

Diversion ratios

1. Our principal focus in this inquiry was the potential harm arising from unilateral (or non-coordinated) effects. As our guidelines note:

Non-coordinated effects, which are sometimes also called unilateral effects, occur when a merger enhances the ability of the merged firm to exercise market power independently, without the need to second-guess the strategies of other firms in the market. ... other firms in the market might nonetheless benefit from such a situation.

2. As discussed in the main text, the formal pricing policy applied by Somerfield in its supermarkets is only one of the dimensions upon which it competes. Any or all of the PQRS available from Somerfield could in principle flex to reflect local market conditions. Competition is the main constraint preventing firms from worsening their offer in one or all of these dimensions, whether deliberately in order to drive margins up or simply as a result of letting standards slip in the face of weak competition. Accordingly, regardless of Somerfield's pricing or quality policies, there would be concerns about an adverse effect on consumers arising from any reduced constraints resulting from this transaction.
3. Supermarkets of different chains provide offers locally that are differentiated from each other. They are differentiated on PQRS, they may be differentiated on brand and they are differentiated geographically, as stores are located in different positions. It is well established that market shares do not necessarily capture the full degree of rivalry between different firms in such differentiated markets (although they might serve as a proxy for better measures when such better measures are unavailable).¹ Two firms might be very close competitors, because they supply products that are seen as very similar by customers, and a merger between such firms might create a larger reduction in rivalry than would a merger between two more differentiated competitors, even if the latter transaction would result in a larger apparent increment in market shares.
4. We have therefore sought a measure of the degree to which Somerfield and Safeway/Morrisons had been rivals locally prior to the transaction. A good measure of the degree of rivalry between two firms is the diversion ratio between them. A diversion ratio from firm A to firm B represents the proportion of revenue from customers who would choose firm B (as opposed to firms C, D and so on) as their second choice. Often, diversion ratios follow market shares. If A, B and C have 40 per cent, 30 per cent and 30 per cent of the market respectively, A's customers might well divert evenly between B and C (and both diversion ratios would be 50 per cent, if revenue per customer is constant²). If, however, two-thirds of any customers

¹Market share analysis fails in these circumstances because market share analysis implicitly treats every percentage point of share of sales of each firm 'in' the market as an equally effective constraint on every other firm in the market, while disregarding any competitive influence of all firms considered 'out' of the market. Direct analysis of the competitive constraints operating on each store avoids making this strong assumption ... This avoids many of the difficulties associated with a strict market definition-based approach to competitive analysis in highly differentiated markets such as retailing.' Baker, Simon, Andrea Coscelli and Theon van Dijk (2002) *Unilateral effects in retail chain mergers*, *European Competition Law Review*, 23(4), 180-192.

²Diversion ratios could express either the proportion of customers diverting or the proportion of revenue diverting. The revenue diversion ratio will normally be the appropriate measure, as firms considering the likely responses of their customers to price changes will be concerned with any loss of revenue, not specifically customers. The NOP survey asked customers about the value of the goods they had just purchased as well as for their diversion choice: weighting the diversion choices by the

leaving A would choose B and only one-third would choose C, then it appears that B is a closer substitute for A than is C. Consequently, a merger between A and B would be more likely to result in an SLC than would a merger between A and C.

5. The diversion ratio from the acquired Morrisons/Safeway store to the existing local Somerfield stores (the proximity store or stores) would therefore measure the degree to which Morrisons/Safeway and Somerfield were locally competitors. The figures might differ from simple diversion ratios based on market share for a variety of reasons. Customers might see the product range on offer between the two brands as particularly similar, or particularly dissimilar. Of more relevance for local analysis, details of traffic flows and the locations of competitor stores might result in diversion ratios between the acquired and proximity stores that differ significantly from those that might be expected from analysis of market shares. If a Somerfield proximity store is the only alternative near the centre of an isochrone centred on the acquired store, for example, the diversion ratio might be particularly high. If the Somerfield proximity store is located right next to—or even slightly beyond—a cluster of large supermarkets, when moving outwards from the acquired store, the diversion ratio might be particularly low.
6. In order to measure this directly, we commissioned NOP to conduct surveys at 56 stores, most of which were identified as potential problems by the Stage 1 rule.³ NOP asked customers in the problem areas identified which stores they would use (including those not within the market definition we have adopted above) in the extreme event that the acquired Somerfield stores had not been available. Note, however, that we were not seeking to model the effects of Somerfield stores closing. Rather, the proportion of customers diverting to another Somerfield store is a measure of the degree to which Somerfield overall will retain those customers' business even if the prices at one of its stores rose, or quality, range and service worsened.
7. Somerfield submitted that the diversion ratios calculated from NOP's survey may be exaggerated because they are not calculated only for marginal (more PQRS-sensitive) customers, as they should be. While accepting that diversion ratios might be different for different groups of customers, we did not accept that this constituted any reason to believe the measured diversion ratios were over-stated. There is no clear reason for diversion ratios to differ systematically between people likely to be more or less price-sensitive.⁴ Somerfield put to us two a priori reasons for believing that more price-sensitive customers are less likely than the average to choose Somerfield as an alternative:
 - (a) customers spending more are both more likely to be price-sensitive and more likely to choose a one-stop shop; and
 - (b) brand loyalty is likely to result in high diversion ratios to Somerfield post-merger but not pre-merger.

purchase values provided revenue diversion ratios. Throughout this appendix, and the main report, 'diversion ratio' should be taken to mean 'revenue diversion ratio'.

³We note that it is not necessary to survey every store to estimate diversion ratios. For alternative methodological approaches to estimating diversion ratios see eg Baker, Coscelli and van Dijk (op cit), which uses national shoppers' surveys and loyalty card data, or New Zealand Commerce Commission decision 448 (Progressive Enterprises/Woolworths, December 2001), which uses local revenue market shares.

⁴Unlike, for example, measures of elasticities for which the most marginal customers' values will by definition exceed the average. Diversion ratios measure second choices. All customers will have second choices and there is no obvious reason why a more price-sensitive customer's second choice is more likely to be (say) Sainsbury's than is represented by the Sainsbury's diversion ratio in the sample as a whole.

These seemed unconvincing. It could equally be argued that there are good a priori reasons to conclude the opposite, that the measured ratios might understate the true picture. For example:

- (c) customers without access to a car, and who therefore spend less than average, might be more price-sensitive because they are poorer, but also less likely to choose a one-stop shop rather than a nearer smaller Somerfield; or
- (d) the current diversion ratio might understate Somerfield's market power because its brand image is building up among the acquired stores' customers. Further, the results of NOP's survey do not suggest much brand loyalty to Somerfield because location is overwhelmingly the most important reason for shopping at Somerfield.

We did not accept that any such a priori reasoning should lead us to conclude that there was any systematic bias in the survey results.

8. Of necessity, the NOP survey was conducted after the transaction was completed. It is therefore possible in principle that any adverse effects arising from the merger would already have occurred, so more recent measures of the diversion ratios cannot be used to assess the potential for worsening PQRS (the measured ratios might be expected to understate the likely diversion to another Somerfield store). However, our focus is principally on longer-term deterioration of PQRS in response to reduced competitive constraints—we are not simply assessing the merger on whether prices have already risen (and we would not expect them to have done so).
9. It could more generally be argued that a measured Somerfield—Somerfield diversion ratio is not a good proxy for a pre-merger Morrisons/Safeway—Somerfield diversion ratio (even if it is not clear in which direction any bias would go). This is true as far as customer preferences between fascias goes—but this preference seems unlikely to vary locally. What will vary locally, and is unchanged by the merger, is the location of the stores (except in those cases when a store has shut). Also unchanged, therefore, is the degree to which the details of local geography (including the locations of competitors' stores, traffic patterns and other details not considered in Stage 1) affect the closeness of competition between acquired and proximity stores. Thus, this point did not affect the ranking of firms in order of likelihood of concern (higher diversion ratios imply greater market power, for given margins). It had some relevance but only in assessing the threshold level at which diversion ratios were high enough to give concern.
10. There is inevitably some uncertainty regarding the reliability of any survey results. Although in total the survey exercise was very large (around 5,400 respondents), for any individual store the sample was inevitably much smaller: 100 or less. However, for *customer* diversion ratios (but not revenue diversion ratios), we can approximate the standard deviation of the number of respondents diverting as the square-root of that number (for example, if 16 respondents divert from the Acquired Store to the Proximity Store, then the standard deviation is the square-root of 16, which is 4), because the underlying distribution can be assumed to be Poisson.⁵ This provides a measure of the reliability of our customer diversion ratios. Tests of whether our customer diversion ratios for each of the stores identified as SLCs are significantly greater than our 14 per cent threshold, based upon this measure of reliability,⁶ are

⁵The Poisson distribution approximates the Bernoulli distribution of a number of binomial events (ie a survey respondent switches or does not switch from the Acquired to the Proximity store).

⁶Table 1 also reports significance tests based on an estimate of the standard deviation of the Bernoulli distribution that the Poisson distribution approximates.

given in Table 1, which shows that the customer diversion ratios for Poole and Whitburn are not significantly above our 14 per cent threshold, statistically speaking.

TABLE 1 Tests of whether customer diversion ratios exceed 14 per cent threshold for ten stores identified as SLCs

Acquired store	Standard deviation estimated from			
	Poisson distribution		Bernoulli distribution*	
	T-test†	P-value‡	T-test†	P-value‡
Johnstone	6.05	0.00	9.49	0.00
South Shields	3.83	0.00	4.97	0.00
Peebles	4.67	0.00	6.38	0.00
Middlesbrough	1.65	0.05	1.88	0.03
Pocklington	3.84	0.00	4.85	0.00
Yarm	2.79	0.00	3.31	0.00
Newark	2.00	0.02	2.29	0.01
Filey	1.53	0.06	1.72	0.04
Poole	0.27	0.39	0.29	0.39
Whitburn	0.49	0.31	0.53	0.30

Source: CC estimates.

*The distribution of a number of binomial events (ie a survey respondent switches or does not switch from the Acquired to the Proximity Somerfield) is called the Bernoulli distribution, which has a variance of $np(1-p)$ and a standard deviation of $\sqrt{np(1-p)}$, where n is the number of survey respondents and p is the probability of 'switching' (estimated as the number of respondents switching as a proportion of all survey respondents).

†Test of whether customer diversion ratio is greater than 14 per cent.

‡One-tailed p-value. Conventionally we say the customer diversion ratio is greater than 14 per cent if the p-value is less than 0.05.

11. We further confirmed that customer and revenue diversion ratios were similar for each of the stores identified as SLCs, to ensure that unmeasurable variance in the revenue diversion distribution did not result in high values unsupported by a high customer diversion ratio.
12. Overall, therefore, although we accept that there will be uncertainties associated with the diversion ratios calculated on the basis of the NOP survey, we did not see any convincing reason to believe that the measured diversion ratios differed systematically from the underlying reality, in other words they were no more likely to over-state than to under-state the true diversion ratios.
13. The diversion ratio alone will not be sufficient to measure the degree to which the merger might locally reduce competitive constraints leading to unilateral effects. Higher margins, implying a lower residual elasticity of demand for the merging stores, would result in larger incentives to increase prices (or otherwise worsen PQRS) post-merger, for given diversion ratios. For example, in a very simple model, purely illustrative post-merger price rises could be calculated using the following formulae:⁷
 - (a) Change in price = $md/(2(1 - d))$ for linear demand; and
 - (b) Change in price = $md/(1 - m - d)$ for isoelastic demand.

where d is the diversion ratio and m the margin. We would not interpret the 'change in price' in these formulae as a prediction of actual post-merger price rises, because our concerns are more widely with a deterioration in PQRS over time, as a result of reduced competitive constraints, rather than just an increase in price. However, we did regard the formulae as providing important guidance on how to combine margin

⁷Assuming a differentiated Bertrand model of competition in the market. See Bishop, Simon and Mike Walker (2002) *The Economics of EC Competition Law*, Sweet and Maxwell: London, for a discussion of the derivation of these formulae.

and diversion ratio data to evaluate the relative lessening of competitive constraints in different stores.

14. If demand is isoelastic, the price elasticity of demand is constant at different price levels. If demand is linear, the price elasticity rises as price rises. This latter assumption seemed a particularly unreasonable assumption for groceries (intuitively, it seems more plausible that demand would become less elastic at higher prices, when demand has already fallen), and we therefore considered the effects of applying the isoelastic version of the formulae above to the diversion ratio data (from our survey) and to margin data (from Morrisons).
15. Somerfield noted that the formulae above assume symmetry between the acquired store and Somerfield stores existing in the area before the transaction in the following senses:
 - the diversion ratios are symmetric (from acquired store to proximity store and vice versa);
 - the revenues of the two stores are the same; and
 - third-party competitive constraints faced by the two stores are the same.

If these conditions do not hold, the formulae above would need to be modified in order to produce the correct price rises. However, once again the effect could run in either direction—each of the conditions above could fail either in a manner which implies that the competitive constraints are greater or less than the central measure produced from application of the formulae. It seemed reasonable to assume such symmetry, in the absence of evidence to the contrary.

16. We further note that all alternative methodologies that have been suggested to us in this inquiry—notably Somerfield’s own market share approach—implicitly assume a single local market within which all stores face symmetric conditions of competition (in the case of Somerfield’s market share approach because Somerfield argued that changes in local market shares at least partly captured the degree of competition removed by the merger). The diversion ratio analysis represents a more sophisticated approach to determining competitive constraints in markets with differentiated products. Inevitably, the methodology could have been made more sophisticated still, were better data available.

Estimating diversion ratios where Proximity stores have shut

1. Paragraphs 7.36 and 7.37 of our report refer to estimated diversion ratios for the acquired Bedlington, Kelso and Littlehampton stores, where the proximity store had shut by the time of NOP's survey, which are considered problematic. Further, Morrisons is opening a new one-stop shop in Paisley on [X] 2005, in addition to its existing one-stop shop in the 5-minute isochrone (as mentioned in paragraph 7.31). This annex reports estimates of what post-merger customer and revenue diversion ratios could have been at these four acquired stores, using regression analysis.
2. Our results are given in Table 2, which reports the estimated post-merger diversion ratios for the acquired Bedlington, Kelso and Littlehampton stores had each relevant proximity store not shut, and for the acquired Paisley store when the new Morrisons one-stop shop opens: the diversion ratios for Kelso and Littlehampton are above our 14.3 per cent threshold but the diversion ratios for Bedlington and Paisley are not.⁸

TABLE 2 Estimates of post-merger diversion ratios and standard errors for the acquired Bedlington, Kelso, Littlehampton and Paisley stores

Acquired store	Customer diversion ratio, %		Revenue diversion ratio, %	
	Diversion ratio	Standard error	Diversion ratio	Standard error
Bedlington	13.9	2.5	13.7	2.4
Kelso	28.9	7.3	24.2	6.8
Littlehampton	20.4	4.9	21.3	6.2
Paisley	8.9*	3.8	9.5†	4.3

Source: CC calculations on regression results reported in Table 3.

*Customer diversion ratio from NOP survey was 19.3 per cent.

†Revenue diversion ratio from NOP survey was 21.4 per cent.

3. The diversion ratios in Table 2 are estimated as a linear prediction from the regression results reported in Table 3 with the independent variables set to the relevant values for Bedlington, Kelso, Littlehampton and Paisley. Specifically:
 - for Bedlington (an urban store), the drive-time to the closed proximity Somerfield (which was the closest proximity store) set at 0.03 minutes, the number of proximity Somerfield stores set at 1, Somerfield's post-merger market share set at 26.5 per cent,⁹ the drive time to the nearest one-stop shop set at 3.9 minutes and the number of fascias in the isochrone set at 2;
 - for Kelso (a rural store), the drive-time to the closed proximity Somerfield (which was the closest proximity store) set at 0.78 minutes, the number of proximity Somerfield stores set at 1, Somerfield's post-merger market share set at 83 per cent, the drive-time to the nearest one-stop shop set at 30 minutes and the number of fascias in the 10-minute isochrone set at 3;

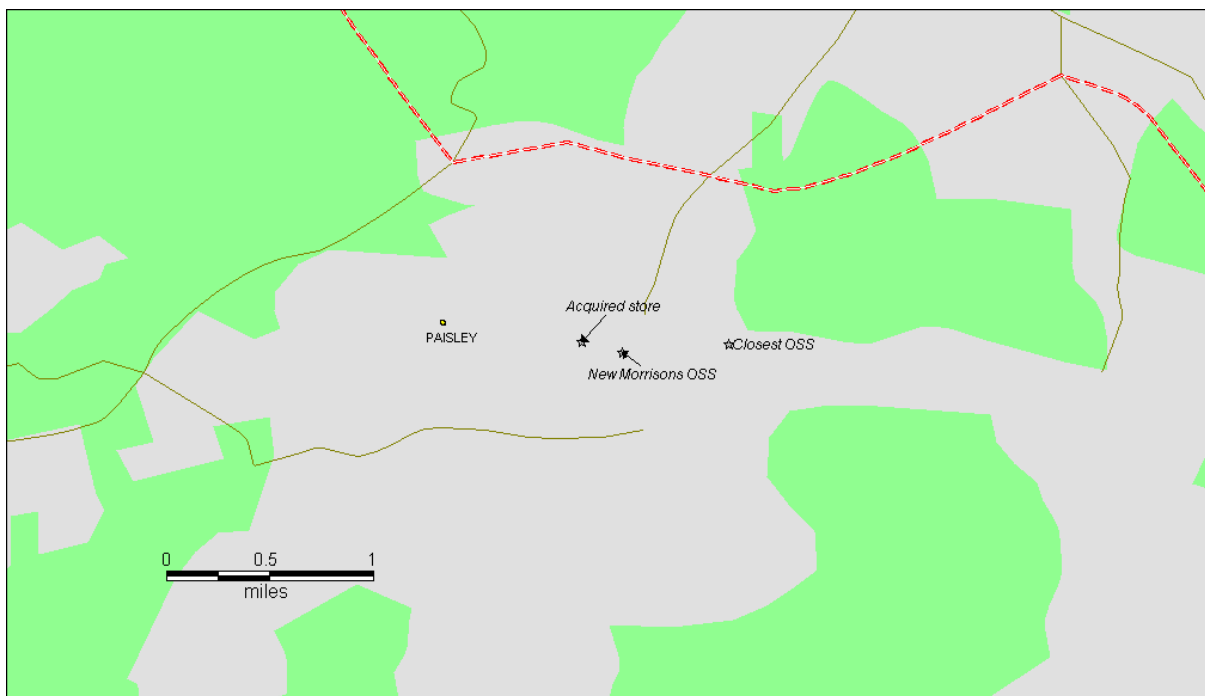
⁸Tests of whether these estimated diversion ratios are above the 14.3 per cent threshold return, for Kelso's customer diversion ratio, $t=2.00$ (one-tailed $p=0.03$) and for Littlehampton's customer diversion ratio, $t=1.25$ (one-tailed $p=0.11$); and for Kelso's revenue diversion ratio, $t=1.46$ (one-tailed $p=0.08$) and for Littlehampton's revenue diversion ratio, $t=1.13$ (one-tailed $p=0.13$).

⁹Somerfield's estimate of its post-merger market share (5 per cent) is within a 10-minute isochrone and not a 5-minute isochrone. We have estimated Somerfield's post-merger market share using Somerfield's 'method 1' with the results of GeoBusiness's census output area population re-centring analysis.

- for Littlehampton (an urban store), the drive-time to the closed proximity Somerfield (which was the closest proximity store) set at 0.5 minutes, the number of proximity Somerfield stores set at 3, Somerfield's post-merger market share set at 28.4 per cent, the drive time to the nearest one stop shop set at 2.4 minutes and the number of fascias in the 5-minute isochrone set at 3; and
- for Paisley (an urban store), the drive-time to the nearest proximity store set at 2.1 minutes, the number of proximity Somerfield stores set at 2, Somerfield's post-merger market share set at 22.2 per cent, the drive time to the nearest one stop shop set at 0.7 minutes (see Figure 1¹⁰) and the number of fascias in the isochrone set at 4.

FIGURE 1

Map of Paisley showing acquired store, former closest one-stop shop and new Morrisons one-stop shop



Source: CC calculations.

4. The estimated diversion ratio for Kelso uses the count of fascias in the competitive set in the relevant isochrone, although NOP's survey results indicate a customer diversion ratio of 14 per cent to the recently-opened Lidl that is very close by. Including this Lidl in the fascia count reduces the estimated diversion ratios for Kelso but we may be generous in treating it as a comparable fascia.¹¹

¹⁰We do not know the drive time from the new Morrisons one-stop shop to the acquired Somerfield but it appears to be much closer than 2.1 minutes (the drive time to the former closest one-stop shop, which also is the closest proximity store) from inspecting the locations of the acquired store, its former closest one-stop shop and the new Morrisons on the map in Figure 1. The former closest one-stop shop is 1 km (0.6 miles) away and we have set the drive time to one-third of that to the former nearest one-stop shop, ie 0.7 minutes, since the new Morrisons one-stop shop appears to be less than one-quarter of a mile (ie 0.4 km) away.

¹¹Including this Lidl in the fascia count in the isochrone reduces Kelso's estimated customer diversion ratio to 0.26 (standard error 0.08), which is not significantly above the 0.143 threshold ($t=1.41$, one-tailed $p=0.08$). Including this Lidl reduces Kelso's estimated revenue diversion ratio to 0.21 (standard error 0.08), which is not significantly above the 0.143 threshold ($t=0.85$, one-tailed $p=0.20$).

5. Our surveyed customer and revenue diversion ratios are all post-merger, although we take them to proxy pre-merger outcomes. Consequently, we considered the following post-merger independent variables in explaining observed post-merger customer and revenue diversion ratios:
- distance to the nearest proximity Somerfield (measured as drive time in minutes);¹²
 - number of proximity stores in the relevant isochrone, post-merger;¹³
 - Somerfield's post-merger market share;^{14, 15}
 - distance to the nearest one-stop shop (measured as drive-time in minutes); and
 - post-merger fascia count (excluding the LADs and Marks & Spencer) in the relevant isochrone.
6. The results of our regression analysis of customer and revenue diversion ratios are given in Table 3.

TABLE 3 Results of regression analysis of customer and revenue diversion ratios for 53 surveyed stores*

	Customer diversion ratios				Revenue diversion ratios			
	Coefficient	Standard error	t	P> t	Coefficient	Standard error	t	P> t
Drive-time to nearest proximity Somerfield	-0.010	0.004	-2.24	0.030	-0.009	0.005	-2.05	0.046
Number of proximity Somerfields in isochrone	0.052	0.023	2.23	0.030	0.058	0.029	1.99	0.053
Somerfield's post-merger market share	0.161	0.065	2.47	0.017	0.116	0.065	1.79	0.080
Drive-time to nearest one-stop shop	0.004	0.004	1.04	0.302	0.003	0.003	0.89	0.376
Fascia count in isochrone	-0.032	0.015	-2.07	0.044	-0.033	0.016	-2.01	0.050
Intercept	0.093	0.059	1.59	0.119	0.102	0.064	1.60	0.116
Number of observations	53				53			
R ²	0.470				0.382			
F _{5,47} (p-value)	21.47 (0.000)				26.57 (0.000)			

Source: CC and NOP survey results.

*We note that our results imply only the explanatory power of proximity and the number of overlapping and competing fascias are significant for diversion ratios, which may be consistent with a bright-line approach to estimating diversion ratios using the existing Stage 1 decision rules.

Notes:

1. Dependent variable is surveyed customer diversion ratio to proximity store or calculated revenue diversion ratio to proximity store.
2. Method of estimation is ordinary least squares.
3. Robust standard errors.

¹²We experimented with differentiating between whether the nearest proximity store was a Somerfield or Kwik Save but it made no difference to our results.

¹³We experimented with the ratio of the acquired store size to the size of the nearest proximity store but it made no difference to our results.

¹⁴Somerfield's estimates of its post-merger market share include the closed proximity stores. Arguably, we could use estimates of the pre-merger market shares of Somerfield and Morrisons, instead of Somerfield's post-merger share, because post-merger market shares are known to be poor predictors of competitive effects in differentiated-goods mergers (whereas pre-merger market shares are good indicators of market power). Doing this makes no difference to whether our estimated diversion ratios are above the threshold.

¹⁵In ten cases, Somerfield's estimates of its post-merger market shares are for the wrong isochrone (ie 10 minutes instead of 5, or vice versa) because nine stores have been reclassified from rural to urban as a result of GeoBusiness's verification analysis and one from urban to rural. We have adjusted these market shares in our analysis using Somerfield's 'method 1' with the results of GeoBusiness's census output area population re-centring analysis.