

Entry analysis

Introduction

1. The purpose of this appendix is to examine the effects of entry of a grocery store on the performance of incumbent grocery stores in the local area. Our analysis is based on revenue data for incumbent stores for the period from mid-2001 to mid-2006.¹ In particular, we are seeking to understand how the change in incumbent store revenue varies with the size of the incumbent and entrant store, the distance between the stores and the fascias of the incumbent and entrant stores. We also assess how the effect varies with the strength of the incumbent's pre-entry local position.
2. Given the large number of entries as well as a number of contemporaneous effects that we aim to control for (seasonal effects, for example), our analysis is regression-based. More details on the estimation method we use can be found in Annex 2. In that annex we also discuss reasons that may mean that our results, whilst meaningful in terms of the differential effects of distance, store size and fascia, may be conservative estimates of the effect of entry on incumbent revenue.

Summary statistics

3. The following two tables provide summary statistics on the extent of observed new-build store entry. Table 1 gives the number of incumbent stores larger than 280 sq metres for which we observe new-store entry of another store larger than 280 sq metres within a drive-time of 10 minutes during the period mid-2001 to mid-2006.
4. Across all fascias, we observe 1,713 entries within 10 minutes' drive-time during the period of the analysis. However, 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. It is also possible that a single incumbent store is counted more than once, for example if it has been exposed to entry by various fascias or if it has been exposed to entry by more than one store of the same fascia.
5. Table 2 summarizes the average net sales area of the entrant store relative to the net sales area of the incumbent store, separately for each observed incumbent-entrant fascia pair. Variation in the relative size of the entrants reflects (to some extent) differences in the size distribution of each fascia's stores. For example, [X] and [X] entrant stores were on average larger than the average entrant store of other fascias.²

¹See Annex 1 for more details on the data used and fascia included in the estimations.

²In the estimations we allow for the effects of entry to vary according to the size of the incumbent and entrant store.

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

Number of incumbent stores exposed to entry, by fascia	Entrant fascia (within 10 minutes' drive-time):												
	Aldi	Asda	Co-op (CGL)	Co-op (reg)	Iceland	Lidl	Morrisons	M&S	Netto	Sainsbury's	Somerfield	Tesco	Waitrose
Aldi													
Asda													
Co-op (CGL)													
Co-op (reg)													
Iceland													
Lidl													
Morrisons													
M&S													
Netto													
Sainsbury's													
Somerfield													
Tesco													
Waitrose													
Total													

Source: CC analysis.

Note: Number of sampled incumbent stores above 280 sq metres exposed to entry by a new store above 280 sq metres within 10 minutes' drive-time. Period of the analysis is mid-2001 to mid-2006.

TABLE 2 **Relative size of entrant stores (10 minutes)**

Incumbent stores exposed to entry, by fascia	Entrant fascia (within 10 minutes' drive-time):													
	Aldi	Asda	Co-op (CGL)	Co-op (reg)	Iceland	Lidl	Morrisons	M&S	Netto	Sainsbury's	Somerfield	Tesco	Waitrose	
Aldi														
Asda														
Co-op (CGL)														
Co-op (reg)														
Iceland														
Lidl														
Morrisons														
M&S														
Netto														
Sainsbury's														
Somerfield														
Tesco														
Waitrose														

Source: CC analysis.

Note: Estimates are based on the sum of the net sales area of entrant(s) stores within 10 minutes' drive-time relative to the net sales area of the incumbent store. We include all stores with a net sales area greater than 280 sq metres. Period of the analysis is mid-2001 to mid-2006.

Estimation results

6. Our regressions relate the change in the incumbent store's revenue over time to various measures of entry.³ The following results are based on average weekly revenues per quarter over the period mid-2001 to mid-2006.⁴ Each regression includes dummy variables that capture quarter-specific (seasonal) effects for individual fascias and a (potential) trend in revenue growth for each of 12 UK regions. In this way, we isolate the incumbent's revenue response to entry from a regional trend in revenue growth and contemporaneous average revenue growth at the fascia level, which captures fascia-specific seasonal effects as well as the effect of fascia-wide promotions in the particular quarter or month. In addition, all regressions include dummy variables that capture the revenue effect of own-store refurbishment for the two quarters following refurbishment. We only consider refurbishments that cost £500,000 or more.
7. To allow for the possibility that entry may have a gradual and sustained impact on incumbent revenue, all regressions include lags of the entry measure. We therefore estimate the revenue effect in the quarter of entry as well as in the two subsequent quarters. These estimated quarterly responses are then combined to provide an estimate of the medium-term effects on new-build store entry.⁵
8. A full specification of the model can be found in Annex 2. There we also discuss a number of issues which we believe may have resulted in the results reported in this appendix being conservative estimates of the actual entry effects.

Store-count entry measure

9. We first present results using a store count measure of entry. Table 3 shows the estimated medium-term effect from entry of different size stores on the revenues of different size incumbent stores. By grouping entry events according to size and undertaking separate regressions on incumbent stores less than and greater than 1,400 sq metres we allow for the effects of entry to vary according to the size group of the entrant and incumbent.⁶ We report the regression coefficients used to estimate medium-term revenue impact in Table 1 of Annex 3.

³We use the difference in the natural logarithm of revenue as our measure for the change of store performance, because it can be derived directly from a standard empirical model (see Annex 2 for more details).

⁴We use this measure of revenue to allow for the fact that the periodicity of our revenue data differs across fascias.

⁵The exact period of the revenue effect will vary depending on when entry occurred within the quarter. Thus we estimate the effect over a six- to nine-month period.

⁶This approach assumes that each entrant store within a size group has the same effect on an incumbent store within a size group.

TABLE 3 Estimated medium-term percentage revenue effect on incumbent stores from entry by another store

	1 <i>Revenue effect (%) on incumbent stores 280–1,400 sq m</i>	2 <i>Revenue effect (%) on incumbent stores greater than 1,400 sq m</i>
Entry of mid-size store (280–1,400 sq m):		
—within 5 minutes' drive-time	-5.4***	-1.6***
—within 5 to 10 minutes' drive-time	-2.3***	-0.27
—within 10 to 15 minutes' drive-time	-0.59	-0.44
—within 15 to 20 minutes' drive-time	-0.38	0.3
Entry of large store (1,400–4,000 sq m):		
—within 5 minutes' drive-time	-15***	-7.1***
—within 5 to 10 minutes' drive-time	-2.1	-5.1***
—within 10 to 15 minutes' drive-time	0.37	-2.3***
—within 15 to 20 minutes' drive-time	-0.31	-0.7
Entry of very large store (>4,000 sq m):		
—within 5 minutes' drive-time	-12***	-11***
—within 5 to 10 minutes' drive-time	-4.4***	-6.9***
—within 10 to 15 minutes' drive-time	-0.23	-2***
—within 15 to 20 minutes' drive-time	0.54	-0.24
Store-quarter observations	28,070	21,868

Source: CC analysis.

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

10. Column 1 of Table 3 shows that entry by either a large (1,400 to 4,000 sq metres) or very large (greater than 4,000 sq metres) store had a much greater average percentage revenue effect on stores with a net sales area less than 1,400 sq metres than entry by other mid-size (280 to 1,400 sq metres) stores. The results in column 2 indicate that entry by large and very large stores had a greater percentage effect on the revenues of stores with a net sales area greater than 1,400 sq metres. The results also show that the entry by a mid-size store tended to affect only the revenues of larger stores when the stores were closely located (ie within a 5-minute drive-time). In contrast, entry by larger stores had a much wider effect at up to 15 minutes' drive-time. These results are consistent with an asymmetric constraint between stores whereby larger stores place a greater competitive constraint on smaller stores than vice versa.

Relative size entry measure

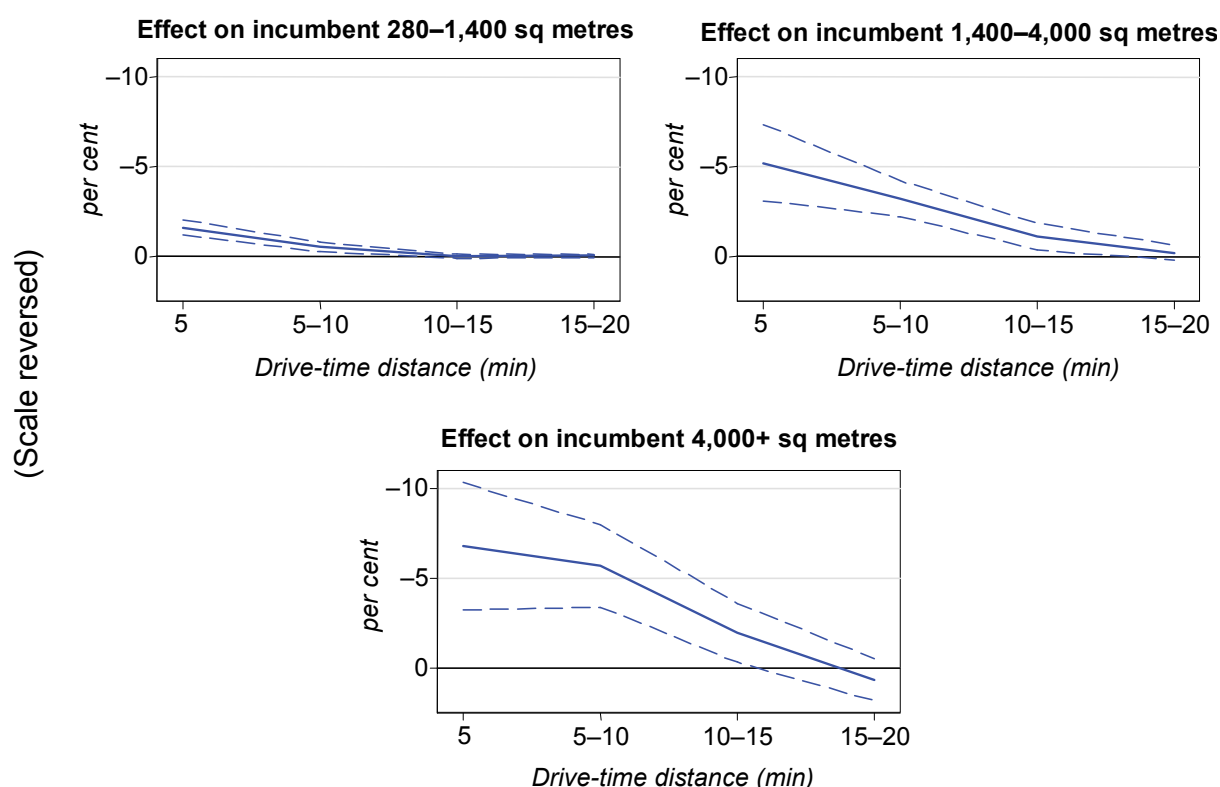
11. Whilst the store-count measure provides useful insights into the entry effects of different store size groups, it does not account for size differences between each individual entrant and incumbent store. We would expect a larger impact, all other things being equal, when the entrant store is large relative to the incumbent.
12. We now present results using an alternative measure of entry which accounts for these differences and allows us to isolate the effects of distance on store revenues from the effect of stores of different size. Entry is measured as the sum of the entrant store(s) net sales area relative to the incumbent stores net sales area. For example, if the net sales area of an incumbent store was 500 sq metres and there were two new entrants with net sales areas of 500 and 1,000 sq metres, the entry measure would be 3.⁷

⁷This measure is the same as if there were three stores of equal size entering using the store count method.

13. In the previous analysis we grouped entrants and incumbent according to size to provide insights into the extent to which the effects of entry varied according to store size group. Using the relative measure of entry and restricting the analysis in this way makes little sense since the resulting coefficients provide estimates of the effect from entry of an equal size store. However, we still wish to allow for a (potential) non-linear effect of entry and so we estimate separate effects on different incumbent size groups (more precisely we estimate the additional effect of different size groups relative to a base size group using dummy variables).⁸
14. Figure 1 shows the estimated medium-term percentage revenue effect from entry of a store of equal size to the incumbent. We find that entry (by a store of equal size) within 5 minutes of a mid-size incumbent store reduced revenues by an average of 1.6 per cent, whereas entry by a large and very large store reduced incumbent revenues on average by around 5.2 and 6.8 per cent respectively. We find the strongest negative effect for nearby entry (ie 5 minutes) and decreases in both economic and statistical significance with increasing distance between incumbent and entrant store, with no statistically significant entry effects beyond 15 minutes' drive-time. The dashed lines indicate the 95 per cent confidence interval and are indicative of the variation in the entry effect.

FIGURE 1

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



Source: CC analysis.

Notes:

1. Estimates (lines) and 95 per cent confidence interval (dash).
2. Using data for incumbent stores with net sales area of 280 sq metres or more.

⁸Using a relative measure of entry and not grouping stores would assume that the effects of entry of a 300 sq metre store close to 600 sq metre incumbent store would be the same as a 1,500 sq metre store opening close to a 3,000 sq metre incumbent store (both entry measures would be 2).

15. It is important to note that our estimates of the revenue effect do not account for a potentially endogenous relationship between revenue growth and new-store entry. In Annex 2, we argue that the corresponding estimation bias is likely to lead us to conservative estimates of the competitive impact of new-store entry.
16. Table 4 shows the medium-term estimates presented in Figure 1. The coefficients upon which these medium-term estimates are derived can be found in Tables 2 and 3 of Annex 3. The revenue effects for different entrant-incumbent size combinations are simply scalars of the 'same size' effects reported.⁹ The declining effect with distance between entrant and incumbent store is clear. We also find evidence that entry beyond 10 minutes' drive-time of a mid-size incumbent had no significant revenue effect, whereas entry at up to 15 minutes by a store of equal size to a large and very large incumbent has a significant effect.

TABLE 4 Medium-term entry effects from entry by a store of equal size to the incumbent

	Revenue effect (%) from entry of one store of equal size		Revenue effect (%) from entry of one store of equal size
<i>Effect on mid-size incumbent (280–1,400 sq m)</i>		<i>Effect on mid-size incumbent (280–2,000 sq m)</i>	
Entry within 5 minutes' drive-time	-1.6***	Entry within 5 minutes' drive-time	-1.7***
Entry within 5–10 minutes' drive-time	-0.56***	Entry within 5–10 minutes' drive-time	-0.61***
Entry within 10–15 minutes' drive-time	-0.014	Entry within 10–15 minutes' drive-time	-0.021
Entry within 15–20 minutes' drive-time	-0.024	Entry within 15–20 minutes' drive-time	-0.015
<i>Effect on large incumbent (1,400–4,000 sq m)</i>		<i>Effect on large incumbent (2000–4,000 sq m)</i>	
Entry within 5 minutes' drive-time	-5.2***	Entry within 5 minutes' drive-time	-6.4***
Entry within 5–10 minutes' drive-time	-3.2***	Entry within 5–10 minutes' drive-time	-3.3***
Entry within 10–15 minutes' drive-time	-1.1***	Entry within 10–15 minutes' drive-time	-1.3***
Entry within 15–20 minutes' drive-time	-0.26	Entry within 15–20 minutes' drive-time	-0.21
<i>Effect on very large incumbent (>4,000 sq m)</i>		<i>Effect on very large incumbent (>4,000 sq m)</i>	
Entry within 5 minutes' drive-time	-6.8***	Entry within 5 minutes' drive-time	-6.8***
Entry within 5–10 minutes' drive-time	-5.6***	Entry within 5–10 minutes' drive-time	-5.6***
Entry within 10–15 minutes' drive-time	-2**	Entry within 10–15 minutes' drive-time	-2**
Entry within 15–20 minutes' drive-time	0.64	Entry within 15–20 minutes' drive-time	0.66
Store quarter observations	49, 938	Store quarter observations	49,938

Source: CC analysis.

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

17. Table 4 also reports comparable estimates for 2,000 sq metres as a group boundary. The negative results are a little higher but the differentials remain. Comparing Tables 3 and 4 shows that the estimates using the relative measure of entry are around half as large as those obtained using the store count measure. This is because, on average, new entrants were around double the size of incumbent stores.
18. The key finding from these estimations is that entry by a store of equal size to the incumbent had a much greater percentage impact when the entrant was larger and that the negative revenue effects decline with increasing distance between entrant and incumbent stores, with no evidence of a significant revenue impact after 15 minutes. This suggests that customers tend to shop locally. It is also consistent

⁹For example, an entrant twice the size of a large incumbent within 5 minutes' drive-time led to an average decline in store revenues of 10.4 per cent.

with the notion of local competition in grocery retailing. We now turn our attention to fascia-specific estimates.

Fascia-specific estimates

19. Table 5 presents fascia-specific estimates of the medium-term revenue effects of entry within 10 minutes' drive-time. These estimates are based on regressions which are similar to those described above but are separately estimated for each fascia while allowing the incumbent revenue effect to vary depending on the entrant fascia. It is important to note from Table 1 the small number of observed entry observations for some entrant-incumbent fascia pairs. We present the regression coefficients upon which the medium-term estimates are derived in Tables 4 to 7 of Annex 3.
20. We continue to use our relative measure of entry and so account for relative differences in store size between incumbent and entrant. We do not allow the effects to vary according to the size group of the incumbent fascia due to the small number of observations for some fascia pairs. For the same reason, we also only distinguish between two bands of distance between entrant and incumbent (up to 10 minutes' and between 10 and 20 minutes' drive-time).

TABLE 5 Estimated average medium-term revenue effect (%) from entry within 10 minutes' drive-time, by fascia (size-scaled)

Incumbent stores exposed to entry by fascia	Entrant store fascia												
	Morrisons	Asda	Tesco	Sainsbury's'	M&S	Co-op (reg)	Co-op (CGL)	Somerfield	Waitrose	Aldi	Lidl	Netto	Iceland
Asda	- *	- ***	- ***	+	- *	-	.	.	+	-	+	-	.
Morrisons	- ***	-	- **	- *	+	-	.	.	+	-	+	-	.
Tesco	-	- **	- **	- ***	- *	- **	.	-	- **	+	-	+	.
Sainsbury's	- *	- ***	- ***	- ***	- ***	+	-	+	- *	+	- ***	+	.
Waitrose	-	- **	- ***	- ***	+	+	.	.	- ***	-	-	.	.
M&S	-	- ***	-	-	- *	-	+	+	-	+	-	+	.
Somerfield	-	-	- ***	+	-	+	.	.	+	-	-	-	.
Co-op (CGL)	-	-	- ***	+	-	.	-	-	-	-	-	+	.
Co-op (reg)	+	- ***	- **	- ***	-	-	.	.	+	-	-	.	.
Lidl	+	- **	-	.	-	-	.	+	.	- **	-	.	.
Netto	-	- ***	-	-	-	- *	+	.	+	-	- **	- ***	.
Aldi	-	-	-	+	-	-	.	.	+	-	- ***	-	.
Iceland	-	- **	+	.	-	- *	.	-	-	-	+	.	.

Source: CC analysis.

Notes:

1. We estimate the impact from entry of a store of equal size. The results reported here indicate the sign and statistical significance of the estimated medium-term revenue effect.
2. Asterisks indicate that the medium-term estimate is significantly different from zero with the following confidence levels: *90%, **95%, ***99%.
3. A dot indicates that we do not observe an entry event for the incumbent-entrant fascia pair during the period of the analysis.

21. Table 6 summarizes those fascias which had a statistically significant effect on the revenues of stores operated by the incumbent fascia when they opened a store within a 10-minute drive-time (we exclude own-fascia entry).

TABLE 6 Statistically significant entry effects, by incumbent fascia

Incumbent	Entrant	Incumbent	Entrant	Incumbent	Entrant
	*				
	*				
					*
	*		✂		
	*				
	*		*		

Source: CC analysis.

Note: A single asterisk indicates that evidence of a significant effect is weak.

22. The analysis shows that, in most cases, there is a statistically significant negative impact on the revenue of Asda, Morrisons, Sainsbury's, Tesco and Waitrose stores following the entry of a new store by one of these competitors. With the exception of the entry of a Lidl store on a Sainsbury's store, we find little evidence that entry by a LAD store (Lidl, Netto and Aldi) had a statistically significant impact on the revenues of stores operated by Tesco, Sainsbury's, Asda, Waitrose or Morrisons, although we do observe statistically significant effects in several cases when analysing the effect of the opening of one LAD store on an incumbent LAD store. We find some evidence that M&S entry had a statistically significant effect on a number of different fascia stores, including Asda, Tesco and Sainsbury's; although only the effect on Sainsbury's was statistically significant at the 5 per cent level. We also find that only Asda entry had a significant effect on M&S revenues. The effect on other fascias might be partly explained by the large non-grocery offering of some stores, which might suggest that in this case, the analysis is identifying an impact on non-grocery revenue.¹⁰

Strength of incumbent's pre-entry local position

23. So far we have used two measures of new-build entry. The first approach used a store count measure and by grouping entrants and incumbents according to size we allowed for the effects to vary according to size group. The second approach used the size of the entrant store(s) relative to the incumbent store. This allowed for the entry effect to vary within size groups as well and by controlling for size differentials in this way we can estimate the impact from entry of a store of equal size.

¹⁰The revenue data we use does not allow us to strip out non-grocery revenues. We note, however, evidence submitted by M&S in relation to the effect of entry on its Simply Food stores.

24. However, it may also be the case that the strength of an incumbent's pre-entry local position has an effect on the entry impact. We might expect that the effects of entry would be much higher in situations where the incumbent store has a high share of local net sales area (ie a strong local position) than in a case where the incumbent has a weak position (even if the entrant is small relative to the incumbent). Equally, where an incumbent has a weaker local position, entry may have a very large effect if the entrant is very large. We therefore undertake further analysis where we allow for the estimated entry effects to vary depending on the incumbent's pre-entry local position.
25. To do this, we use two different relative entry measures to isolate the effect of the size of the incumbent from the effect of the incumbent's pre-entry local position—both effects contribute to the overall business stealing effects:
 (a) entrant store(s) net sales area/incumbent store net sales area; and
 (b) entrant store(s) net sales area/total pre-entry net sales area of all stores within 10 minutes' drive-time of the incumbent store.
26. Adopting a stylized version of the actual model used,¹¹ we therefore estimate:
- (i)
$$\Delta rev = \beta_1 \frac{\text{Entrant size}}{\text{Incumbent size}} + \beta_2 \frac{\text{Entrant size}}{\text{Total size 10}}$$
- This is actually a reduced form of the true effect we wish to capture:
- (ii)
$$\Delta rev = \beta_1 \frac{\text{Entrant size}}{\text{Incumbent size}} + \beta_2 \frac{\text{Entrant size}}{\text{Incumbent size}} \cdot \frac{\text{Incumbent size}}{\text{Total size 10}}$$
- The interaction between the two measures in equation (ii) allows us to examine how the revenue effect varies with differences in the local position of the incumbent.
27. Table 7 presents the regression results with and without this additional measure of entry. We use dummy variables to identify separate effects on mid-size (280 to 1,400 sq metres) and large (greater than 1,400 sq metres) incumbent stores.¹² Specification [1] reproduces the analysis we have undertaken previously using the entrant size/incumbent size measure of entry (but for two incumbent size groups). We interpret the results as follows: in the quarter of entry, revenue of a mid-size (280 to 1,400 sq metres) incumbent within 5 minutes declined on average by 0.65 per cent, a further 0.73 per cent in the next quarter and a further 0.16 per cent in the second quarter after entry. The medium-term impact was therefore a decline of around 1.5 per cent.
28. Specification [2] in Table 7 includes our additional entry measure: entrant net sales area/total net sales area within 10 minutes of the incumbent store (the coefficient label takes an M to indicate this measure). We interpret the results slightly differently from the previous specification as the impact from entry is the combined effect of the two entry measures in each quarter (the three quarterly measures are then combined to form the medium-term effect). The coefficient 'revenue change in quarter of entry' indicates the estimated revenue effect from entry of a store of equal size to the incumbent. The coefficient 'revenue change in quarter of entry—M' indicates the estimated revenue effect from entry on an incumbent store which had no other stores above 280 sq metres present within 10 minutes' drive-time.

¹¹See Annex 2 for a full description of the model used.

¹²In these regressions we use dummy variables to capture both incumbent groups and so drop the constant term when running the regressions. We therefore estimate the average effect on mid-size and larger incumbents rather than estimating the additional effect from size relative to a base group as before.

29. The estimates reported in Table 7 using specification [2] are for the scenario where both measures of entry are equal to 1, ie the entrant is 1,000 sq metres, the incumbent is 1,000 sq metres, and there are no other stores within 10 minutes of the incumbent store. The key feature of specification [2] is that the larger the incumbent store relative to the total net sales area of all stores within 10 minutes, the greater the effect the coefficient 'revenue change in quarter of entry—M' will have on the overall result.
30. In terms of interpreting the results, for the case of entry within 5 minutes of a mid-size incumbent store, it can be seen that when the entrant is the same size as the incumbent and there were no other stores within 10 minutes' drive-time of the incumbent, entry reduced the incumbent's revenue on average by 15.85 per cent in the quarter of entry (-16 per cent + 0.15 per cent). Combining the effects over the three quarters generates an average medium-term effect of around -26 per cent.
31. Comparing specifications [1] and [2], it can be seen that a large part of the negative revenue effect from entry was determined by the size of the incumbent relative to total net sales area within 10 minutes' drive-time: when a store had a stronger local position the negative impact on revenue from entry was higher.

TABLE 7 Regression coefficients after controlling for pre-entry local dominance

	[1]	[2]
Effect on incumbent store 280–1,400 sq m		
<i>Entry within 5 minutes' drive-time</i>		
Revenue change in quarter of entry	-.0065***	0.0015
Revenue change quarter after entry	-.0073***	-0.00081
Revenue change in 2nd quarter after entry	-.0016**	-.0016**
Revenue change in quarter of entry—M	.	-.16***
Revenue change quarter after entry—M	.	-.12***
Revenue change in 2nd quarter after entry—M	.	0.00052
<i>Entry within 5–10 minutes' drive-time</i>		
Revenue change in quarter of entry	-.0016**	-0.00023
Revenue change quarter after entry	-.0019***	-0.00044
Revenue change in 2nd quarter after entry	-.0017*	-0.0015
Revenue change in quarter of entry—M	.	-.034**
Revenue change quarter after entry—M	.	-.032***
Revenue change in 2nd quarter after entry—M	.	-0.0038
<i>Entry within 10–15 minutes' drive-time</i>		
Revenue change in quarter of entry	0.00037	0.00055
Revenue change quarter after entry	-0.0005	-0.0003
Revenue change in 2nd quarter after entry	0.00014	0.00034
Revenue change in quarter of entry—M	.	-0.0037
Revenue change quarter after entry—M	.	-0.0047
Revenue change in 2nd quarter after entry—M	.	-.004*
<i>Entry within 15–20 minutes' drive-time</i>		
Revenue change in quarter of entry	0.00027	0.00025
Revenue change quarter after entry	0.00018	0.00021
Revenue change in 2nd quarter after entry	-0.00028	-0.00039
Revenue change in quarter of entry—M	.	-0.00022
Revenue change quarter after entry—M	.	-0.00087
Revenue change in 2nd quarter after entry—M	.	0.0012
Effect on incumbent store >1,400 sq m		
<i>Entry within 5 minutes' drive-time</i>		
Revenue change in quarter of entry	-.027***	-0.0029
Revenue change quarter after entry	-.024***	-0.0067
Revenue change in 2nd quarter after entry	-0.0044	-0.0047
Revenue change in quarter of entry—M	.	-.12**
Revenue change quarter after entry—M	.	-.089***
Revenue change in 2nd quarter after entry—M	.	-0.00078
<i>Entry within 5–10 minutes' drive-time</i>		
Revenue change in quarter of entry	-.017***	-.0098*
Revenue change quarter after entry	-.014***	-0.0039
Revenue change in 2nd quarter after entry	-.0043***	-.0086***
Revenue change in quarter of entry—M	.	-.041**
Revenue change quarter after entry—M	.	-.057***
Revenue change in 2nd quarter after entry—M	.	.022**
<i>Entry within 10–15 minutes' drive-time</i>		
Revenue change in quarter of entry	-.0072***	0.0038
Revenue change quarter after entry	-0.0031	-0.00097
Revenue change in 2nd quarter after entry	-.0037***	-.0043**
Revenue change in quarter of entry—M	.	-.06***
Revenue change quarter after entry—M	.	-0.013
Revenue change in 2nd quarter after entry—M	.	0.0025
<i>Entry within 15–20 minutes' drive-time</i>		
Revenue change in quarter of entry	-0.001	0.00029
Revenue change quarter after entry	.0027**	.0049**
Revenue change in 2nd quarter after entry	-.0041***	-.0051***
Revenue change in quarter of entry—M	.	-0.0071
Revenue change quarter after entry—M	.	-.011*
Revenue change in 2nd quarter after entry—M	.	0.0038
Drefurb500K	-.011***	-.011***
Drefurb500KL1	.034***	.034***
Drefurb500KL2	0.0017	0.0018
Observations	49,938	49,938
R ²	0.594	0.598

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficient is significantly different from zero with the following confidence levels: *90%, **95%, ***99%.

Data/scope

1. Our analysis is based on average weekly revenue per quarter for incumbent stores over the period mid-2001 to mid-2006.¹ By using average weekly revenue per quarter, we accommodate the fact that the periodicity of our revenue data differs across stores: for most stores, revenue is recorded per calendar month, but for a considerable number it is recorded per four-week period and thus for 13 periods in total per calendar year. Our dependent variable in the regressions is the quarterly change (first difference) in the log of average weekly revenue per quarter, which is a measure of the quarterly percentage change in revenue.
2. We include stores with a net sales area greater than 280 sq metres of the following fascia as incumbents: Asda, Aldi, Booths, Budgens, Regional Co-op² (Co-op Anglia, Co-op East England, Co-op Heart England, Co-op Leeds, Co-op Lincolnshire, Co-op Mid-counties, Co-op Midlands, Co-op Plymouth & SW and Co-op Scottish Midland), Co-op (main) Farm Foods, Iceland, Lidl, M&S, Morrisons, Netto, Sainsbury's, Somerfield, Tesco and Waitrose.³
3. Some 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 include these stores only 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.
4. We observe entry by stores with a net sales area greater than 280 sq metres of the following fascias: Asda, Tesco, Sainsbury's, Morrisons, Waitrose, M&S, Somerfield, CGL, Co-op (regional) Aldi, Netto, Iceland and Lidl. An entry event includes both the building of a new store and also the conversion of a non-grocery store. We exclude the transfer of an *existing* grocery store from one fascia to another from our definition of entry as this reflects product repositioning rather than new entry.
5. Drive-time distance between stores is based on a geographic mapping of postcodes provided by CACI using a geographic information system.

¹Some parties have provided revenue data net of VAT whilst others have included VAT, but since we only compare percentage changes in revenue across stores, the results presented here should remain unaffected.

²In the estimations we group the various Co-op regional fascias.

³For a few stores, we are missing data on net sales area and so for these stores we currently use a proxy based on data from other stores of the same fascia.

Estimation method

1. We set out below our estimation method and a number of factors which lead us to believe that our estimates are conservative estimates of the revenue impact from new store entry.

General approach

2. Our estimates relate the change in incumbent quarterly revenue to a measure of entry, controlling for fascia-specific seasonal effects, a trend growth in revenue at the regional level and own-store refurbishment. The resulting estimates are equivalent to a difference-in-differences estimator where the control group of stores includes all stores of the same fascia that are situated in the same region as the incumbent store. In other words, the estimated coefficient captures the difference in the quarterly change in revenue between stores that experienced nearby entry and other stores of the same fascia in the region.¹⁶

Store revenue as performance measure

3. We are seeking to understand whether, and by how much, an incumbent store's revenue changes when it is exposed to new-store entry. By combining the effect of changes in prices and quantities (customer switching), store revenue effectively measures the outcome of competition. In the absence of sufficient data on PQRS, changes in store revenue thus indirectly measure the competitive process. Tesco submitted that by considering store revenue, our results reflect purely a 'volume' (or business stealing) effect of entry. However, even if the estimated change in revenue was driven purely by volume, it would still indicate the extent and direction of customer switching. An assessment of the change in incumbent revenue after entry of a new store is therefore useful in providing information on customer substitution patterns and the competitive conduct of grocery retailers.¹⁷
4. In addition, the incumbent store may respond to entry by varying other aspects of the retail offer that our data does not capture sufficiently (at least not over time for a given store). For example, the incumbent may change its product range by adding or replacing certain low-price products in response to entry. In this case, store revenue may change even if none of its customers switch to the entrant. Or the incumbent may change opening hours or checkout waiting times, which affects the customer cost of shopping even if product prices remain the same. Further details of the evidence that grocery retailers have provided to us regarding their competitive responses to local entry are set out in Appendix 4.4. In effect, PQRS responses may keep some customers from switching to the new store and may thus counteract the entrant's effect on incumbent revenue. We expect that this may soften the incumbent's revenue change in response to entry.

¹⁶Although we are not aware of particular problems associated with our approach, we note that an alternative approach which defines a smaller and specific control group stores for each incumbent, may further improve the methodology. Unfortunately, we have not received any submissions on what detailed criteria might be used to define an alternative control group of stores to enable us to implement a sensitivity test of our results with this alternative methodology.

¹⁷The corresponding results are helpful in a market definition exercise, but they do not directly translate into a SSNIP test.

Regression specification

5. Revenue of a store depends on a number of factors including store characteristics (such as net sales area and PQRS), local demand factors (such as mean household income), fascia characteristics (such as the quality of own-label products and fascia-wide promotions), as well as seasonal effects (such as the Christmas effect). A standard functional form for an empirical analysis of this dependence is the semi-logarithmic form:

$$(1) \quad \log(R_{ifgt}) = x_{1,i}\beta_1 + x_{2,it}\beta_2 + x_{3,gt}\beta_3 + x_{4,ft}\beta_4 + \varepsilon_{ifgt},$$

where the dependent variable is the natural logarithm of store i 's revenue in period t , the β s are parameters to be estimated, $x_{1,i}$ contains time-invariant characteristics of store i and local demand around store i (including a store-specific constant term), $x_{2,it}$ contains time-variant store characteristics (including measures of local competition around store i), $x_{3,gt}$ and $x_{4,ft}$ represent (seasonal) effects at the region and fascia level.

6. By looking at first differences in store performance, we can implicitly account for time-invariant store and demand characteristics while focusing on inter-temporal dynamics (where Δz denotes first-differences of variable z):

$$(2) \quad \Delta \log(R_{ifgt}) = \Delta x_{2,it}\beta_2 + \Delta x_{3,gt}\beta_3 + \Delta x_{4,ft}\beta_4 + \Delta \varepsilon_{ifgt}$$

7. For example, if $x_{2,it}$ contains information on market structure around store i (say, the number of stores above 1,400 sq metres within 10 minutes' drive-time), then coefficient β_2 gives the estimated change in revenues associated with the entry of an additional store above 1,400 sq metres within 10 minutes' drive-time. If $x_{2,it}$ *only* contains information on entry of a certain type, then coefficient β_2 can be interpreted as a difference-in-differences estimator, where the control group of stores is defined by $\Delta x_{3,gt}$ and $\Delta x_{4,ft}$. However, $x_{2,it}$ may in addition contain information on store characteristics that change over time. In particular, the date at which a store has been refurbished marks a discrete change in store characteristics that we aim to account for in estimation. Store-specific time-variant data on opening hours, local promotions and product range may be used as well, but unfortunately this data is not available for most stores in our sample.
8. To allow for the possibility that incumbent revenue responds gradually to entry, we include lagged values of the corresponding entry variable. The medium-term revenue response to entry can then be derived from a combination of the estimated coefficients for all employed lags. For example, a regression with two lagged values of $\Delta x_{2,it}$ gives three coefficients: one for the contemporaneous effect ($b_{2,L0}$) and two for the lagged effects ($b_{2,L1}$; $b_{2,L2}$). An estimate for the medium-term effect can then be calculated as $(1 + b_{2,L0}) * (1 + b_{2,L1}) * (1 + b_{2,L2}) - 1$. This being a non-linear combination of regression coefficients, we use the delta method to obtain the standard error of this estimate (see Wooldridge (2002), *Econometric Analysis of Cross Section and Panel Data*, pp44ff).
9. We specify the seasonal effect as a time-specific revenue change that is common to all stores of fascia f , which may be due, for example, to fascia-wide changes in PQRS but it may also capture fascia-specific seasonal effects ($\Delta x_{4,ft} = \lambda_{ft}$). We also allow for a time trend in revenue growth common to all stores in region g ($\Delta x_{3,gt} = \lambda_{gt}$), which, for example, proxies for demographic changes in region g .¹⁸ In other words, when estimating the average revenue response to entry at the store level, we correct

¹⁸A more flexible specification that allows for a time-specific regional effect has the disadvantage that it is very likely to pick up some of the entry effect, as entrant stores do not feed into estimation of the regional effect (for incumbent stores that opened or closed during the period of our sample, we omit revenue observations within six months of the opening or closure date).

for contemporaneous average revenue growth at the fascia level as well as a regional time trend in revenue growth.

Absolute values of the estimates

10. Parties have submitted that our previous estimates of the effect of entry on incumbent revenue seem relatively low from industry experience (the estimates reported in this appendix are very similar to those previously reported). In its 'Initial response to [the second] market definition working paper', Tesco argued that the entry analysis results reported in our second working paper on market definition 'leave 75 per cent of [the entrant's] sales unexplained' (p4). This number results from a highly stylized application of our estimates, where an entrant store is estimated to gain about 25 per cent of its revenue from five equally-sized incumbent stores within 10 minutes' drive-time. According to Tesco, a realistic share would be around [X] per cent, as it would expect the entrant to gain about [X] per cent of its revenue from smaller grocery stores and independents. Tesco therefore concluded that the entry paper's results must 'substantially underestimate the revenue impact of new entry' (p16).
11. However, Tesco's figure of 75 per cent is unlikely to include all of the entrant's revenue gains from similarly-sized stores. First, it is based on estimates that understate the incumbent store's revenue change. Second, in Tesco's stylized example it is assumed that the entrant does not gain any revenue from stores beyond 10 minutes. Yet, the entry effect on stores within 10 to 15 minutes was (and remains) significant in some of the results reported in our second working paper on market definition, suggesting that there is a diminishing yet sizeable effect within 10 to 15 minutes. If we amend Tesco's example accordingly, we find that our estimates and methodology seem to account for a more reasonable part of the entrant's revenue gain.¹⁹
12. We agree that our estimates of the change in an incumbent store's revenue may understate the true effect of local entry. Nevertheless, as long as the bias is systematic we would not expect unbiased estimates to lead to qualitatively different findings regarding the relative size of incumbent and entrant store, the distance between the stores, and stores of different fascias.
13. The working paper on entry analysis (April 2007) and the further results in Annex 2 of the working paper on market definition (May 2007) both discuss the possibility that the estimates may be biased. First, there is a two-way causal relationship between incumbent revenue growth and new store entry. For example, there may be anticipated demand growth at a narrow local level that differs significantly from regional growth and leads to local new-store entry. In this case, our negative estimates for the revenue response to entry would carry an upward bias. Since we are looking at new-store entry only (and not at store exit), we believe that if significant a potential endogeneity bias in our estimates is likely to be positive, which implies that our negative estimates of the incumbent revenue response to new-store entry are conservative. In other words, accounting for a potential endogeneity bias, the actual revenue response to new-store entry is likely to be greater than implied by our estimates. However, if the endogeneity bias is systematic it is a scaling effect which

¹⁹For example, Tesco's stylized case has two incumbents within 5 minutes of the entrant, each of which are estimated to lose 6 per cent of their revenue to the entrant, and three incumbents within 5 to 10 minutes, each of which are estimated to lose 4 per cent. If all incumbent stores have similar revenue, altogether the entrant would gain about 24 per cent of its revenue from these incumbents. If our estimates understate the true revenue gain by one percentage point and if there are another three incumbents within 10 to 15 minutes that are estimated to lose 2 per cent of their revenue to the entrant, the implied 'true' overall revenue gain of the entrant would be 38 per cent.

will not alter the relative differences in estimates for relative store sizes, different drive-time distances between entrant and incumbent stores, and different fascias.

14. Second, our estimates based on the drive-time distance between incumbent and entrant do not account for the presence of 'buffer' stores located between the two stores under consideration. An intermediate store located between an incumbent store and an entrant will dampen the observed revenue change of the incumbent. In the main appendix we report how the negative effects of entry are much larger when the incumbent is the only store within 10 minutes' drive-time and how this negative effect declines when an incumbent's local position is weaker.

Regression results

1. We report the regression coefficients used to derive the medium-term estimates reported in Tables 3, 4 and 5 and Figure 1 of the main appendix. Depending on the entry measure(s) used in each regression, the coefficients represent the percentage effect on revenue from entry of either one store, one store of equal size or one store of equal size to the net sales area within 10 minutes' drive-time of the incumbent.
2. In Tables 1 and 4 to 7 below we report estimates for the average effect from entry of each size group/fascia. In Tables 2 and 3 we report the additional effect on large and very large incumbent stores relative to the effect on mid-size stores.

TABLE 1 Regression results for store count entry measure

	Revenue effect on incumbent <1,400 sq m	Revenue effect on incumbent >1,400 sq m
<i>Entry of mid-size store (280–1,400 sq m)</i>		
Within 5 minutes' drive-time:		
—Revenue change in quarter of entry	–.025***	–.011***
—Revenue change in quarter after entry	–.021***	–0.0017
—Revenue change in 2 nd quarter after entry	–.0088*	–0.0037
Within 5–10 minutes' drive-time:		
—Revenue change in quarter of entry	–0.001	–.0066**
—Revenue change in quarter after entry	–.014***	0.0032
—Revenue change in 2 nd quarter after entry	–.0081**	0.00075
Within 10–15 minutes' drive-time:		
—Revenue change in quarter of entry	0.00014	–.0046**
—Revenue change in quarter after entry	–0.0012	0.0017
—Revenue change in 2 nd quarter after entry	–.0048*	–0.0016
Within 15–20 minutes' drive-time:		
—Revenue change in quarter of entry	0.0016	0.00051
—Revenue change in quarter after entry	–0.00013	0.0021
—Revenue change in 2 nd quarter after entry	–.0052**	0.00034
<i>Entry of large store (1,400–4,000 sq m)</i>		
Within 5 minutes' drive-time:		
—Revenue change in quarter of entry	–.092***	–.045***
—Revenue change in quarter after entry	–.079***	–.031***
—Revenue change in 2 nd quarter after entry	0.011	0.0036
Within 5–10 minutes' drive-time:		
—Revenue change in quarter of entry	0.0023	–.029***
—Revenue change in quarter after entry	–.025***	–.015***
—Revenue change in 2 nd quarter after entry	0.0022	–0.0072
Within 10–15 minutes' drive-time:		
—Revenue change in quarter of entry	0.0051	–.014***
—Revenue change in quarter after entry	–0.0076	–0.0029
—Revenue change in 2 nd quarter after entry	0.0063	–.0063**
Within 15–20 minutes' drive-time:		
—Revenue change in quarter of entry	0.0071	–.0048*
—Revenue change in quarter after entry	–.008*	0.0014
—Revenue change in 2 nd quarter after entry	–0.0022	–0.0036
<i>Entry of very large store (>4,000 sq m)</i>		
Within 5 minutes' drive-time:		
—Revenue change in quarter of entry	–.044***	–.054***
—Revenue change in quarter after entry	–.058***	–.046***
—Revenue change in 2 nd quarter after entry	–.022**	–.016**
Within 5–10 minutes' drive-time:		
—Revenue change in quarter of entry	–.02**	–.03***
—Revenue change in quarter after entry	–0.0096	–.036***
—Revenue change in 2 nd quarter after entry	–.015*	–0.0055
Within 10–15 minutes' drive-time:		
—Revenue change in quarter of entry	0.0094	–.017***
—Revenue change in quarter after entry	–0.0083	–0.0047
—Revenue change in 2 nd quarter after entry	–0.0033	0.0011
Within 15–20 minutes' drive-time:		
—Revenue change in quarter of entry	0.0072	–0.0019
—Revenue change in quarter after entry	0.0038	.0055*
—Revenue change in 2 nd quarter after entry	–0.0055	–.0059**
<i>Own-store refurbishment</i>		
—Revenue change in quarter of entry	–0.000074	–.016***
—Revenue change in quarter after entry	.037***	.031***
—Revenue change in 2 nd quarter after entry	0.0045	0.00024
Store-quarter observations	28,070	21,868
R-squared	0.52	0.743

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: *90%, **95%, ***99%.

TABLE 2 Regression results for relative measure of entry measure (1)

	<i>% effect from entry of a store of equal size</i>
<i>Effect on mid-size (280–1,400 sq m) incumbent (base group)</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.0067***
—Revenue change in quarter after entry	–.0076***
—Revenue change in 2 nd quarter after entry	–.0018***
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.0018***
—Revenue change in quarter after entry	–.0021***
—Revenue change in 2 nd quarter after entry	–.0018**
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	0.00032
—Revenue change in quarter after entry	–0.00055
—Revenue change in 2 nd quarter after entry	0.000091
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	0.00016
—Revenue change in quarter after entry	0.000067
—Revenue change in 2 nd quarter after entry	–0.00037
 <i>Additional effect on large (1,400–4,000 sq m) incumbents</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.02***
—Revenue change in quarter after entry	–.016**
—Revenue change in 2 nd quarter after entry	–0.0011
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.014***
—Revenue change in quarter after entry	–.011***
—Revenue change in 2 nd quarter after entry	–0.0023
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	–.0066**
—Revenue change in quarter after entry	–0.002
—Revenue change in 2 nd quarter after entry	–.0036**
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	–0.0021
—Revenue change in quarter after entry	.0032**
—Revenue change in 2 nd quarter after entry	–.0036***
 <i>Additional effect on very large (>4,000 sq m) incumbents</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.027*
—Revenue change in quarter after entry	–0.013
—Revenue change in 2 nd quarter after entry	–0.014
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.027***
—Revenue change in quarter after entry	–.022***
—Revenue change in 2 nd quarter after entry	–0.0026
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	–.012**
—Revenue change in quarter after entry	–0.0049
—Revenue change in 2 nd quarter after entry	–0.0025
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	.011***
—Revenue change in quarter after entry	–0.00018
—Revenue change in 2 nd quarter after entry	–0.0038
 <i>Own-store refurbishment</i>	
—Revenue change in quarter of entry	–.011***
—Revenue change in quarter after entry	.034***
—Revenue change in 2 nd quarter after entry	0.0018
Store-quarter observations	49,938
R-squared	0.593

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: *90%, **95%, ***99%.

TABLE 3 Regression results for relative measure of entry measure (2)

	<i>% effect from entry of a store of equal size</i>
<i>Effect on mid-size (280–2,000 sq m) incumbent (base group)</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.007***
—Revenue change in quarter after entry	–.0079***
—Revenue change in 2 nd quarter after entry	–.0018***
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.002***
—Revenue change in quarter after entry	–.0023***
—Revenue change in 2 nd quarter after entry	–.0018**
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	0.00033
—Revenue change in quarter after entry	–0.00062
—Revenue change in 2 nd quarter after entry	0.000082
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	0.00019
—Revenue change in quarter after entry	0.000086
—Revenue change in 2 nd quarter after entry	–.00042*
<i>Additional effect on large (2,000–4,000 sq m) incumbents</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.03***
—Revenue change in quarter after entry	–.017***
—Revenue change in 2 nd quarter after entry	–0.0012
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.015***
—Revenue change in quarter after entry	–.0077*
—Revenue change in 2 nd quarter after entry	–.0045*
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	–.01***
—Revenue change in quarter after entry	0.0014
—Revenue change in 2 nd quarter after entry	–.0041**
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	–.0044*
—Revenue change in quarter after entry	.0054***
—Revenue change in 2 nd quarter after entry	–.003**
<i>Additional effect on very large (>4,000 sq m) incumbents</i>	
Within 5 minutes' drive-time:	
—Revenue change in quarter of entry	–.026*
—Revenue change in quarter after entry	–0.013
—Revenue change in 2 nd quarter after entry	–0.013
Within 5–10 minutes' drive-time:	
—Revenue change in quarter of entry	–.027***
—Revenue change in quarter after entry	–.022***
—Revenue change in 2 nd quarter after entry	–0.0026
Within 10–15 minutes' drive-time:	
—Revenue change in quarter of entry	–.012**
—Revenue change in quarter after entry	–0.0047
—Revenue change in 2 nd quarter after entry	–0.0024
Within 15–20 minutes' drive-time:	
—Revenue change in quarter of entry	.011***
—Revenue change in quarter after entry	–0.000081
—Revenue change in 2 nd quarter after entry	–0.0037
<i>Own-store refurbishment</i>	
—Revenue change in quarter of entry	–.011***
—Revenue change in quarter after entry	.034***
—Revenue change in 2 nd quarter after entry	0.0017
Store-quarter observations	49,938
R-squared	0.593

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter specific dummies. Asterisks indicate that coefficients are significantly different from zero with the following confidence levels: *90%, **95%, ***99%.

TABLE 4 Regression results for fascia-specific estimations (1)

Quarterly revenue response to entry, estimated separately by incumbent fascia

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

	Aldi incumbent stores	Asda incumbent stores	Co-op (main) incumbent stores
<i>Asda entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Asda entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Morrisons entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Morrisons entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Sainsbury's entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Sainsbury's entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Tesco entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Tesco entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>M&S entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>M&S entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Co-op (reg) entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Co-op (reg) entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Co-op (main) entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Co-op (main) entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Somerfield entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Somerfield entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			

✂

Quarterly revenue response to entry, estimated separately by incumbent fascia.

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

	Aldi incumbent stores	Asda incumbent stores	Co-op (main) incumbent stores
<i>Waitrose entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Waitrose entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
Revenue change in quarter after own-store refurbishment			
Revenue change in quarter of own-store refurbishment			
Revenue change in 2nd quarter after own-store refurbishment			
Store quarter observations	2,319	3,235	6,668
Adjusted R-squared	0.1	0.848	0.18

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficients are significantly different from zero with the following confidence intervals: *90%; **95%; ***99%.

TABLE 5 Regression results for fascia-specific estimations (2)

Quarterly revenue response to entry, estimated separately by incumbent fascia

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

Co-op (reg) incumbent stores	Iceland incumbent stores	Lidl incumbent stores
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Asda entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Asda entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Morrisons entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Morrisons entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Sainsbury's entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Sainsbury's entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Tesco entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Tesco entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

M&S entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

M&S entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (reg) entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (reg) entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (main) entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (main) entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Somerfield entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Somerfield entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry



Quarterly revenue response to entry, estimated separately by incumbent fascia.

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

	Co-op (reg) incumbent stores	Iceland incumbent stores	Lidl incumbent stores
<i>Waitrose entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Waitrose entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
Revenue change in quarter after own-store refurbishment			
Revenue change in quarter of own-store refurbishment			
Revenue change in 2nd quarter after own-store refurbishment			
Store quarter observations	4,230	629	667
Adjusted R-squared	0.269	0.179	0.722

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficients are significantly different from zero with the following confidence intervals: *90%; **95%; ***99%.

TABLE 6 **Regression results for fascia-specific estimations (3)**

Quarterly revenue response to entry, estimated separately by incumbent fascia

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

<i>M&S incumbent stores</i>	<i>Morrison incumbent stores</i>	<i>Netto incumbent stores</i>
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Asda entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Asda entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Morrisons entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Morrisons entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Sainsbury's entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Sainsbury's entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Tesco entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Tesco entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

M&S entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

M&S entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (reg) entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (reg) entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (main) entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Co-op (main) entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Somerfield entry within 10 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

Somerfield entry within 10–20 minutes' drive-time
 Revenue change in quarter of entry
 Revenue change in quarter after entry
 Revenue change in 2nd quarter after entry

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Quarterly revenue response to entry, estimated separately by incumbent fascia

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

	M&S incumbent stores	Morrisons incumbent stores	Netto incumbent stores
<i>Waitrose entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Waitrose entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Aldi entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Lidl entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Netto entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
<i>Iceland entry within 10–20 minutes' drive-time</i>			
Revenue change in quarter of entry			
Revenue change in quarter after entry			
Revenue change in 2nd quarter after entry			
Revenue change in quarter after own-store refurbishment			
Revenue change in quarter of own-store refurbishment			
Revenue change in 2nd quarter after own-store refurbishment			
Store quarter observations	5,139	1,999	2,252
<i>Adjusted R-squared</i>	0.862	0.775	0.748

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficients are significantly different from zero with the following confidence intervals: *90%; **95%; ***99%.

Quarterly revenue response to entry, estimated separately by incumbent fascia

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

	Sainsbury's incumbent stores	Somerfield incumbent stores	Tesco incumbent stores	
<i>Waitrose entry within 10 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Waitrose entry within 10–20 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Aldi entry within 10 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Aldi entry within 10–20 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Lidl entry within 10 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Lidl entry within 10–20 minutes' drive-time</i>				✂
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Netto entry within 10 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Netto entry within 10–20 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Iceland entry within 10 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
<i>Iceland entry within 10–20 minutes' drive-time</i>				
Revenue change in quarter of entry				
Revenue change in quarter after entry				
Revenue change in 2nd quarter after entry				
Revenue change in quarter after own-store refurbishment				
Revenue change in quarter of own-store refurbishment				
Revenue change in 2nd quarter after own-store refurbishment				
Store quarter observations	7,257	795	10,825	
<i>Adjusted R-squared</i>	0.63	0.525	0.516	

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficients are significantly different from zero with the following confidence intervals: *90%; **95%; ***99%.

TABLE 8 Regression results for fascia-specific estimations (5)

Quarterly revenue response to entry, estimated separately by incumbent fascia Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store	Waitrose incumbent stores
<i>Asda entry within 10 minutes' drive-time</i>	✂
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Asda entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Morrisons entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Morrisons entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Sainsbury's entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Sainsbury's entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Tesco entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Tesco entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>M&S entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>M&S entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Co-op (reg) entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Co-op (reg) entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Co-op (main) entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Co-op (main) entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Somerfield entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Somerfield entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	

Quarterly revenue response to entry, estimated separately by incumbent fascia Waitrose incumbent stores

Entry is measured by the increase in the sales area of a newly-built store >280 sq m, relative to the incumbent store

<i>Waitrose entry within 10 minutes' drive-time</i>	⌘
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Waitrose entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Aldi entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Aldi entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Lidl entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Lidl entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Netto entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Netto entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Iceland entry within 10 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
<i>Iceland entry within 10–20 minutes' drive-time</i>	
Revenue change in quarter of entry	
Revenue change in quarter after entry	
Revenue change in 2nd quarter after entry	
Revenue change in quarter after own-store refurbishment	–.02**
Revenue change in quarter of own-store refurbishment	.017**
Revenue change in 2nd quarter after own-store refurbishment	0.011
Store quarter observations	2,341
<i>Adjusted R-squared</i>	0.731

Source: CC analysis.

Note: All regressions include 12 region and 396 fascia-quarter dummies. Stars indicate that coefficients are significantly different from zero with the following confidence intervals: *90%; **95%; ***99%.