

Local concentration and individual indicators of the store-level retail offer

Introduction

1. This appendix reviews an analysis submitted by Tesco¹ of the link between local concentration and nine separate measures of individual aspects of the retail offer, namely:
 - (a) *product range* as measured by the number of SKUs in a store relative to an expected number of SKUs for a store of that size;²
 - (b) *staffing levels* as measured by sales per member of staff;
 - (c) *customer facilities* as measured by a composite of nine in-store customer facilities, such as a crèche and an opticians, but excluding food counters;
 - (d) *prices* as measured by a store-level price index that is inclusive of local promotional discounts;
 - (e) *queues* as measured by the proportion of customers queuing that receive One In Front queue service;³
 - (f) *product availability* as measured by the loss in sales represented by the missing items;
 - (g) *customer satisfaction* as measured by the number of customer complaints;
 - (h) *store quality* as measured by the number of years since the store was last refurbished; and

¹Non-confidential version of original submission available on the CC's website at: www.competition-commission.org.uk/inquiries/ref2006/grocery/main_party_submissions.htm.

This appendix also takes into account further submissions by Tesco in March and September 2007 responding to various CC comments on its initial submission.

²Tesco also submitted variations of the product range measure, namely the absolute number of lines sold and the absolute number of value, finest, and non-grocery lines sold.

³One in Front is the name Tesco gives to its target of ensuring that when a customer joins a queue there is, at most, one customer queuing in front. A store's success in meeting this target is measured using infrared cameras to detect the number of customers in a queue.

(i) *store-level retail offer* as measured by a composite mystery shopper score for each store based on 11 mystery shopper variables, such as satisfaction and how friendly the staff are.⁴

2. We also analyse the link between local concentration and the store-level retail offer in Appendix 4.6. However, in that analysis, rather than looking at separate measures of different aspects of the retail offer, we use the store-level profit margin as a proxy for the entire store-level retail offer.

Tesco's analysis and results

3. Tesco conducted an econometric analysis to assess the extent to which measures of the store-level retail (as identified in paragraph 1) systematically vary with the level of local concentration. In its initial analysis Tesco focused on stores larger than 1,400 sq metres that are within a 10-minute drive-time in urban areas (and a 15-minute drive-time in rural areas).

4. In its econometric analysis, Tesco sought to control for a number of variables that might affect both the retail offer and local concentration.⁵ These control variables included:

- (a) the net sales area of the store;
- (b) the number of facilities offered by the store;
- (c) the staff intensity of the store (ie the number of staff employed in the store divided by the net sales area of the store);
- (d) the population within the isochrone; and
- (e) the proportion of the population within the isochrone that is drawn from social class AB.

⁴Tesco also broke down the mystery shopper measure into [redacted].

⁵Failure to do so would result in a mis-specified analysis of the relationship between the retail offer and local concentration, meaning that we could place no weight on the results.

5. Tesco also sought to address a possible endogeneity problem with the store level retail offer and the local concentration variables. It did so by using the population within the isochrone as an instrumental variable for local concentration.⁶ Tesco also sought to address concerns regarding the possible limitations involved in analysing individual measures of the store-level retail offer. It therefore conducted additional analysis based on three aggregate variables from the individual PQRS measures described in paragraph 1—a composite index of eight of the indexed PQRS measures; an aggregate index of the nine mystery shopper subcomponents; and an average of these two aggregates. Tesco also conducted a principal components analysis based on the measures described in paragraph 1. Tesco told us that this was an alternative way to form an aggregate PQRS measure.⁷

6. Tesco told us that its analysis allowed it to reject the hypothesis that there was a relationship between the store-level retail offer and local concentration. The key components of Tesco's econometric analysis are presented in Tables 1 and 2. In many cases Tesco reported that the sign of the relationship was the opposite to that which would suggest a deterioration in PQRS in areas of high concentration, and in some cases this opposite relationship was statistically significant.

⁶The instrumental variable technique is a method of solving endogeneity issues. In this case it involves finding a third variable that can be used as an instrument. This variable must be correlated with local concentration but uncorrelated with the store level retail offer.

⁷See paragraphs 21 to 23.

TABLE 1 The effect of including control variables in the analysis (using population as an instrument for the number of competing fascia)

<i>Store level retail offer measure (expected effect)</i>	<i>Coefficient (no controls)</i>	<i>t-statistic (no controls)</i>	<i>Coefficient (plus controls)</i>	<i>t-statistic (plus controls)</i>
Range (+)	()))
Sales per member of staff (-)				
Customer facilities (+)				
Effective price index (-)				
One in front (+)				
Availability (+)				
Customer complaints (-)				
Years since last store refit (-)				
Mystery shopper overall score (+)				

Source: Tesco analysis.

TABLE 2 The effect of including control variables in the analysis (without instruments)

<i>Store level retail offer measure (expected effect)</i>	<i>Coefficient (no controls)</i>	<i>t-statistic (no controls)</i>	<i>Coefficient (plus controls)</i>	<i>t-statistic (plus controls)</i>
Range (+)	()))
Sales per member of staff (-)				
Customer facilities (+)				
Effective price index (-)				
One in front (+)				
Availability (+)				
Customer complaints (-)				
Years since last store refit (-)				
Mystery shopper overall score (+)				

Source: Tesco analysis.

Overall evaluation of the Tesco analysis

- We consider that there are three key concerns with the Tesco analysis. First, the retail offer at the store level is complex and multi-dimensional. We consider it unlikely that the nine measures that Tesco has selected are capable of fully reflecting all the different aspects of the store-level retail offer.⁸ For example, the analysis does not include an adequate measure of a number of factors that are potentially quite important. These include store opening hours, opening hours of food counters, assisted bag-packing service, product availability, free bus service, car-park charges, quality of staff (years experience, total bonuses paid per year), staff expertise (on

⁸Whilst the mystery shopper measure includes some important aspects of the store-level retail offer, it is largely subjective in nature and partially derived from customer satisfaction scores. Levels of satisfaction are conditioned on the different benchmarks or expectations of customers and are not a reliable instrument for judging the offer of different stores (unless the same consumers are asked to judge each store).

food counters), customer service desk satisfaction, recycling facilities, percentage of locally sourced products, average days to expiry date on non-ambient products, customer satisfaction, CCTV in car park, security guards, number of freezer and chilled units, store environment, store congestion, number of express checkouts, and maintenance and replacement of trolley park. It is for this reason that the store-level profit margin is used as a proxy for the entire store-level retail offer in the analysis in Appendix 4.6.

8. Second, Tesco's analysis only considers the relationship between local concentration and the retail offer at Tesco stores; not all stores. This is understandable given that Tesco does not have access to the relevant data for other retailers. In principle, we could have sought to extend Tesco's analysis using our own data from other grocery retailers. However, given our concerns regarding the usefulness of focusing on a limited number of separate indicators (particularly given the alternative of using store-level profit margins) and the methodological concerns that we raise below, we did not consider that it was useful to extend this analysis further to include other grocery retailers.
9. Finally, we have a number of methodological concerns regarding the analysis that has been submitted by Tesco. Tesco considered that its results were robust. However, in the following paragraphs we set out the various concerns that, in combination with the other issues we have identified, mean we can place only limited weight on the results of the Tesco analysis.

Methodological issues

10. The methodological concerns that we have with the Tesco analysis relate to:
 - the choice of variables used to measure those aspects of the retail offer it is trying to capture in its analysis;

- the possible endogeneity of the analysis; and
- the conclusions that can be drawn from analysing individual variables.

11. These concerns are discussed in paragraphs 12 to 23.

Measures of the retail offer

12. As set out in paragraph 7, we do not consider that the measures of the retail offer used in Tesco's analysis fully capture the store-level retail offer. As we note, the complex and multi-dimensional nature of the store-level retail offer means that a list of individual measures of the retail offer are unlikely to measure it adequately. We consider this to be a serious shortcoming to identify a relationship between the level of the retail offer and local concentration. However, even putting this limitation to one side, we consider that there are further issues in relation to the individual measures selected by Tesco for inclusion in its analysis.
13. For example, product availability is measured with an estimate of the percentage loss in sales represented by the missing items, rather than a simple count of the number of unavailable SKUs. However, this approach focuses on the impact of product availability on the store rather than capturing the inconvenience caused to the customer, which research by Tesco shows to be one of the key factors in customers' choice of store.
14. Furthermore, the number of customer complaints received by a store might reflect both the quality of the store-level retail offer and the number of competing stores in the area (ie the degree of local concentration). Competing stores provide customers with a benchmark against which the store can be judged. In addition, the 'years since store refit' variable is problematic since it does not account for relatively new stores

that do not require refits. As such, it appears that in Tesco's analysis, these stores are expected to provide a poor level of quality when in fact they may offer the best.

Endogeneity

15. There are two sets of concerns regarding possible endogeneity problems in the Tesco regressions (ie variables that are correlated with other measures of the retail offer and thus may result in a erroneous finding of an insignificant relationship between store level retail offer and local concentration). The first relates to the control variables listed in paragraph 4 and the store level retail offer variable being endogenously determined (see paragraphs 16 to 20). The second relates to the local concentration variable and the store level retail offer variable being endogenously determined. If either of these endogeneity problems proves to be true, then ordinary least squares regressions can be expected to be biased and inconsistent and the results will be misleading.

Control variables and the store level retail offer

16. Tesco's initial reporting of the different levels of each of the nine measures of the store-level retail offer showed considerable variation across stores. However, this variation was not explained by the econometric regressions submitted by Tesco. These regressions included no control variables, hence the lack of an identified relationship between store level retail offer and local concentration might be attributed to the existence of relationships between these and other missing variables.
17. In an attempt to control for factors which affect both the store level retail offer and local concentration, Tesco introduced a number of additional variables to its regressions. However, it is not clear whether these control variables, as listed in

paragraph 4, have successfully controlled for other factors that co-determine the store level retail offer and local concentration.

18. We also consider that some of the control variables used in the analysis are endogenous. For example, the number of facilities present in a store is used as a control variable when measuring the store level retail offer, although they are likely to be correlated with other store level retail offer measures, in particular the 'customer facilities' variable. This endogeneity problem means that the coefficient estimates of the relationship between store level retail offer and local concentration that emerge from the econometric analysis will be both inconsistent and biased, meaning that little weight can be attached to the results.

Local concentration and the store level retail offer

19. The second endogeneity issue is that there is likely to be an inherent endogeneity bias in ordinary least squares regressions of measures of the store-level retail offer on local concentration variables. It seems likely that entry decisions are, at least in part, based on the profitability of each local market, which is partially determined by the level of the retail offer in the local stores. That is, whilst high local concentration might contribute to a poor store level retail offer, we would expect that the poor offer would attract entrants into such areas, thus decreasing the level of concentration. If local concentration and the local retail offer are jointly determined, then the ordinary least squares regressions will generate biased results.
20. Tesco told us that this endogeneity problem is of minor importance. However, it revised its analysis using instrumental variable estimates to alleviate the possible bias in the coefficient estimates. Tesco said that its results did not change whether or not endogeneity was controlled for.

Composite variables

21. Finally, while Tesco submitted that its analysis showed that there was not a significant relationship between individual measures of the store-level retail offer and local concentration, there might be a significant relationship between local concentration and a composite measure of the retail offer. That is, even if the relationship with measures of individual components of the retail offer is insignificant, it does not necessarily follow that the retail offer as a whole has an insignificant relationship with local concentration. This is because the variation in the store offer caused by local concentration might manifest itself in different aspects of the store retail offer in different areas.

22. We note that Tesco submitted an analysis of: (a) a number of aggregated individual measures of the store retail offer; and (b) a principal component analysis based on the individual measures of the store retail offer. The principal components analysis uses a statistical process to generate underlying common factors across a set of variables. Tesco told us that this was an alternative way to form an aggregate PQRS measure. It also told us that it analysed the relationship between the most important underlying PQRS factor and concentration and that the results showed instead the opposite relationship, and this was statistically significant in each regression. However, both these analyses are based on the nine measures of the store retail offer described in paragraph 1. As such, since we consider that some important measures of a store's retail offer are missing and that others are inadequately measured, this analysis does not address the concerns that we have.

23. We note that for a composite measure to be significant, the majority of the store-level components would have to have the expected effect upon local concentration. For example, where each individual component of the retail offer has an unexpected relationship with local concentration, we would not expect to see a significant positive relationship between local concentration and the composite store retail offer.