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ARE NEW SHOPPING CENTERS DRIVERS OF DEVELOPMENT IN LARGE METROPOLITAN SUBURBS? THE INTERPLAY OF AGGLOMERATION AND COMPETITION FORCES

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Are New Shopping Centers Drivers of Development in Large Metropolitan Suburbs? The Interplay of Agglomeration and Competition Forces

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Abstract: We investigate to which extent shopping centers are drivers of economic development by studying how distance to newly established shopping centers affects the performance of incumbent firms located in the suburbs of the three Swedish major metropolitan areas (Stockholm, Gothenburg, and Malmö) between 2000 and 2016. We use a regression setup with 27,000 firm-year observations and explore the possible heterogeneity imposed on the results from two main elements of spatial economics theory: the size of the new retail area and the distance from the new retail area to the analyzed incumbents. We observe a clear difference in the direction of the effects of large versus small shopping centers. While competition forces are much stronger when large shopping centers make entry, yielding an average negative effect of 5% on incumbent firm revenue and 3% on firm employment, results indicate an opposite pattern for smaller shopping centers, with firm revenue and firm employment increasing by 4 and 3%, respectively. Moreover, we also observe that both agglomeration and competition effects attenuate sharply with distance from the new entrant, confirming one of the central premises of retail location theory. Finally, the results indicate that the geographical scope of the effects is much wider in the case of larger shopping centers, with the estimates becoming insignificant at about 9-10 km from the new entry, as compared to 3-4 km in the case of smaller retail centers.

Keywords: Shopping centers, firm performance, retail location, agglomeration effects, competition, attenuation of effects.

JEL-Codes: D22, L25, P25, R11, R12.

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1 Introduction

The number of shopping centers located in the suburbs and the number of consumers patronizing them have increased exponentially in the second half of the 20th century. Higher space availability and lower land costs as compared to central cities have played a central role. Furthermore, the increased access to and use of cars after World War II together with improvements in road networks contributed to improved mobility (Forsberg, 1998) and the increased participation of women in the workforce considerably raised the purchasing power of the households. Moreover, the economy has in later years evolved towards what is often called 'the experience economy', where more value is derived from the experience of consuming a product as compared to the actual value of the commodity (Pine and Gilmore, 1999; Öner, 2014). A clever combination of retail and service sanctioned suburban shopping centers with the potential to fulfill these 'entertainment' needs and thus increased demand for such areas.

The notion of 'suburbia' was originally linked to the new lush villa settlements outside the central cities, which functioned as resorts for the affluent in the first half of the 1900s. In the 1950s, the notion was adopted to denominate the modernistic neighborhoods constructed with housing, working places, and large commercial centers outside the central cities (Castell, 2010). Mainly a positive notion at the onset, the 'suburbia' has, especially at the dusk of the 20th century, been associated more and more with negative connotations. In Sweden, the Million Homes Program[1] contributed significantly to the creation of this negative image, especially in the three major metropolitan areas of Stockholm, Gothenburg, and Malmö. During the last decades many of the suburbs in these metropolitan regions have faced problems regarding e.g., economic decline, physical decay, unsafety, and social marginalization (Castell, 2010). Against this background, the establishment of new shopping centers has been both criticized as contributing to the economic decline of the suburbs and hailed as possible growth engines. Supporters argue that shopping centers are catalyzers of economic development in the suburbs because they generate positive demand and supply spillovers on the incumbent firms located in the same cluster (e.g., Wolinsky, 1983; McCann, 2001; Zhu et al., 2011). The opponents emphasize however the centrifugal forces that originate in increasing competition and are

[1] The Swedish Million Homes Program was part of the political vision of a Swedish modern welfare state where every citizen was given the opportunity to live a good life and followed a parliamentary decision of targeting the building of a million homes in ten years, between 1965 and 1974. The program was criticized not only for the physical designs of the buildings and of the neighborhoods, but mostly for the stigma that has been gradually associated with living in these buildings, which eventually led to a very high number of vacancies in these areas.

responsible for the decline in productivity and thus the poor performance of the surrounding incumbents. These critics argue that many of the incumbent firms exit the market because they don't have the capacity to compete with the new gigantic malls (Monheim, 1998; Farhangmehr et al., 2001).

In reality, the picture is not black or white. The combination of centripetal and centrifugal forces acts in intricate ways and yields effects that are heterogeneous with respect to several factors. First, the allure of a shopping district may determine its range and thus the strength of agglomeration effects at work, especially on the demand side (Huff, 1962; Brown, 1993). Second, a significant body of research debates the attenuation of both agglomeration and competition effects, in line with the classic argument of the central place theory (Christaller, 1933; Lösch, 1940). These studies convey that, regardless of scale, agglomeration and competition effects are strongest at market centers and decrease with distance from these central points (e.g., Ellickson and Grieco, 2013; Larsson, 2014; Andersson et al., 2016; Rosenthal and Strange, 2019; Arcidiacono et al., 2020). The question is however whether agglomeration effects are stronger than competition, and how this relationship evolves with distance from a new shopping center in the suburban environments.

As theory also indicates that the range of a retail area positively correlates with its size (Christaller, 1933; Lösch, 1940), results of studies that have focused solely on big-box entry may not be generalizable to other types of stores, including shopping centers. In comparison, we expect that the effects are more extensive both in magnitude and with regard to their geographical scope when a new shopping center opens up in a region. Research focused on identifying the effects of new shopping centers is however impaired by a series of limitations, one of the most important being methodological. For example, Abdelghani (2013), who investigates the co-existence of the central traditional market and suburban shopping, bases his study solely on surveys and interviews. Stone and McConnon (1982) also use surveys and supplement them with simple regression models at aggregate level. While offering interesting insights, the choice of qualitative methods limits the possibility for generalization of results outside their original context. Furthermore, studies conducted with aggregate data do not allow for the accurate identification of the spillover effects on incumbent firms because aggregate data include the new entrants themselves and these are often highly productive and take over a large share of the market (Basker, 2007). This may bias results based on aggregate data and cause them to exaggerate the positive spillover effects of new retail areas. More recent work

(e.g., Ellickson and Grieco, 2013; Arcidiacono et al., 2020), while methodologically robust, continues to be solely focused on big-box entry. Another limitation originates in the geographical restrictions imposed in previous studies. While some of them specifically focus on rural areas (Heffner and Twardzik, 2015) and smaller cities (Stone and McConnon, 1982), others investigate the effects of new shopping centers on traditional downtowns and main streets (Maronick and Stiff, 1985).

The debate over how city-center stores are affected by the establishment of new external shopping areas is heated today, and mainstream media has had a particular contribution to it, emphasizing almost exclusively the negative impacts. During the last decade there was an abundance of these types of news stories, for example on how ”city centers lose against shopping centers” (Huntington, 2012), and how ”retail in the city center in going to disappear in the long run” (Carlsson, 2019), and the ”death of the store is worse than anticipated” (Björk, 2018). This focus on city centers has drawn away attention from the developments in the suburbs, so much so that studies about the significance of new shopping centers in suburbs of larger urban areas are quite scarce.

The aim of our paper is thus to fill this gap in the literature by specifically investigating how the economic performance of incumbents is impacted by large retail entries in suburbs, in our case those surrounding the three major metropolitan regions in Sweden: Stockholm, Gothenburg, and Malmö. We measure economic performance using the revenue, employment, and productivity of these incumbent firms, and focus our analysis on the two concepts of Huff's spatial interaction theory (1962): size and distance. We thus investigate whether the effects on incumbent firms depend on the size of the new shopping center and find that large and small shopping centers yield opposite effects: while entry by large shopping centers is followed by an average drop in firm revenue of almost 5%, small shopping centers contribute to an increase of about 4% in the revenues of the incumbent firms located within the same cluster. This also goes for the impacts on firm employment, where we estimate a drop of 3% for firms located close to large centers and an increase of 3% for firms located close to small centers. Firm productivity is however almost not at all impacted. Using a continuous distance function that yields a refined picture of the investigated spatial relationship, we also model the attenuation shape of the agglomeration effects to verify how fast the effects dissipate with distance. The results confirm the attenuation of the effects of both large and small centers, indicating a much wider geographical scope in the case of large shopping centers.

In the following sections 2 and 3 we discuss retail location theory and previous evidence as to the effects of shopping centers on incumbent firm performance. We then describe the data and methodology in section 4, and present and discuss the results in section 5. The last section summarizes and concludes the study.

2 Two essential concepts in retail location theory: size and distance

Our analysis is constructed around the two leading concepts of retail location theory, size and distance, and the postulate about the attenuation of agglomeration effects due to the interplay of centrifugal and centripetal market forces. Christaller (1933) and Lösch's (1940) central place theory emphasizes the idea that demand for any product is likely to diminish to zero beyond a certain point, as the distance and cost of transport to a retail cluster increases (Brown, 1993). This effect is due to the existence of other retail clusters in the region and competition among these clusters delineates their market areas. Reilly's law of retail gravitation (1931) and the spatial interaction theory (Huff, 1962) reiterate the role of market size and the existence of a trade-off between the allure of a shopping district and the deterrent of travel distance (Huff, 1962; Brown, 1993). The probability that consumers choose to patronize a shopping district is directly proportional to the district's relative attractiveness and inversely proportional to both the consumer's travel distance to the respective district and to the attractiveness of other trade areas in the region (Brown, 1993).

Consequently, when a new retail district opens in a region, customers will choose to patronize it over other retail districts, given it has a more attractive offer and/or it is located at a closer distance. An increase in the customer base is likely to positively affect the sales and productivity of all firms in the entry cluster due to demand spillovers. Demand-side or shopping externalities occur when the sales of one retailer are affected by the location and sales of other retailers and the products sold are either imperfect substitutes or complements. Co-location of imperfect substitutes or complements minimizes consumer search costs and uncertainty and allows for comparison and/or multipurpose shopping, thus increasing the attractiveness of the whole retail cluster (Brown, 1989; van Handel, 1970; Wolinsky, 1983).

The supply side also plays an important role. As first discussed in Marshall's (1920) theory of agglomeration economies, firms co-locate to decrease input costs, facilitate labor matching by creating a local skilled labor pool, and benefit from knowledge spillovers (McCann, 2001;

O'Sullivan, 2003). Knowledge spillovers can be industry specific (so-called localization or specialization externalities) (Marshall, 1920), can occur between complementary industries (urbanization or diversification externalities) (Jacobs, 1969), or both. These economies of scale are called 'external economies' to indicate their functional mechanism: the production costs of one firm decrease as the output of another firm (or the total output in the local market) increases (O'Sullivan, 2003). A combination of the increase in sales due to demand-side linkages, and a decrease in input costs due to supply-side linkages may thereby lead to an increase in productivity.

However, the establishment of a new shopping center can also create market crowding and thus increase competition for consumers' disposable income. Benefitting from internal economies of scale, large retailers and shopping centers are highly productive and may offer lower prices and thus attract more customers. Basker (2005), for example, finds that new Walmart stores result in city-wide price reductions of 2-3% in the short run and up till 10% in the long run. If market crowding occurs, low-productivity firms may be impacted negatively (Saito and Gopinath, 2009). To survive, incumbent firms need to increase their productivity levels and this may advance innovation (Schumpeter, 1942; Porter, 1990). Sobel and Dean (2008) argue that price reductions following entry by large retailers or retail districts may even give consumers a significant amount of additional disposable income to spend elsewhere – for example in smaller local firms. This may reduce any possible negative impact of new large retailers and shopping centers on the size, growth, and profitability of small firms (Sobel and Dean, 2008) and may even positively affect their performance (Li et al., 2019).

3 Previous research on effects of big-box retail and shopping centers in metropolitan suburbs

The proliferation of suburban shopping centers in the second half of the 20th century soon attracted the attention of many scholars who began to investigate on the effects of these new shopping districts on host towns and outlying areas. This was however not an easy task, and for methodological reasons much of the attention in the economic and planning literature has disproportionately been focused on big-box stores. Several studies have for example attempted to measure the effects of new Walmart stores. Singh et al. (2006), for example, emphasize the negative competition effects and find that incumbent supermarkets lose 17% of sales volume due to customer migration to new Walmart stores. Jia (2008) shows that Walmart stores reduce

local competitors' market shares and profit margins, causing as much as 50-70% of the net exit of small discount retailers from the American market between 1988 and 1997. Ailawadi et al. (2010) also identify significant sales losses of incumbents as a result of Walmart entering a market, but details substantial variation across retail formats, stores, and product categories.

The conclusions of these studies are however far from unanimous. Davidson and Rummel (2000), for example, find instead that total revenues increases by up to 41% in Walmart towns, while Basker (2005) argues that county-level retail employment increases by 100 jobs following Walmart entry. This finding is later supported by Drewianka and Johnson (2006), as well as Hicks (2007). Competition effects seem to prevail particularly when it comes to substitute products. Zhu et al. (2011), for example, find that while the sales of substitutes for items carried by the new big-box stores decrease at all incumbent supermarkets, the sales of complements increase. This result is also confirmed for other types of big-boxes as well. Han et al. (2018), for example, find that incumbent retailers selling complementary goods (e.g., furniture and furnishings) that are located close to IKEA entry sites in smaller municipalities in Sweden subsequently increase their productivity by 18-35%. However, for incumbents selling substitutes it is the competition effects that prevail. In the case of IKEA it also seems that centripetal agglomeration forces are stronger than centrifugal competition forces in regions where the size of the entry is large relative to the local retail market (Daunfeldt et al., 2019; Håkansson et al., 2019), while in larger markets the positive effect is limited to small retailers (with a maximum capital stock of approximately 150 000 EUR) (Li et al., 2019).

Previous studies seem however to be in agreement when it comes to the role of distance and the attenuation of agglomeration and competition effects. Some of these studies convey that, regardless of scale, agglomeration effects are strongest at market centers and dissipate with distance from these central points (e.g., Larsson, 2014; Andersson et al., 2016; Rosenthal and Strange, 2019). Jones and Doucet (2000), for example, pinpoint the positive aspects of clustering, showing in their study that retail employment within 2 km of a big-box retail establishment in the greater Toronto area increases from 28% to 43%, an increase accounted for by the establishment of additional retail and service firms. Competition effects are also found to dissipate with distance (e.g., Ellickson and Grieco, 2013; Arcidiacono et al., 2020). Haltiwanger et al. (2010) find negative effects on employment for both single-unit and smaller chain stores, but only as a consequence of big-box entrants that locate in the immediate area and operate in the same industry as the affected incumbents. Ellickson and Grieco (2013) and

Arcidiacono et al. (2020) also confirm that Walmart's competitive effect decays with distance from the entry point. However, the focus tends to be on either agglomeration or competition effects, while it is rarely discussed that it is rather the interplay between agglomeration and competition forces that we measure in these kinds of studies, and that this interplay is what defines the strength and the geographical scope of the effect.

Attempting to generalize the results of studies focused solely on big-box entry may however cause us to underestimate the effects as concerns shopping centers. While the size of an average big-box store such as IKEA is of about 30 000 square meters, newly established shopping centers in Sweden may reach as much as 180 000 square meters (SSCD, 2017). Theory suggests that a larger size implies a wider range, which in turn means that potential effects may be more extensive in both magnitude and geographical scope when a large retail center opens up. Even when big-box stores are preceded or closely followed by other new stores within a short time span after their establishment, the possible effect that emerges from the synergy between all new retailers is seldom identified as such.[2] Consequently, results of previous studies based on big-box entry are not generalizable enough to apply to larger shopping centers as well.

As early as 1960, Pratt and Pratt attempted to identify changes in customer behavior generated by the establishment of suburban shopping centers and observed a shift in the demand of suburban consumers from the central city to these new suburban malls. Using interviews, they identified a 55% net decrease in shopping in incumbent stores in the central city, but also a 22% decrease in shopping in incumbent stores located in suburbia. Stone and McConnon (1982) also count among the pioneers in the field. In their work they showed that real sales for general merchandise, clothing, and specialty stores decreased by as much as 59% following the establishment of suburban shopping malls. More recent studies continue to emphasize competition over agglomeration effects. In the 1990s, Howard and Davies (1993) used surveys, complemented by pedestrian counts, vacancy statistics, and changes in land use patterns, to assess the 'health' of traditional shopping streets. The surveyed shop owners acknowledge decreases in both sales and employment following a new shopping mall entry. Other authors pinpoint that many of these stores exit the market because they are unable to compete with the

[2] One exception is Daunfeldt et al. (2019) who discuss that the effect they are measuring is not the sole effect of IKEA entry, but rather of 'all other changes associated with IKEA entry that occur in the retail environment of the entry municipality […]. The results should therefore be interpreted as a general equilibrium reduced form effect combining the impact of the IKEA store itself and all other changes in the retail environment associated with IKEA entry.'

new gigantic malls (Monheim, 1998; Farhangmehr et al., 2001). The negative effects are however heterogenous, depending on both the retail mix of the new center and the distance to the incumbent stores (Howard and Davies, 1993). Moreover, not all stores were negatively affected. Stores selling complementary goods, such as building materials and hardware, groceries, and coffee shops and restaurants registered instead increases in their sales. Traditional markets may thus continue to attract customers purchasing certain types of goods that are complementary to those offered in the large shopping malls, such as, for example, non-chain clothing and traditional local foods (Abdelghani, 2013). Also interesting was the fact that the effects in adjacent areas appeared to be much more severe than in the downtown areas, as the 'leakage' of sales decreased in magnitude with distance from the new entry (Stone and McConnon, 1982).

These studies are however impaired by a series of limitations. Methodological limitations, such as the sole use of qualitative research methods, limit the power of generalization of the results beyond the original context of each research setting. Abdelghani (2013), for example, bases his research solely on surveys and interviews. Stone and McConnon (1982) also use surveys and supplement them with simple regression models at aggregate level, which do not allow for the accurate identification of the spillover effects on incumbent firms because aggregate data include the new entrants themselves and these are often highly productive and take over a large share of the market (Basker, 2007). This may bias results based on aggregate data and cause them to exaggerate the positive spillover effects of new shopping centers. Another limitation originates in the geographical restrictions applied in these studies. While some authors specifically focus on rural areas (Heffner and Twardzik, 2015) and smaller cities (Stone and McConnon, 1982; Heffner and Twardzik, 2015), others investigate the effects of new shopping centers solely on traditional downtowns and main streets (Maronick and Stiff, 1985).

We thus aim to contribute to this body of literature by investigating the effects of new shopping centers outside of traditional city centers, in the suburbs of the largest metropolitan areas, which have been the original locations of the shopping centers. We base our methodology on regression analysis and attempt to connect changes in the distance to the closest new retail center (caused by the establishment of new shopping centers) to the economic performance of incumbent firms. The research questions we attempt to answer are *i)* whether or not negative effects from competition are stronger than the positive effects from demand and supply spillovers, *ii)* if this total effect is heterogeneous in space, and *iii)* to what extent is the effect

attenuated by the size of the new shopping center? In other words, do the effects on incumbent firms vary with distance to the closest shopping center and its size?

4 Data, empirical model, and descriptive statistics

We investigate the effects of new shopping centers on the economic performance of incumbent firms in the metropolitan suburbs of Stockholm, Gothenburg, and Malmö (Figure 1), under the time period between 2000 and 2016. Data on shopping centers is available from the Swedish Shopping Center Directory (SSCD), the compilation of which is the result of collaboration between HUI Research and Datscha, two consulting firms specialized on retail and property analytics, and the Nordic Council of Shopping Centers (NCDC). In this database, shopping centers are categorized on the basis of their total gross leasing area (GLA), the number of tenants and anchors, as well as their type of supply (Table 1). According to the data, 118 shopping centers were located in our area of analysis in 2016. Of these, 83 made entry before and 35 after the year 2000, the first year in our analysis (Table 2).[3] We observe that over time there is a tendency towards opening larger shopping centers, with an average total GLA of more than 30,000 square meters, categorized as super-regional and regional malls, regional retail parks, and retail parks.

Table 1. Types of shopping centers in Sweden, 2016

shopping center	type	GLA (sqm)	no. tenants	no. anchors	characteristics
super-regional mall	1	>70,000	>80	>=3	'much extended supply'
regional retail park	2	>70,000	.	>=5	'large big box establishments'
regional mall	3	20,000-70,000	50-80	>=2	'extended supply'
retail park	4	>5,000	>5	>=3	'big box'
theme center	5	>5,000	>=15	.	'specialized supply'
outlet center	6	>5,000	.	.	'emphasis on durable goods'
community center	7	7,000-20,000	16-35	>=2	'balanced'
neighborhood center	8	5,000-7,000	7-15	>=1	'convenience-based'
city mall	9	5,000-7,000	>5	>=1	'within or close to city center'

Source: SSCD, 2017.

[3] 80 of the shopping centers are located in the three central cities in our analysis (Stockholm, Gothenburg, and Malmö) or in their metropolitan suburbs, while three are located outside the defined borders of their metropolitan suburbs. These three shopping centers are old (established before 2000) and have been included in our analysis because they have been registered as nearest shopping centers for some of the firms located in the analyzed metropolitan suburbs.

Table 2. Shopping centers in the Swedish metropolitan suburbs, 2016

shopping center	number	average GLA 2016 (sqm)	number, type 1-4	number, type 5-6	number, type 7-9
all	118	26,185	62	3	53
old (entry before 2000)	83	24,309	38	1	44
new (entry after 2000)	35	30,635	24	2	9

Source: SSCD, 2017.

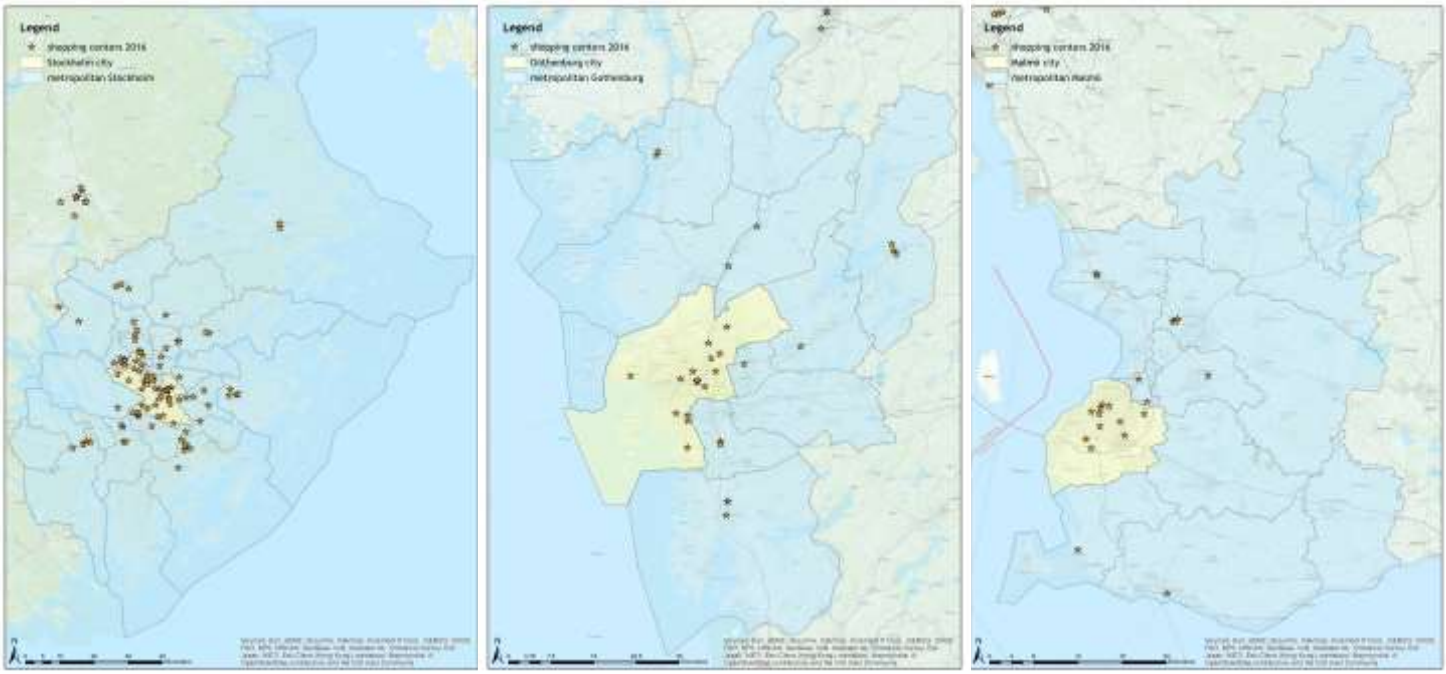

Figure 1. Shopping centers in the metropolitan suburbs of Stockholm, Gothenburg, and Malmö, 2016

As for firm-level data, we use information on all limited-liability firms in Sweden, active at some point between 2000 and 2016 in the retail industry, the hotel and restaurant industry, and commercial service. These data were collected by PAR and later updated by Bisnode, both of which are Swedish consulting firms that compile information on all variables registered in the annual reports from the Swedish Patent and Registration Office (PRV). Since our analysis is based on the relationship between location and firm key performance indicators, only firms that report results at establishment level are included in the analysis; these firms however represent more than 90% of all firms registered in Sweden for the studied time period.

On a yearly basis, we measure the distance to the nearest shopping center from each firm located in one of the three analyzed Swedish metropolitan suburban areas. When a new shopping center is established in the region sometimes during our analysis period (2000-2016), a change (decrease) in the distance to the nearest shopping center will be recorded for a certain share of

the firms in our sample, while for other firms there will be no recorded change (for those firms that continue to be located closer to a pre-existing shopping center and who are therefore not affected). We thus measure whether this decrease in the distance is simultaneous to a change in the revenues, employment, and productivity of the respective firm, using the pooled OLS model shown in equation one below.

$$\ln Q_{it} = \beta_0 + \beta_1 \times DC_{it} + \beta_2 \times D_{it} + \beta_3 \times D_{it}^2 + \pi_t + \gamma_m + \rho_j + \pi_t \times \gamma_m + \epsilon_{ijmt}. \quad (1)$$

Q_{it} is the outcome variable in our model (firm revenue, employment or productivity). As discussed in Håkansson et al. (2019), firm revenue must be discounted using a price index to arrive at a meaningful measure. As such, we follow Han et al. (2018) and use a suggestion made by analysts of the OECD (2001) to discount the revenue of firm *i* in year *t* by using the Swedish consumer price index (CPI), a fairly standard procedure. The log transformation of the outcome variable (Q_{it}) has the additional benefit of making its parameter estimate interpretable in percentage terms after using the formula *100 × [exp(treatment effect) – 1]* (see Wooldridge, 2010). We include a year-specific indicator variable (π_t) to adjust for time-variant heterogeneity given by, e.g., nationwide economic trends, such as the crisis of 2008-2009, as well as a city-specific indicator variable to control for any city-specific heterogeneity (γ_m). We also include an interaction term ($\pi_t \times \gamma_m$) to account for any city-specific trends that may affect firm performance, such as city-specific inflation or other secular trends. Further, to also take into account possible time-invariant heterogeneity across retail trade industries, we include a three-digit NACE code indicator variable (ρ_j). Finally, we also control for distance from each firm to the central city (i.e., Stockholm, Gothenburg, and Malmö), DC_{it}, as closeness to the central market has previously been shown to attract more and higher profile demand and may thus affect firm performance (Alonso, 1964; Johnston, 1973; Öner, 2014).

The variable of interest is D_{it}, the Euclidean distance ('as the crow flies') from a firm to the closest shopping center, measured yearly. Following previous studies (Daunfeldt et al., 2019), we allow for a non-linear functional form of the relationship between the distance to the closest shopping center and our output variable by also including the squared distance in our model, D_{it}^2. Lastly, we also include Huber-White robust standard errors to control for any heteroskedasticity problems. Our estimated effects should thus be interpreted as the impact of new shopping centers on firm performance, holding all other independent variables, including the city-year specific trends, constant.

Initial analysis of the data shows that there is no clear boundary within the city where the effect of the new shopping centers becomes zero. This may be due to the fact that shopping malls commercialize higher-order goods and can have impacts that reach much further away from the entry site (Klaesson and Öner, 2014; Öner and Klaesson, 2017), compared to grocery-based retailers such as Walmart that are usually associated with highly localized effects (Pope and Pope, 2015; Slade, 2018). Consequently, we cannot make a clear distinction between any 'treatment' and 'control' cities, and we thus use a within-city-type strategy to investigate the relationship between entry by new shopping centers and firm performance. As new shopping centers are likely to be established in regions with positive development trends, running within-city estimations also helps avoid positive bias in estimating the relationship between new entry and firm performance (Pope and Pope, 2015).

For firms located far away from the closest shopping center, the change in distance to the closest shopping center may sometimes be large, however without a meaningful impact on their economic performance. To avoid possible bias from this kind of situations, we follow Arcidiacono et al. (2020) and limit the sample to firms located within 20 km of the closest shopping center. The space in direct proximity of the new shopping center is also problematic. Since new shopping centers and their related infrastructure use up a quite considerable amount of space by themselves, our sample may thereby be reduced to a very small number of observations in the direct vicinity of the new shopping center. To avoid problems related to this situation, we thus also limit the firm sample to firms located more than 1 km from the closest shopping center. The selected data thus includes 5,635 firms over a 17-year period (2000-2016), which in total yields a sample of 26,961 firm-year observations. Descriptive statistics for the variables used in our main model for this sample of firms are available in Table 3 below.

The average firm in our study, with 4.9 employees and registered revenues of about 7.9 million SEK (about 720 000 EUR)[4] in 2016, is located 4.9 km away from the closest shopping center and about 10.4 km away from the closest central city. As expected, the distance to the closest shopping center decreases over time, from 5.4 km in 2000 to 4.9 km in 2016. This decrease is however accompanied by a slight increase in the average level of revenues from 7.5 to 7.9 million SEK (about 680 000 and 720 000 EUR, respectively[4]), while average employment remains constant. Average firm productivity decreases slightly in spite of this increase of firm

[4] At an exchange rate of 1 SEK = 0.091 SEK, April 15, 2020.

revenue and the constant level of employment. The question is how much of these trends in the performance of incumbent firms can be explained by the new establishments of shopping centers and whether the effects are heterogeneous in space. We focus on these questions sin the next section.

Table 3. Descriptive statistics for the variables used in our main model, 2000 and 2016

			2000		2016	
variable	**variable name**	**variable definition**	**mean**	**st.dev.**	**mean**	**st.dev.**
Q_{it}	revenues	CPI-adjusted firm revenues (tSEK)	7,512.36	16,443.69	7,923.02	29,516.88
	revenues (ln)	CPI-adjusted firm revenues, log form	7.91	1.41	7.74	1.49
	employment	firm employment	4.96	6.98	4.90	7.99
	employment (ln)	firm employment, log form	1.24	0.76	1.17	0.83
	productivity	firm labor productivity (CPI-adjusted revenues/employment, tSEK/employee)	1,327.22	2,531.17	1,155.68	1,924.27
	productivity (ln)	firm labor productivity, log form	6.67	0.98	6.58	0.96
D_{it}	distance	Euclidean distance from each firm to the closest shopping center (km)	5.40	4.77	4.95	4.38
D_{it}^2	squared distance	squared Euclidean distance from each firm to the closest shopping center (sqkm)	51.84	84.40	43.63	77.12
DC_{it}	distance to central city	Euclidean distance from each firm to the closest border of the central city	9.09	7.95	10.47	10.89
γ_m	municipality variable	municipality indicator variable	.	.	.	.
π_t	year variable	year indicator variable	2000	.	2016	.
ρ_j	industry variable	industry indicator variable	.	.	.	.
$\pi_t \times \gamma_m$	city-year variable	city-year trends	.	.	.	.

no.obs. = 26,961.

5 Results and analysis

We investigate how the change (decrease) in the distance to the nearest new shopping center is related to the change in our output variables (revenues, employment, and productivity) for all incumbent firms located in the metropolitan suburbs of Stockholm, Gothenburg, and Malmö. As highlighted in the theoretical section, there may be significant heterogeneity in the effect depending on the allure of and the distance to the closest shopping center. To investigate these hypotheses, we examine how distance to shopping centers of different sizes impacts our key variables (Table 4 and Figure 2). Based on the classification from SSCD (Table 1 in Section 4 above), we categorize shopping centers in 'small' and 'large', where 'small' centers include city, community, and neighborhood centers, and 'large' centers include all the super-regional and regional malls and retail parks. Outlet and theme centers are both defined as 'large' as they tend to be closer in both size and characteristics (i.e., both focus on offering durable goods) to

other centers in this category.[5] We also use a continuous function to investigate how the effects vary with geographical distance from the new shopping centers.

Table 4. The effect of large versus small shopping centers on the revenues, employment, and productivity of incumbent firms

distance	effect revenues (%) (p-value)		effect employment (%) (p-value)		effect productivity (%) (p-value)	
	large shopping centers	small shopping centers	large shopping centers	small shopping centers	large shopping centers	small shopping centers
average effect	-4.94*** (0.000)	4.12*** (0.003)	-3.23*** (0.000)	3.04*** (0.000)	-1.77** (0.050)	1.05 (0.239)
1 km	-4.58*** (0.000)	3.23*** (0.008)	-3.03*** (0.000)	2.40*** (0.000)	-1.55* (0.057)	0.83 (0.296)
2 km	-2.05*** (0.000)	1.21** (0.025)	-1.39*** (0.000)	0.90*** (0.003)	-0.65* (0.069)	0.31 (0.380)
5 km	-0.53*** (0.000)	-0.00 (0.978)	-0.41*** (0.000)	-0.00 (0.978)	-0.12 (0.188)	-0.00 (0.985)
10 km	-0.02 (0.632)	-0.41*** (0.000)	-0.08*** (0.001)	-0.30*** (0.000)	0.06** (0.049)	-0.11*** (0.008)
15 km	0.15** (0.024)	-0.54*** (0.000)	0.03 (0.368)	-0.40*** (0.000)	0.12*** (0.009)	-0.14*** (0.006)
20 km	0.23*** (0.005)	-0.61*** (0.000)	0.09* (0.054)	-0.45*** (0.000)	0.15*** (0.001)	-0.16*** (0.010)
no.obs.	14,651	12,310	14,651	12,310	14,651	12,310

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

The results shown in Table 4 indicate opposite directions of effects from the establishment of large as compared to small shopping centers. The negative coefficients in columns two and four strongly suggest that proximity to specifically large shopping centers is detrimental to the incumbent firm, as entry by a large shopping center is related to an average decrease in firm revenue by 4.94 % and in firm employment by 3.23 %. This translates to an annual loss of almost 400 000 SEK (about 36 000 EUR[4]) in the revenues and 0.16 employees in the employment of the average firm in the entry region in 2016. On the contrary, proximity to small shopping centers seems to be beneficial for incumbents: the establishment of a small shopping center is related to an average increase in firm revenue by 4.12% and in employment by 3.04%. This translates to a gain of about 330 000 SEK (about 30 000 EUR)[4] and 0.15 employees per year for incumbent firms located between 1 and 20 km from the new entry. Smaller and/or insignificant effects in productivity are likely due to the fact that employment seems to quickly adjust to the changes in revenue induced by the new entry. In other words, personnel layoffs seem to follow quite closely in time – although not to the exact same extent – after significant

[5] Only 55 firms (210 firm-year observations) are closest to an outlet or theme center, which makes about 1% of all firms (0.80% of all firm-years), which means that their impact on the results is minimal.

losses in firm revenues in areas with entry by large shopping centers, while personnel hiring follows increases in revenues in areas with new small shopping centers. These results indicate that the negative competition effects are much stronger than any positive agglomeration spillovers when new large shopping centers make entry in the three studied metropolitan suburbs, while the outcome is the opposite for small shopping centers, where agglomeration effects in terms of increased demand spillovers and supply-side benefits seem to follow the new entries.

The results in Table 4 however also indicate that both the positive and negative effects attenuate very quickly with distance from the new entry. The loss in revenue following entry of large shopping centers is of 4.58% at 1 km and drops to 2.05% and 0.53% at 2 km and 5 km from the new shopping center, respectively. The gain in revenue that follows entry by small shopping centers also drops from 3.23% at 1 km to 1.21% at 2 km from the new entry. Furthermore, in accordance to the theoretical argument, the effects of large shopping centers seem to have a wider geographical scope than those of small shopping centers (Figure 2). The effects become insignificant at 9-10 kilometers away from the large shopping centers, but at 3-4 km from the small shopping centers. All effects change sign at further distances from the new entry, but the magnitude of these coefficient estimates is very low; between 0.09% and 0.23% in the case of large shopping centers and between -0.23% and -0.61% in the case of small shopping centers.

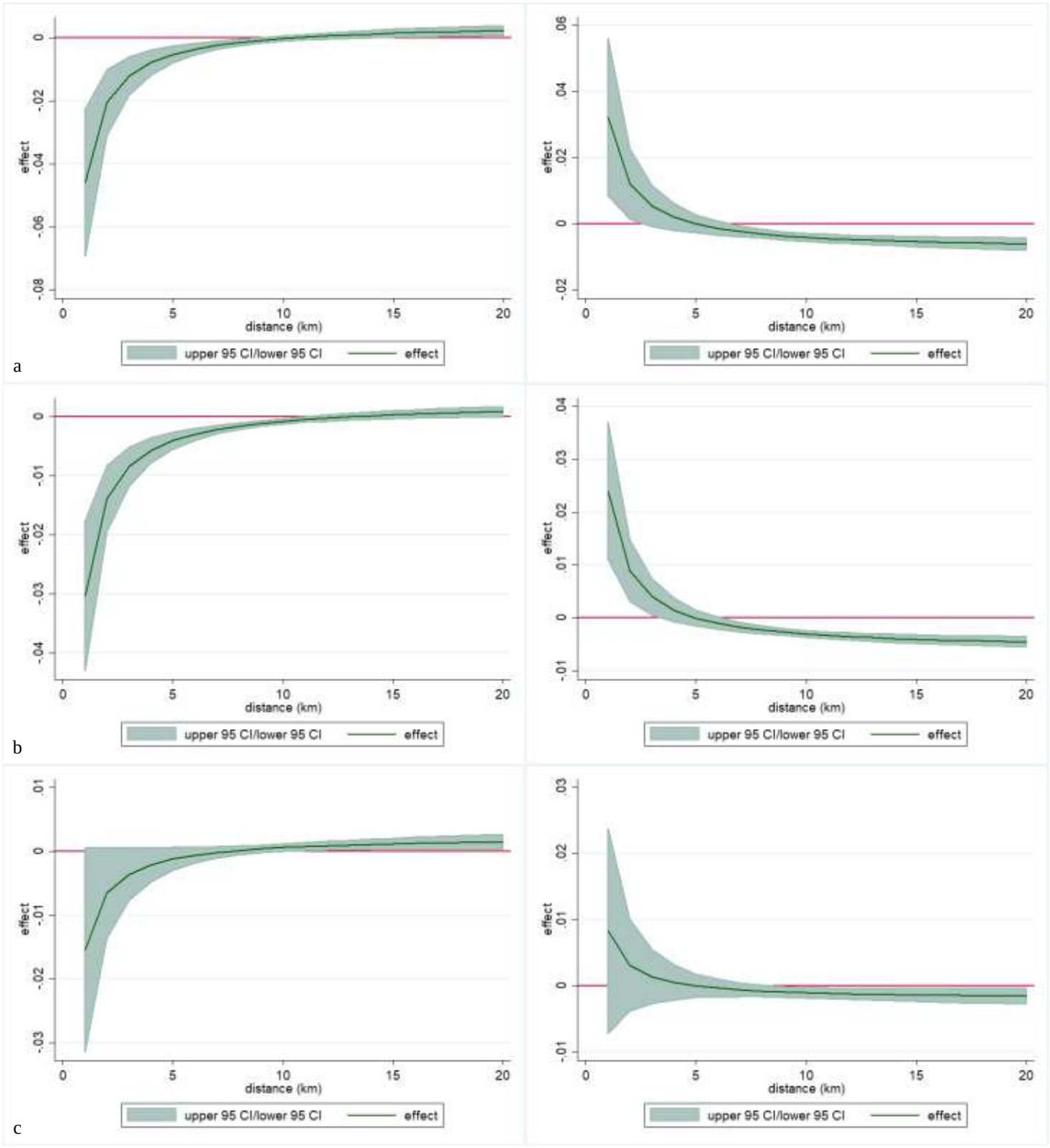

Figure 2. The effect of large (left) versus small (right) shopping centers on the revenues (a), employment (b), and productivity (c) of incumbent firms

6 Discussion and conclusions

After the end of the World War II, the number of shopping centers located in the suburbs and the number of consumers patronizing them have increased exponentially. Proponents of this development regard shopping centers as catalyzers of economic development in the suburbs. They emphasize the positive effects of large retailers and shopping centers on local economies, positive effects which are the results of centripetal forces that originate in demand and supply spillovers (e.g., Wolinsky, 1983; McCann, 2001; Zhu et al., 2011). Opponents however emphasize the centrifugal forces that originate in competition and argue that these are responsible for a decline in productivity and thus the poor performance of the surrounding incumbents. They argue that many of these incumbent firms exit the market because they do not have the capacity to compete with the new gigantic malls (Monheim, 1998; Farhangmehr et al., 2001). In reality the combination of centripetal and centrifugal forces depends on the allure of the shopping centers and the distance to the incumbent firms, making the effects of the new shopping centers very much heterogeneous across space.

It is clear from exploring results of previous research that identifying the impacts of new shopping centers on the local economy and outcome for incumbent firms is not an easy task. The majority of studies have so far focused on investigating big-box entry and are not consistent in terms of results (e.g., Jia, 2008; Ailawadi et al., 2010; Ellickson and Grieco, 2013). Of the studies investigating the effects of entry by large shopping centers, many did not adventure to go beyond descriptive or simpler quantitative approaches (e.g., Stone and McConnon, 1982; Abdelghani, 2013), which makes their results hard to generalize beyond their original contexts. The recent research focus on city centers (e.g., Maronick and Stiff, 1985; Heffner and Twardzik, 2015) has not extended to suburban areas, which have been largely forgotten even though they represent the birthplace of external shopping. We fill this gap in the research by investigating the effects of new shopping centers in the suburbs outside of traditional city centers. We use a pooled OLS regression model to connect change in the distance to the closest new retail center (caused by the establishment of new shopping centers) to the economic performance of incumbent firms. We also attempt to verify the theoretical postulates of location theorists that the size of and distance to the market play a major role for the direction and the magnitude of the impacts.

Our results are in line with these theoretical assertions, showing that proximity to specifically large shopping centers is detrimental to the incumbent firm, as entry by a large shopping center is related to an average decrease in firm revenue by 4.94 % and in firm employment by 3.23 %. This in turn corresponds to an average revenue loss of about 400 000 SEK (about 36 000 EUR[4]) and 0.16 employees. On the contrary, proximity to small shopping centers seems to be beneficial for incumbents: entry of a small shopping center is related to an average increase in firm revenue by 4.12% and in employment by 3.04% (330 000 SEK (about 30 000 EUR[4]) and 0.15 employees, respectively). Smaller and/or insignificant effects in productivity are likely due to the fact that employment seems to quickly adjust to the changes in revenue induced by the new entry. Firms co-located with large shopping centers and losing revenue due to the new entry seem to rather quickly calibrate their number of employees to the new situation. In other words, personnel layoffs seem to quite nearly follow significant losses in firm revenues for firms located close to new large shopping centers. Firms close to the smaller shopping centers are more careful to immediately adjusting their employment upwards and register instead a slight increase in their productivity.

These results suggest that entry of large suburban shopping centers, such as super-regional malls and regional retail parks, trigger a round of centrifugal forces linked to competition that prove to be much stronger than any agglomeration forces and drive customers away from the smaller incumbent stores located in the entry regions. Co-location seems to be more beneficial in the case of smaller neighborhood or community centers, which creates stronger agglomeration effects likely due to a wider customer base that is attracted to the area by the new entrants, a higher demand that spills over to the smaller incumbent stores.

The results also show that these effects are however attenuating very quickly with distance from the new entry, dropping under 1% (in absolute terms) at about 3 km from the new smaller entries and at 4 km from larger entries. This result is in line with both theory and previous studies indicating that both agglomeration and competition effects are strongest at market centers and dissipate with distance from these central points (e.g., Larsson, 2014; Andersson et al., 2016; Rosenthal and Strange, 2019; Arcidiacono et al., 2020). In accordance with the theoretical argument, the effects of large shopping centers seem however to have a wider geographical scope than those of small shopping centers; the positive coefficient estimates become insignificant at 3-4 km from the small shopping centers, while the negative coefficient estimates become insignificant at 9-10 km from the larger retail centers.

That the negative effects become insignificant and even turn positive (though very small in magnitude) suggests though that the competition effects decrease faster than any agglomeration effects, or alternatively, that agglomeration effects increase with distance from the new entries to counteract the negative effects that dominate in the close neighborhood of the large entries. This suggests that incumbents that are located very close to new large shopping centers need to be proactive when they define their business strategies. That layoffs closely follow a decrease in revenues may help firms survive on the short term, but more innovative solutions are likely needed in the longer run. Previous research indicates that the key for incumbents may lay in differentiating their offer from that of the new large entrants. Policies that support these firms may be thus needed to help them face the challenge and find innovative ways of business development. Thus, even if the effects are negative in the short run, this challenge may force a process of 'creative destruction' (Schumpeter, 1942) if incumbents find ways to increase their sales and profitability levels.

In the same time, co-location with smaller neighborhood-level shopping centers is beneficial to the firms already located in the entry area, but the effects are very local, pertaining solely to the entry cluster. The agglomeration forces dissipate very fast with distance, making place for competition forces at further distances from the new entries. This is also an indication that such neighborhood-level clusters may require a higher concentration for the generation of positive spillovers.

To conclude, our study suggests that the one-size-fits-all approach is not appropriate when studying effects of large retail entry on the economy of the entry areas. Assuming that all shopping centers have the same impact and that all firms behave similarly is wrong. Small shopping centers have opposite impacts from larger shopping centers, and firms located closer to the new entries must withstand stronger (either beneficial or not) impacts. This is essential to consider in urban and regional planning as well as in regards to industrial policy and regional economic growth.

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