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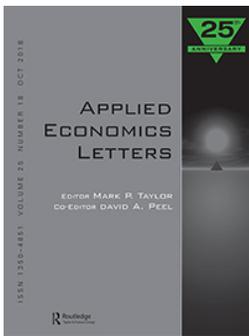Yujiao Li, Johan Håkansson, Oana Mihaescu & Niklas Rudholm

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ARTICLE

Agglomeration economies in urban retailing: are there productivity spillovers when big-box retailers enter urban markets?

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ABSTRACT

Previous studies have found that big-box retail entry does not affect the productivity of incumbent retailers when entry occurs in urban areas. In this paper, we show that there are positive spillover effects of big-box retail entry for incumbent retailers in urban areas, but these effects are limited to relatively small retailers; thus, it is difficult to detect these effects in a full sample of firms by using traditional econometric methods, such as difference-in-difference estimation. In a two-step procedure, we first use panel smooth transition regression to determine size thresholds that delimit incumbent retail firms by their possible reactions to the new big-box entry. We then use difference-in-difference estimations to determine the direction and magnitude of the effects of big-box entry on the productivity of firms in each subgroup. For the group of small incumbent retailers, we find positive spillover effects on productivity of approximately 9%.

I. Introduction

The impact of big-box retail entry has been previously studied both in Sweden (Daunfeldt et al. 2015, 2017; Håkansson et al. 2018; Han et al. 2018; Rudholm, Li, and Carling 2018) and abroad (Artz and Stone 2012; Huang et al. 2012; Haltiwanger, Jarmin, and Krizan 2010).[1] Several studies (Artz and Stone 2006; Maican and Orth 2012; Håkansson et al. 2018; Han et al. 2018; Rudholm, Li, and Carling 2018) report that positive spillover effects of big-box retail entry for incumbent retailers are limited to entries that have taken place in smaller local markets. However, little to no effects have been found when investigating big-box retail entry in urban areas. The two studies most closely related to this study, which were conducted by Håkansson et al. (2018) and Han et al. (2018), found no statistically significant spillover effects when IKEA entered the urban area of Gothenburg in 2004; however, they found positive effects when IKEA entered smaller rural markets.

Finding no effects in Gothenburg was surprising. After all, an average IKEA in Sweden attracts customers who spend approximately 800 million SEK (73.5 million Euro, exchange rate 2018-05-23) in the local market. This should have an impact on retailers located near the new IKEA, even in a large retail market such as Gothenburg.

Empirical studies analysing determinants of firm growth often have their theoretical foundation in Gibrat's (1931) proposition that firm growth is independent of firm size. However, Daunfeldt, Elert, and Lang (2012) report that Gibrat's law does not necessarily hold for Swedish retailing, with smaller firms outgrowing their larger counterparts. One explanation for not finding any effects of IKEA entry on the productivity of incumbent retailers in larger markets could then be that IKEA entry effects are limited to smaller retailers only.

The purpose of this study is to empirically investigate if the impact of big-box retail entry on incumbent retailers in urban areas is dependent on incumbent firm size, using the IKEA entry in Gothenburg in 2004 as our case study. Our study contributes to the literature as it explains why previous studies have been unable to find any effects of big-box retail entry on incumbent retailers in urban areas.

II. Methods and material

Previous studies of big-box retail entry mostly use difference-in-difference (DiD) estimations, often after having first selected control regions with characteristics similar to the entry regions (e.g., Basker 2007; Daunfeldt et al. 2015, 2017; Håkansson et al. 2018; Han et al. 2018). However, a potential weakness of DiD analysis is that it estimates the average IKEA entry effect on all firms, ignoring the possibility of subgroup heterogeneity in the effects. As such, we use panel smooth transition regression (PSTR) (González et al. 2005) to find size thresholds where IKEA entry becomes less likely to affect the incumbent retailers. PSTR assumes that regression coefficients may vary across subgroups, and we use PSTR to find subgroups where the coefficient of either capital or labour on output is more pronounced.[2] Since incumbent retailers increase their use of labour (Daunfeldt et al. 2015, 2017) and capital (Rudholm et al. 2015) when IKEA enters the market, this analysis will also indicate whether IKEA entry is likely to have a larger effect on the output of small firms or large firms. The analysis is done on pre-IKEA entry data, as entry could affect the production function. Our transition regression is specified in Equation 1:

$$y_{it} = \mu_i + \beta_1 L_{it-1} + \beta_2 K_{it-1} \\ + \left(\beta_3 L_{it-1} + \beta_4 K_{it-1}\right)g(q_{it}, \gamma, c) + \varepsilon_{it},$$

$$\text{where } g(q_{it}, \gamma, c) = \left(1 + \exp(-\gamma(q_{it} - c))\right)^{-1} \quad (1)$$

and where y_{it} is the log-transformed consumer price index adjusted sales of firm i at time t, and L_{it-1} and K_{it-1} are measures of the cost of labour and capital, respectively, both of which are log-transformed and lagged one period to account for potential endogeneity.[3] μ_i represents firm fixed effects, and $_{it}$ is an error term. $g(q_{it}; \gamma, c)$ represents a continuous transition function bounded by 0 and 1, where q_{it} is the transition variable (capital or labour), and c is the threshold value. The parameter γ determines the smoothness of the function: when $\gamma = 0$, the model collapses into a linear regression model, and when $\gamma = 1$, there is at least one threshold in capital or labour affecting the production function.

Second, we estimate a difference-in-difference Cobb-Douglas production function on the whole dataset and for subgroups of firms below and above the threshold identified by the estimation of Equation 1. The DiD equation is written:

$$y_{it} = \mu_i + \beta_1 L_{it-1} + \beta_2 K_{it-1} + \alpha_1 TR_i \\ + \alpha_2 TP_t + \alpha_3 (TP_t \cdot TR_i) + \varepsilon_{it} \quad (2)$$

where TR_i is an indicator variable equal to one for firms located in the IKEA-entry region, Gothenburg. As in Håkansson et al. (2018) and Han et al. (2018), retail firms in the Stockholm metropolitan area are used as controls for firms located in the Gothenburg metropolitan area. TP_t is an indicator variable equal to one for the treatment period, while $TP_t \cdot TR_i$ is an interaction variable equal to one for firms located in Gothenburg after IKEA entry. The parameter α_3 measures how the output of incumbent retailers in the entry region compares after IKEA entry with their own output before entry and with the output of retailers in the control region throughout the study period, holding the levels of labour and capital constant. Since we control for changes in the use of capital and labour, we are measuring the spillover effect that IKEA entry causes, not the impact of increased use of inputs.

III. Results

When estimating Equation 1, Wald test statistics and p-values are calculated under the null hypothesis of homogeneity ($\gamma = 0$), and the results are presented in Table 1. The results show that heterogeneity exists and that capital is a more suitable transition variable than labour. Consequently, firms should be separated into two subgroups according to size, and the threshold value of

Table 1. Homogeneity test.

	χ^2 statistic	F statistic
capital	6.473 (0.039)	2.422 (0.089)
labour	5.662 (0.059)	2.118 (0.121)

Note: H₀: Linear model ($\gamma = 0$) versus H₁: PSTR model with at least one. Threshold ($\gamma = 1$). p-values in parenthesis.

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[2]The PSTR has recently been used when analysing how corporate social responsibility (Chen and Lee 2017) and the number of patents (Chen, Shih, and Chang 2014) affect firm value, and in these studies the PSTR is described in more detail.
[3]For details regarding the measurement of all variables, see e.g. Han et al. (2018) using the same dataset.

Table 2. DiD regression results.

	OLS			FE		
	Small firms (capital $\leq$ 4.3)	Large firms (capital > 4.3)	All firms	Small firms (capital $\leq$ 4.3)	Large firms (capital > 4.3)	All firms
labour	1.464***	1.298***	1.348***	0.588***	0.581***	0.692***
capital	0.094***	0.054***	0.014***	0.032***	0.021***	0.031***
$TP \cdot TR$	0.094*	−0.041	0.03	0.088*	−0.041	0.039

Note: ***Significant at the 1% level, *significant at the 10% level.

K_{it-1} is estimated to be 4.3, which translates to firms having a capital stock of approximately 1 500 000 SEK (138 000 EURO).[4] This results in a small firm subgroup of 1 569 firms and a large firm subgroup of 1 281 firms.[5]

The results from the estimations of Equation 2 are presented in Table 2. For all firms, the results are similar to Håkansson et al. (2018) and Han et al. (2018), reporting no effects of the IKEA entry in Gothenburg on the productivity of incumbent retailers. However, the results also show that IKEA entry determines a statistically significant 9% increase in the productivity of small incumbent retailers.[6] Thus, recognizing that small retailers in Sweden often outgrow their larger counterparts as reported by Daunfeldt, Elert, and Lang (2012) is essential for correctly modelling how the entry of big-box retailers affects incumbent retailers, especially when entry takes place in urban areas.

IV. Discussion

Contrary to previous studies, we show that big-box retail entry can also have positive effects on incumbent retailers in urban areas. The reason why previous studies failed to find any effects is that these effects are limited to small incumbent retail firms with a capital stock of less than 1 500 000 SEK, making the effect difficult to identify when analysing the full dataset of affected retailers. We suggest that future studies should consider firm size when examining how big-box retail entry affects incumbent retailers, as we find that the effects differ between small and large incumbents.

References

Artz, G.M. and Stone, K.E., 2006. "Analyzing the impact of Wal-Mart supercenters on local food store sales." *American journal of agricultural economics*, 88(5), pp.1296-1303.

Artz, G. M., and K. E. Stone. 2012. "Revisiting Wal-Mart's Impact on Iowa Small-Town Retail: 25 Years Later." *Economic Development Quarterly* 26: 298–310. doi:10.1177/0891242412461828.

Basker, E. 2007. "The Causes and Consequences of Wal-Mart 's Growth." *Journal of Economic Perspectives* 21 (3): 177–198. doi:10.1257/jep.21.3.177.

Chen, R. C. Y., and C. H. Lee. 2017. "The Influence of CSR on Firm Value: An Application of Panel Smooth Transition Regression on Taiwan." *Applied Economics* 49 (34): 3422–3434. doi:10.1080/00036846.2016.1262516.

Chen, Y.-S., C.-Y. Shih, and C.-H. Chang. 2014. "Explore the New Relationship between Patents and Market Value: A Panel Smooth Transition Regression (PSTR) Approach." *Scientometrics* 98: 1145–1159. doi:10.1007/s11192-013-1110-9.

[4]These calculations are presented in Appendix A in the supplemental online material, while Appendix B contains descriptive statistics regarding the share of large and small firms.

[5]We have also tested if there should be more than one threshold level, and these tests show that the one-level model is preferred to models having two or more levels.

[6]In the supplemental online material, Appendix C, additional results show that changes in model specification or changes in the estimation method determining the size thresholds does not alter the results.

Daunfeldt, S.-O., N. Elert, and Å. Lang. 2012. "Does Gibrat's Law Hold for Retailing? Evidence from Sweden." *Journal of Retailing and Consumer Services* 19: 464–469. doi:10.1016/j.jretconser.2012.06.001.

Daunfeldt, S.-O., O. Mihaescu, H. Nilsson, and N. Rudholm. 2015. "When IKEA Enters: Do Local Retailers Win or Lose?" HUI Working Paper No. 109. Stockholm: HUI Research.

Daunfeldt, S.-O., O. Mihaescu, H. Nilsson, and N. Rudholm. 2017. "What Happens When IKEA Comes to Town?" *Regional Studies* 51: 313–323. doi:10.1080/00343404.2015.1100287.

Gibrat, R. 1931. *Les inegalite´s economiques* [Inequalities in economics]. Paris: Librairie du Receuil Sirey.

González, A., T. Teräsvirta, D. van Dijk, and Y. Yang. 2005. "Panel Smooth Transition Regression Models, SSE/EFI Working Paper Series in Economics and Finance 604." Stockholm: Stockholm School of Economics.

Håkansson, J., Y. Li, O. Mihaescu, and N. Rudholm. 2018. "Big-Box Retail Entry in Urban and Rural Areas: Are There Productivity Spillovers to Incumbent Retailers?." *International Review of Retail, Distribution and Consumer Research* (2019): 1-23..

Haltiwanger, J. C., R. R. Jarmin, and C. J. Krizan. 2010. "Mom-And-Pop Meet Big-Box: Complements or Substitutes?" *Journal of Urban Economics* 67: 116–134. doi:10.1016/j.jue.2009.09.003.

Han, M., O. Mihaescu, Y. Li, and N. Rudholm. 2018. "Comparison and One-Stop Shopping after Big-Box Retail Entry: A Spatial Difference-In-Difference Analysis." *Journal of Retailing and Consumer Services* 40: 175–187. doi:10.1016/j.jretconser.2017.10.003.

Huang, Q., V. R. Nijs, K. Hansen, and E. T. Anderson. 2012. "Wal-Mart's Impact on Supplier Profits." *Journal of Marketing Research* 49: 131–143. doi:10.1509/jmr.10.0256.

Maican, F., and M. Orth 2012. "Productivity Dynamics and the Role of "Big-Box" Entrants in Retailing." Research Institute of Industrial Economics Working Paper No. 898. Stockholm: Research Institute of Industrial Economics. doi:10.1094/PDIS-11-11-0999-PDN.

Rudholm, N., S.-O. Daunfeldt, O. Mihaescu, and H. Nilsson. 2015. "Effekter Av En IKEA-etablering/Consequences of IKEA Entry." (In Swedish), Forskningsrapport 2015:5. Stockholm: Handelns Utvecklingsråd.

Rudholm, N., Y. Li, and K. Carling. 2018. "How Does Big-Box Entry Affect Labor Productivity in Durable Goods Retailing? A Synthetic Control Approach." HUI Working Paper No. 130. Stockholm: HUI Research.