

NOTE ON STORE MARGIN ANALYSIS

1. The purpose of this note is to present the preliminary results of the margin-concentration analysis. 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 this note focus on the geographic nature of competition between large stores (over 1,400 sq m).

3. Our preliminary results indicate that:
 - i. Competition is local as there is evidence that the number of rivals located close to a store affect its performance.

 - ii. The magnitude of the effect is likely to be understated in simple regression analysis and in the paper we begin to develop our analysis to take account of this.

 - iii. Using this empirical method we develop two approaches to take account of local competitive conditions. The first allows us to consider the effect of an extra competitor store over 1,400 sq m. This measure does not take account of the

number of stores already present in the area. In the second approach, we distinguish between areas where there are no competitor stores and those where there is at least one competitor store. Using this approach we find a significant effect on store performance from there being at least one competitor store within 10 minutes.

4. This note is structured as follows. In the first section we discuss the approach and the data used in this analysis. In the second section we present a simple regression approach that allows us to control for factors other than local competitive conditions that might affect store performance. We note that this approach might tend to understate the true magnitude of the effect of local competition. In the third section we employ an empirical approach that might overcome these concerns. In the fourth section we present preliminary results of analysis of the effect that the different fascia have on the performance of each others' stores.

Section 1 Method and data

5. In this section, we first discuss the data used in the analysis before presenting descriptive statistics of the data. We then present the preliminary results of the analysis.
6. Our empirical analysis of store margins examines how store performance varies with the different local competitive conditions. We use store margins because they provide a direct measure of store performance and because changing any aspect of the local retail offer would store margins¹. We use the number of competing stores to capture the degree of local competition - as the number of rival stores within a local

¹ In fact, we are trying to uncover any relationship between price and concentration, holding constant marginal costs, because a store with market power will raise price relative to marginal cost. (With national pricing, a retailer seeking to exercise local market power could cut costs – and let quality, range and service deteriorate – rather than increase prices so as to increase price relative to marginal cost.) However, if marginal costs vary across products or areas and these costs are not well

area increases, consumers have more alternative stores to switch to if the store raises its price (or deteriorates its retail offer) and as a result the degree of competition increases². If stores perform better in locations where they face fewer competitors, high concentration may be indicative of a lack of effective competition³.

7. Stores do not provide a uniform retail offer, and there are a number of factors besides concentration that might explain variation in store margins. We need to control for factors that might affect both margin and concentration to avoid misleading results. Local cost conditions, such as staff costs for example, will affect store margins. In high cost areas, stores' margins will tend to be lower. But, entry decisions are also based on local cost conditions. As a result, in high cost areas, the number of competing stores will tend to be small. By controlling for these factors in the analysis we try to isolate the relationship between store margin and concentration. Please see Annex 1 for a technical presentation of the quantitative approach.

Data

8. The CC collected information on all stores operated by Sainsbury's, Asda, Tesco and Morrisons. In this analysis we have concentrated on large stores, which we define here as those with net sales area over 1,400 sq m following the approach in previous CC inquiries of the grocery retailing sector. The analysis uses data on these stores for the period May 2005 to May 2006. The exact period of the data varies slightly

measured, an analysis of price and concentration might not give the right results. Using store margins, which is defined as store gross margin over direct costs (i.e. cost of sales, cost of staff and distribution costs), overcomes this problem.

² It should be noted, however, that the number of competitors is not always a good proxy for the level of competition a firm faces. For example, if the subset of stores in the candidate market operate a cartel, or if there are no barriers to entry or exit.

³ Concentration can be measured in a number of different ways to capture different aspects of competition between stores. For example, concentration can be measured as the number of competitor fascia within the isochrone, or as the number of competitor stores. Alternatively, concentration can be measured as the share of revenue, or share of net sales area, of the store in question. If, within the isochrone, there are stores owned by the same chain as the store at the centre of the isochrone whose margin we consider, we might measure concentration as the share revenue or net sales area of all stores in the isochrone owned by the chain.

between fascia, because of slight differences in the data collection and accounting periods of each retailer.⁴ We do not expect this to affect the results.

9. We have excluded from the analysis those stores that opened up to six months before the period of the analysis. We also dropped from the sample stores that closed during the period. We expect margins of these stores to differ from margins of established stores.
10. In addition, we exclude from the analysis stores with missing data and those with extreme values of margin. For example, one store belonging to [X] has an average margin of -80% for the sample period. Finally, we have excluded from the analysis extremely large stores, which we define as those with net sales area over 6,000 sq m. This is because the data on revenue includes non-grocery products and we would expect stores over 6,000 sq m to sell a large proportion of non-grocery products. Please see Annex 2 for full details of the construction of the store data set for each of the four retailers.
11. Store margin is a proxy for variable store profit. Variable store profit is a measure of store performance that is determined both by store revenue and by store costs. When more customers shop at one store than at another, revenue will be higher at the shop with higher footfall, but so will store costs. The net effect on store performance, as measured by store margin, is not clear.⁵
12. Store margin is calculated as total gross revenue (including groceries and non-groceries) less store costs that vary with volume of goods sold, as a proportion of total gross revenue. Store costs that vary with volume of goods sold include costs of

⁴ For example, for [X], the sales data is for the period 25th April 2005 to 1st May 2006.

sales and staff costs, but exclude rent and other property costs. This measure of store margin captures variable profit margin and excludes fixed costs. We exclude fixed costs because they are not directly related to store performance; the retail offer at a store may improve, or deteriorate, without changes in fixed costs. For example, high commercial rent will reduce store profit, but the store may perform well compared to others because it faces fewer competitor stores.

13. As far as possible, we have tried to ensure that the measure of store margin is the same for each grocery retailer. However, there are some differences due to differences in data collection and accounting conventions between the retailers. The most notable differences are in the treatment of VAT and property expenses. In particular, store margin data for [✂] includes property expenses in direct costs. We hope to be able to exclude these costs in subsequent iterations of this analysis and note that this will change the results presented in this paper. The components of store margins are described for each of the retailers in Annex 3.
14. We have captured the local competitive conditions of the area around a store by the count of all competing grocery stores over 1,400 sq m.⁶ The information on grocery stores is based on data collected by the CC from main parties. It includes stores owned by Tesco, Asda, Sainsbury's, Morrisons, M&S, Waitrose, Netto, Aldi, Lidl, Co-Op, Somerfield, Iceland, and Spar. Distance between stores is based on geographic mapping of postcodes provided by CACI, using a geographic information system.

⁵ A profit maximising store will select the optimal level of retail offer. An improvement in the retail offer beyond the optimal level might attract additional customers and therefore more revenue, but will generate additional costs that more than offset the increase in revenue.

⁶ We average monthly margin data for the period May 2005 to May 2006 to exclude any seasonal effects in any one month. The data is a cross-section of store gross margins.

15. In Paragraphs 16 to 19 we describe the relationship between store margin and number of competitor stores in different isochrones for each of the four largest grocery retailers.

Store margin and the number of nearby competitors

16. Simple scatter plots shows how store margin and the number of competitor stores vary together within a 10 minute isochrone⁷. The results show that, with the exception of [X], store margins decline as the number of competing stores over 1,400 sq m within 10 minutes drive-time increases.⁸ The positive relationship for [X] stores is not statistically significant.

Figure 1 [X] store margins

[X]

Source: CC analysis

Figure 2 [X] store margins

[X]

Source: CC analysis

Figure 3 [X] store margins

[X]

Source: CC analysis

Figure 4 [X] store margins

[X]

Source: CC analysis

⁷ The relationship shown in these charts is statistically significant for some, but not all, of the grocery retailers. For [X], the coefficient is [X], which means that store margin is [X] percentage points lower when there is one more competitor store over 1,400 sq m within 10 minutes. This is statistically significant. For [X], the coefficient is [X] and this is not statistically significant. For X the coefficient is [X] and the relationship is statistically significant. For [X], the coefficient is [X] and the relationship is not statistically significant.

⁸ Because the data is the average over the period, the number of competitor stores is not always a whole number if a competitor store has entered during the year.

17. We see similar relationships for number of competitor fascia – as opposed to number of competitor stores, which is shown above - over 1,400 sq m within 10 minutes.
18. We have also undertaken analysis to understand if there is a difference in the average margin of stores that face no competitor stores within a given drive-time and those that face at least one competitor. The results are consistent with the scatter charts above and show that the average store margin for stores that face no competitor stores within an isochrone is higher than the average store margin for stores that face competitors. The chart below shows this for a 10 minute isochrone, but, with the exception of [✂], the results are similar for 5 minutes, 10 minutes and 15 minutes isochrones. For [✂], the results are reversed in 5 minutes and 15 minutes.

Figure 5 Average store margin and local competitive conditions update



Source: CC analysis

19. These straightforward analyses show how store performance and local competitive conditions vary together, but we would expect other factors, such as store size, also to affect store performance. In order to isolate the relationship between store performance and local competitive conditions, we need to control for these other factors. We do this using regression analysis as described in Paragraphs 20 to 24.

Section 2 Description of the OLS model and preliminary results

20. In this section, we discuss the quantitative approach that we use to control for factors other than local competitive conditions and present some preliminary results.

21. The factors that we might expect to affect store profit margin, other than local competitive conditions, include:
- i. Store characteristics, such as store size (net sales area in sq m), the number of staff and the presence of a petrol forecourt, the presence of a pharmacy, the presence of ATMs, and the presence of toilets. All stores within the sample have off-street parking, so we do not need to include this store characteristic. Information on store characteristics is from data collected by the CC from main parties.
 - ii. Characteristics of the people living around the store, such as the proportion of the population that is unemployed. We measure population characteristics for the population living within 20 minutes drive-time of the store.
22. An analysis of the relationship between store performance and the number of competitor stores within a given drive-time shows that these factors are important in explaining store performance. It also indicates that the effect of an extra competitor store within a given drive-time varies between the grocery retailers, but overall tends to decline with drive-time from the store.
23. We analysed the effect of the number of competitor stores in 10 minute drive-time “bands” around the store, controlling for store characteristics and the characteristics of the local population described in Paragraph 20. The results summarised in Table 1 show the effect of the number of competitor stores in a 10 minute isochrone around the store and of the number of competitor stores in a 10 to 20 minute band around the store. It shows that an extra competitor store within 10 minutes of a [✂] store, reduces store margins by about 1%. An extra competitor store within a band of 10 to

20 minutes drive-time of a [X] store reduces store margins by about 0.08%, but this result is not statistically significant. For full results, please see Annex 4.

Table 1 Summary of OLS regression results

	[X]	[X]	[X]	[X]
Average margin (%)	[X]	[X]	[X]	[X]
Percentage point change in margin due to an extra competitor store in 10 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to an extra competitor store in 10 minute isochrone	-0.33	-0.98	-0.74	-1.20
Percentage point change in margin due to an extra competitor store in 20 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to an extra competitor store in 10 to 20 minute isochrone	-0.43	-0.08	0.0	-0.51

Source: CC analysis

Notes:

1. * statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

24. The preliminary results of this analysis show that the effect of an extra competitor store declines with drive-time from the store; the further away is the extra competitor store, the less is the effect on the store margin. This might indicate that local market structure is important in determining store performance and that competition is local.

25. However, the results shown in Table 1 are not all statistically significant, which means that we cannot be confident of all of the results⁹. In addition, whilst we are trying to uncover any negative impact of the number of local competitors on store margin, it is possible that store margins have themselves an impact on the number of local competitors. For example, it might be that a highly profitable store encourages

⁹ Please see Annex 2 for full tables of regression results.

new entrants to locate nearby. In this case, store margin affects local entry and thus the number of local competitors. Empirically this effect will translate into high margins being associated with a large number of competitors. By omitting to correct for this feedback effect of margin on the number of stores, a simple regression might understate the negative impact of the number of local competitors on store margin. Because our current estimates do not correct for this feedback effect, the results tend to understate the true negative effect of the number of competitors on store margin. It is possible to use other quantitative techniques to alleviate this problem and to isolate the causal relationship between store performance and local market structure¹⁰. In Paragraphs 25 to 34, we discuss an alternative specification of the model that might alleviate this problem.

Section 3 Instrumental variables and 2 stage least squares regression

26. One way to alleviate this econometric problem is to use an instrumental variable estimator. This technique requires us to find other variables that are correlated with the degree of local competition, but that remain unrelated to the profit margin of the incumbent grocery store.¹¹ This allows us to correct for the feedback effect discussed above and to isolate the effect of local competitive conditions on store performance. These variables are called instrumental variables.

27. Using this empirical technique, we develop two approaches to take account of local competitive conditions. The first allows us to consider the effect of an extra competitor store over 1,400 sq m. This measure does not take account of the number of stores already present in the area. In the second approach, we

¹⁰ Please see Annex 1 for a more detailed discussion of this issue.

¹¹ In principle, instrumental variable estimator will generate consistent estimates of the parameter of interest as long as the instruments are valid. And valid instruments need to satisfy two conditions. First, they should not be correlated with the error terms of the regression; that is they are not related to the dependent variable; in this case variable profit margin. Second, instruments should be correlated with the endogenous regressors. In this case, the instruments should be related to store entry decision. If instruments are not correlated with the endogenous variable, the parameter of interest will be still be severely biased.

distinguish between areas where there are no competitor stores and those where there is at least one competitor store. Using this approach we find a statistically and economically significant effect on store performance from there being at least one competitor store within 10 minutes, though we note that there are some issues with the identification of the instrumental variables, which we discuss below.

28. Table 2 shows the preliminary results using the first approach. It shows the percentage change in store margin for each of the four largest grocery retailers, due to an extra competitor store over 1,400 sq m within a 10 minute isochrone and the incremental effect on store margin due to an extra competitor store over 1,400 sq m within 10 to 20 minutes drive-time of the store. Please see Annex 5 for full results.

Table 2 Summary of IV regression results, approach 1

	[X]	[X]	[X]	[X]
Average margin (%)	[X]	[X]	[X]	[X]
Percentage point change in margin due to an extra competitor store in 10 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to an extra competitor store in 10 minute isochrone	-0.77	-2.38	-0.45	-2.23
Percentage point change in margin due to an extra competitor store in 10 to 20 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to an extra competitor store in 10 to 20 minute isochrone	+0.02	-0.38	-0.51	-0.04

Source: CC analysis

Notes:

1.* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

29. The results show that the effect on store margin of an extra competitor store within 10 minutes is negative and statistically significant at the 10% confidence level for

[X], [X] and [X]. The incremental effect of an extra competitor store within 10 to 20 minutes drive-time is much smaller and only statistically significant for [X] and [X]. The effect of an extra competitor store within 10 to 20 minutes of a [X] store is to increase the store margin, but this result is not statistically significant.

30. A comparison of the results of the IV regression analysis with those of the OLS regression analysis indicates that the effect of the number of competitor stores in a 10 minute isochrone is in most cases greater using IV regression approach. This suggests that a simple regression does understate the negative impact of the number of local competitors on store margin and that unless we correct for this feedback effect, the results tend to understate the true negative effect of the number of competitors on store margin. However, we note that in a number of cases, the test statistics indicate that the instruments we use in this analysis may be related to factors that affect store margin, and which we do not observe. This could mean that the effect of local competitive conditions is biased and we may need to consider alternative instruments.
31. In the results shown in Table 3 we do not distinguish the effect on store margins according to the number of nearby competitor stores and treat the addition of the tenth rival store within an isochrone in the same manner that we treat the addition of the first rival store within an isochrone. Our second approach is to consider the difference in margins of stores when there are no competitor stores within the isochrone and the margins of stores when there is at least one competitor store within the isochrone. The results of this approach are shown in Table 3. Please see Annex 6 for full regression results.

Table 3 Summary of IV regression results, approach 2

	[X]	[X]	[X]	[X]
Average margin (%)	[X]	[X]	[X]	[X]
Percentage point change in margin due to an extra competitor store in 10 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to a competitor store in 10 minute isochrone	-9.32	-14.53	-4.63	-7.56
Percentage point change in margin due to an extra competitor store in 10 to 20 minute isochrone	[X]	[X]	[X]	[X]
Percentage change in margin due to a competitor store in 10 to 20 minute isochrone	-7.39	-6.97	-18.12	-5.87

Source: CC analysis

Notes:

1.* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

32. The results show that there is a statistically and economically significant difference in store margins that have no competitor stores within a 10 minute isochrone, and those that have at least one competitor store. However, we note again that the test statistics indicate that the instruments we use in this analysis may be related to factors that affect store margin, and which we do not observe. This could mean that the effect of local competitive conditions is biased and we may need to consider alternative instruments.
33. In these preliminary results, [X] store margins are, on average, about 9% lower when there is at least one competitor store over 1,400 sq m within 10 minutes, compared to when there are no competitor stores over 1,400 sq m. [X] store margins are about 5% lower (though this result is not statistically significant), [X] are about 14% lower and [X] are about 7% lower.

34. With the exception of [X], the effect of a rival store within a 10 to 20 minute “band” is less than the effect of a rival store within 10 minutes, which is consistent with local competitive conditions within about 10 minutes of about a store affecting its performance. For [X] the effect of a rival store within 10 to 20 minutes is greater than the effect of a store within 10 minutes. This effect is statistically significant.
35. The preliminary results of this analysis of the relationship between store margins and competitive conditions around a store indicate that, overall, local competitive conditions affect store performance. As we would expect, the impact of local competitive conditions varies between the four grocery retailers included in this analysis, but overall the results also indicate that the affect of the local competitive conditions tends to decline with drive-time from the store.
36. In the next section we present the preliminary results of analysis of how the presence of different fascia in the area around a store affects store performance of the four largest grocery retailers. This might provide insight into the competitive constraints between these retailers.

Section 4 Fascia

37. In our margin analysis we can also consider the effect on store performance of the presence of different grocery retailers around a store. Table 4 below shows the OLS regression results within a 10 minute isochrone, 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. Please see Annex 6 for full regression results.

Table 4 OLS regression results for fascia

	[X]	[X]	[X]	[X]
Average margin (%)	[X]	[X]	[X]	[X]
Percentage point change in margin due to a [X] store in 10 minute isochrone		[X]	[X]	[X]
Percentage change in margin due to a [X] store in 10 minute isochrone		-3.88	-2.19	-2.05
Percentage point change in margin due to an [X] store in 10 minute isochrone	[X]	[X]		[X]
Percentage change in margin due to an [X] store in 10 minute isochrone	-1.74	-7.06		-0.50
Percentage point change in margin due to a [X] store in 10 minute isochrone	[X]		[X]	[X]
Percentage change in margin due to a [X] store in 10 minute isochrone	-5.09		-1.78	-1.02
Percentage point change in margin due to a [X] store in 10 minute isochrone	[X]	[X]	[X]	
Percentage change in margin due to a [X] store in 10 minute isochrone	-1.26	-0.25	+1.62	

Source: CC analysis

Notes:

1.* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

38. These preliminary results show that the presence of a [X] store over 1,400 sq m within 10 minute isochrone reduces [X] store margin, on average, by about 5%. This result is statistically significant. The presence of an [X] store reduces [X] store margin by about 2%, but this result is not statistically significant. Although the results indicate that the presence of a [X] store reduces [X] store margins, this result is not statistically significant. [X]

39. [X]

Annex 1 Technical appendix

1. This econometric analysis assesses empirically the effect of the number of local competitors on store variable profit margin. However, the empirical analysis of the relationship between store margin and the number of competitors needs to account for the fact that firms base their entry decisions on demand and cost factors. And some of these factors will affect both margin and the number of competitors. As a result, a regression-based analysis is preferable to a simple comparison of store margins that cuts across different local competitive conditions.

2. The empirical model takes the following form:

$$(1) \text{margin}_j = \alpha + \beta_1 C_j^{0-10} + \beta_2 C_j^{10-20} + \Gamma X_j + \varepsilon_j,$$

where α and the β s are parameters to be estimated. The variables C contain the number of rival stores within a specific band around each local store for which we observe profit margin. For example, C^{0-10} includes the number of rival stores that are located within 10 minutes drive-time and C^{10-20} contains the number of rival stores located within a band of 10 to 20 minutes drive-time. The parameter estimate β_1 will provide an indication of the effect of an additional rival store located within 10 minutes drive time on a store profit margin. This model specification allows us to identify the effect of the number of competitors located relatively close to the local store and that of the number of competitors that are located further away.

3. The vector X contains additional explanatory variables, such as store characteristics and demographic variable to control for variation in local cost and demand conditions.

4. The margin equation assumes that store entry is exogenous to the conduct of local stores. It is quite possible that entry decisions are based on how profitable each local market is, which is reflected by the performance of local stores. As a result high margin stores encourage local entry by rivals. In that case if entry (the number of competitors) and margin are jointly determined, the ordinary least squares estimates of the margin equation may generate biased estimates of the parameters.
5. When high margin trigger entry, a positive shock on margin would encourage more entry. Therefore, the number of competitors and the error term of the empirical model are positively correlated. Because we expect the true coefficients on the Cs variable to be negative, the coefficient estimate on the number of competitors is upward biased. In other words, the OLS estimates of equation (1) understate the relationship between the number of competitors and margins.
6. When the OLS coefficient estimates are statistically significant, and economically meaningful, they provide a lower bound for the true β_s coefficient. For example, the OLS estimate of β_1 in for the four fascias is statistically significant. In each case, this suggests that an additional rival within a 5 minute-drive time would have an impact of a magnitude at least equivalent to the OLS coefficient estimates.
7. The endogeneity problem can in principle be addressed by employing instrumental variable techniques. This requires finding instrumental variables that are correlated with the number of competitors but are unrelated to variable profit margin. Generally, these instruments are notoriously difficult to find. In the present case, we will experiment with market size, retail density and possibly other variables that would be correlated with the number of local stores but remain unrelated with variable profit margins.

8. In our regression analysis, any instrumental variables should not be related to variable profit, which is the object of interest, but should be correlated with the store entry decision that ultimately determines the number of rival stores. As a result, any factor that affects demand or cost factors that also affects store variable profit margins should not be used as an instrument.
9. The set of instruments consists of variables related to market size. The first type of instrument is the total number of people living in a specific isochrone. In principle, local areas with a large population tend to support a greater number of grocery stores. Yet total population does not directly affect variable profit; whereas the characteristics of that population may affect the propensity of consumers to react to a change in price or the retail offer. The second set of instruments consists of the number of retail outlets in the local area. Grocery stores are likely to locate where other types of retail establishments are already present. Areas with high numbers of retail outlets 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. The number of retail outlets, however, is not likely to impact the incumbent grocery store variable profit margin. The third set of instruments consists of the interaction of the first two sets of instruments.
10. For each regression where we use an instrumental variable estimator,¹² we also computed the Sargan statistics. This statistics is reported in our results. This test provides some information as to whether the total population, number of retail outlets and the interaction of these two variables, within a specific isochrone meet the condition that instruments are not related with any unobserved factors that affect store variable profit margin. We note that in a number of cases, the Sargan statistics

¹² We use the two-stage-least-square regressor. Under the assumption that the errors are i.i.d. we compute the Sargan statistics to determine whether the selected instruments are not related with the regression residuals.

indicates that the instruments we use in this analysis may be related to factors that affect store margin, and which we do not observe. This could mean that the effect of local competitive conditions is biased and we may need to consider alternative instruments.

Local population and store characteristics

11. In our analysis, we control for local population characteristics and store characteristics, which may be important determinants of store margins. We discuss some of these variables in the following paragraphs.
12. We use demographic information to control for local population characteristics. These variables include the proportion of the local population that is unemployed; the average number of cars per household and the average income in the local population.
13. The high negative and statistically significant coefficient on the variable “unemployed” shows that as the greater the proportion of the population that is unemployed, the lower are store margins. This result suggests that store margins are higher, all else equal, for those stores located in areas with a more affluent population.
14. We control for a number of store characteristics, including store size, number of staff working at the store and various store facilities such as toilets. We find that store characteristics are important determinants of store performance. For example, stores with larger net sales area tend to have lower store margins and stores with more staff tend to have higher margins. Stores with a petrol forecourt tend to have lower margins and stores with a pharmacy in-store also tend to have lower margins.

It is possible that this is because sales at these facilities cannibalise sales from the store itself and reduce store margin.

15. The high coefficient on the indicator variable “toilets” suggests that stores with toilets have significantly higher margins. It is likely that this variable is picking up the effect of a store characteristic that is not measured in the analysis. It could be that stores with toilet facilities are more attractive to families shopping with young children and therefore tend to attract more customers doing large shopping trips than other stores without toilet facilities. It could also be that there is more likely to be toilet facilities in stores that have café and restaurant facilities, which could also make them more attract to families doing large shopping trips. We interact the indicator variable “toilets” with the size of the store and find that the coefficient is negative, which suggests that the presence of toilet facilities at smaller stores has a more important affect on store margin.
16. The high coefficient on the indicator variable “ATMs” suggests that stores with ATM facilities tend to have higher margins. It is not clear why this might be, but it is possible that this facility is also related to store size.

Annex 2 Construction of the store data set

17. [✂]

18. [✂]

19. [✂]

20. [✂]

Annex 3 Measures of revenue and direct cost for the margin calculation for each of the four retailers

1. In this Annex we describe the revenue and direct cost components of the margin calculations.
2. [X] has provided revenue data net of VAT, whilst [X],[X] and [X] have included VAT. [X] store costs include cost of goods sold, shrinkage, wages, salaries, consumables net of supplier income and net of small income streams such as concessions, post office income, commission etc.
3. [X] direct store costs include VAT, cost of goods sold, stock loss, staff discounts, [X], store labour, store controlled costs (utilities, carrier bags, wrapping materials, general equipment, refuse removal, trolleys, till losses, uniform and catering).
4. [X] store revenue is inclusive of VAT. Direct costs include the cost of goods sold (including all supplier discounts attributable to product lines), [X], internal packaging and development costs, recharge for incorrect prices invoiced to suppliers, supplier-funded discounts not attributable to individual product lines, [X], stock loss, store payroll costs and other store costs. [X] includes property expenses as direct store costs. We might expect property expenses to vary by store but not with the volume of groceries sold. Therefore, we need to exclude these costs from [X] cost data. We have asked [X] to provide this information and will incorporate it as soon as it is available.
5. [X] store costs include property expenses, security costs, cleaning, casual labour, overalls, petty cash, gardening, refuse, packaging and sundry items. We have separately collected from [X] store labour costs and costs of sales and use this to

calculate store gross margin. Although this is not an exact measure of store variable profit margin, we do not expect this to affect the results significantly.

Annex 4 OLS regression results with drive-time “bands”

Variable	[X]	[X]	[X]	[X]
Number of competitors in 10 minutes	[X]	[X]	[X]	[X]
Number of competitors in 10 to 20 minutes	[X]	[X]	[X]	[X]
Net sales area ('00 sq m)	[X]	[X]	[X]	[X]
Number of staff	[X]	[X]	[X]	[X]
Petrol forecourt	[X]	[X]	[X]	[X]
Pharmacy	[X]	[X]	[X]	[X]
ATMs	[X]	[X]	[X]	[X]
Toilets	[X]	[X]	[X]	[X]
Toilets * net sales area	[X]	[X]	[X]	[X]
Unemployed as a proportion of the population in 20 minutes	[X]	[X]	[X]	[X]
Urban/rural indicator variable = 1 if urban	[X]	[X]	[X]	[X]
Constant	[X]	[X]	[X]	[X]
N	[X]	[X]	[X]	[X]
F	[X]	[X]	[X]	[X]
r2	[X]	[X]	[X]	[X]
r2_a	[X]	[X]	[X]	[X]

Source: CC analysis

Notes:

* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

Annex 5 IV regression results, approach 1

Variable	[X]	[X]	[X]	[X]
Number of competitors in 10 minutes	[X]	[X]	[X]	[X]
Number of competitors in 10 to 20 minutes	[X]	[X]	[X]	[X]
Net sales area ('00 sq m)	[X]	[X]	[X]	[X]
Number of staff	[X]	[X]	[X]	[X]
Petrol forecourt	[X]	[X]	[X]	[X]
Pharmacy	[X]	[X]	[X]	[X]
ATMs	[X]	[X]	[X]	[X]
Toilets	[X]	[X]	[X]	[X]
Unemployed as a proportion of the population in 20 minutes	[X]	[X]	[X]	[X]
Urban/rural indicator variable =1 if urban	[X]	[X]	[X]	[X]
Toilets * net sales area	[X]	[X]	[X]	[X]
Constant	[X]	[X]	[X]	[X]
N	[X]	[X]	[X]	[X]
F	[X]	[X]	[X]	[X]
r2	[X]	[X]	[X]	[X]
r2_a	[X]	[X]	[X]	[X]

Source: CC analysis

Notes:

* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

Annex 6 IV regression results, approach 2 using an indicator variable = 1 when there is at least one competitor store within the drive-time

Variable	[X]	[X]	[X]	[X]
Effect of a competitor store within 10 minutes	[X]	[X]	[X]	[X]
Effect of a competitor store in 10-20 minutes	[X]	[X]	[X]	[X]
Net sales area ('00 sq m)	[X]	[X]	[X]	[X]
Number of staff	[X]	[X]	[X]	[X]
Petrol forecourt	[X]	[X]	[X]	[X]
Pharmacy	[X]	[X]	[X]	[X]
ATMs	[X]	[X]	[X]	[X]
Toilets	[X]	[X]	[X]	[X]
Unemployed as a proportion of the population in 20 minutes	[X]	[X]	[X]	[X]
Urban/rural indicator variable =1 if urban	[X]	[X]	[X]	[X]
Toilets * net sales area	[X]	[X]	[X]	[X]
Constant	[X]	[X]	[X]	[X]
N	[X]	[X]	[X]	[X]
F	[X]	[X]	[X]	[X]
r2	[X]	[X]	[X]	[X]
r2_a	[X]	[X]	[X]	[X]

Source: CC analysis

Notes:

* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level

Annex 7 OLS regression results for fascia effect

Variable	[X]	[X]	[X]	[X]
Net sales area ('00 sq m)	[X]	[X]	[X]	[X]
Number of staff	[X]	[X]	[X]	[X]
Petrol forecourt	[X]	[X]	[X]	[X]
Pharmacy	[X]	[X]	[X]	[X]
ATMs	[X]	[X]	[X]	[X]
Toilets	[X]	[X]	[X]	[X]
Unemployed as a proportion of the population in 10 minutes	[X]	[X]	[X]	[X]
Toilets * net sales area	[X]	[X]	[X]	[X]
Urban/rural indicator variable =1 if urban	[X]	[X]	[X]	[X]
Indicator variable = 1 if Tesco store in 10 minutes	[X]	[X]	[X]	[X]
Indicator variable = 1 if Sainsbury's store in 10 minutes	[X]	[X]	[X]	[X]
Indicator variable = 1 if Morrisons store in 10 minutes	[X]	[X]	[X]	[X]
Indicator variable = 1 if Asda store in 10 minutes	[X]	[X]	[X]	[X]
Constant	[X]	[X]	[X]	[X]
N	[X]	[X]	[X]	[X]
F	[X]	[X]	[X]	[X]
r2	[X]	[X]	[X]	[X]
r2_a	[X]	[X]	[X]	[X]

Source: CC analysis

Notes:

* statistically significant at 10% confidence level, ** statistically significant at 5% confidence level, * statistically significant at 1% confidence level