

Working paper on market definition (May 2007)

Introduction

1. This further working paper on market definition sets out the current thinking of the Competition Commission (CC) Group established to conduct both the market investigation into the supply of groceries in the UK and the inquiry into the acquisition by Tesco of the former Co-op store in Slough. It follows the publication of an earlier working paper on market definition, as part of the market investigation, in January 2007.¹
2. In our earlier working paper on market definition we set out our preliminary thinking in relation to the definition of the product market and the geographic market. Regarding the product market, our preliminary thinking was that larger grocery stores are an effective substitute for smaller grocery stores, but that smaller grocery stores do not provide a similarly effective substitute for larger grocery stores. Regarding the geographic market, our preliminary thinking was that the market was local.
3. In relation to both the product market and the geographic market, we noted that further analysis was required to assess market boundaries in terms of fascia and store size for the product market, and the extent of local markets for groceries. This paper discusses the analysis that we have undertaken since the publication of our earlier working paper on market definition as well as the submissions and analyses that have been put to us by various parties in relation to market definition. Some of this analysis has already been published. In particular, a working paper on margin-

¹A copy of our earlier working paper on market definition and our Emerging Thinking is available at www.competition-commission.org.uk/inquiries/ref2006/grocery/index.htm.

concentration analysis and a working paper on entry analysis were both published in April 2007, and we draw on this work in this paper.^{2 3}

4. Our findings to date can be summarized as follows:
 - In relation to store size, our analysis of the 1,400 sq metre threshold as a boundary between types of stores that may be able to exercise a competitive constraint on each other does not indicate, at this point, particular significance for this size threshold. However, we continue to consider that larger stores place a greater competitive constraint on smaller stores than vice versa, and we continue to assess the extent to which smaller stores are capable of acting as a competitive constraint on larger stores.
 - In relation to store fascia, we find that Asda, Morrisons, Sainsbury's, Tesco and Waitrose compete in the same product market. We also consider that there is evidence that M&S exerts a sufficient competitive constraint to warrant inclusion in the same product market, but we have seen little evidence to warrant including the Limited Assortment Discounters (LADs) in this market. We are continuing to assess the position of Co-op and Somerfield, in particular, in relation to the product market.
 - In relation to the geographic market, we continue to consider that the market is local and that the most significant competitive constraint occurs between stores that are located less than 15 minutes' drive-time from one another.
5. The remainder of this paper considers, first, the relevant product market(s), and second, the relevant geographic market(s).

²The analysis in these two working papers has been further extended since the publication of the papers, and we include this latest work in Annexes A and B of this paper.

³We have received comments from Tesco regarding the margin and entry analyses. We will consider these comments as we undertake further work in this area and further analysis published by us will set out how we have taken these comments into account.

Product market

6. Our approach to defining the product market to date has been to focus on two observable variables, store size and store fascia, which we consider capture many aspects of the total 'offer' of any given grocery outlet. These aspects include factors such as price, range of products, quality of products, cleanliness, parking facilities and so on. Our working paper on grocery shoppers' characteristics and behaviour (published at the same time as this working paper) provides an overview of consumer research into the various factors influencing shoppers' choice of retail outlet and the relative importance of these factors. Notwithstanding this, we continue to consider that store size and store fascia represent the most appropriate means of capturing the retail 'offer' of a grocery outlet, and as a result, our analysis below reflects this approach.

Store size

Background

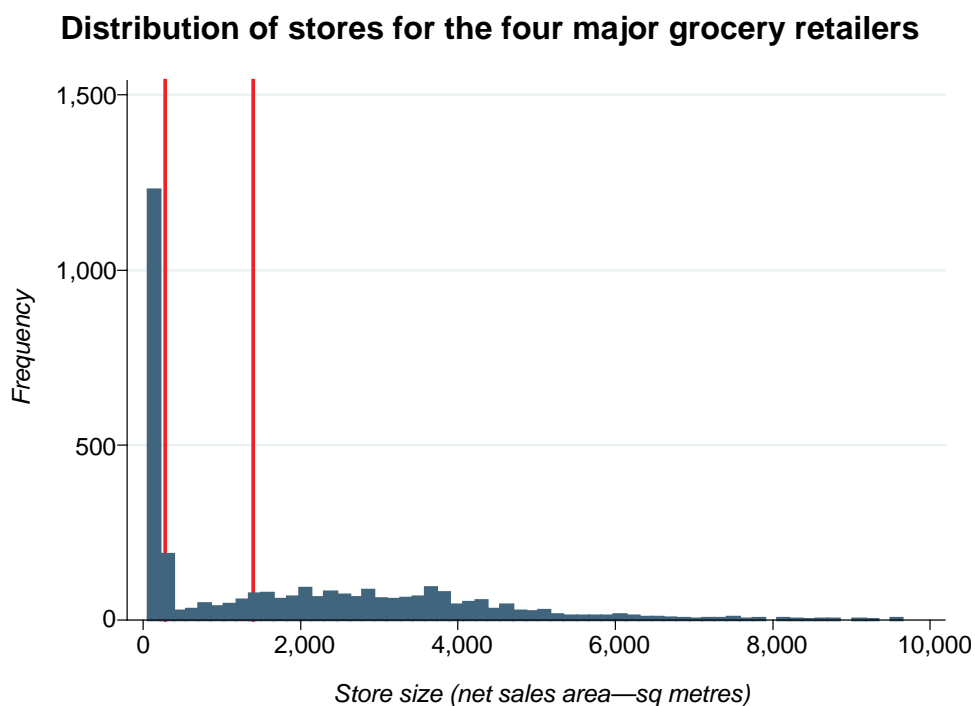
7. Prior to this investigation, the CC has focused on shopping missions as the starting point for defining the product market, distinguishing between one-stop shopping (ie shopping for a large range of products at the same time and at the same store) and secondary or top-up shopping. However, the CC has found a close link between shopping mission and store size in that it considered that only those stores larger than 1,400 sq metres are sufficiently large to conduct a one-stop shop.
8. This has contributed to the following findings in previous inquiries in relation to store size:
 - (a) Stores larger than 1,400 sq metres in net sales area exercise a competitive constraint on each other (and may also be constrained by stores larger than 1,050 sq metres in net sales area, ie 75 per cent of the size of stores at the bottom end of this range).

(b) Stores between 280 sq metres and 1,400 sq metres in net sales area are constrained by each other and by stores over 1,400 sq metres in net sales area.

(c) Stores smaller than 280 sq metres in net sales area do not exert a competitive constraint on larger stores.

9. The distribution of grocery retail outlets by size (net sales area) for the four major UK grocery retailers (Asda, Morrisons, Sainsbury's and Tesco) is shown in Figures 1 and 2. These figures show that there is a concentration of stores around the 280 sq metre threshold, but there is no similarly obvious break or concentration of stores at the 1,400 sq metre threshold.

FIGURE 1



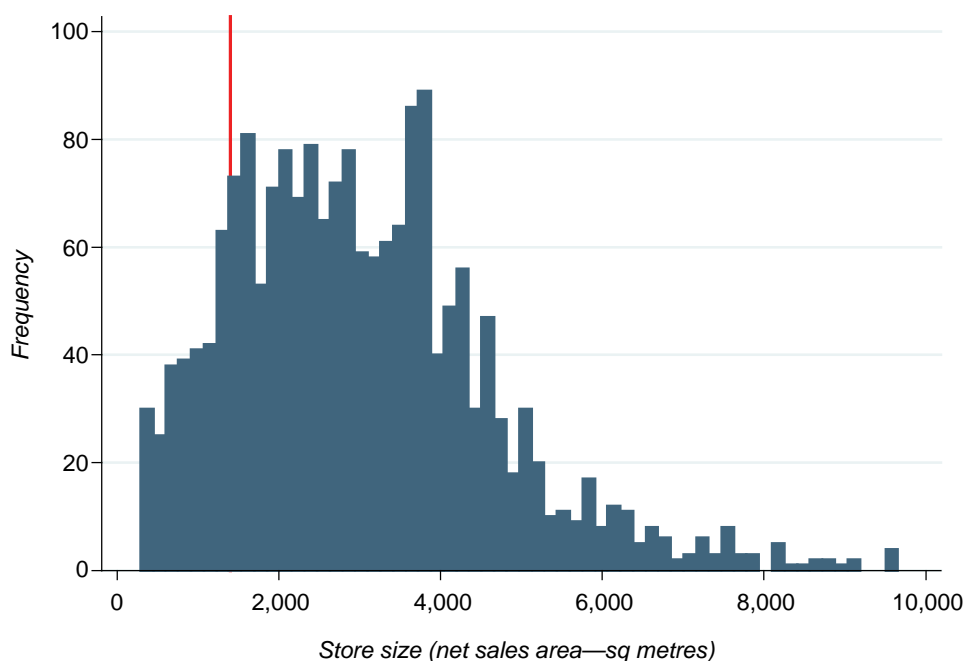
Source: CC analysis of questionnaire responses.

10. The concentration of stores at the 280 sq metre threshold is driven by the Sunday trading laws that allow shops of this size to open for extended hours, and thus offer a different service to stores of a larger size. This is supportive of a view that stores smaller than 280 sq metres may operate in a separate product market to stores larger than 280 sq metres (although we continue to assess whether this is the case).

It is less clear that there is a similar distinction between stores larger and smaller than 1,400 sq metres.

FIGURE 2

Distribution of stores larger than 280 sq metres for the four major grocery retailers



Source: CC analysis of questionnaire responses.

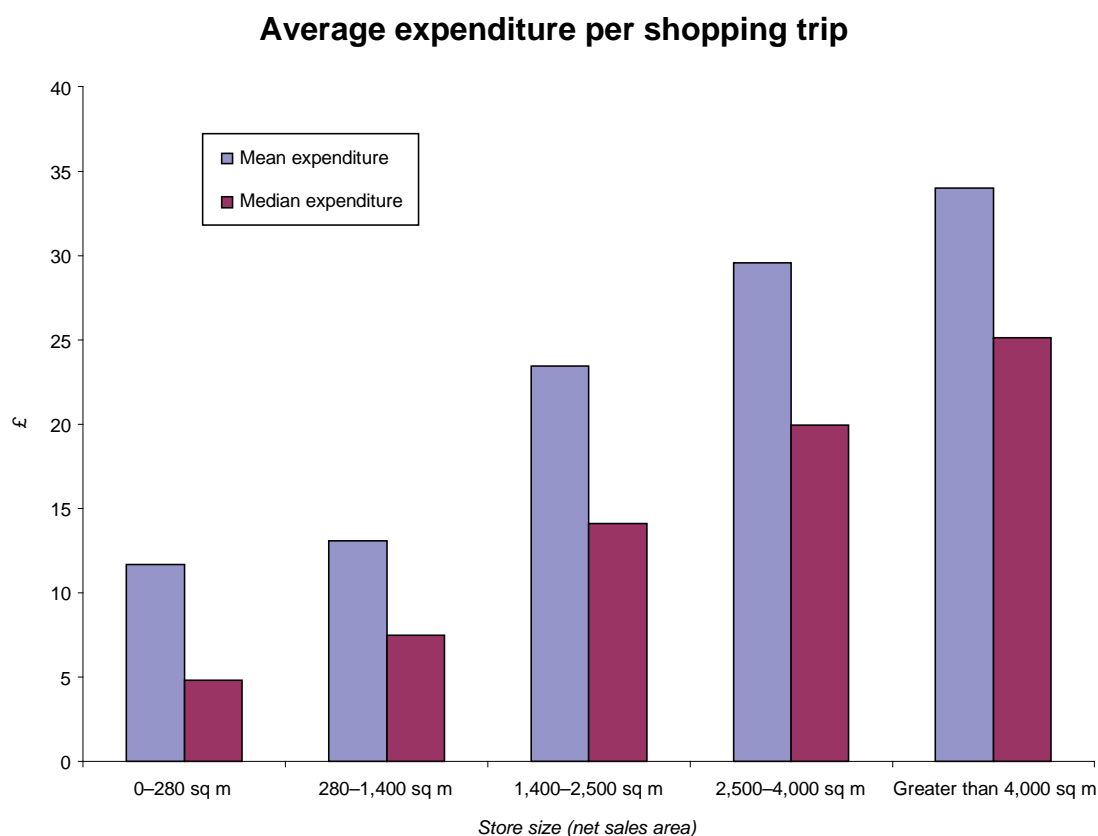
11. In the following paragraphs, we discuss some indicators of the extent to which large and small grocery outlets are, in general, substitutable for each other prior to setting out the results of our empirical analysis of this issue.

Indicators of substitutability between different sized grocery outlets

12. Consumer research data from TNS, a market research organization, shows that average expenditure per shopping trip for grocery shoppers increases with store size. Median expenditure in a store smaller than 280 sq metres is approximately £4.80 per shopping trip, but this increases to nearly £20.00 per shopping trip at a store that is between 2,500 sq metres and 4,000 sq metres (see Figure 3).

13. In the event that all grocery outlets were perfectly substitutable for one another, we might expect to see a similar level of average expenditure at each outlet regardless of size. This is not, however, sufficient to conclude that these different sized grocery outlets are in different product markets, but it is indicative that there may be some barrier to consumer switching between stores that are substantially different in size.

FIGURE 3



Source: CC analysis of TNS data.

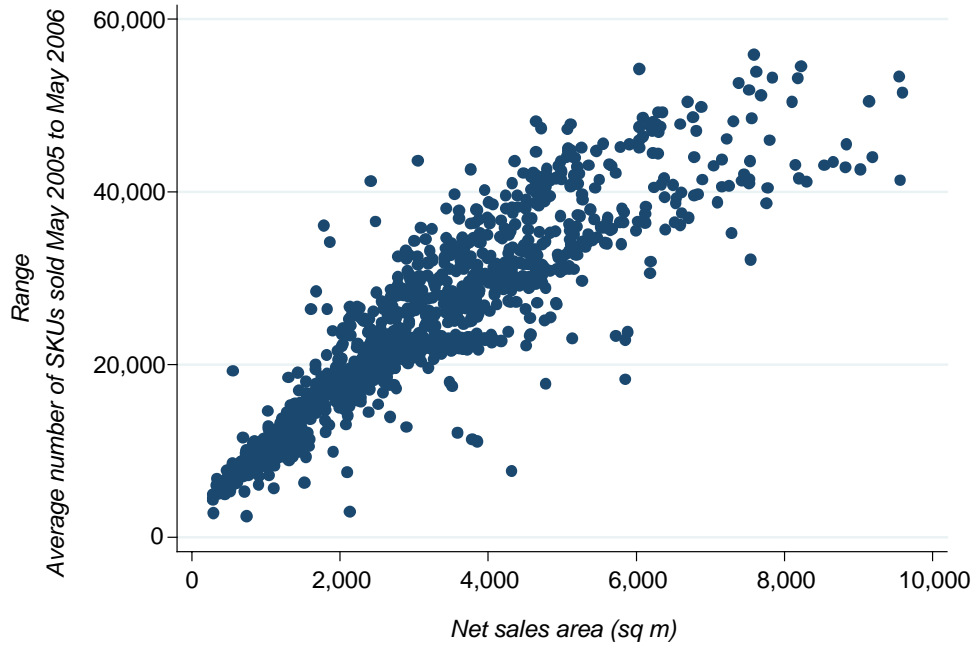
14. Larger stores carry a broader range of products than smaller stores. Figure 4 shows the relationship between store size (net sales area in sq metres) and range (the average number of grocery and non-grocery SKUs sold per month between May 2005 and May 2006) at Tesco, Asda and Morrisons stores in the UK.⁴ To the extent that products are available in larger stores—due to their broader range—but not in

⁴ Sainsbury's were not able to provide this information.

smaller stores, this will constrain the extent to which a consumer would view shopping in a smaller store as a satisfactory substitute for shopping in a larger store.

FIGURE 4

Store size and product range, Tesco, Asda and Morrisons



Source: CC analysis of questionnaire responses.

15. Similarly, larger stores tend to offer a wider range of services and facilities, such as toilets, bakeries, fresh meat counters and pharmacies, compared with smaller stores (see Figure 5). Again, the presence of these facilities in larger stores and not in smaller stores may be expected to limit the extent to which a consumer would view shopping in a smaller store as a satisfactory substitute for shopping in a larger store.

FIGURE 5

Number of services and facilities by store size, Tesco, Asda and Sainsbury's stores



Source: CC analysis of questionnaire responses.

Notes:

1. Services and facilities include: petrol forecourt; parking at store; parking off-street; pharmacy; optician; dry cleaning; photoprocessing; post office; ATMs; restaurant or coffee shop; crèche; and, toilets.

16. Related to the range, services and facilities and the expenditure points above is the evidence that we have on consumer shopping patterns, and in particular, the extent to which shoppers conduct large weekly shopping trips that, in general, necessitate the use of larger stores so that all of their weekly shopping needs can be met in a single trip.
17. Our working paper on grocery shoppers' characteristics and behaviour reviews recent trends in shopping patterns, and in particular, the trend towards more frequent and less planned shopping by many consumers. For these shoppers, there is likely to be greater substitutability between stores of different sizes. Nevertheless, there remains a substantial proportion of the population, in the region of 60 per cent of shoppers, that continue to conduct a single, main weekly shop, and which is likely to necessitate shopping at a larger grocery retail outlet. For these shoppers, the extent to which they would be willing to substitute shopping in a substantially smaller store for these weekly shopping trips is likely to be limited.
18. In this section we have focused on a number of factors that are likely to limit shoppers' willingness to substitute smaller grocery outlets for larger grocery outlets. This is not to say, however, that there are not factors that also work in the other direction. In particular, smaller grocery outlets may offer a greater level of convenience for shoppers who wish to purchase only a relatively small number of items. That said, the findings in previous CC investigations (as set out in paragraph 8), as well as our own view expressed in Emerging Thinking, has been that the shoppers are more willing to substitute shopping in a smaller store for a larger store than vice versa. In other words, the competitive constraint between large and small stores is asymmetric with larger stores placing a greater competitive constraint on smaller stores than vice versa.

Quantitative analysis of the competitive constraints between small and large stores

19. While the evidence reviewed above provides a broad indication that there are limits to shoppers' willingness to substitute between large and small grocery outlets, it is more difficult to reach a view, based on this evidence, regarding the extent of the competitive constraint exercised on a store of one size by a store of another size. As a result, we have carried out, and are continuing to conduct, considerable quantitative analysis to assist in shedding light on this issue.
20. This quantitative analysis provides direct evidence of the extent of competitive constraints exercised on stores of different sizes and fascia (and at different distances). It draws on the SSNIP test (or hypothetical monopolist test)⁵ to frame the analysis; evidence that stores of one size are competitively constrained by stores of another size indicates that a hypothetical monopolist owner of the first group of stores would not be able profitably to impose a SSNIP. This would indicate that the relevant product market is wider than that group of stores.
21. As mentioned in paragraph 3, our working papers on margin-concentration analysis and entry analysis that were published in April 2007 provide a first indication of the results from this quantitative analysis, and updated versions of these two papers are at Annexes A and B of this working paper. In the following paragraphs we set out the major findings from this analysis relevant to our consideration of the product market, and in particular, the attributes of the product market in relation to store size. We commence with a discussion of our margin-concentration analysis and then move on to our entry analysis.

TABLE 1 **Effect of large and mid-sized stores on the profit margin of large stores**

	[X]	[X]	[X]	[X]
Average store margin (%) (stores over 1,400 sq m)	[X]	[X]	[X]	[X]

⁵See CC3, *Market Investigation References: Competition Commission Guidelines*, Part 2, http://www.competition-commission.org.uk/rep_pub/rules_and_guide/index.htm.

Effect of an additional large competitor fascia within 10 mins (%)	-7.38*** (-3.40)	-2.06*** (-3.22)	-5.33*** (-3.07)	-2.28*** (-2.78)
Effect of an additional mid-size competitor fascia within 5 mins (%)	1.38 (1.25)	-0.08 (-0.13)	-0.39 (-0.43)	-1.34 (-1.56)

Source: CC analysis.

Notes:

1. * statistically significant at 90 per cent confidence level, ** statistically significant at 95 per cent confidence level, *** statistically significant at 99 per cent confidence level.
2. t statistics in brackets.
3. Please see column (2) of Tables 1, 4, 7 and 10 for full results.

22. The starting point for our margin-concentration analysis has been an assessment of the extent to which the profit margin of a store larger than 1,400 sq metres in net sales is affected by the presence within a 10-minute drive-time of both an additional store larger than 1,400 sq metres as well as an additional mid-sized store (ie 280 to 1,400 sq metres) within a 5-minute drive-time.
23. The outcomes from this analysis, which are set out in Table 1, varied between the four major grocery retailers. Profit margins at both [X] and [X] were more sensitive to the presence of another store larger than 1,400 sq metres than was the case for [X] and [X]. This may be due, in part, to differences in the measurement of store margins.⁶ However, the negative impact on margins for the incumbent store is statistically significant at the 1 per cent level for each of the grocery retailers. The effect of an additional mid-sized store on the profit margin of a store larger than 1,400 sq metres was substantially smaller for each of the four grocery retailers, and in each case the effect that we detected was not statistically significant. Further details of our analysis are in Annex A.

⁶As noted in Annex A, the treatment of VAT in store margins differs between [X] and [X], and [X] and [X]. [X] has excluded VAT from store revenue and [X] has deducted VAT as a store cost, whilst [X] and [X] margins are inclusive of VAT. Since VAT is not uniform across grocery products, [X] and [X] net store revenues are not as precisely measured as those of [X] and [X].

24. We also looked at the effect of both an additional store larger than 1,400 sq metres within a 15-minute drive-time (as opposed to 10 minutes) as well as an additional mid-range store within a 5-minute drive-time. The results in terms of store size are similar for a 10-minute drive-time except for [§] where we find that an extra mid-range store within a 5-minute drive-time reduces the profit margin at the large store by 1.75 per cent, a result that is statistically significant at the 10 per cent confidence level.
25. As set out in paragraph 9, looking at the size distribution of stores for the four major grocery retailers, it is not immediately obvious that there is a distinction between stores larger and smaller than 1,400 sq metres. As a result, we repeated the analysis set out above using two different thresholds—1,200 sq metres and 1,600 sq metres. The results from this analysis, provided at Annex A, indicate that the choice of threshold does not significantly alter the results.
26. This analysis suggests that the distinction between stores larger than 1,400 sq metres and those less than 1,400 sq metres may no longer be appropriate. This does not, however, mean that we do not consider that different sized stores place different competitive constraints on each other, but that the drawing of a boundary at the 1,400 sq metre level may not accurately reflect the constraints that are present.
27. Our analysis of the impact of the entry of a new store on the revenues of an incumbent store can also be drawn on to inform our definition of the product market. Table 2 shows the results of our analysis of the effect on the revenue of incumbent stores with a net sales area greater than 1400 sq metres from entry by mid-sized (280 to 1,400 sq metres), large (1,400 to 4,000 sq metres) and very large (greater than 4,000 sq metres) stores. It can be seen that the revenue effect of the entry of large and very large stores is greater than the effect of mid-sized stores. This is

consistent with an asymmetric constraint whereby larger stores place a greater competitive constraint on smaller stores than vice versa.

TABLE 2 **Estimated medium-term revenue response of stores greater than 1,400 sq metres in net sales area to entry by another store**

	<i>Revenue effect (%) on incumbent store greater than 1,400 sq m</i>
Entry of mid-range store (280–1,400 sq m):	
—within 5 minutes' drive-time	-2.4**
—within 5 to 10 minutes' drive-time	-0.54
—within 10 to 15 minutes' drive-time	-0.81*
—within 15 to 20 minutes' drive-time	0.71
Entry of large store (1,400–4,000 sq m):	
—within 5 minutes' drive-time	-6.1**
—within 5 to 10 minutes' drive-time	-3.9***
—within 10 to 15 minutes' drive-time	-1.5
—within 15 to 20 minutes' drive-time	-0.62
Entry of very large store (larger than 4,000 sq m):	
—within 5 minutes' drive-time	-8.7***
—within 5 to 10 minutes' drive-time	-6.5***
—within 10 to 15 minutes' drive-time	-2.3**
—within 15 to 20 minutes' drive-time	-0.003
Store quarter observations	22,747

Source: CC analysis.

Note: Medium-term estimates are based on the regression coefficients reported in Annex B column (2) Table 3. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%.

28. We also examined the effect on the revenues of stores with a net sales area less than 1,400 sq metres arising from the entry of various differently sized stores. The results of our entry analysis in Table 3 show that the entry of large stores has a greater effect on revenue of stores with a net sales area less than 1,400 sq metres than the entry of other mid-sized stores. The results also suggest that the entry of smaller stores affects the revenue of other smaller stores, only when the stores are quite closely located (ie within a 5-minute drive-time).

TABLE 3 **Estimated medium-term revenue response of stores with a net sales area less than 1400 sq metres to entry by another store**

	<i>Revenue effect (%) on incumbent store less than 1,400 sq m</i>
Entry of mid-sized store (280–1,400 sq m):	
—within 5 minutes' drive-time	-5.9***
—within 5 to 10 minutes' drive-time	-1.2
—within 10 to 15 minutes' drive-time	-0.79
—within 15 to 20 minutes' drive-time	0.61
Entry of large store (1,400–4,000 sq m):	
—within 5 minutes' drive-time	-9.2***
—within 5 to 10 minutes' drive-time	-3.0*
—within 10 to 15 minutes' drive-time	-0.29
—within 15 to 20 minutes' drive-time	-0.035
Entry of superstore (larger than 4,000 sq m):	
—within 5 minutes' drive-time	-6.5**
—within 5 to 10 minutes' drive-time	-3.2**
—within 10 to 15 minutes' drive-time	-0.28
—within 15 to 20 minutes' drive-time	0.63

Source: CC analysis.

Note: Medium-term estimates are based on the regression coefficients reported in Annex B column (1) Table 3. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%

Preliminary findings in relation to store size

29. Our quantitative analysis to date provides further support for the view that there is an asymmetric constraint between large and small stores. That is, larger stores place a greater competitive constraint on smaller stores than vice versa. Further, our analysis of the 1,400 sq metre threshold as a boundary between types of stores that may be able to exercise a competitive constraint on each other does not indicate, at this point, particular significance for this size threshold. Rather, we think that the strength of competitive constraints between two stores is likely to depend (all else being equal) on the relative size of the two stores.
30. We continue to assess the extent to which smaller stores are capable of acting as a competitive constraint on larger stores. In the Safeway merger inquiry in 2003,⁷ the CC considered that stores of 1,400 sq metres (or at least 75 per cent of the size of the Safeway store under consideration) or larger were effective competitors. We note the CC's finding of a 75 per cent threshold for a smaller store to provide an effective competitive constraint for stores below the 1,400 sq metre threshold. This may be indicative of an appropriate threshold across all store sizes, given our current view that the 1,400 sq metre threshold is no longer relevant, in terms of the minimum size of a smaller store that could be expected to provide a competitive constraint on a larger store. However, we plan to extend our quantitative analysis to further assess the minimum sized store that could be expected to exert a competitive constraint on a larger store.

⁷Safeway, paragraph 5.238.

Store fascia

Background

31. In previous investigations, the CC has identified a set of store fascia that it has considered to be effective competitors within the relevant store size range.
32. In the 2000 market investigation, the CC found that none of Aldi, Lidl, Netto (the LADs), Iceland, Budgens or M&S competed in the one-stop-shop market. For each of these grocery retailers, other than Budgens and M&S, this was a function of them not owning any stores larger than 1,400 sq metres. For Budgens, the CC considered that the one store that it did own of this size did not offer sufficient range or depth of product to service the one-stop-shop market. For M&S, the CC considered that although some of its stores met the size criterion, the fact that it only stocked own-label goods, lacked the full food product range, generally did not offer flat car parking and had a limited range of non-food grocery products meant that its retail offer was not sufficient to compete in the one-stop-shop market.
33. In the 2003 Safeway merger inquiry, the CC gave greater emphasis to the ability of stores smaller than 1,400 sq metres to compete in the one-stop-shop market, and accordingly included Budgens in the list of effective competitors in one-stop shopping. Iceland was also included in the list of effective competitors for the smaller Safeway outlets. However, the LADs and M&S continued to be regarded as outside the list of effective competitors. In the 2005 Somerfield inquiry, where the acquired stores were predominantly smaller than 1,400 sq metres, the LADs, Iceland and M&S were also excluded from the list of primary competitors.
34. Our working paper on market definition, published in January 2007, does not address the store fascia issue in detail but notes the extent to which different grocery retailers

monitor the behaviour of other grocery retailers and points to this as an indicator of competition between those retailers.

Quantitative analysis of competitive constraints between different store fascia

35. In this section, we set out the results from the quantitative analysis that we have conducted to date concerning the competitive constraint between different store fascia. We start with the results of our analysis of the four largest grocery retailers as well as Waitrose and then set out our analysis in relation to M&S and the LADs. We are continuing to assess the position of other fascia, in particular Co-op and Somerfield, in relation to the product market.

36. In our entry analysis, we have estimated the medium-term revenue impact on incumbent Asda, Morrisons, Sainsbury's, Tesco and Waitrose stores larger than 1,400 sq metres when a new store operated by Asda, Morrisons, Sainsbury's, Waitrose or Tesco—also larger than 1,400 sq metres—opens nearby. As might be expected, in general, we find that revenues at the incumbent store decline when a new store opens nearby. There is, however, some variation in the magnitude of the revenue impact depending on the size and the identity of the incumbent and entrant stores.

37. The following ranks, for each grocery retailer, the different grocery retailers that have the most significant impact on the revenue of a store operated by the incumbent grocery retailer when they open a new store nearby:
 - For Asda, [X] followed by [X] and then [X]. (A new [X] store reduced revenue at an incumbent Asda store, but the result is not quite statistically significant. [X] did not open new stores over 1,400 sq metres within 10 minutes' drive-time of Asda stores from mid-2001 to mid-2006.)

- For Morrisons, [X] followed by [X] and then [X]. ([X] did not open new stores over 1,400 sq metres within 10 minutes' drive-time of Morrisons stores from mid-2001 to mid-2006.)
- For Sainsbury's, [X] followed by [X],[X] and then [X]. (A new [X] store reduces revenue at an incumbent Sainsbury's store, but the result is not quite statistically significant.)
- For Tesco, [X] followed by [X] and [X]. (The estimated effect of a new [X] store is not statistically significant.)
- For Waitrose, our analysis shows that revenues decline when a [X] or [X] store opens nearby, but the results are statistically significant only for [X]. (Neither [X] nor [X] opened new stores over 1,400 sq metres within 10 minutes' drive-time of Waitrose stores from mid-2001 to mid-2006.)

38. We are currently extending this analysis to stores sized between 280 and 1,400 sq metres. This analysis indicates that there is some variation in the extent of the competitive constraint placed on different grocery retailers by each other. However, we do not consider that these results indicate that any of these fascia are operating in a separate product market.

39. We have also undertaken an analysis of the impact of new store openings by M&S on the revenues of nearby grocery retailers.⁸ The results in Table 4 show that revenue of incumbent stores with net sales area of less than 1,400 sq metres decline in response to a new M&S store with a grocery offer. The effect is greatest when the M&S store is within 5 minutes drive-time of the incumbent grocery retailer—in that case incumbent revenue declines in the medium term by nearly 7 per cent on average. The effect declines with distance.

TABLE 4 Estimated medium-term revenue response to entry by M&S

	Revenue effect (%) on incumbent <1,400 sq m	Revenue effect (%) on incumbent >1400 sq m	Revenue effect (%) on incumbent >4,000 sq m
Entry of mid-range store:			
—within 5 minutes' drive-time	-6.9***	-2.2	-1.8
—within 5 to 10 minutes' drive-time	-2.8**	-3.8**	-4.6
—within 10 to 15 minutes' drive-time	-1.9**	-2.5***	-4.0
—within 15 to 20 minutes' drive-time	-2.2***	0.13	-0.64
Entry of large store:			
—within 5 minutes' drive-time	-	-	-
—within 5 to 10 minutes' drive-time	-	-	-
—within 10 to 15 minutes' drive-time	-	-	-
—within 15 to 20 minutes' drive-time	-	-	-
Entry of superstore:			
—within 5 minutes' drive-time	-	-	-
—within 5 to 10 minutes' drive-time	-	-	-
—within 10 to 15 minutes' drive-time	-	-	-
—within 15 to 20 minutes' drive-time	-	-	-
Store quarter observations	31,493	22,747	6,194

Source: CC analysis of questionnaire responses.

Note: Medium-term estimates are based on the regression coefficients reported in Annex B Table 5. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%

40. There is also some evidence that revenue at larger stores declines in response to entry of a mid-sized M&S store within 5 to 10 minutes. The effect on larger stores might be explained by the large non-grocery offering of some M&S stores and also of these stores, which might suggest that in this case, this analysis is identifying the impact on non-grocery revenue..

41. The results of this analysis suggest that there is some evidence that M&S exerts a competitive constraint on grocery retailers. As noted above, in the Somerfield inquiry M&S was excluded from the competitor set, in part because the competitor impact assessment estimated that the effect on Somerfield and Kwik Save sales of M&S openings was much less than Tesco's. We have not, at this point, assessed the impact of openings of mid-sized stores separately by all fascia, but the results of our entry analysis show that the sales impact on mid-sized stores from the opening of an M&S is slightly bigger than the effect due to a mid-sized store, on average.

⁸The estimates are based on [] entry events within 5 minutes' drive-time of an incumbent store with a net sales area less than 1,400 sq metres ([] entry events for incumbent stores greater than 1,400 sq metres). The number of entry events increases to [] within 20 minutes' drive-time.

42. We have also undertaken some analysis aimed at informing whether the LADs should be included in the same product market as the other grocery retailers. To this end, we have analysed the effect on the profit margin of a store operated by Asda, Morrisons, Sainsbury's and Tesco arising from the presence of an extra LADs store within 5 minutes' drive-time.⁹ The results show that an extra LADs store has a negative effect on [X], [X] and [X] store margins. However, the effect is not statistically significant for [X] and [X] and is only statistically significant for [X] at the 10 per cent level.¹⁰ The effect on [X] store margins is small and positive, but not statistically significant.
43. We also looked at the revenue responses of stores operated by the four major grocery retailers to entry by Aldi and Lidl. We find that entry of an Aldi or a Lidl store (of equal size) has a negative effect on the revenue of nearby [X], [X] and [X] stores larger than 1,400 sq metres, but the effect is statistically significantly different from zero only for [X] stores.
44. For stores larger than 1,400 sq metres our analysis (summarized in Table 5) indicates that the opening of a LAD store (not of equal size) within 5 minutes' drive-time has a negative effect on revenue, but the effect is statistically significant only at the 10 per cent confidence level. For stores smaller than 1,400 sq metres, our analysis also indicates that, in the medium term, on average there is no statistically significant effect on the revenue of smaller stores from the entry of an LAD.
45. Taken together, the margin and entry analysis that we have conducted to date does not indicate that the LADs exert a significant competitive constraint on stores larger

⁹ Please see column (3) of Tables 1, 2, 4, 5, 7, 8, 10 and 11 in Annex A for full results.

¹⁰ When we use a 15 minute drive-time, the effect of an extra LADs store within 5-minute drive-time is also statistically significant for [X], but only at the 10 per cent level.

than 1,400 sq metres operated by Asda, Morrisons, Sainsbury's or Tesco, nor on stores smaller than 1,400 sq metres.

TABLE 5 Estimated medium term revenue response to entry of LADs

<i>Entry of LAD store</i>	<i>Revenue effect (%) on incumbent <1,400 sq m</i>	<i>Revenue effect (%) on incumbent >1,400 sq m</i>
Within 5 minutes' drive-time	-0.97	-2.5*
Within 5 to 10 minutes' drive-time	0.16	0.36
Within 10 to 15 minutes' drive-time	0.25	-0.1
Within 15 to 20 minutes' drive-time	0.12	1.6**
<i>Store quarter observations</i>	31,496	22,747

Source: CC analysis of MPQ responses.

Note: Medium-term estimates are based on the regression coefficients reported in Annex B Table 6. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%

Preliminary findings in relation to store fascia

46. Our preliminary findings suggest that large stores operated by Tesco, Asda, Sainsbury's, Morrisons and Waitrose impose a significant competitive constraint on one another and should therefore be considered as belonging to the same product market.
47. With regard to M&S, the preliminary results of our empirical analysis suggest that M&S exerts a sufficient competitive constraint to warrant inclusion in the relevant product market.
48. With regard to the LADs, the preliminary results of our margin and entry analyses suggest that there is little evidence at this stage that they exert sufficient competitive constraint on mid-sized and large stores operated by mainstream grocery retailers to warrant their inclusion in the relevant product market.

Geographic market

49. Our earlier working paper on market definition published in January 2007 concluded that the evidence that had been provided to that time in our investigation was

consistent with previous CC findings that the geographic market is local. We noted that in the period up to publication of provisional findings we would be conducting empirical analyses to assess the most appropriate market boundaries. This section sets out our empirical analysis to date in this area.

50. Since the publication of *Emerging Thinking* we have also received substantial submissions from Tesco in support of the view that the geographic market is substantially larger in scope than has previously been the view of the CC. This section also discusses this analysis.

Consumer shopping patterns

51. In our working paper on grocery shoppers' characteristics and behaviour, we note that driving is the most common mode of transport for grocery shopping with 36 per cent of shoppers driving to an out-of-town supermarket, 25 per cent driving to a high street shop and 6 per cent getting a lift in a car with another shopper. This compares to 16 per cent of shoppers that walk to the shops, and 10 per cent that use public transport, while use of online shopping is a comparatively small 1 per cent of shoppers. We note that the number of shoppers that walk to the shops is a significant minority. There is some expectation that this proportion might increase in the future given both environmental concerns and changes in shopping habits,¹¹ but for the purposes of this paper, we consider that the use of a drive-time metric remains a useful means of expressing the size of the relevant geographic market.
52. An analysis of consumer shopping patterns (see Table 6) shows that the vast majority of customers shop locally with less than 10 per cent, on average, shopping at a store that is more than 15 minutes' drive-time from their house. That said, there is some variation by store size (see our working paper on grocery shoppers'

characteristics and behaviour) and by region. For example, shoppers in London are more likely to shop very close to home.

TABLE 6 Cumulative distribution of shopper drive-times*

All stores	Cumulative % of shoppers						
	Drive-time (mins)						
	0–5	5–10	10–15	15–20	20–25	25–30	Over 30
All regions	38	70	85	92	95	97	100
East Midlands	32	65	82	90	94	96	100
East of England	37	66	83	91	95	97	100
London	46	77	88	94	97	98	100
North East	37	70	85	93	96	97	100
North West	39	76	89	94	97	98	100
Scotland	40	70	83	90	94	96	100
South East	38	71	86	93	96	98	100
South West	39	67	82	91	95	97	100
Wales	33	64	79	88	93	96	100
West Midlands	37	70	87	94	97	98	100
Yorkshire and The Humber	36	68	83	92	96	98	100

Source: CC analysis of TNS SuperPanel data.

*Although some consumers do not use a car to go shopping—16 per cent report that they walk and a further 10 per cent use public transport—we think that drive-time is a useful measure of distance and time spent travelling.

53. Stores that are further apart, however, may still impose a competitive constraint on each other. In particular, Tesco has told us that the relevant market is wider than that found in previous CC inquiries because although customers shop locally, grocery retailers' catchments overlap so that 'chains of substitution' operate between different local areas. We considered these arguments in our earlier working paper on market definition and set out several reasons why we consider that chains of substitution are unlikely to widen geographic market boundaries beyond local areas.

Tesco submissions

54. Since the publication of our Emerging Thinking in January 2007, Tesco has submitted a quantitative study, *Applying the SSNIP test to Geographic Market Definition*,¹² that presents an application of the SSNIP test to assess whether the relevant market(s) for grocery retailing in the UK are local¹³. Tesco shows that almost

¹¹See paragraphs 6, 14 to 20 and 23 of our working paper on grocery shoppers' characteristics and behaviour.

¹²See www.competition-commission.org.uk/inquiries/ref2006/grocery/main_party_submissions.htm.

¹³ Tesco also submitted analysis that showed that [§] separate observable measures of the retail offer do not vary with local market competitive conditions. See Tesco response to Emerging Thinking <http://www.competition->

90 per cent of its 568 stores with net sales area in excess of 1,400 sq metres are in markets that are at least 30 minutes wide, and each relevant market contains, on average, 23 stores.

55. Tesco has provided two Expert Reports that assess the methodological approach taken in this analysis. The reports by [redacted] conclude that the SSNIP test modelling carried out by Tesco is methodologically sound and that the results that are reported are robust, although we note that they have not had access to the data that would allow them to test the robustness of this work.
56. Notwithstanding these testimonies, we have a number of concerns regarding some of the simplifying assumptions that Tesco has made in order to make the model tractable.

Assumption (i): Uniform price increase across all stores in the candidate market

57. First, Tesco has assumed a uniform price increase at all stores controlled by a hypothetical monopolist. However, as explained in our working paper on market definition in January 2007, the correct interpretation of the hypothetical monopolist test does not require that prices at all stores must be raised. Application of the SSNIP test with a uniform price increase will bias the results in favour of a wider market.¹⁴
58. In his expert opinion, [redacted] comments that:

In principle, it could be possible for the hypothetical monopolist to increase the price of stores in its 'chain' by differing amounts—for example, by charging higher prices to customers that have further to

commission.org.uk/inquiries/ref2006/grocery/responses_emerging_thinking_main_parties.htm [redacted] We note, however, that these variables each capture just one aspect of the retail offer and do not measure the retail offer per se. It is plausible that in concentrated markets, retailers might exert market power by changing any number or combination of these (and other) aspects of the retail offer, not necessarily all of them. As the aim of changing any aspect of the retail offer would be to increase margins, we consider margins to be the most relevant dependent variable to use in this type of analysis. The results of our margin analysis are discussed below.

¹⁴Tesco told us [redacted]. Source: *Tesco Response to Market Definition working paper January 2007 with Emerging Thinking*, paragraph 2.5(a)(i). However, this is not the case.

travel to a store outside of the candidate market. This would increase the profitability of a SSNIP and so lead to estimated market sizes being too wide, although the magnitude of this effect is unclear. However, determining the appropriate values of the price increase across many stores would be a highly complicated exercise. This assumption is a pragmatic step.

59. In our view, it would not be necessary for a hypothetical monopolist to charge different prices to different customers shopping at the same store—though we do not exclude this possibility via vouchers and targeted offers. Rather, it would only be necessary for the hypothetical monopolist to raise prices (or deteriorate the retail offer) by different amounts at different stores under its control. For example, it may be optimal for the hypothetical monopolist to increase prices less at stores at the edge of the isochrone, where customers have smaller distances to travel to other stores outside the candidate market, than at stores at the centre of the isochrone. In our view, this assumption raises serious concerns regarding the results of this analysis.

Assumption (ii): Consumer heterogeneity

60. Second, Tesco has assumed that the only switching cost faced by consumers in switching between grocery outlets is the cost associated with travel time. Implicit in this is the assumption that all stores over 1,400 sq metres of all fascia are equal substitutes for all consumers and that there is no relationship between consumer preferences and the fascia of the nearest store. However, as we have discussed in relation to product market definition in this paper, different stores have different retail offers and the extent to which consumers are willing and able to substitute between stores will depend on how closely aligned their retail offers are to their preferences. So customers may face switching costs other than the cost of travelling to a further

store. For example, survey data indicates that familiarity with store layout is the single most important driver of store choice.¹⁵ Customers switching away from a store may face the cost of not being familiar with layout at the nearest alternative store.

61. If, as [§] notes, customers choose stores on the basis of factors other than distance (such as price or quality), and if these factors are correlated with the number of stores available to customers who might switch (because stores prefer to locate near to their 'core' customers), the results of the SSNIP test could be biased and the simplifying assumption may underestimate the true costs to consumers of switching away from a store in response to a SSNIP and bias results in favour of a wider market.

Assumption (iii): Estimated cost of travel time

62. Third, the estimated cost of travel time assumes that consumers have the same cost of travel time regardless of their location or preferences, but in reality we would not expect this to be true. In Tesco's model, customer switching costs increase with the cost of travel time, so a low cost of travel time will bias the results towards broader markets. Tesco's estimate of the cost of travel time is taken from an analysis of Total Consumer Cost undertaken by a consultant on its behalf. That model does not allow for any differences across consumers. We have replicated the analysis used to derive the cost of travel time and developed the analysis to incorporate differences in social grade, regional variations and a price index. The results (see Table 7) show that there are differences in the cost of travel time by customer type, according to household size and social grade, and that Tesco's estimated cost of travel time of £6.10 per hour is a lower bound on the true cost of travel time. This will tend to bias the results of Tesco's analysis towards a broader market.

¹⁵See working paper on grocery shoppers' characteristics and behaviour.

TABLE 7 Cost of travel time in GBP per hour, by household size and social grade

Household size	Median		
	A, B	C	D, E
1	10.76	6.99	8.87
2	7.02	7.04	7.94
3	6.10	6.18	6.19
≥ 4	9.39	7.54	7.61

Source: CC analysis of TNS Superpanel data.

63. For these reasons, we are concerned that the results of Tesco's SSNIP test analysis may not fully identify local competitive constraints between stores. In the following paragraphs we describe the results of our quantitative analysis of these constraints.

Quantitative analysis of the competitive constraints between stores in local areas

64. The evidence from consumer shopping patterns indicates that consumers prefer to visit grocery stores near to where they live or work, but in order to assess the geographic nature of competition we have analysed whether stores are competitively constrained by the stores that are near to them.¹⁶

65. As mentioned in paragraph 3, our working papers on margin-concentration analysis and entry analysis that were published in April 2007 provide a first indication of the results from this quantitative analysis. (Updated versions of these two papers are at Annexes A and B of this working paper.) In the following paragraphs we set out the major findings from this analysis relevant to our consideration of the relevant geographic market. We commence with a discussion of our margin-concentration analysis and then move on to our entry analysis.

66. We analysed the effect on large store margins of the number of competitor fascia within 10 minutes' drive-time of each store, controlling for store characteristics and

¹⁶ As set out in our January 2007 Working paper on market definition, we recognise that there are some national aspects to competition, and in particular, that substantial components of price setting occur at a national level.

the characteristics of the local population. The results of this analysis show that the effect of an extra competitor store declines with drive-time from the store; the further away the extra competitor store, the less the effect on the store margin. Table 8 shows that an extra competitor fascia within 10 minutes of an [X] store reduces store margins by nearly 5.5 per cent and an extra competitor fascia within 15 minutes reduces store margins by just under 5 per cent. The results vary across the fascia, but for all four, the effect of an extra competitor fascia is greater the closer the store. This indicates that local market structure is important in determining store performance and that competition is local.

TABLE 8 Variable profit of large stores

	[X]	[X]	[X]	[X]
Average store margin	[X]	[X]	[X]	[X]
Effect of an additional large competitor fascia within 10 mins (%)	-5.44*** (-3.50)	-2.19*** (-3.17)	-2.74*** (-3.56)	-7.38*** (-3.37)
Effect of an additional large competitor fascia within 15 mins (%)	-4.68*** (-4.59)	-2.18*** (-4.01)	-1.83*** (-3.57)	-6.25*** (-3.67)

Source: CC analysis.

Notes:

1. * statistically significant at 90% confidence level, ** statistically significant at 95% confidence level, * statistically significant at 99% confidence level.
2. t statistics are in brackets.
3. Please note that these results are from different regressions. Please see column(1) of Tables 1,2 4, 5, 7, 8, 10, 11 of Annex A for full results.

67. We have also examined the effect of entry on the performance of incumbent stores in the local area. We have estimated the medium-term impact on the revenue of stores less than 1,400 sq metres from the entry of different sized stores. The results shown in Tables 2 and 3 and repeated in Table 9 show that the entry of a very large store, or a mid-range store, within 5 minutes has led to a decline in incumbent revenue of nearly 6 per cent on average in the medium term. The entry of a large store has led to a greater decline in incumbent revenue—9.2 per cent on average in the medium term. The impact of entry on the incumbent mid-sized store declines with distance

from the entrant and we do not find a statistically significant effect beyond 10 minutes.

TABLE 9 Estimated medium-term revenue response of mid-sized stores (<1,400 sq metres in net sales area) and large (>1,400 sq metres in net sales area) to entry by another store

	<i>Revenue effect (%) on incumbent stores less than 1,400 sq m</i>	<i>Revenue effect (%) on incumbent stores greater than 1400 sq m</i>
Entry of mid-sized store (280–1,400 sq m):		
—within 5 minutes' drive-time	-5.9***	-2.4**
—within 5 to 10 minutes' drive-time	-1.2	-0.54
—within 10 to 15 minutes' drive-time	-0.79	-0.81*
—within 15 to 20 minutes' drive-time	0.61	0.71
Entry of large store (1,400–4,000 sq m):		
—within 5 minutes' drive-time	-9.2***	-6.1**
—within 5 to 10 minutes' drive-time	-3.0*	-3.9***
—within 10 to 15 minutes' drive-time	-0.29	-1.5
—within 15 to 20 minutes' drive-time	-0.035	-0.62
Entry of very large store (larger than 4,000 sq m):		
—within 5 minutes' drive-time	-6.5**	-8.7***
—within 5 to 10 minutes' drive-time	-3.2**	-6.5***
—within 10 to 15 minutes' drive-time	-0.28	-2.3**
—within 15 to 20 minutes' drive-time	0.63	-0.003
<i>Store quarter observations</i>	31,522	22,747

Source: CC analysis.

Note: Medium-term estimates are based on the regression coefficients reported in Annex B Table 3. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%

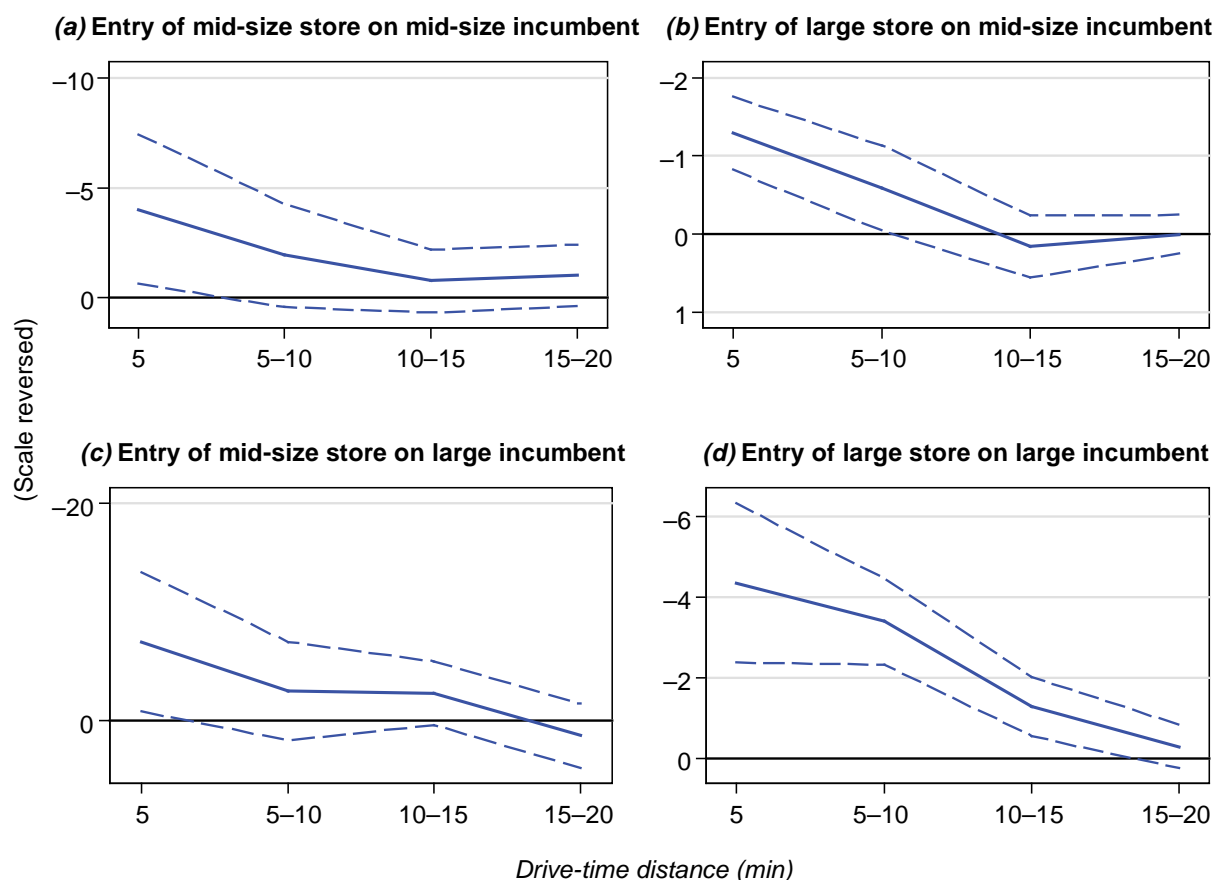
68. Table 9 also shows the results of this analysis for large incumbent stores (greater than 1,400 sq metres in net sales area). It shows that the medium-term effect of entry on these stores declines with distance from the entrant and that there is no statistically significant impact from entry of stores between 1,400 and 4,000 sq metres beyond 10 minutes and no effect of entry of very large stores (greater than 4,000 sq metres) beyond 15 minutes.

69. In order to isolate the effect of distance on revenue responses from the effect of stores of different sizes, we have also analysed the revenue response to entry taking account of the differences in net sales area between entrant and incumbent.¹⁷ Figure 6 shows that the estimated impact of entry by a new store the same size as the incumbent store decreases in absolute value with increasing distance.

¹⁷ Please see Annex B for a detailed description of the results presented in Figure 6.

FIGURE 6

Medium-term percentage revenue response to entry of a new store of equal size



Notes:

1. Dotted line represents 95 per cent confidence interval.
 2. Using data for incumbent and entrant stores with net sales area of 280 sq metres or more.
- Source: CC analysis.

70. Taken together, the estimates suggest that on average and across all observed fascia, new-store entry has had a negative impact on revenue for the incumbent stores. Incumbent revenue declined gradually after new-store entry; the medium-term decline was on average stronger for nearby entry and weaker for more distant entrants, a finding that is consistent with the notion of local competition.

Preliminary findings on geographic market definition

71. The results of our analysis, to date, indicate that competitive constraints in grocery retailing are local and that the most significant competitive constraint occurs between stores that are located, on average, within 15 minutes' drive-time of each other. We

consider that this distance is likely to vary according to store size and according to whether the area in question is urban or rural.

72. We have reviewed the analysis put to us that seeks to directly apply the SSNIP test in a number of different locations. Our current view is that the simplifying and other assumptions made in this modelling are such that the result is biased towards a finding of a larger geographic market. As a result, we do not view this work as of sufficient robustness to outweigh our own quantitative analysis of this issue.
73. We will continue to analyse this issue in the lead-up to the publication of our provisional findings.

Store margin analysis (May 2007)

1. This annex sets out the preliminary results of the margin-concentration analysis. This further note follows the publication of an earlier paper on the preliminary results of our store margin analysis in April 2007.¹⁸ This analysis is one of several empirical analyses that will inform our assessment of product and geographic market definition and the assessment of competition.
2. This empirical analysis uses gross margin data that the main parties have provided for each of their stores. This analysis focuses on the stores owned by the four largest grocery retailers, Tesco, Asda, Sainsbury's and Morrisons. It seeks to determine whether variation in store margin is explained by local competitive conditions. We are looking to identify and measure this relationship and to determine how this relationship varies with store size, fascia and distance. The results presented in the earlier paper focused on the geographic nature of competition between large stores (over 1,400 sq metres). In this annex we have extended the analysis to look at store size.
3. In the previous paper we described the method and data of our store margin analysis. Since the last version of this paper was published in April, we have received more data from the parties that has allowed us to refine the dataset used in this analysis. In particular, [redacted] provided data on its rent and other charges for all its stores.¹⁹ We have also cleaned the store margin data further.

¹⁸See working paper on margin concentration analysis http://www.competition-commission.org.uk/inquiries/ref2006/grocery/further_working_papers.htm.

¹⁹[redacted] provided annual rental data. In order to compute an equivalent value for the period of our data, we summed all the rent and other charges for each store for the two financial years that it gave us, then divided it by the number of days in that two-year period which the store in question was open in order to calculate a daily rate of rent. We then multiplied the daily rate by the number of days in the monthly period (ie 28 days for [redacted]).

4. In the previous paper we presented the results of preliminary analysis using regression techniques. We noted that not all the results were statistically significant, which meant that we could not be confident of all the results. We also noted that whilst we are trying to uncover any negative impact of the number of local competitors on store margin, it is possible that store margins themselves have an impact on the number of local competitors. In this case, store margin affects local entry and thus the number of local competitors. We presented an alternative specification of the model using an instrumental variable estimator that might alleviate this feedback effect problem. In this annex we present the results of our extensions and developments of this analysis using an instrumental variable estimator.

5. This annex is structured as follows. In the first section, we briefly describe the developments to this analysis and the results since the working paper on margin concentration analysis. In the second section, we describe in detail the technical specification of the models presented in this analysis.

Section 1: Results

6. Since the previous version of the paper we have further developed our instrumental variable analysis and present here the results of our analysis using a set of instruments that proxy the size of the market. These variables are related to the number of competitors but do not determine the size of the store margin: population size; number of cars; and retail density. See Section 2 for a full discussion of these instruments.

7. In developing the analysis we have used the number of competitor fascia as a measure of local competitive conditions rather than the number of competitor stores. We have also refined other explanatory variables included in the model: number of

staff ('00); presence of a petrol forecourt; presence of a restaurant or coffee shop; presence of an ATM; store size ('000 sq metres); presence of toilets; proportion of the local population that are unemployed; and proportion of the population that are social grade AB.

8. For each fascia we present the estimation results of eight different models. We have looked at the relationship between store size and performance and fascia and performance using four main specifications of the model where the explanatory variables are defined for the area 10 minutes around the store, and the same four specifications where the variables are defined for the area 15 minutes around the store. In all specifications we consider the effect on variable profit of stores with net sales area over 1,400 sq metres ('large stores'). This is the definition of large stores in all specifications. Mid-size stores are defined as those with net sales area of between 280 and 1,400 sq metres.

Product market definition

Store size

9. The results in column (1) of Tables 1, 2, 4, 5, 7, 8, 10 and 11 of this annex show that the number of large stores has a statistically significant negative effect on variable profit. In the first specification of the model we consider the effect of the number of large competitor fascia within 10 minutes and find that an extra competitor fascia has a statistically significant effect on large store margin. For example, [X] store margin is on average about 5 per cent lower due to an extra competitor fascia within 10 minutes.²⁰ The magnitude of the effect varies across fascia. [X] shows the greatest effect of over 7 per cent, and [X] shows the smallest effect of just over 2 per cent. We note that data from [X] and [X] exclude VAT [X] excludes VAT from revenue and [X] includes VAT in direct costs) whilst data from [X] and [X] includes it. This

may explain the difference in the magnitude of the effect on store margin, but we have not been able to test this at this stage.

10. We also test the effect of the presence of a large competitor in the fourth specification of the model, the results of which are shown in column (4) of Tables 1, 2, 4, 5, 7, 8, 10 and 11 of this annex. In that specification we consider the difference in variable profit when there are no competitor fascia within 10 minutes' drive-time and the variable profit when there is at least one competitor fascia within 10 minutes' drive-time. We include both large competitor fascia and mid-size competitor fascia. The results show that the presence of at least one large competitor fascia within 10 minutes' drive-time has a statistically significant effect on variable profit of each of Asda, Morrisons, Sainsbury's and Tesco. For example, [~~Asda~~] store variable profit is over 11 per cent lower when there is at least one large competitor fascia within 10 minutes compared with variable profit when there are no large competitor fascia within 10 minutes.
11. We are also interested in whether mid-size stores have an impact on the variable profit margin of large grocery stores. We tested this hypothesis using different model specifications. Generally there is little evidence that mid-size stores have an impact on the performance of large stores. In each table presented below, columns (2) and (4) of Tables 1, 2, 4, 5, 7, 8, 10 and 11 of this annex present two different specifications that test this hypothesis. Column (2) presents the results of a model specification including the number of mid-size store fascias within an isochrone of 5 minutes' drive-time. We also instrumented this variable which is arguably endogenous. Column (4) presents the results of a model specification including a dummy variable for the presence of large and mid-size competing fascia. The coefficient estimate on the presence of mid-size fascia is not statistically significant except in one case.

Discounters

12. We also tested whether the number of local discounters (ie Aldi, Lidl and Netto) has an impact on large store margins. We note that discounter shops are usually less than 1,400 sq metres (the definition of a one-stop shop in previous CC inquiries) and that, for example, all [X] stores have a net sales area of around 700 sq metres. The results show little evidence that the number of discounters has an impact on large stores. However, this conclusion is not as strong as the result for mid-size stores as there are a few notable exceptions. The results for [X] show that the number of discounters has a statistically significant impact, and one of the model specifications for [X] shows there is a possible effect.

13. As discussed in paragraph 8 of the market definition working paper, looking at the distribution of stores of the four major grocery retailers, it is not immediately obvious that there is a distinction between stores larger and smaller than 1,400 sq metres. So we repeated the first main specification (10 minutes) above using two different thresholds—1,200 and 1,600 sq metres. The results shown in the tables below indicate that the choice of threshold does not significantly alter the results.

²⁰The dependent variable is log margin so that coefficients should be interpreted as percentages rather than percentage points.



TABLE 1 Variable profit [✂] large stores—10 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 10 mins	-0.0219*** (-3.17)	-0.0206*** (-3.22)	-0.0205*** (-3.17)	
Number of mid-size competitor fascia within 5 mins		-0.0008 (-0.13)		
Number of discounters within 5 mins			-0.0035 (-0.22)	
Presence of large competitor fascia within 10 mins				-0.1054*** (-2.78)
Presence mid-size competitor fascia within 5 mins				0.0179 (0.72)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.424	0.427	0.424	0.198
Andersen likelihood ratio	79.406	46.024	28.830	19.526
p-value	0.000	0.000	0.000	0.001
Hansen J
p-value				

Source: CC analysis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Note: t statistics in parentheses.

TABLE 2 Variable profit [✂] large stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 15 mins	-0.0218*** (-4.01)	-0.0225*** (-4.20)	-0.0215*** (-3.94)	
Number of mid-size competitor fascia within 5 mins		-0.00583 (-1.05)		
Number of discounters within 5 mins			-0.0146 (-0.96)	
Presence of large competitor fascia within 15 mins				-0.261** (-2.40)
Presence of mid-size competitor fascia within 5 mins				0.00521 (0.21)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.412	0.397	0.390	-0.120
Andersen likelihood ratio	66.678	48.000	28.008	9.261
p-value	0.000	0.000	0.000	0.055
Hansen J
p-value				

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.

TABLE 3 Variable profit [✂] 1,200 and 1,600 sq metre stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>
Number of competitor fascia over 1,200 sq m within 15 mins	-0.0165*** (-3.64)	
Number of competitor fascia over 1,600 sq m within 15 mins		-0.0227*** (-3.85)
Number of staff ('00)	[✂]	
Petrol forecourt		
Restaurant or coffee shop		
ATM		
Store size in '000 sq m		
Toilets		
Unemployed		
Social grade AB		
Constant		
Observations		
Adjusted R2	0.440	0.402
Andersen likelihood ratio	80.460	68.535
p-value	0.000	0.000
Hansen J	.	.
p-value		

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.



TABLE 4 Variable profit [✂] large stores—10 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 10 mins	-0.0738*** (-3.37)	-0.0738*** (-3.40)	-0.0704*** (-3.31)	
Number of mid-size competitor fascia within 5 mins		0.0138 (1.25)		
Number of discounters within 5 mins			0.0384 (0.84)	
Presence of large competitor fascia within 10 mins				-0.4271*** (-2.67)
Presence mid-size competitor fascia within 5 mins				0.1621* (1.76)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.348	0.364	0.377	-0.121
Andersen likelihood ratio	62.436	57.956	34.183	10.508
p-value	0.000	0.000	0.000	0.033
Hansen J	2.218	2.712	3.627	1.282
p-value	0.330	0.438	0.305	0.733

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.

TABLE 5 Variable profit [✂] large stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 15 mins	-0.0625*** (-3.67)	-0.0620*** (-3.65)	-0.0619*** (-3.64)	
Number of mid-size competitor fascia within 5 mins		0.00329 (0.30)		
Number of discounters within 5 mins			0.0124 (0.28)	
Presence of large competitor fascia within 15 mins				-0.484** (-2.37)
Presence of mid-size competitor fascia within 5 mins				0.0465 (0.67)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.341	0.346	0.348	0.225
Andersen likelihood ratio	91.645	89.313	36.168	15.868
p-value	0.000	0.000	0.000	0.003
Hansen J	2.434	2.526	2.548	7.722
p-value	0.296	0.471	0.467	0.052

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Note: t statistics in parentheses.

TABLE 6 Variable profit [✂] 1,200 and 1,600 sq metre stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>
Number of competitor fascia over 1,200 sq m within 15 mins	-0.0540*** (-4.22)	
Number of competitor fascia over 1,600 sq m within 15 mins		-0.0657*** (-3.41)
Number of staff ('00)	[✂]	
Petrol forecourt		
Restaurant or coffee shop		
ATM		
Store size in '000 sq m		
Toilets		
Unemployed		
Social grade AB		
Constant		
Observations		
Adjusted R2	0.367	0.329
Andersen likelihood ratio	108.597	90.157
p-value	0.000	0.000
Hansen J	0.330	2.860
p-value	0.848	0.239

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Note: t statistics in parentheses.



TABLE 7 Variable profit [✂] large stores—10 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 10 mins	-0.0274*** (-3.56)	-0.0228*** (-2.78)	-0.0221** (-2.28)	
Number of mid-size competitor fascia within 5 mins		-0.0134 (-1.56)		
Number of discounters within 5 mins			-0.0591* (-1.65)	
Presence of large competitor fascia within 10 mins				-0.1146*** (-2.68)
Presence mid-size competitor fascia within 5 mins				-0.0087 (-0.24)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.418	0.414	0.324	0.343
Andersen likelihood ratio	149.832	76.040	29.414	17.569
p-value	0.000	0.000	0.000	0.001
Hansen J	2.231	2.258	2.116	1.794
p-value	0.328	0.521	0.549	0.616

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.

TABLE 8 Variable profit [✂] large stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 15 mins	-0.0183*** (-3.57)	-0.0164*** (-3.09)	-0.0166*** (-2.76)	
Number of mid-size competitor fascia within 5 mins		-0.0175* (-1.92)		
Number of discounters within 5 mins			-0.0656* (-1.91)	
Presence of large competitor fascia within 15 mins				-0.208*** (-3.16)
Presence of mid-size competitor fascia within 5 mins				-0.0265 (-0.85)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.410	0.405	0.304	0.270
Andersen likelihood ratio	211.124	98.196	31.756	18.525
p-value	0.000	0.000	0.000	0.001
Hansen J	2.963	2.838	2.669	1.137
p-value	0.227	0.417	0.446	0.768

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Note: t statistics in parentheses.

TABLE 9 Variable profit [✂] 1,200 and 1,600 sq metre stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>
Number of competitor fascia over 1,200 sq m within 15 mins	-0.0169*** (-3.47)	
Number of competitor fascia over 1,600 sq m within 15 mins		-0.0210*** (-3.66)
Number of staff ('00)	[✂]	
Petrol forecourt		
Restaurant or coffee shop		
ATM		
Store size in '000 sq m		
Toilets		
Unemployed		
Social grade AB		
Constant		
Observations		
Adjusted R2	0.422	0.418
Andersen likelihood ratio	203.635	169.526
p-value	0.000	0.000
Hansen J	4.021	1.531
p-value	0.134	0.465

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Note: t statistics in parentheses.



TABLE 10 Variable profit: [✂] large stores—10 minutes' drive-time

	(1)	(2)	(3)	(4)
	<i>ln_margin</i>	<i>ln_margin</i>	<i>ln_margin</i>	<i>ln_margin</i>
Number of large competitor fascia within 10 mins	-0.0544*** (-3.50)	-0.0533*** (-3.07)	-0.0511*** (-2.82)	
Number of mid-size competitor fascia within 5 mins		-0.0039 (-0.43)		
Number of discounters within 5 mins			-0.0251 (-0.62)	
Presence of large competitor fascia within 10 mins				-0.2568** (-2.30)
Presence mid-size competitor fascia within 5 mins				-0.0073 (-0.16)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.439	0.440	0.441	0.142
Andersen likelihood ratio	50.821	36.899	11.413	9.002
p-value	0.000	0.000	0.022	0.061
Hansen J	1.249	1.499	1.329	2.083
p-value	0.535	0.683	0.722	0.555

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Note: t statistics in parentheses.

TABLE 11 Variable profit [✂] large stores—15 minutes' drive-time

	(1) <i>ln_margin</i>	(2) <i>ln_margin</i>	(3) <i>ln_margin</i>	(4) <i>ln_margin</i>
Number of large competitor fascia within 15 mins	-0.0468*** (-4.59)	-0.0448*** (-4.48)	-0.0395*** (-3.49)	
Number of mid-size competitor fascia within 5 mins		-0.0119 (-1.40)		
Number of discounters within 5 mins			-0.0681* (-1.76)	
Presence of large competitor fascia within 15 mins				-0.566* (-1.95)
Presence of mid-size competitor fascia within 5 mins				-0.0121 (-0.25)
Number of staff ('00)	[✂]			
Petrol forecourt				
Restaurant or coffee shop				
ATM				
Store size ('000 sq m)				
Toilets				
Unemployment				
Social grade AB				
Constant				
Observations				
Adjusted R2	0.504	0.520	0.458	-0.007
Andersen likelihood ratio	70.849	46.395	11.416	7.700
p-value	0.000	0.000	0.022	0.103
Hansen J	2.634	3.227	1.507	6.459
p-value	0.268	0.358	0.681	0.091

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.

TABLE 12 Variable profit [X] large stores—15 minutes' drive-time

	(1) <i>Ln margin</i>	(2) <i>Ln margin</i>
Number of competitor fascia over 1,200 sq m within 15 mins	-0.0431***	
	(-4.39)	
Number of competitor fascia over 1,600 sq m within 15 mins		-0.0425***
		(-4.41)
Number of staff ('00)	[X]	
Petrol forecourt		
Restaurant or coffee shop		
ATM		
Store size in '000 sq m		
Toilets		
Unemployment		
Social Grade AB		
Constant		
Observations		
Adjusted R2	0.496	0.458
Andersen likelihood ratio	64.688	77.470
p-value	0.000	0.000
Hansen J	3.922	4.534
p-value	0.141	0.104

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Note: t statistics in parentheses.

Fascia

14. We also looked at the effect on store performance of the presence of different grocery retailers around a store. Table 13 below shows the OLS regression results within a 10-minute drive-time, where the presence of a store is measured with an indicator variable equal to one if a store owned by the retailer is present within 10 minutes and equal to zero otherwise.

15. These preliminary results show that the presence of a [X] store over 1,400 sq metres within a 10-minute drive-time reduces [X] store margin, on average, by about 4 per cent. The presence of an [X] store reduces [X] store margin by about 3 per cent, and [X] by about 3 per cent. These results are statistically significant. These preliminary results might suggest that the presence of [X],[X] and [X] has a negative and statistically significant effect on [X] large store variable profit, which might indicate that these fascia competitively constrain [X].
16. Further, these preliminary results might indicate that [X] is the most important competitive constraint for [X], that [X] and [X] are the most important competitive constraints for [X] and that [X] is the most important competitor for [X].

TABLE 13 OLS regression results for fascia effect

	[X] ⁽¹⁾	[X] ⁽²⁾	[X] ⁽³⁾	[X] ⁽⁴⁾
Store size (NSA sq m)	[X]			
Number of staff				
Petrol forecourt				
Pharmacy				
ATM				
Restaurant or coffee shop				
Proportion of the population that are Urban or rural				
Indicator variable = 1 if there is an [X] store within 10 minutes				
Indicator variable = 1 if there is a [X] store within 10 minutes				
Indicator variable = 1 if there is a [X] store within 10 minutes				
Indicator variable = 1 if there is a [X] store within 10 minutes				
Constant				
Observations				
R ²	0.461	0.516	0.488	0.434
Adjusted R ²	0.449	0.494	0.472	0.396
F	27.664	18.100	31.938	11.564

Source: CC analysis.

* p < 0.10, ** p < 0.05, *** p < 0.01.

Geographic market definition

17. The results presented in Tables 1, 2, 4, 5, 7, 8, 10 and 11 of this annex and summarised in Table 8 of the working paper clearly show that the number of competing fascia for stores of size greater than 1,400 sq metres has a negative and

statistically significant impact on store margin. Although the coefficient estimates vary by fascia, the results are robust enough to conclude that local competition between large stores matters. The results were derived using drive-times of 10 and 15 minutes.

Section 2: Technical description of the model specifications

18. This section contains the technical description of the analysis and the full results of the revised store margin analysis.
19. This empirical work attempts to determine how the strength of local competition affects store performance. Using the number of local competing fascias, we estimate whether a larger number of rivals affect negatively store profit margin.
20. We use store margin for the four largest suppliers of groceries in the UK: Tesco, Asda, Sainsbury's and Morrisons. To the extent possible, we constructed variable profit margin, netting out any fixed cost such as commercial rent or costs that are not specific to any particular store such as distribution cost that are spread across many stores. Technically we net out store direct cost from all revenues. The measure of direct cost includes cost of sales, wages, stock losses and other cost depending on the fascia (eg plastic bag costs). The measure of margin differs across fascia. For example, [X] and [X] provided revenues net of VAT, but this is not the case for [X] and [X]. Since VAT is not uniform across the various grocery products, [X] and [X] net store revenues are not as precisely measured as those of [X] and [X].

21. The basic econometric specification is a variable profit function scaled by revenues (expressed as margin) that is specified as follows:²¹

$$\pi_{fi} = X_{fi}\beta + g(\theta; N) + \varepsilon_{fi}$$

where π_{fi} represents the variable profit of store i of fascia f .

22. We used data on store revenues and costs for the period covering May 2005 to April 2006, excluding the World Cup. The X matrix contains store-specific variables as well as demographic variables that describe local demand and cost conditions affecting variable profit of each store. We include these variables to control for the cross-section variation in store variable profit. The reduced-form nature of the regression prevents us from making inference on the parameter estimates of β . The function $g(\cdot)$ captures the effect of the number of competing rivals on variable profit. We will estimate different models each with a different version of this function.
23. The function $g(\cdot)$ that measures the strength of local competition contains variables that are possibly endogeneous for at least two reasons. Unobservable shocks could simultaneously affect the number of rivals and store profit margins. In this case, the number of rivals is not independent of the error of term. For example, a positive demand shock would affect positively both the incumbent store profit margin and possibly trigger new entry. Secondly, although the strength of local competition directly affects profit margin, store performance in turn affects entry of potential rivals. The logic goes that highly profitable stores attract new local competitors. In each case, applying OLS would lead to biased estimates of the store margin regression.²²

²¹Reiss (1996), Berry (1992), Mazzeo (2002), Toivanen and Waterson (2006) suggest estimating similar models, but unlike these authors we observe variable profit.

²²The OLS estimate would be upward biased, understating the true relationship between local competition and store profit margin.

24. To alleviate the endogeneity issue we use an instrumental variable estimator. The set of instruments consists of variables that proxy the size of the market, because a bigger market would support a greater number of competitors. We also assume that market size is not relevant in explaining store margin. The first type of instrument is the total number of persons living in a specific isochrone. In principle, local areas with a large population tend to support a greater number of grocery stores, and whilst the characteristics of that population may affect the propensity of consumer to react to change in price or the retail offer, the size of the total population does not directly affect variable profit of stores located in that area. The second instrumental variable consists of the total number of cars recorded in the specific isochrone. As many shoppers use their cars to visit large stores (most of which have a car park), a large number of cars in the area is associated with a large potential number of customers. The third instrument consists of retail density in the local area. Grocery stores are likely to locate where other types of retail establishments are already present. Areas of high retail density tend to attract a large number of consumers and, because access to retailing is already established, these areas are likely to attract additional grocery stores. Retail density, however, is not likely to impact the incumbent grocery store variable profit margin.
25. For each regression we computed robust standard errors. We also report in the tables above the Hansen J test for over-identifying restrictions. A rejection of the null hypothesis would cast doubt on the validity of the instruments. In most regression, the results show that the null hypothesis is not rejected. In addition, we report the Andersen a likelihood ratio test statistic for under-identification. Using weak

instruments would essentially leave the model unidentified.²³ In each case the null hypothesis of under-identification is rejected.

²³For more, see Woolridge (2002).

Further results from the entry analysis, May 2007

Introduction

1. The **working paper on entry analysis** published in April analysed the impact of entry by large stores on the revenues of large incumbent stores and the extent to which this varied with the fascia of, and distance between, entrant and incumbent stores.
2. This annex presents further regression results used to estimate the medium-term effects of entry by stores of different size which are reported in Tables 2, 3, 4, 5, 10 and Figure 6 of the **working paper on market definition**. In particular, we present results on the interaction between mid-size and large stores and how this varied with distance. We also update and extend some of the results of the previous entry analysis by controlling for the entry of mid-size stores and including Marks and Spencer as an incumbent and entrant fascia and Netto as an entrant fascia. The approach follows that set out in the previous entry working paper.

Data

3. As before, the analysis is based on a quarterly aggregation of monthly revenue data for incumbent stores over the period mid-2001 to mid-2006. We include stores with a net sales area less than and greater 1,400 sq metres of the following fascia: Asda, Morrisons, Sainsbury's, Somerfield, Tesco, Waitrose and Marks and Spencer. We are working to include limited assortment discounters (LADs) as incumbent stores.
4. Some incumbent stores opened or closed during the period of our sample. Since we aim to identify the entry response of established stores (as opposed to just-opened or soon-to-be-closed stores), we only include observations from six months after their

opening date, or until six months before their closure date, respectively. In addition, we omit stores whose time series of revenue has gaps.

5. We observe entry by stores with a net sales area greater than 280 sq metres of the following fascia: Asda, Tesco, Sainsbury's, Morrisons, Waitrose, Somerfield, Co-op, Aldi, Netto and Lidl. An entry event includes both the building of a new store and also the conversion of a non-grocery store. We continue to exclude the conversion of an *existing* grocery store from our definition of entry as this reflects product repositioning rather than new entry.
6. Drive-time distance between stores is based on a geographic mapping of postcodes provided by CACI using a geographic information system.
7. We have therefore made three changes to the data since the publication of our April working paper:
 - (a) inclusion of stores with a net sales area less than 1,400 sq metres as both incumbents and entrants allowing an analysis of the competitive constraints between stores of different size groups;
 - (b) inclusion of Marks and Spencer stores as incumbents and entrants and Netto stores as entrants; and
 - (c) including the conversion of non-grocery stores to grocery stores in our definition of new store entry.

Summary statistics

8. Tables 1 and 2 provide some summary statistics on the extent of observed new-store entry. Table 1 shows the number of incumbent stores for which we observe new-store entry within a drive-time of 10 minutes, separately for each observed incumbent and entrant fascia. For example, in our sample we observe 105 [✂] stores which

were exposed to entry by a [X] store within 10 minutes' drive-time. The entry events reported here differ from total new entry as a new store may have opened within 10 minutes of more than one incumbent store.

TABLE 1 Number of store observations with new store entry (10 minutes)

Incumbent stores exposed to entry by fascia	Entrant store by fascia (within 10 minutes' drive-time)						
	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[X]	[X]						
[X]							
[X]							
[X]							
[X]							
[X]							
[X]							
[X]							
Total							

Source: CC analysis of MPQ responses.

Note: One Stop includes entrant events

9. Table 2 summarizes the number of incumbent store observations with new store entry by size group of the incumbent and entrant store.²⁴ It can be seen that 696 stores with a net sales area less than 1,400 sq metres were exposed to entry by stores with a net sales area between 280 and 1,400 sq metres.

TABLE 2 Number of store observations with new store entry, by size group (10 minutes)

Size of incumbent store exposed to entry	Entrant store size group:	
	280–1,400 sq m	>1,400 sq m
<1,400 sq metres	696	273
>1,400 sq metres	510	305

Source: CC analysis of MPQ responses.

Estimations

10. The regressions relate the change in the incumbent store's revenue over time to a measure of entry.²⁵ Each regression includes dummy variables that capture quarter-

²⁴Size groups are used to gain an insight into the competitive constraints between stores of different sizes and we recognize that the precise boundaries used may not accurately reflect the constraints that are present.

²⁵We use the difference in the natural logarithm of revenue as our measure for the change of store performance. See April entry working paper for more details.

specific (seasonal) effects for each fascia, a (potential) trend in revenue growth for each of the 12 UK regions and own-store refurbishment.

11. To allow for the possibility that an incumbent's revenue may respond gradually to new-store entry, all regressions include lags of the entry measure. We therefore estimate a revenue response to entry in the quarter in which entry occurred as well as in the two subsequent quarters. These estimated quarterly responses over a nine-month period are then combined to provide an estimate of the medium-term response to entry.
12. It is important to note that our estimates of the incumbent response do not account for a potentially endogenous relationship between revenue growth and new-store entry but we argue that the corresponding estimation bias is likely to lead us to understate the competitive impact of new-store entry. A full specification of the model can be found in the April **entry analysis working paper**.
13. We present estimation results using two measures of entry. The first approach uses a store count measure of entry and by grouping entrants and incumbents we present results on the competitive constraints between mid-size and large stores. Using the same approach, we then present results on the extent to which entry by Marks and Spencer and the LADs affects the revenues of mid-size and large incumbent stores.
14. The second approach uses the sum of the net sales area of entrant store(s) within a given drive-time relative to the net sales area of the incumbent store as our measure of entry. This approach enables us to isolate the effect of distance on revenue responses from the effect of stores of different sizes and we present the results in the final section of this annex.

Entry by store size group

15. To gain an insight into the extent of competitive constraints between stores of different size and how this varied with distance we group entrants into three size categories: mid-size (280–1,400 sq metres), large (1,400–4,000 sq metres) and very large (greater than 4,000 sq metres) and undertake separate regressions on incumbent stores with net sales areas less than and greater than 1,400 sq metres.²⁶ New store entry is captured by a store count.

16. Estimates of the medium-term revenue response to entry by size group are reported in Tables 2 and 3 of the **working paper on market definition** (and then combined in Table 10). The interpretation of the estimates in Table 3 of the working paper is as follows. Entry by a mid-range store within 5 minutes of an incumbent store less than 1,400 sq metres led to a decline in incumbent store revenues by an average of 5.9 per cent over the medium term. In contrast, entry between 5 and 10 minutes' drive-time had, on average, no statistically significant effect on incumbent store revenues.

17. Table 3, below, presents the regression coefficients upon which the estimates of the medium-term revenue responses reported in the working paper are based.

²⁶The approach implicitly assumes that each entrant store within a size group has the same effect on an incumbent store within a size group.

TABLE 3 Regression results for entry of mid-range, large and very large stores (all fascia)

	(1) Revenue effect on incumbent <1,400 sq m	(2) Revenue effect on incumbent >1,400 sq m
<i>Entry of mid-size store</i>		
Within 5 minutes' drive-time:		
Revenue change in quarter of entry	-0.037***	-0.01*
Revenue change in quarter after entry	-0.028***	-0.0046
Revenue change in 2 nd quarter after entry	0.0055	-0.0098
Within 5 to 10 minutes drive-time:		
Revenue change in quarter of entry	0.0019	-0.0025
Revenue change in quarter after entry	-0.0035	-0.0018
Revenue change in 2 nd quarter after entry	-0.01**	-0.0011
Within 10 to 15 minutes drive-time:		
Revenue change in quarter of entry	-0.0047	0.00028
Revenue change in quarter after entry	0.0028	-0.0067**
Revenue change in 2 nd quarter after entry	-0.0059*	-0.0017
Within 15 to 20 minutes drive-time:		
Revenue change in quarter of entry	0.000035	0.0068***
Revenue change in quarter after entry	-0.00092	-0.0051*
Revenue change in 2 nd quarter after entry	-0.0052*	0.0054*
<i>Entry of large store</i>		
Within 5 minutes' drive-time:		
Revenue change in quarter of entry	-0.033**	-0.032
Revenue change in quarter after entry	-0.04***	-0.037***
Revenue change in 2 nd quarter after entry	-0.022**	0.0082
Within 5 to 10 minutes' drive-time:		
Revenue change in quarter of entry	-0.02	-0.013
Revenue change in quarter after entry	0.0026	-0.029***
Revenue change in 2 nd quarter after entry	-0.013**	0.0023
Within 10 to 15 minutes' drive-time:		
Revenue change in quarter of entry	0.0092**	0.00072
Revenue change in quarter after entry	-0.0017	-0.012**
Revenue change in 2 nd quarter after entry	-0.0046	-0.0039
Within 15 to 20 minutes' drive-time:		
Revenue change in quarter of entry	0.00087	0.0083**
Revenue change in quarter after entry	0.0029	-0.0094**
Revenue change in 2 nd quarter after entry	-0.0041	-0.005
<i>Entry of very large store</i>		
Within 5 minutes' drive-time:		
Revenue change in quarter of entry	-0.021	-0.035*
Revenue change in quarter after entry	-0.029**	-0.054***
Revenue change in 2 nd quarter after entry	-0.017**	0.00011
Within 5 to 10 minutes drive-time:		
Revenue change in quarter of entry	-0.016**	-0.019**
Revenue change in quarter after entry	-0.011	-0.031***
Revenue change in 2 nd quarter after entry	-0.0057	-0.017**
Within 10 to 15 minutes' drive-time:		
Revenue change in quarter of entry	0.00018	-0.0013
Revenue change in quarter after entry	-0.0042	-0.023***
Revenue change in 2 nd quarter after entry	0.0069	0.0019
Within 15 to 20 minutes' drive-time:		
Revenue change in quarter of entry	0.00045	0.011**
Revenue change in quarter after entry	0.0052	-0.0057
Revenue change in 2 nd quarter after entry	0.0007	-0.0054
<i>Own-store refurbishment</i>		
Revenue change in quarter of entry	-0.0046	-0.016***
Revenue change in quarter after entry	0.018***	0.025***
Revenue change in 2 nd quarter after entry	-0.0015	0.0025
Store-quarter observations	31,522	22,747
R-squared	0.57	0.45

Source: CC analysis.

Note: All regressions include 12 region and 418 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: * 90%, **95%, *** 99%.

18. A coefficient of -0.037 in column (1) of Table 3 for 'revenue change in quarter of entry' indicates that, on average, entry by a mid-range store within 5 minutes' drive-time has led to a decrease in incumbents revenue by 3.7 per cent in the quarter of entry. The coefficient beneath indicates that revenues have decreased by a further 2.8 per cent in the quarter following entry, and the next coefficient indicates that revenue increased by 0.5 per cent between the quarter after entry and the second quarter after entry.
19. We derive the medium-term revenue response by combining these quarter-on-quarter changes as follows: $(1 + \text{coefficient in quarter of entry}) * (1 + \text{coefficient in quarter after entry}) * (1 + \text{coefficient in 2}^{\text{nd}} \text{ quarter after entry}) - 1$.²⁷

Entry by Marks and Spencer and LADs

20. Table 4 describes the number of entry events by Marks and Spencer and LADs on incumbents within 10 minutes' drive-time.²⁸ We are only looking here at the entry events of mid-sized stores because [redacted].

²⁷ We use the standard delta method to calculate the standard errors of this combination of regression coefficients.

²⁸ There were [redacted] Marks and Spencer entry events within 5 minutes' drive-time of an incumbent store with a net sales area less than 1,400 sq metres ([redacted] entry events for incumbent stores greater than 1,400 sq metres). The number of Marks and Spencer entry events increases to [redacted] within 20 minutes' drive-time.

TABLE 4 Number of incumbent store observations with new-store entry (10 minutes)

Size of incumbent store exposed to entry	Mid-size (280–1,400 sq m) entrant store within 10 minutes' drive-time:		
	Aldi/Netto/Lidl	M&S	Other fascia
<1,400 sq metres	[X]	[X]	[X]
>1,400 sq metres	[X]	[X]	[X]
Total	[X]	[X]	[X]

Source: CC analysis of MPQ responses.

21. Continuing to use the store count measure of entry, we now present regression results separately for entry by Marks and Spencer and the LADs on different store size groups. We control for the entry of all other stores

Marks and Spencer

22. Table 5 presents the regression coefficients used to estimate the medium-term effect of Marks and Spencer entry reported in Table 4 of the **working paper on market definition**. The interpretation of the regression coefficients and the medium-term effect is set out in paragraphs 16 and 18 above. We only report coefficients from the entry of mid-size Marks and Spencer stores because [X].

TABLE 5 Regression results for entry of mid-size Marks and Spencer's stores

	(1) Revenue effect on incumbent <1,400 sq m	(2) Revenue effect on incumbent >1,400 sq m	(3) Revenue effect on incumbent >4,000 sq m
<i>Entry of mid-size M&S store</i>			
Within 5 minutes' drive-time:			
Revenue change in quarter of entry	-0.035***	-0.017**	-0.019*
Revenue change in quarter after entry	-0.026**	0.012	0.017
Revenue change in 2 nd quarter after entry	-0.0089	-0.017	-0.015
Within 5 to 10 minutes' drive-time:			
Revenue change in quarter of entry	0.00071	-0.022**	-0.045*
Revenue change in quarter after entry	-0.014*	-0.0091	-0.0056
Revenue change in 2 nd quarter after entry	-0.015*	-0.0077	0.004
Within 10 to 15 minutes' drive-time:			
Revenue change in quarter of entry	-0.0062	-0.013**	-0.015
Revenue change in quarter after entry	-0.0037	-0.0051	-0.019
Revenue change in 2 nd quarter after entry	-0.0092*	-0.0074*	-0.0068
Within 15 to 20 minutes' drive-time:			
Revenue change in quarter of entry	-0.01***	-0.0049	-0.015
Revenue change in quarter after entry	-0.0011	0.0032	0.0059
Revenue change in 2 nd quarter after entry	-0.011**	0.003	0.0029
<i>Own-store refurbishment</i>			
Revenue change in quarter of entry	-0.0049	-0.016***	-0.033**
Revenue change in quarter after entry	0.018***	0.025***	0.036**
Revenue change in 2 nd quarter after entry	-0.0013	0.0023	0.0064
Store-quarter observations	31,493	22,747	6,194
R-squared	0.57	0.451	0.246

Source: CC analysis.

Note: All regressions include 12 region and 418 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%.

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23. Table 6 presents the regression coefficients used to estimate the medium-term effect of LAD entry reported in Table 5 of the **working paper on market definition**. The interpretation of the regression coefficients and the medium-term effects is set out in paragraphs 16 and 18 above. Again, we only report coefficients from the entry of mid-size LADs stores because [✂].

TABLE 6 Regression results for entry of mid-size LAD stores

	(1) <i>Revenue effect on incumbent <1,400 sq m</i>	(2) <i>Revenue effect on incumbent >1,400 sq m</i>
<i>Entry of mid-size LAD store</i>		
<i>Within 5 minutes; drive-time:</i>		
Revenue change in quarter of entry	0.0042	-0.0061
Revenue change in quarter after entry	-0.003	-0.011
Revenue change in 2 nd quarter after entry	-0.011	-0.008
<i>Within 5 to 10 minutes' drive-time:</i>		
Revenue change in quarter of entry	-0.0091	0.0011
Revenue change in quarter after entry	0.012*	0.002
Revenue change in 2 nd quarter after entry	-0.0013	0.00048
<i>Within 10 to 15 minutes' drive-time:</i>		
Revenue change in quarter of entry	-0.00033	0.0031
Revenue change in quarter after entry	0.0075*	-0.0059
Revenue change in 2 nd quarter after entry	-0.0046	0.0018
<i>Within 15 to 20 minutes' drive-time:</i>		
Revenue change in quarter of entry	0.0023	0.012***
Revenue change in quarter after entry	0.008***	-0.0073*
Revenue change in 2 nd quarter after entry	-0.009	0.011**
<i>Own-store refurbishment</i>		
Revenue change in quarter of entry	-0.0047	-0.016***
Revenue change in quarter after entry	0.018***	0.025***
Revenue change in 2 nd quarter after entry	-0.0016	0.0025
Store-quarter observations	31,496	22,747
R-squared	0.57	0.45

Source: CC analysis.

Note: All regressions include 12 region and 418 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%.

Entry by size group controlling for store size

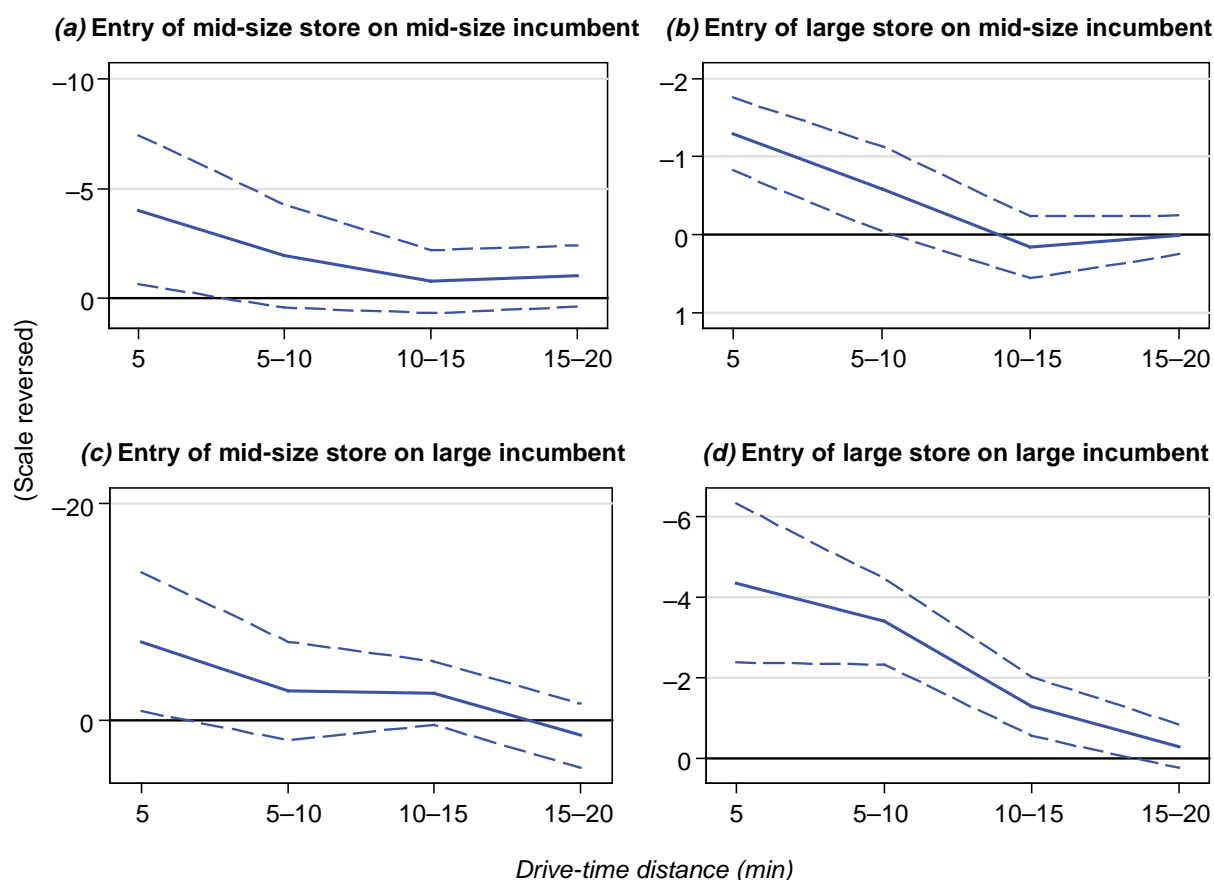
24. In this final section, we present the results from using our second measure of store entry where entry is measured by the ratio between the sales areas of the entrant(s) and incumbent store. For example, if the net sales area of an incumbent store was 500 sq metres and there were two new entrants with a net sales area of 500 and 1000 sq metres respectively, the entry measure would be three. In essence, this is the same as if there were three stores of equal size entering using the store-count method.
25. The resulting estimates provide an indication of the incumbent revenue response to entry of a store with *equal net sales area*. Using this approach we can isolate the effects of distance on the revenue response from the effect of store size.

26. As we have no evidence of a linear relationship between the entry effects from stores of different sizes, we continue to group entrants but this time just use mid-size (280–1,400 sq metres) and large (greater than 1,400 sq metres).²⁹ We undertake two separate regressions on mid-size and large incumbent stores. We exclude incumbent stores with a net sales area less than 280 sq metres to ensure consistency with store entrants.
27. Figure 1, below, presents the estimated medium-term revenue effect for each of the entrant-incumbent store size combinations. The Figure is the same as Figure 10 in the **market definition working paper**.

²⁹A 100 sq metre store opening close to a 50 sq metre incumbent may have a very different effect to a 3,000 sq metre store opening close to a 1,500 sq metre incumbent. Using our relative measure of entry and not grouping stores would assume that entry effects were the same.

FIGURE 1

Medium-term percentage revenue response to entry of a store of equal size



Notes:

3. Dotted line represents 95 per cent confidence interval.

4. Using data for incumbent and entrant stores with net sales area of 280 sq metres or more.

Source: CC analysis.

28. It is important to note that we are now estimating the percentage medium-term revenue response to the entry of a store of *equal size*. This has implications for the interpretation of the revenue effect when we consider the impact of mid-size entrants on large incumbents and large entrants on mid-size incumbents as, by definition, the stores in question are not of equal physical size.

29. For example, if we assume mid-size stores are on average half the size of large stores, the *actual* revenue response from the entry of a mid-size store would be 50 per cent of the estimated medium-term effect depicted in Figure 1(c). Equally, the

revenue response from the entry of a large store would be twice the estimated medium-term effect depicted in 1 (b).

30. Notwithstanding this scaling effect, it is evident from Figure 1 that the estimated impact of entry by a new store the same size as the incumbent store decreases in absolute value with increasing distance.

31. Table 7 presents the regression coefficients used to estimate the medium-term effect reported in Figure 1.

TABLE 7 Regression results for entry of a store of equal size

	<i>Revenue effect on mid-size incumbent store</i>	<i>Revenue effect on large incumbent store</i>
<i>Entry of mid-size store</i>		
Within 5 minutes' drive-time:		
Revenue change in quarter of entry	-0.032**	-0.055***
Revenue change in quarter after entry	-0.0039	0.000008
Revenue change in 2 nd quarter after entry	-0.0048	-0.019
Within 5 to 10 minutes' drive-time:		
Revenue change in quarter of entry	-0.0017	-0.016
Revenue change in quarter after entry	-0.0012	-0.0028
Revenue change in 2 nd quarter after entry	-0.016*	0.0092
Within 10 to 15 minutes' drive-time:		
Revenue change in quarter of entry	-0.0065	-0.011
Revenue change in quarter after entry	0.0085**	-0.01
Revenue change in 2 nd quarter after entry	-0.0095**	-0.0048
Within 15 to 20 minutes' drive-time:		
Revenue change in quarter of entry	-0.0011	0.0078
Revenue change in quarter after entry	0.00041	-0.01
Revenue change in 2 nd quarter after entry	-0.0094*	0.016
<i>Entry of large store</i>		
Within 5 minutes' drive-time:		
Revenue change in quarter of entry	-0.0056***	-0.021***
Revenue change in quarter after entry	-0.0042***	-0.025***
Revenue change in 2 nd quarter after entry	-0.0032***	0.0024
Within 5 to 10 minutes' drive-time:		
Revenue change in quarter of entry	-0.0028*	-0.013***
Revenue change in quarter after entry	-0.0022	-0.016***
Revenue change in 2 nd quarter after entry	-0.00092	0.0056**
Within 10 to 15 minutes' drive-time:		
Revenue change in quarter of entry	-0.00048	-0.0033
Revenue change in quarter after entry	-0.00031	-0.01***
Revenue change in 2 nd quarter after entry	0.0024**	0.00042
Within 15 to 20 minutes' drive-time:		
Revenue change in quarter of entry	-0.001	0.003
Revenue change in quarter after entry	0.0014	-0.0034**
Revenue change in 2 nd quarter after entry	-0.00036	-0.0025*
<i>Own-store refurbishment</i>		
Revenue change in quarter of entry	-0.0035	-0.016***
Revenue change in quarter after entry	0.02***	0.025***
Revenue change in 2 nd quarter after entry	0.0012	0.0023
Store-quarter observations	12,088	22,751
R-squared	0.73	0.448

Source: CC analysis.

Note: All regressions include 12 region and 418 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: * 90%, ** 95%, *** 99%.