will *underestimate* the overall effect of global retail chains on manufacturing. As in our regressions we examine how the presence of global retailers affects the performance of food industries (relative to the performance of all manufacturers), not taking into account the possibility that non-food manufacturers are also affected by global chains will *work against* us finding a statistically significant effect.

Thus our estimates should be thought of as a lower bound on the true effect.

5.2 Empirical Strategy

In our empirical analysis, we examine the link between the access to foreign retail chains and the performance of manufacturing firms, and, in particular, we focus on the performance of the supplying industries relative to non-supplying industries in the same location and time period. Our analysis is based on the following specification:

$$TFP_{it} = \beta_1 Food_s \times (access \text{ to chains})_{c,t-1} + \beta_2 age_{it} + V_{s,t-1}\Theta + \alpha_{ct} + \alpha_i + \beta_3 t \times Food_s + \varepsilon_{it} \quad (1)$$

where TFP_{it} denotes the logarithm of the total factor productivity of manufacturing firm i, operating in sector s in county c at time t. Our baseline measure of TFP is a multilateral index calculated following Aw, Chen and Roberts (2001) (see Appendix II for details). We first express an individual firm's outputs and inputs (capital, labor and materials) as deviations from a hypothetical reference firm operating in the same sector at time t with average input costs shares, average logarithm of inputs and average logarithm of outputs. Then we chain-link all reference firms together over time within a sector. Thus the index is a measure of the proportional difference in TFP for firm i observed in year t relative to the hypothetical firm in the base year, 1997. The index is calculated separately for each of the 3-digit NACE manufacturing sectors. The advantage of this measure is that it allows for heterogeneity in production technology across producers. The disadvantage is that it does not take into account economies of scale and does not allow for measurement error.

As a robustness check, we also employ two alternative measures of firm performance. The first measure is the TFP estimated following Ackerberg, Caves and Frazer (2006) who build on the earlier work of Olley and Pakes (1996) and Levinsohn and Petrin (2003). This measure allows us to take into account the possibility that a firm's private knowledge of its productivity (unobserved by the econometrician) may affect the input decisions. It also provides a solution to multicollinearity issues from which the estimators proposed in these earlier papers may suffer. In contrast to the TFP index, the measure allows for measurement error, but it does not allow production technology to differ between firms within the same industry.[17] The second measure employed is the labor productivity, defined as the value added per worker. All three measures

[17] We are grateful to Carolina Villegas-Sanchez for sharing with us a STATA routine implementing the procedure proposed by Ackerberg et al. (2006).

lead to qualitatively the same conclusions. We choose the TFP index as our baseline measure as it allows for flexible and heterogeneous production technology within sectors.[18]

Similar to other studies assessing the impact of various aspects of globalization on firm productivity (for example, Pavcnik 2002, Javorcik 2004, and Amiti and Konigs 2007), we rely on a revenue based measure of productivity, as opposed to a measure based on physical quantities. Doing so may lead to confounding higher productivity with higher markups, as pointed out by Klette and Griliches (1996), Foster, Haltiwanger and Syverson (2008) and Katayama, Lu, and Tybout (2009).[19] While we acknowledge this limitation of our approach, we believe global retail chains are likely to press suppliers to lower their markups, in which case our estimate of interest (if positive) will be capturing a lower bound of the true effect.[20] The existence of downward price pressures is supported by the results of the World Bank survey indicating an increase in competitive pressures due to entry of foreign retailers (Figure 1). It is also consistent with the case study evidence presented in Durand (2007) and Javorcik et al. (2008).

The explanatory variable of interest is the interaction term between the dummy for the sectors manufacturing food and beverage products denoted as $Food_s$, and a measure capturing the access to outlets of global retail chains, denoted as *access to chains*$_{c,t-1}$. We lag the latter measure by one period to allow time for the effect to manifest itself.

We use information on the presence of foreign chains in 42 counties, and for each county we construct a measure capturing proximity to all foreign retailers.[21] We do so by weighting the number of foreign chains' outlets in all counties at time *t* by the inverse of their distance to the county where the manufacturer in consideration operates:

$$\text{access to chains}_{ct} = \ln\left(\sum_{k=1}^{42} \text{no. of outlets}_{kt} / \text{distance}_{ck}\right) \quad (2)$$

In the above formula, *c* stands for the county of interest. Note that *k* does not exclude *c*, meaning that the chain presence in county *c* is also taken into account. The distance between two counties is measured by the great circle distance between their capital cities. Following Amiti and

[18] A comparison of the robustness of five widely used productivity measures (index numbers, data envelopment analysis, stochastic frontiers, GMM and semiparametric estimation) suggests that the approach we chose tends to produce very robust results across the different experiments (see van Biesebroeck 2007).

[19] Though Mairesse and Jaumandreu (2005) find that estimating the revenue function (using a nominal output measure) or the production function proper (using a real output measure) makes very little difference for the results in their sample.

[20] We are grateful to an anonymous referee for making this point.

[21] If the entry of an outlet of a foreign retail chain took place in the last quarter of the year, we consider it effective as of the following year.

Javorcik (2008), the within-county distance is calculated as a radius of a circle assuming each county has a circular shape:

$$\text{distance}_{cc} = \sqrt{area_c / \pi} \qquad (3)$$

where $area_c$ stands for the land area of county c. An analogous measure is constructed using the county-level information on the selling space of foreign chains.[22]

We also control for other factors that may affect the performance of manufacturing firms. We use the number of years since the establishment of a manufacturer to control for learning-by-doing effects. The variable is denoted as age_{it} and enters in a logarithmic form. We control for the effects of trade liberalization by including sector-level imports and exports.[23] Both variables are lagged by one period and take a logarithmic form. The level of competition in the industry is another potential factor influencing firm productivity, and we use the Herfindahl index to take it into account. Summary statistics for all variables are listed in Table 3.

We control for time-varying county-specific factors by including a set of county-year fixed effects. They take into account the uneven economic development across Romanian counties. They control for any shocks to market conditions in a given location that affect all firms in the county equally. Most importantly, they eliminate any simultaneity bias that might arise due to endogenous variation in the proxy for access to chains. We also include firm fixed effects to take into account unobservable firm characteristics, such as managerial ability. These fixed effects will also allow us control for time-invariant sector characteristics, for instance, the level of development in the pre-transition period and extent of privatization during the early reform period.

In our most stringent specification, we allow for a time trend specific to the food manufacturing industries. Doing so helps to distinguish the impact of foreign retail chains from the sector-specific TFP trend that may be driven by other factors. This is a very conservative strategy as we do not have a strong prior for why the performance of the food sector should exhibit a different trend from that observed in other industries. Including this time trend comes at a cost, however. The trend may be capturing some of the variation in TFP resulting from the

[22] We add one before taking the log to avoid observations prior to the entry of foreign chains dropping out. In the case of the measure based selling space, one corresponds to a one square meter of selling space. Dropping this adjustment would not change the conclusions of this study.

[23] Although normalizing imports or exports by domestic production may be prefereable, the differences between the classifications in which the two types of data are available means that the ratios could be misleading.

entry of global retail chains. It may also aggravate the measurement error. Therefore, in all tables in the paper, we present results both with and without the time trend and let the readers draw their own conclusions.

Note that we do not need to include the variable *access to chains* by itself in the model because productivity changes coinciding with the chain's expansion and affecting all manufacturing sectors equally are captured by county-year fixed effects. Similarly, inclusion of firm fixed effects means that we do not need to include a dummy for the food sector.

Finally, we cluster standard errors at the county level to take into account the fact that the measures of global retail chains' presence are specific to counties (though time-varying) and to address a potential serial correlation problem, as suggested by Bertrand et al. (2004).

5.3 Baseline Results

In our baseline results, reported in Table 4, the firm performance is measured using the multilateral TFP index. We present the estimates for both measures of access to global chains. For each, we present three specifications: (i) without time-variant sector-specific controls; (ii) with time-variant sector-specific controls; and (iii) with time-variant sector-specific controls and a time trend for the food sector.

We find that expansion of global retail chains leads to a significant increase in the total factor productivity of firms in the supplying industries. The estimates listed in columns (1) and (2) in the top panel demonstrate a positive and statistically significant (at the one percent level) relationship between the access to outlets of foreign chains and the productivity of food manufacturers. The magnitude of the effect is economically meaningful. A ten percent increase in the number of foreign chains' outlets in all counties is associated with a 2.4 to 2.6 percent increase in the productivity of food manufacturers in the county in question. A positive and statistically significant link between access to foreign retailers and the performance of food producers is also found in columns (4) and (5) where the measure of access is based on the outlets' selling space.[24] In columns (3) and (6), we add a time trend for the food sector to allow

[24] Note that the size of individual outlets varies between various chains as well as within the same chain. Thus the measure based on the selling space is not simply a rescaled version of the measure based on the number of outlets. It seems reasonable that a given proportional increase in the number of stores (*ceteris paribus*) would have a much higher effect than the same proportional increase in the selling space of stores, which is what we find. Entry of several supermarkets is likely to create more business opportunities for suppliers of core products (such as manufactured food and beverages) than entry of one hypermarket where most of additional selling space may be

for the possibility that the food sector follows a different productivity trajectory from non-food industries. The coefficient on the measure based on the selling space is positive (albeit smaller in magnitude) and statistically significant at the five percent level, while the estimate for the measure based on the number of outlets does not reach conventional significance levels (it is significant at 14%). It is possible that the change in results is due to measurement error being aggravated by controlling for this additional dimension.

In order to derive policy implications it useful to know whether our conclusions hold if we restrict the sample to domestic firms. Although the *Amadeus* database provides detailed information on shareholders of each firm, this information pertains to the end of the sample period. As we are unable to easily identify when a firm became foreign, we drop from the sample firms whose foreign owners hold more than 10 percent of equity which is the standard cutoff for defining FDI.[25] The results, presented in the second panel of Table 4, are stronger than those for the full sample. This is not surprising as we would anticipate Romanian firms to be more affected by entry of global chains, relative to foreign affiliates which are likely to operate closer to the efficiency frontier and may have been exposed to global retail chains in their home country. In all columns, we find positive and statistically significant relationship between access to foreign chains and the performance of the supplying industries. The coefficient of interest is significant at the one percent level in five columns, and in one case it is significant at the five percent level. The magnitudes of the estimated coefficients are slightly larger than in the top panel.

In the third panel of the table, we return to the baseline specification for the full sample and use an alternative measure of TFP, estimated following Ackerberg et al. (2006). In the bottom panel, we repeat the exercise considering labor productivity as the outcome of interest, controlling for capital per worker (in the logarithmic form). In each panel, the estimated coefficients are positive and statistically significant at the one or five percent level in five of six specifications. The exception is the specification with the time trend for food industries where the access measure is based on the number of outlets. The estimated magnitudes are slightly larger than those found in the specification for the TFP index.

devoted to non-food products.

[25] This means that our sample may still include firms which at some point were foreign and later became domestic.

5.4 Robustness Checks

We subject our results to a series robustness checks. First, we consider a possible outlier problem. Bucharest as the capital of Romania has disproportionate concentration of economic activity and wealth. It produces about twenty percent of the country's GDP while only accounting for ten percent of the total population. To check whether our results are affected by the special case of Bucharest, we exclude firms operating in Bucharest and perform the baseline analysis. We present these results in the top panel of Table 5. All coefficients on the variable of interest are positive and significant at the one or the five percent level. These estimates indicate that our findings are not driven by the observations from Bucharest.

Second, if our identification strategy based on the regional variation is reasonable, we would expect to observe that goods that are more expensive to transport should be more affected by the entry of global retail chains into the region because they are more dependent on the regional retail infrastructure and logistics than other products. To check whether this is true we use the data on the product-specific transport costs from Javorcik and Narciso (2008).[26] Each of 28 4-digit NACE sectors producing food is classified as facing high transport costs if its costs are above the median value found for all food industries. We augment our baseline specification by adding an interaction terms between the dummy for high transport cost food industries and access to foreign chains. If food industries facing high transport costs are affected more by the entry of global retailers than the food sector in general, then this additional interaction term will be positive and statistically significant. This is indeed the case in all specifications. The interaction term between *Food* and access to foreign chains also remains positive and statistically significant in four of six models. We conclude that these results (reported in the middle panel of Table 5) give credibility to our identification strategy and confirm our findings on the link between the activities of foreign retail chains and the firm performance in the supplying industries.

Third, we check whether young food producers (defined as firms in the first three years of their operation) are affected differently. According to Foster et al. (2008), young producers

[26] The figures are derived from the difference between the value of Finnish imports from Germany recorded including the cost of insurance and freight (c.i.f. basis) and the value of German exports to Finland recorded in Germany net of the cost of insurance and freight (f.o.b. basis). Finland was chosen by Javorcik and Narciso (2008) as the importing country because it was ranked by Transparency International as the least corrupt country in the world, which suggests that Finnish import data are unlikely to be contaminated by tariff evasion. Annual figures are available in 6-digit HS classification for 1992-2005. We compute the average value for each HS code and then concord the HS classification with 4-digit NACE codes.

tend to charge lower prices than incumbents and thus their productivity advantage may be understated. As seen in the bottom panel of Table 5, the interaction terms between the food dummy and *access to chains* is positive and statistically significant in five of six specifications. The presence of global chains appears to be affecting young producers more than established producers. This additional effect on young producers is statistically significant in all specifications.

Fourth, Katayama et al. (2009) argue that the problems with using revenue based TFP measures are reduced in a differenced specification, we check whether our results are robust to differencing. In the specification in first differences, we drop firm age but still include county-year fixed effects. As before, we cluster standard errors at the county level. We present the results in top panel of Table 6. The interaction term between *Food* and each of the two measures of *access to chains* remains positive and statistically significant in all specifications.

We also conduct a simple cross-sectional regression on the overall changes in TFP during the period covered by our sample. Correspondingly, we only include county fixed effects. We cluster the standard errors at the county level. The results, presented in the second panel of Table 6, suggest that the overall changes in the TFP of the food supplying sectors during the period are positively correlated with changes in the access to global chains. The estimated coefficients are statistically significant at the one or the five percent level in all but one specification.

In the two lower panels of Table 6, we re-estimate the differenced specifications on the subsample of Romanian firms. The results confirm our earlier conclusions based on the full sample. As before, we find that the estimated effects are slightly larger for domestic firms.

Finally, we employ an alternative empirical strategy focusing on larger territorial units, namely 8 NUTS regions.[27] We use a difference-in-differences approach and compare the TFP in the supplying industries before and after the entry of foreign chains into their region with the TFP of non-supplying industries in the same region during the same period.[28] We control for

[27] The NUTS (Nomenclature of Territorial Units for Statistics) classification is a hierarchical system for dividing up the economic territory of the European Union (EU) for the purpose of the collection, development and harmonization of EU regional statistics, socio-economic analyses of the regions, and framing of EU regional policies.

[28] We quantify the presence of global chains in several different ways. Our first measure is a dummy taking on the value of 1 if at least one global retail chain is present in the region at time *t*, and zero otherwise. As our second measure, we use the number of global retail chain outlets in the region at time *t* in a logarithmic form, adding one before taking a log. The third measure is the logarithm of the chains' total selling space in the region at time *t* (again one is added before taking a log). The next two proxies are designed to measure the presence of foreign chains relative to the size of the food manufacturing sector. They are defined as the number of outlets or the total selling space divided by the total output of food manufacturers operating in a given region in a given time period. The final

other factors that may affect the performance of manufacturing firms, as described in equation (1). We include firm and region-year fixed effects. The results, presented and described in detail in the earlier version of this paper (Javorcik and Li forthcoming), confirm our results. We find that presence of global retail chain boosts the performance of food manufacturers. This effect is statistically significant at the one percent level across all specifications. Its magnitude is economically meaningful: the presence of foreign chains increases the TFP of firms in the food sector located in the region by 3.8 to 4.7 percent. The results are robust to a large number of robustness checks analogous to those performed on our preferred specification at the county level.

6. Drivers of Aggregate Performance

To better understand the implications of foreign chains' presence, we next describe developments in aggregate (weighted average) productivity in the food sector and in other industries. We decompose them into changes in the unweighted average productivity and reallocation effects. Then we examine how aggregate productivity and its two subcomponents are affected by the entry of global retailers.

Following Olley and Pakes (1996) and Pavcnik (2002), we compile the aggregate industry productivity measure W_t which is the average of the firms' individual productivities (measured using the multilateral TFP index described in section 5) weighted by each firm's share in the total industry output (s_{it}). Then we decompose the aggregate productivity into the unweighted aggregate productivity measure (i.e., the average productivity taken over all firms) and the covariance between a firm's share of the industry output and its productivity.

$$W_t = \sum_i s_{it} TFP_{it} = \overline{TFP}_t + \sum_i (s_{it} - \overline{s}_t)(TFP_{it} - \overline{TFP}_t) \qquad (4)$$

Changes in the first term (unweighted average productivity) capture within-plant productivity improvements. They are also affected by the productivity of entering and exiting firms. A positive second term (covariance) indicates that more output is produced by more productive producers. Changes in the covariance capture the effects of reallocation of market shares and resources across firms of different productivity levels.

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two measures express the presence of foreign chains relative to the economic size of the region. The number of outlets and the total selling space are normalized by the gross value added of the region at time *t*. We lag all the measures by one period to take into account the time lag needed for the effect to manifest itself.

The results of this exercise are presented in Table 7. Following Pavcnik (2002), we report the values as growth rates relative to 1998, the first year when an effective entry of foreign chains occurred.[29] Our calculations show that during the period under study the aggregate productivity increased faster in food industries (where it rose by 16.4 percent) than in other sectors (where it increased by 5.3 percent). Reallocation appears to play a more critical role in driving productivity growth in food industries than in other industries. In food industries, about a half of the productivity increase (8.3 percentage points) was driven by changes in the within-firm performance and about a half (8.1 percentage points) by the reallocation of market shares. In non-food industries, the contribution of the within-firm changes was much higher. It accounted for 82 percent of the aggregate productivity growth, while reallocation accounted for only 18 percent.[30]

Given the significant contribution of both within-firm productivity improvement and reallocation to the productivity growth in food industries, it is natural to ask how these changes were related to entry of global retailers. The pro-competitive effects of opening the retail sector to FDI are likely to be similar to the role of trade liberalization in stimulating productivity growth through market-share reallocation, as highlighted by Melitz (2003).

Following the approach of Harrison et al. (2011), we regress aggregate productivity and each of its components on the access to foreign chains. More specifically, we calculate the aggregate weighted productivity, unweighted average productivity and the covariance at the 3-digit NACE-county-year level. Then we estimate the following model:

$$Y_{sct} = \delta_1 Food_s \times (access \text{ to chains})_{c,t-1} + V_{s,t-1}\Phi + \alpha_{sc} + \alpha_{ct} + \delta_2 t \times Food_s + \upsilon_{it} \quad (5)$$

where Y_{sct} is each of the three measures relevant to industry *s* operating in county *c* at time *t.* The other variables are defined as before. The specification includes 3-digit NACE sector-county fixed effects and county-year fixed effects. In our most stringent specification, we allow for a time trend specific to the food sector. We weight all observations using the maximum number of firms observed in each county-industry group during the period under study, which ensures that industries and counties with large firm populations receive a higher weight in the analysis and

[29] Recall that if the entry of an outlet of a foreign retail chain takes place in the last quarter of the year, we consider it to be effective as of the following year. The first entry by a foreign retail chain took place in October of 1997, when Metro set up its first establishment in Bucharest. According to our rule, the entry is effective as of 1998.

[30] Our findings are consistent with the view that allocation inefficiency across firms in developing countries leads to substantive aggregate productivity loss. They are also in line with the conclusions of Bartelsman et al. (2009) who find that the covariance between a firm's share of industry employment and its labor productivity improved significantly between 1992/1995 and 1996/2001 in the manufacturing industries in Romania.

makes the results more representative of the national level. We cluster the standard errors at the county level.

Our estimation results in Table 8 are consistent with the presence of global chains facilitating increases in aggregate productivity in food industries through both within-firm changes and reallocation, though the latter effect is less robust. We find a positive and statistically significant relationship between the access to global retailers and the aggregated weighted productivity in five of six specifications. When we focus on the unweighted average productivity as the outcome of interest, we find a positive and significant coefficient on the proxy based on the number of outlets in two of three models, including our most stringent specification with time-varying industry controls and a time trend for the food sector. The results based on the selling space are weaker and reach conventional significance levels only in one case. In the bottom panel of Table 8, we present the estimates for models where the covariance is the outcome of interest. Here, we find positive and statistically significant effects only when the time trend for food industries is not included.

All of these findings are in line with survey evidence presented in Appendix I which indicates that entry of foreign retailers has led to increased competitive pressures and that more productive producers able to do business with foreign chains were more likely to expand their market share. They are also in line with the findings of the recent theoretical and empirical literature suggesting that increases in the level of competition lead to productivity-enhancing reallocation of resources (Melitz 2003, Pavcnik 2002, Harrison et al. 2011).

7. Conclusions

Although the implications of liberalizing trade in goods for firm productivity have been widely examined, the implications of services liberalization are much less well understood. This paper seeks to enhance the understanding of services liberalization by using Romanian firm-level data to examine the link between the entry of global retail chains and developments in the supplying industries.

Our econometric results are consistent with entry of foreign retailers boosting the performance of upstream manufacturing industries. The estimated effects are economically meaningful: a ten percent increase in the number of foreign chains' outlets is associated with a 2.4 to 2.6 percent rise in the TFP in the supplying industries.

The results further suggest that during the period of expansion of foreign retailers the aggregate weighted productivity increased faster in the supplying industries (where it rose by 16.4 percent) than in other sectors (where it increased by 5.3 percent). In the former industries, the productivity increase was driven in equal parts by changes in the average performance of firms and the reallocation of market shares. In the latter industries, the contribution of the within-firm changes was much higher. The findings are consistent with the entry of foreign retail chains driving both within-firm improvements and reallocation of market shares within the upstream sector.

All these results indicate that opening of the retail sector to FDI may stimulate productivity growth in upstream manufacturing in the context of transition and developing economies. It also suggests that countries restricting FDI inflows into the retail sector may be foregoing an opportunity to provide a competitive stimulus to the upstream industries.

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Appendix I Supplier Premium

Table A1 Supplier Premium

	ln(TFP index)	ln (TFP Ackerberg et al.)	ln(Labor productivity)
All suppliers			
Supplier	0.128***	0.182***	0.249***
	(0.024)	(0.046)	(0.040)
Year before supplying	-0.006	-0.074	0.085
	(0.048)	(0.110)	(0.095)
ln(capital/labor)			0.429***
			(0.017)
R-squared	2595	2641	2654
No. of obs.	0.160	0.344	0.466
F-test of Supplier = Year before supplying	6.76	4.98	2.68
p-value	0.009	0.026	0.101
Suppliers operating in food and beverage manufacturing			
Supplier	0.125***	0.165***	0.355***
	(0.026)	(0.056)	(0.051)
Year before supplying	-0.015	-0.089	0.084
	(0.049)	(0.113)	(0.099)
ln(capital/labor)			0.414***
			(0.018)
R-squared	2389	2432	2444
No. of obs.	0.144	0.346	0.454
F-test of Supplier = Year before supplying	6.84	4.40	6.36
p-value	0.009	0.036	0.012

All models control for the exporter status, foreign ownership and state ownership and include 2-digit industry, region and year fixed effects.
Robust standard errors are reported in parentheses. * significant at 10%, ** at 5%, *** at 1%

In the regressions presented above, we combine data on firm performance (compiled based on the information from *Amadeus* database and described in Section 3) with the time-varying information on whether or not a particular firm included in the World Bank enterprise survey supplies global retail chains. The sample includes 315 firms of which 51 supply at least one global retail chain and 24 suppliers operate in the food and beverage sector. We use three measures of firm performance: a TFP index, a TFP measure estimated following Ackerberg et al. (2006) and labor productivity (value added per worker). We regress each measure of firm performance on an indicator variable taking the value of one if firm *i* supplies at time *t* a global retail chain operating in Romania and zero otherwise. We control for the firm's industry affiliation (2-digit NACE), its exporting status, foreign ownership and state ownership at time *t*. The information on the last three variables comes from the survey. We also include region and year fixed effects.

The results suggest that suppliers outperform other firms in terms of the TFP and labor productivity. The coefficient on the supplier dummy is positive and statistically significant in all three

specifications. Depending on the performance measure used, the supplier premium ranges from 14 to 28 percent.

The supplier premium is not present in the year prior to the firm starting to supply a global retain chain. An additional indicator variable equal to one in the year preceding supplying a global retail chain (and zero otherwise) is not statistically significant in any of the specifications. Moreover, its coefficient is significantly different from the coefficient on the supplier dummy in two of three specifications.

In the lower panel of the table, we narrow our focus to 24 suppliers operating in food and beverage manufacturing by dropping from the sample 27 suppliers belonging to other industries. This change does not affect the estimated results. In all specifications, we find a positive and statistically significant supplier premium of a magnitude very similar to that found earlier. In all cases, we are able to reject the hypothesis that this premium was present one year prior to doing business with foreign retailers.

Appendix II Calculation of TFP index

Following Aw, Chen and Roberts (2001), we calculate the index as

$$\ln TFP_{it} = (\ln Y_{it} - \overline{\ln Y_t}) + \sum_{\tau=2}^{t} (\overline{\ln Y_\tau} - \overline{\ln Y_{\tau-1}})$$

$$- [\sum_{j=1}^{m} \frac{1}{2}(S_{jit} + \overline{S}_{jt})(\ln X_{jit} - \overline{\ln X_{jt}}) + \sum_{\tau=2}^{t}\sum_{j=1}^{m} \frac{1}{2}(\overline{S_{j\tau}} + \overline{S_{j\tau-1}})(\overline{\ln X_{j\tau}} - \overline{\ln X_{j\tau-1}})]$$

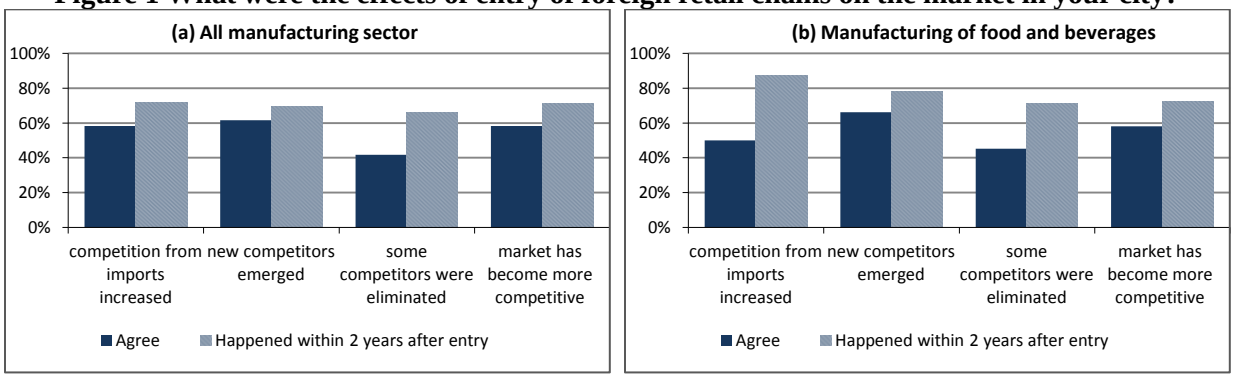
where *i* denotes firm, *t* denotes year, *j* denotes types of inputs. *Y* denotes output, which is measured in real terms. Inputs (*X*) include labor (number of employees), materials (real value of material costs), and capital stock. *S* denotes input shares, that is, the ratio of wage bill (or material costs) to output. The capital share is obtained from the assumption of constant returns to scale.

This index is an extension of the multilateral TFP index derived by Caves et al. (1982). It allows for consistent comparison of TFP in firm-level data with a panel structure. The first term in the definition of the index expresses firm output in year *t* as a deviation from the mean output in that year, thus capturing information on the cross-sectional distribution of output. The second term sums the change in the mean output across all years and captures the shift of the output distribution over time by chain-linking the movement in the output reference point. The remaining terms repeat the exercise for each input *j*. The inputs are summed using a combination of the input revenue share for the firm (S_{jit}) and the average revenue share in each year $\overline{S}_{jt}$ as weights. Thus the index is a measure of the proportional difference in TFP for firm *i* observed in year *t* relative to a hypothetical reference firm with average input costs shares, average logarithm of inputs and average logarithm of outputs operating in the same sector in the base year, 1997.

The index is calculated separately for each of the 3-digit NACE manufacturing sectors.

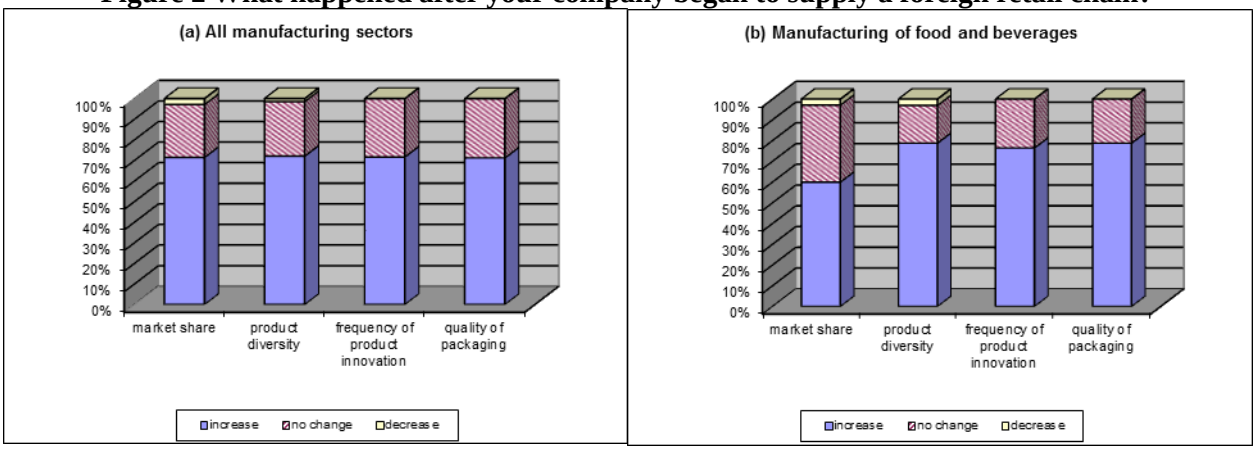
Figures 1-3 Evidence from a 2008 World Bank Enterprise Survey in Romania

Figure 1 What were the effects of entry of foreign retail chains on the market in your city?



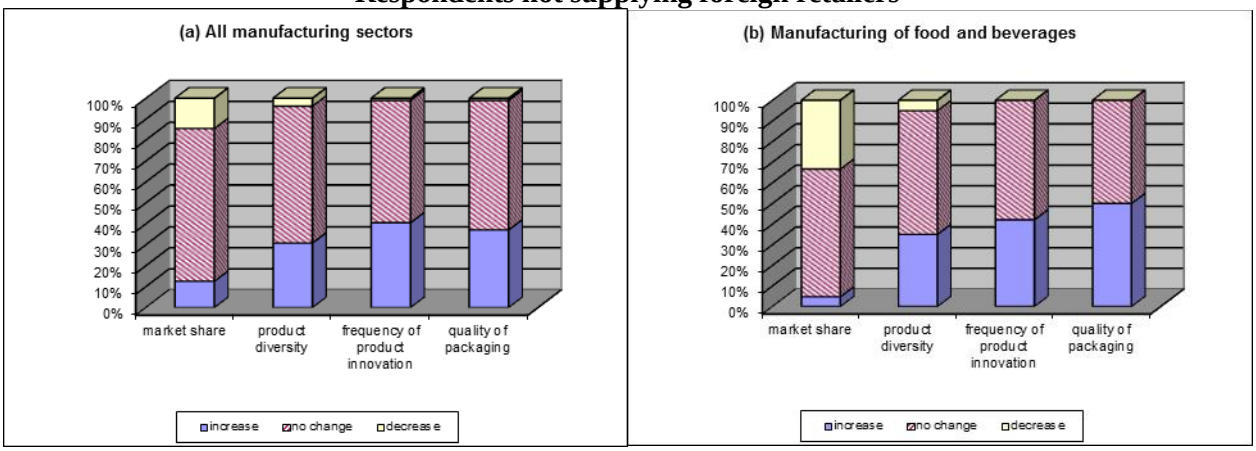
213 responses 62 responses

Figure 2 What happened after your company began to supply a foreign retail chain?



66-70 responses 33-35 responses

Figure 3 Was you company affected by the entry of foreign retail chains into your city? Respondents not supplying foreign retailers



97-111 responses 19-21 responses

Figure 4 Regional Distribution of Global Retail Chains in Romania

1997

2005

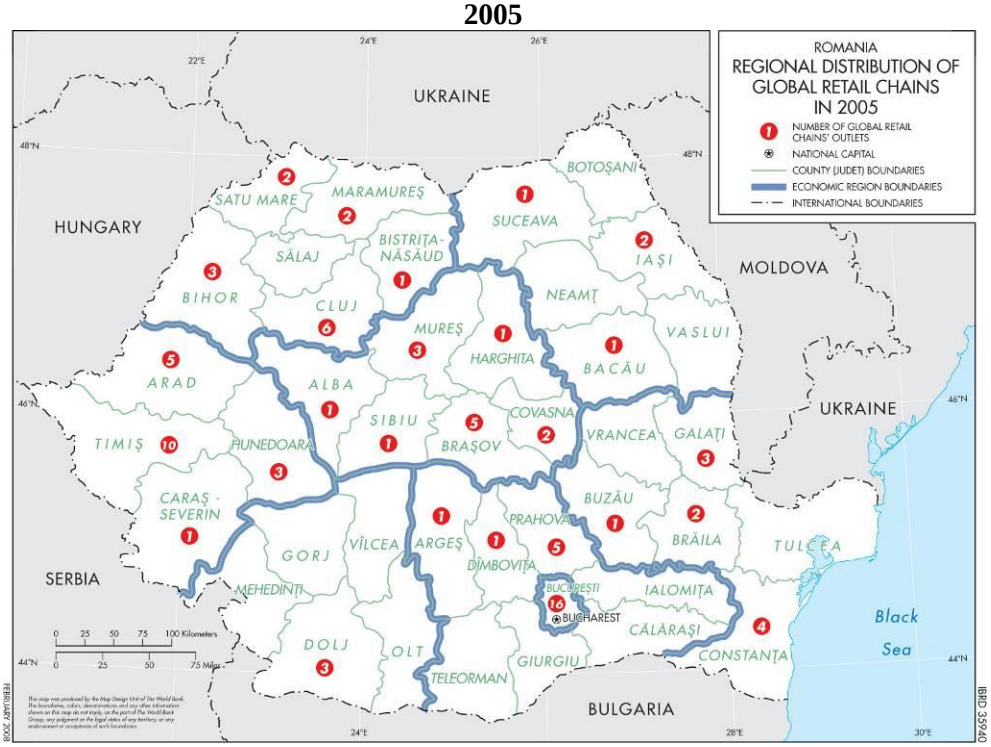


Table 1 Information on Global Retail Chains in Romania

Romanian subsidiary	parent	country of origin	year of entry	2005 employment	2005 capital stock (mn USD)	2005 sales (mn USD)
Metro Cash & Carry Romania	Metro	Germany	1997	6,197	257	1,544
Selgros Cash & Carry	Rewe	Germany	2001	3,933	172	533
Hiproma SA	Carrefour	France	2001	2,695	176	462
Romania Hypermarche SA	Louis Delhaize	Belgium	2003	1,765	14	206
Billa Romania	REWE	Germany	1999	1,613	35	292
Rewe (Romania)	REWE	Germany	2001	877	8	108
Mega Image SA*	Delhaize	Belgium	2000	947	14	63
Profi Rom Food	Louis Delhaize	Belgium	2000	401	10	45
Kaufland Romania SCS*	Kaufland	Germany	2005	500	149	18

*outlet-specific information is not available

Table 2 Evolution of Global Retail Chains in Romania

Year	number of global chains	number of outlets*	selling space (m^2)*	employment	sales (mn USD)	share in total sales of retail sector	share in total sales of retail & wholesale sectors
1997	1	1	13,000	864	126	3.20%	1.30%
1998	1	3	39,000	1,431	198	4.60%	1.70%
1999	2	5	43,000	1,455	207	5.50%	1.80%
2000	4	13	90,686	2,961	306	7.40%	2.30%
2001	7	27	174,024	5,169	585	11.60%	3.60%
2002	7	42	254,317	8,239	959	15.10%	4.60%
2003	8	55	318,013	11,167	1,574	17.70%	5.40%
2004	8	68	390,220	14,243	2,632	20.20%	6.10%
2005	9	86	463,996	18,928	3,271	22.20%	6.90%

*This column pertains to 7 retail chains for which outlet-specific information is available (see Table 1 for a list)

Table 3 Summary Statistics

Firm-specific

Variable	Food Sector			Non-Food Sector		
	No. of Obs.	**Mean**	**Std. Dev.**	**No. of Obs.**	**Mean**	**Std. Dev.**
TFP index	49498	0.116	0.279	171297	0.188	0.491
TFP (Ackerberg et al.)	56772	0.356	0.857	188796	1.025	0.977
value added/labor (th lei 2000)	58252	7.9	29.2	192698	13.2	39.9
capital stock/labor (th lei 2000)	58252	10.8	76.7	192698	10.4	74.1
output (th lei 2000)	58252	1041.3	7388.7	192698	1529.8	20328.3
wage costs (th lei 2000)	57234	85.2	604.5	188869	267.8	2442.5
material costs (th lei 2000)	58252	739.6	5090.6	192698	897.9	13812.3
capital stock (th lei 2000)	58252	354.5	3531.0	192698	694.7	13469.9
employment	58252	23.3	155.4	192698	56.8	343.1
Age	58252	7.7	3.4	192698	7.3	3.6

NACE sector-specific

Variable	Food Sector			Non-Food Sector		
	No. of Obs.	**Mean**	**Std. Dev.**	**No. of Obs.**	**Mean**	**Std. Dev.**
Herfindahl Index	54	0.031	0.017	808	0.165	0.179
imports (th lei 2000)	54	169032.3	174615.6	793	628703.0	1006053.0
exports (th lei 2000)	54	48700.4	55999.3	793	565333.2	1466706.0

County-specific

Variable	No. of Obs.	Mean	Std. Dev.
access to chains (measure based on the no. of outlets)	328	0.122	0.128
access to chains (measure based on the selling space)	328	762.7	752.9

Table 4 Baseline Specification. Various Productivity Measures

	Measure based on the number of outlets			Measure based on the selling space		
			TFP index			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.261*****	**0.237*****	0.080	**0.011*****	**0.010*****	**0.004****
	(0.039)	(0.046)	(0.053)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.023	0.023	0.023	0.022	0.023	0.024
No. of obs.	221236	220002	220002	221236	220002	220002
			TFP index, Excluding foreign firms			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.274*****	**0.246*****	**0.087****	**0.011*****	**0.010*****	**0.005*****
	(0.031)	(0.040)	(0.036)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.021	0.022	0.023	0.021	0.022	0.023
No. of obs.	177938	176866	176866	177938	176866	176866
			Ackerberg, Caves and Frazer TFP			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.382*****	**0.343****	-0.065	**0.022*****	**0.021*****	**0.021*****
	(0.130)	(0.138)	(0.198)	(0.003)	(0.003)	(0.004)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.023	0.024	0.025	0.024	0.025	0.025
No. of obs.	245568	244197	244197	245568	244197	244197
			Labor productivity			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.380*****	**0.333*****	0.011	**0.021*****	**0.019*****	**0.019*****
	(0.093)	(0.094)	(0.131)	(0.003)	(0.003)	(0.003)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.110	0.111	0.111	0.111	0.112	0.112
No. of obs.	250950	249557	249557	250950	249557	249557

All models include a firm's age, firm fixed effects and county-year fixed effects. Industry-level controls include: $\ln(\text{imports})_{t-1}$, $\ln(\text{exports})_{t-1}$ and Herfindahl index_t. Standard errors, clustered at the county level, are reported in parentheses. * significant at 10%, ** at 5%, *** at 1%

Table 5 Robustness Checks. TFP index

	Measure based on the number of outlets			Measure based on the selling space		
			Excluding Bucharest			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.313*** **	**0.302*** **	**0.168*** **	**0.010*** **	**0.010*** **	**0.002** **
	(0.024)	(0.026)	(0.042)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.024	0.025	0.025	0.024	0.025	0.025
No. of obs.	186892	185845	185845	186892	185845	185845
			High vs. low transport costs			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.216*** **	**0.205*** **	0.056	**0.008*** **	**0.006*** **	0.001
	(0.039)	(0.053)	(0.055)	(0.001)	(0.001)	(0.001)
*High transport cost$_s$*Food $_s$**	**0.123*** **	**0.097** **	**0.088***	**0.006*** **	**0.008*** **	**0.007*** **
(access to chains) $_{c,t-1}$	(0.033)	(0.048)	(0.045)	(0.001)	(0.002)	(0.002)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.023	0.023	0.024	0.023	0.024	0.024
No. of obs.	221236	220002	220002	221236	220002	220002
			Young vs. old firms			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.266*** **	**0.243*** **	0.09	**0.011*** **	**0.010*** **	**0.003***
	(0.039)	(0.046)	(0.054)	(0.001)	(0.001)	(0.001)
*Young $_{i,t}$ *Food $_s$* (access to chains) $_{c,t-1}$*	**0.188*** **	**0.187*** **	**0.172*** **	**0.002** **	**0.003*** **	**0.005*** **
	(0.041)	(0.043)	(0.044)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.023	0.023	0.024	0.022	0.023	0.024
No. of obs.	221236	220002	220002	221236	220002	220002

All models include a firm's age, firm fixed effects and county-year fixed effects. Industry-level controls include: ln(imports)$_{t-1}$, ln(exports)$_{t-1}$ and Herfindahl index$_t$. Standard errors, clustered at the county level, are reported in parentheses. * significant at 10%, ** at 5%, *** at 1%

Table 6 Specifications in Differences. TFP index

	Measure based on the number of outlets			Measure based on the selling space		
			First differences			
$Food_s$*Δ(access to chains)$_{c,t-1}$	**0.342*** **	**0.359*** **	**0.145***	**0.008*** **	**0.009*** **	**0.004*** **
	(0.064)	(0.069)	(0.075)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.017	0.017	0.017	0.016	0.017	0.017
No. of obs.	164668	163623	163623	164668	163623	163623
			Long differences			
$Food_s$*Δ(access to chains)$_{c,t-1}$	**0.484*** **	**0.432*** **	0.050	**0.023*** **	**0.022*** **	**0.032** **
	(0.058)	(0.051)	(0.070)	(0.001)	(0.002)	(0.014)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.025	0.027	0.028	0.027	0.028	0.028
No. of obs.	11418	11346	11346	11418	11346	11346
			First differences. Excluding foreign firms			
$Food_s$*Δ(access to chains)$_{c,t-1}$	**0.376*** **	**0.394*** **	**0.164*** **	**0.010*** **	**0.011*** **	**0.006*** **
	(0.051)	(0.058)	(0.058)	(0.001)	(0.001)	(0.001)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.019	0.019	0.02	0.019	0.019	0.02
No. of obs.	133397	132496	132496	133397	132496	132496
			Long differences. Excluding foreign firms			
*Foods*Δ(access to chains)* $_{c,t-1}$	**0.492*** **	**0.430*** **	0.058	**0.022*** **	**0.021*** **	**0.035** **
	(0.056)	(0.063)	(0.062)	(0.001)	(0.002)	(0.014)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	9930	9864	9864	9930	9864	9864
No. of obs.	0.025	0.027	0.028	0.027	0.028	0.028

Industry-level controls include: $\Delta\ln(\text{imports})_{t-1}$, $\Delta\ln(\text{exports})_{t-1}$ and $\Delta\text{Herfindahl index}_t$. All models in first differences include county-year fixed effects. Models in long differences include county fixed effects. Standard errors, clustered at the county level, are reported in parentheses.

* significant at 10%, ** at 5%, *** at 1%

Table 7 Decomposition of Aggregate Productivity

Year	Aggregate weighted productivity	Unweighted average productivity	Covariance
Food sector			
1998	0.000	0.000	0.000
1999	0.072	0.036	0.036
2000	0.074	0.025	0.048
2001	0.085	0.032	0.054
2002	0.102	0.090	0.012
2003	0.112	0.105	0.007
2004	0.101	0.087	0.014
2005	0.164	0.083	0.081
Other industries			
1998	0.000	0.000	0.000
1999	0.014	0.001	0.013
2000	0.036	0.015	0.021
2001	0.040	0.049	-0.008
2002	0.056	0.053	0.003
2003	0.053	0.068	-0.015
2004	0.061	0.049	0.011
2005	0.053	0.044	0.010

Note: the reported figures are relative to 1998

Table 8 Components of Aggregate Productivity and Access to Global Retailer Chains

	Measure based on the number of outlets			Measure based on the selling space		
			Aggregate weighted productivity			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.250*****	**0.131*****	**0.226****	**0.010*****	**0.004****	0.001
	(0.038)	(0.042)	(0.107)	(0.002)	(0.002)	(0.004)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.058	0.059	0.059	0.058	0.058	0.058
No. of obs.	311512	274050	274050	311512	274050	274050
			Unweighted average productivity			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.141*****	0.058	**0.194***	**0.007*****	0.001	0.000
	(0.032)	(0.043)	(0.113)	(0.001)	(0.001)	(0.002)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.094	0.105	0.106	0.094	0.105	0.105
No. of obs.	311512	274050	274050	311512	274050	274050
			Covariance			
Food $_s$ (access to chains) $_{c,t-1}$*	**0.109*****	**0.073***	0.032	**0.004****	**0.003***	0.001
	(0.028)	(0.039)	(0.067)	(0.002)	(0.002)	(0.003)
Industry controls	no	yes	yes	no	yes	yes
Time trend for food sector	no	no	yes	no	no	yes
R-squared	0.083	0.092	0.092	0.083	0.092	0.092
No. of obs.	311512	274050	274050	311512	274050	274050

Dependent variables are defined at the industry-county-year level. All models are estimated as weighted regressions where weights capture the maximum number of firms operating in the industry-county cell during the sample period. All specifications include industry-county and county-year fixed effects. Industry-level controls include: $\ln(\text{imports})_{t-1}$, $\ln(\text{exports})_{t-1}$ and Herfindahl index_t. Standard errors, clustered on county, are reported in parentheses. * significant at 10%, ** at 5%, *** at 1%

WEB APPENDIX [NOT FOR PUBLICATION]
Developments in the Romanian Retail Sector

Table W1 Regional Expansion of Global Retail Chains in Romania

NUTS region	year of first entry	number of outlets 2001	number of outlets 2005	selling space (m^2) 2001	selling space (m^2) 2005
Bucharest-Ilfov	1997	7	16	43,400	115,900
West	1998	8	19	22,266	62,495
Central	1998	3	13	23,958	69,560
Southeast	1999	2	10	15,000	58,500
South	2000	1	7	2,000	33,286
Northwest	2000	2	14	26,000	62,855
Northeast	2001	2	4	26,000	36,000
Southwest	2001	2	3	15,400	25,400

This table pertains to 7 retail chains for which outlet-specific information is available (see Table 2 for a list)

Table W2 Reallocation of Employment and Output in Romanian Retail Sector in 1997-2005

	Employment	Output
Gross reallocation rates (%):		
expansion rate	158.3	162.2
contraction rate	61.6	63.5
net flows	96.7	98.6
excess reallocation	123.2	127.0
Shares of reallocation (%):		
expansion due to entry	62	55
contraction due to exit	23	19

Table W3 Productivity Changes in Romanian Retail Sector in 1997-2005

Productivity growth (%)	17.27
Share of productivity growth (%):	
within share	-39
between share	84
cross share	-73
net entry share	129
entrants' share	135
exiters' share	-7

Table W3 presents decomposition of productivity changes in the Romanian retail sector following the methodology of Foster et al. (2006):

$$\Delta LP_t = \sum_{f \in C} s_{ft-1} \Delta LP_{ft} + \sum_{f \in C} (LP_{ft-1} - \overline{LP_{t-1}}) \Delta s_{ft} + \sum_{f \in C} \Delta LP_{ft} \Delta s_{ft} + \sum_{f \in N} s_{ft} (LP_{ft} - \overline{LP_{t-1}}) - \sum_{f \in X} s_{ft-1} (LP_{ft-1} - \overline{LP_{t-1}})$$

where LP_{ft} stands for the labor productivity (value added per worker) of retail firm f operating at time t and s_{ft} denotes the share of firm f's employment in industry employment at time t. C denotes continuing firms, N new entrants and X exiters. The first term in the decomposition captures a within firm component based on firm-level changes weighted by initial employment shares in the industry. The second term represents a between-firm component reflecting changing shares, weighted by the deviation of initial firm productivity from the initial industry index. The third term represents a cross term indicating whether firms with large positive productivity changes are more likely to have decreased employment and vice versa. The last two terms represent the contribution of entering and exiting firms, respectively.

Foster et al. (2006) suggest that if new business methods (including capital deepening) that lead to productivity improvements can only be adopted by new firms, then the net entry term should dominate. This appears to the case in Romania, where the appearance of new entrants is the key driver of productivity growth in the retail sector. Productivity growth is further boosted by the positive between-firm component suggesting expansion of more productive entities at the expense of lesser performers. Similarly to Foster et al., we find a negative cross term which is consistent with the view that downsizing has been productivity enhancing for continuing establishments. Finally, the negative within-firm effect may be capturing firms being driven up the average cost curve as a result of losing their market share to new entrants.