The diminishing market for local food stores: A case for collective action?

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Abstract

Many countries in Europe have launched policies and planning guidelines with a more restrictive attitude towards out-of-town establishments in grocery retailing. Two possible justifications for these policies are the risk that social dilemmas influence the households’ choice of which stores to use, and that many consumers would favour a different situation. In order to find if there are any efficiency problems in this field of inquiry, a study was carried out which will be discussed in this paper. The study combines a cost evaluation with a demand analysis for different store categories in grocery retailing. The data necessary for the demand analysis was generated by a postal questionnaire with hypothetical questions about households’ choice of stores, together with questions about socio-economic conditions and actual purchasing behaviour. The result implies that the actual situation in grocery retailing in the investigated districts accommodates the preferences of a minority who prefer to make most of their grocery shopping in out-of-town establishments, while the large demand for high-quality local stores can not be realised due to social dilemmas and spatially dispersed preference structures among residents. The large stores attract customers from the entire city, which implies a diminishing market for the smaller local stores in residential areas. It seems that town planning, and other institutional measures, should be activated to prevent a far-reaching dominance of out-of-town stores in grocery retailing and to support more variation in local retail service levels.
Introduction

The structural changes in retailing towards out-of-town establishments during the latest decades have profoundly affected the attractiveness of towns and cities and the urban transport system. Increasing car-usage and dependence, decreasing production of retail services in residential areas, degeneration of inner cities and costly revitalisation programs, reduced demand for public transport with negative consequences for quality, are some of the factors that can be observed and, in part, linked to the changes in retailing.

Increasing access and usage of the car, in combination with a historic record of accommodating town planning, has enhanced the exploitation of scale economies within distribution firms.

As a reaction to this development, many countries in Europe have implemented policies and planning guidelines with a more restrictive attitude towards out-of-town establishments in retailing. This has been done, however, without an in-depth economic analysis capable of ranking different systems of distributing (transportation, storing, handling etc.) goods in urban areas according to their overall socio-economic efficiency, when relevant externalities, distribution costs in the informal sector etc., are incorporated in the analysis.

There is a strong ambiguity concerning the overall efficiency of the distribution system when the costs associated with, for example, travelling and purchasing performed by households are treated as an integral part of the total distribution cost function. There is also an obvious need to expand the cost analysis and incorporate the demand for different services performed by the firms, considering the fact that a grocery store is not producing goods. The relevant output to evaluate is a bundle of services or "convenience dimensions". [1]

Research questions and theoretical perspectives

The research questions dealt with in this paper concern the overall economic efficiency of grocery distribution systems in towns and cities. This main focus is tackled from two complementary perspectives:

- The construction of a spatial general optimisation model capable of evaluating the social costs associated with different distribution systems in urban areas and
- Stated-preference studies with postal questionnaires to individuals with the aim to describe and analyse the demand for different services produced by grocery stores
The aim is to bring together these perspectives in an integrated and comprehensive analytical framework that can be used as a guideline for local town planning in cities. The research is based on economic theory, where distribution of goods is conceptualised as an integrated system with firms and households as the relevant actors performing distribution activities associated with different cost components. The nucleus of the system is the costs for transportation, storing and handling goods, activities carried out by production firms, distribution firms, i.e. wholesalers and retailers, and household members. Institutional and organisational barriers between firms and households, formal markets and informal sectors etc., must be overlooked in the analysis, where the system as a single entity defines the analytical framework.

But the cost analysis is not enough if the aim is to evaluate the overall social efficiency associated with different grocery store nets in cities. It is also necessary to recognize that the production of services, the bundle of convenience dimensions, alters when the store net changes. A local grocery store in a residential area is not producing the same services as an out-of-town establishment. And, as we shall see, it is unfortunately right to assume that the market is not capable of satisfying the various demands for different retailing services.

Modelling the social distribution cost

Let the discussion start with a quotation that summarizes the relevant problem quite well:

"...retail trade is subject to an increasing-returns illusion when increasing consumer participation in performing the services reduces the amount of service actually performed by the firm." [2]

The first step in our analysis was to find if the costs for the increased consumer participation outweigh the cost reductions in the firms, regardless of the services actually performed. The goal function was conceptualised as a simple distribution task: get the groceries to the consumer residences. The model we developed to answer this question is already presented in an earlier paper and we shall only recapitulate the main features and the results. [3] The model is a spatial optimisation model. The optimal distribution system, i.e. the solution of the model, minimises the overall distribution costs. Each store in the model has a hexagonal market area and the optimisation is carried out within the boundaries of four systems of store structures, representing different combinations of store...
size and location. The generalised transportation cost function includes parameters representing distance, parking, time usage and differences between taxed and non-taxed labour costs.

The basis for the model is a function that reflects the price level for different store sizes, and a generalised transport cost function. The price level function, which is estimated on data collected in 202 Swedish stores, describes the relationship between the price level and the turnover. [3] The estimated function in eqn (1), where \( x \) is annual store turnover and \( y \) is price, shows that the price level decreases with higher turnover and asymptotically reaches SEK 3000. The regression model is significant on the 99% level.

\[
y = 3000 + 2887x^{-0.163}
\]  

(1)

The cost function shows that there is a welfare benefit to exploit by reducing the number of grocery stores in the modelled city. The reduction in the number of stores, however, increases the average distance between customers and stores. Within the hexagonal city model, with hexagonal market areas of radius \( r \), the distance is measured by eqn (2).

\[
tot.dist. = r^3 \sin 30 \cos 30 \left[ 1 + \frac{\cos^3 30}{\sin 30} \left( \frac{1}{2} \ln \left( \frac{1 + \sin 30}{\cos 30} \right) \right) \right]
\]  

(2)

The model consists of three levels of stores: large stores ("hypermarkets"), medium sized stores in district (neighbourhood) centres and small stores in residential areas. The largest stores can be located in the inner city or out of town, which in this case is "edge-of-town". The implicit assumption that all relevant costs on the supply side are included in the price level function gives us a simple and one-dimensional measure of costs within the distribution firm. The consumer costs are, however, comprised of transportation costs, i.e. fuel costs and capital depreciation of cars, as well as time usage. They also include parking costs, which in terms of welfare economics is the alternative cost for parking lots. One must also take into account the tax wedge between the work performed in firms, and similar work performed by households. In the model two traffic scenarios are evaluated. As road pricing theory shows, the cost associated with car traffic on a specific street is dependent on the traffic flows. Thus, the cost of travelling to a store depends on the amount of free road capacity. The costs of distributing groceries are therefore computed with low traffic flow costs as well as high traffic flow costs.

Model optimisations show that a store net with large stores located in the inner city is not efficient. The fact that a central location minimises the travel distances is more than counterbalanced by parking costs, which are considerable in inner cities. To fully exploit the scale economies, out-of-town establishments
are necessary. With a moderate transportation cost the most efficient net sustains out-of-town stores with a market share of 80%, and complementary stores in district centres and in residential areas which make up the remaining 20%. Higher kilometre costs change the optimal solution, however. When transport costs reach high levels, due to traffic volumes near the capacity limit, it is no longer efficient to concentrate the stores to a few large units. The transport costs are too high, which makes the large stores inefficient. Hence, the optimal solution contains only two levels, district centre stores and stores in residential areas. But it is important to notice that this high-cost scenario is only realistic in highly congested streets. This congestion level can, in the Swedish context, only be reached in peak hours in the capital Stockholm.

We can therefore conclude that a large market share for out-of-town stores reduces the total grocery distribution cost in almost every Swedish city. The reason for this can be found in large economies of scale at the firm level, and relatively moderate costs for car travelling in a typical Swedish high capacity urban street network without congestion. The grocery retail trade in Sweden is not subject to a complete “increasing-returns illusion”, if only the costs are accounted for in the assessment.

The demand for retailing services

The next research question to tackle is the problem of matching supply and demand in the market for retailing services. The underlying hypothesis for the entire work, inspired by theories about local public goods and club goods, is the possibility that the retailing market is suffering from some severe market failures. Why is it so? Let us start with the output of a grocery store. According to the relatively small economic literature dealing with retailing, the relevant output is a “bundle of convenience dimensions” or services. One of these convenience dimensions is of course accessibility or proximity. A local store in a residential area is easier to use for a consumer living in that particular neighbourhood than a distant out-of-town store say 10 km away. We should therefore expect that prices are higher in the local store ceteris paribus, reflecting the fact that the service production is higher also.

But what are the prerequisites necessary to guarantee that consumers who are willing to pay for this increased production of accessibility also have the opportunity to engage in actual transactions on the market? The first prerequisite is that the demand for the actual service is spatially concentrated in an existing residential area. The local market must be large enough to support a local
store producing accessibility. Individuals and households living in the same neighbourhood, but with different preference structures about retailing services, imply a smaller market for the local store. And if the market falls below some threshold turnover, we can expect that there will be no local store at all.

The second prerequisite is the non-existence of the familiar problem of commons or social dilemmas. A single individual or a household can not alter the production of retailing services, e.g. where to localize stores. A "rational egoist" household has no reason to let the risk of a vanishing accessibility component, caused by a deteriorating production of retail services in the residential area, influence the purchasing behaviour. The reason for this is that one isolated household can not by itself influence the volume and quality of the local retail service. If this accessibility component were internalised with a positive value, a rational household would buy more in the local store, or participate in some other institutional arrangement with the aim of keeping or improving local retail services.

The demand for accessibility in grocery retailing – an empirical study

In order to find if there is any empirical equivalence to the theoretical discussion above, a stated-preference study was carried out. This was done by means of postal questionnaires with hypothetical questions about households' choice of stores, together with questions about socio-economic conditions and actual purchasing behaviour. The questionnaire was sent out to 3900 individuals, living in five different Swedish cities, including a pilot study discussed in an earlier paper.

The hypothetical questions were constructed as choices of shares of the total amount of groceries purchased by the household in two different stores: a local neighbourhood store and a distant out-of-town store. The price differences between the stores were based on the cost functions discussed above. The respondent could choose to buy 0%, 25%, 50%, 75% or 100% of the groceries in the local shop, and the remainder in the larger store.

After a first round of questions options were altered. The consequences of different purchasing shares were described in a table, with the assumption that everybody in the area would choose the same alternative as the respondent. It is plausible to assume that the distant large store is unaffected by the behaviour of the residents in the particular area, but that the outcome concerning the local store is directly proportional to the chosen share. A larger share means lower prices and higher quality in other respects, particularly as regards the range of products, in
the local shop. The share “0%” implies that the local store is forced to close. The share “100%” implies that the local store is unaffected by the arrival of the new out-of-town establishment.

When the respondent had been informed of the consequences, the same question was asked again: “How much groceries do you want to buy in the local store?” This means that the respondent now chooses a scenario for the level of retail service in the area, knowing that everyone else will behave in the same way. The accessibility component discussed above is now internalised, hypothetically, in the household decision making. The result is a clear tendency to increasing purchasing shares in the local store in the second round. The difference is statistically significant at the 99% level. This result suggests that social dilemmas do influence purchasing behaviour in grocery retailing.

Let us now turn to the problem of heterogeneous preference structures. The choice of purchasing shares in the second round can, as mentioned above, be seen as a choice of scenario, sustaining different store structures in grocery retailing. To proceed with the analysis we divided all the respondents in three different groups; Group 1 comprises respondents who have chosen the purchasing shares 0% or 25% in the local store, Group 2 the “50/50”-individuals, and finally we have Group 3, where the preferences for local stores are strong, with consumers purchasing 75% or 100% of their groceries, hypothetically, in the local store. The size of the different groups is illustrated in the following figure. The percentages are calculated as unweighted averages from the different samples in every investigated city district.

Figure 1: The percentages of the individuals in the different groups
The relevant preference structure can be described as polarized. This is true for the total dataset, but it is also true in every city district. The results clearly imply that the relevant preference structure is heterogeneous and dispersed spatially.

The next step in the analysis was to find if there are any differences between typical individuals in the different groups, in addition to the preferences described in the table. The research material contains two kinds of possible explanatory variables: socioeconomic conditions and actual purchasing behaviour. With the help of regression models and cross tables two type-respondents were constructed. One respondent who prefers out-of-town stores, and one who prefers a local store in the residential area and is willing to pay for increased accessibility. The following table summarises the results:

Table 1: Type respondents and explanatory variables

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Out-of-town store</th>
<th>Local store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
<td>Younger</td>
<td>Older</td>
</tr>
<tr>
<td>Driving licence</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Access to a car</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Size of household</td>
<td>Many members</td>
<td>Single or few</td>
</tr>
<tr>
<td>Income</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Purchasing behaviour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Errand</td>
<td>Single</td>
<td>From work/studies</td>
</tr>
<tr>
<td></td>
<td>Other purchases</td>
<td>Other errands</td>
</tr>
<tr>
<td>Who shops?</td>
<td>Other adults</td>
<td>The respondent</td>
</tr>
<tr>
<td></td>
<td>All the adults</td>
<td>One adult with children</td>
</tr>
<tr>
<td></td>
<td>Entire family</td>
<td></td>
</tr>
<tr>
<td>Mode of transport</td>
<td>Car</td>
<td>Walking</td>
</tr>
<tr>
<td></td>
<td>(Bus)</td>
<td>Cycling</td>
</tr>
</tbody>
</table>

The type respondents, as well as the groups, differ substantially, and statistically significantly, in the two dimensions that are described in the table, i.e. socioeconomic conditions and actual purchasing behaviour. We can therefore conclude that the demand for retailing services differs between individuals and households, and that the difference can partly be explained by various socioeconomic factors and actual purchasing behaviour, even if the latter must be regarded as a “quasi-explanatory variable”.

This means that the existence of the two prerequisites, mentioned above, for the functioning of an efficient market for retailing services is hard to imagine. The market can not satisfy the entire willingness to pay for accessibility and proximity in grocery retailing due to social dilemmas and spatially scattered preference structures.

Conclusions

It is plausible to assume that the ongoing trend towards more out-of-town stores and increasing car-dependence among consumers in grocery retailing will continue. The large economies of scale at firm level are of course a powerful force behind the structural changes. Moreover, the result from the model based cost analysis indicates that the total social distribution cost will decrease if the large stores increase their market share in typical Swedish cities. The cost savings in the firms will overcompensate for the costs associated with more participation from the households, as long as the street network is not severely congested.

However, the result from the study also shows that there are efficiency problems in grocery retailing when the service production supplied by different types of stores is focused. As we see it, this aspect cannot be integrated in the cost analysis and must therefore be tackled separately. The hypothesis that social dilemmas influence households' choice of store is supported by the results. The results also show that individuals living in the same residential area have different preferences about the demanded level of retailing service in the local surroundings. By using regression models, and other methods, it is possible to link the differences in preferences to socio-economic background variables and actual purchasing behaviour. Some prefer local stores and are willing to pay for this service, and some prefer to drive their car to more distant stores and take advantage of lower prices.

It is also clear that the actual situation in grocery retailing in the investigated districts accommodates the preferences of those who prefer to make most of their grocery shopping in out-of-town establishments. The large stores attract customers from the entire city, which implies a diminishing market for the smaller local stores in residential areas. It seems that town planning, and other institutional measures, should be activated to prevent a far-reaching dominance of out-of-town stores in grocery retailing and to support more variation in local retail service levels. The parallel to other research about local services, car accessibility, and varying demands for different residential areas is obvious. The challenge is to create this variation in a socially legitimate way. This can perhaps be done with the support of further research.
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References

[1] Svensson, T. Structural Change of Food Distribution- Driving forces and Consequences for Urban Design and Environment, Diss. Institute of Tema Research, Linköping University. 1998.(in Swedish with summary in English)


