The Test

1. This appendix describes the Test that we recommended be adopted to address the AEC that we had found in relation to local market concentration. This was set out in our report in Section 11.

2. We recommended that the Test should be applied to all grocery retail planning applications (extensions and new stores) that resulted in stores with a net sales area of over 1,000 sq metres. We recommended that the OFT should be made statutory consultee to the LPA. The OFT would advise the LPA whether a planning application passed or failed the Test.

3. As set out in paragraph 11.14 of the report, the OFT would:

   (a) assess concentration across an area defined using a 10-minute drive-time isochrone (calculated using a standard, readily available software package) around the store that is to be developed;

   (b) count the number of fascias (including that of the retailer that might operate the developed store) operating stores with net sales area of over 1,000 sq metres within the isochrone. The fascias would include all full-range grocery store operators;

   (c) (where the number of fascias is three or fewer) calculate the share of groceries sales area within the isochrone that the grocery retailer operating the developed store would have after the development had been implemented; and

   (d) provide advice to the LPA on:

      (i) whether the applicant, being a large grocery retailer, had passed or failed the Test; or

      (ii) where a planning application was submitted by a third party, which grocery retailers would fail the Test.

4. A retailer would pass the Test for a development within a particular local area (ie within a 10-minute isochrone around the development) if:

   (a) it was a new entrant in the local area;

   (b) the total number of fascias in the local area was four or more; or

   (c) the total number of fascias was three or fewer but the grocery retailer operating the development would have less than 60 per cent of groceries sales area in the local area.

5. A retailer would fail the Test if:

   (a) the grocery retailer was not a new entrant in the local area;

   (b) the total number of fascias in the local area was three or fewer; and

   (c) the retailer would have 60 per cent or more of groceries sales area (including the new development) in the local area.

6. A development that did not result in an increase in groceries sales area would still be subject to the Test, since planning conditions would be required to prevent an increase in groceries sales area in the future, but would pass it automatically.

7. In order to ensure the effective working of the Test, we also recommended that:

(a) the Department of Communities and Local Government (CLG) and the devolved administrations took such steps as were necessary (including changes to planning policy) to ensure that when an LPA gave open A1 planning permission (which would allow any type of retail development), it should limit the grocery sales area in the development to less than 1,000 sq metres (as an anti-avoidance provision); and

(b) CLG and the devolved administrations took such steps as were necessary to ensure that LPAs should take account of the OFT's advice on the result of the Test and should only approve applications that failed the Test in exceptional circumstances:

(i) the particular development would produce identified benefits for the local area that would clearly outweigh the detriment to local people from the area becoming or remaining highly concentrated in terms of grocery retailing; and

(ii) the development, or any similar development, would not take place without the involvement of a large grocery retailer that had failed the Test.

8. In addition, we said that we would require grocery retailers to:

(a) provide accurate information about sales areas and any other information when requested to do so by the OFT; and

(b) notify the OFT of all acquisitions of existing stores of more than 1,000 sq metres for scrutiny under the existing merger control regime.[1]

[1]See paragraphs 11.123 and 11.124 of the report.

The market model

Introduction

1. This appendix provides an overview of the methodology we have adopted for our analysis of the quantifiable costs and the benefits from the Test in representative local areas and sets out how we have used a market model to generate some of the inputs needed for our assessment. It describes the market model in more detail, discusses it, and presents how we have calibrated the model and the results it produces for new stores and extensions.

Overview of the methodology for calculating the welfare implications of the Test

2. In order to estimate the costs and benefits arising from the Test in a given local area, we compare the outcome for consumers in representative local areas under different market scenarios. For example, suppose in one area one could anticipate that, absent the Test, a strong incumbent would have built a new store. With the Test in place various scenarios may result. A new large store could be built by a rival that is new to the area; a new store could be built by a rival already present (albeit with a smaller market share in that area); or there may be no new store. Moreover, the timing of some of these scenarios may be different depending on whether one could expect the strong incumbent to build its development sooner than a competitor would have done or vice versa. Estimating the costs and benefits to consumers in a specific area involves comparing those scenarios where the Test makes them better off (for example, a rival builds a new large store instead of the strong incumbent) with those scenarios where the Test makes them worse off (for example, because neither a new store nor an extension is built).

3. In carrying out our analysis we have based our estimates mainly on evidence from the groceries market investigation, including:

- the change in an incumbent's profit margin (and profit) as a result of an additional store being operated by a rival close by. This change in profit depends on, and therefore can provide evidence about, the competitive response of stores to increased competition, and the willingness of consumers to switch their allegiance between stores in response to these competitive efforts;

- the change in revenue of one store when a new store is opened by a rival close by. This change is another source of evidence on the degree of competition between rivals;

- the profit margin of stores. This depends on, and therefore provides information about, the extent to which investing in quality attracts new consumers from all sources;

- data on average store profits and revenues which provide information on the level of consumer demand; and

- information about actual store and local area characteristics which informs the choice of representative local areas and scenarios we consider.

4. Although we have evidence on which we can rely in making our estimates, there are some important limitations. First, the process by which these estimates are reached, relying on economic modelling and calibration, is by its very nature not an exact science and there is a significant degree of judgement involved at various stages of the process. Second, the data provides only indirect evidence about benefits to consumers. Third, the data covers only some of the areas and scenarios that we need to consider.

5. In particular, when modelling the welfare implications of the Test with regard to extensions (as opposed to new stores), we faced additional complications on two levels:

- First, the modelling of extensions, by its very nature, is more complicated and there was no well-established literature to inform our modelling approach.
- Secondly, in general, the data collected and analysis performed during the groceries market investigation was not directly targeted to addressing the specific issues that we are addressing in this analysis. In particular, it is more directly applicable to analysing the effect on competition of different numbers of stores in an area, rather than extensions.

6. We have conducted an analysis of the possible effects of the Test in those areas where strong incumbents might be prevented from expanding based on the type of counterfactual analysis commonly used in competition investigations. In doing so we rely on the following principles:

- Those quantifiable costs and benefits that we have included are expressed in terms of money equivalents, so that they can be compared with each other.
- Consumers' willingness to pay is estimated as the area under a consumer demand curve, which links price to quantity bought. Since consumer demand curves are rarely observed directly, they are inferred using data to calibrate or estimate a demand curve statistically.

7. The approach in counterfactual analysis that we have used is to *(a)* build a model of how firms and consumers behave in representative local areas, *(b)* use observed data to calibrate the model so that the outcomes it generates are consistent with aspects of those areas that have been observed, and then *(c)* use the calibrated model to simulate outcomes in relevant scenarios.

The contribution of the market model

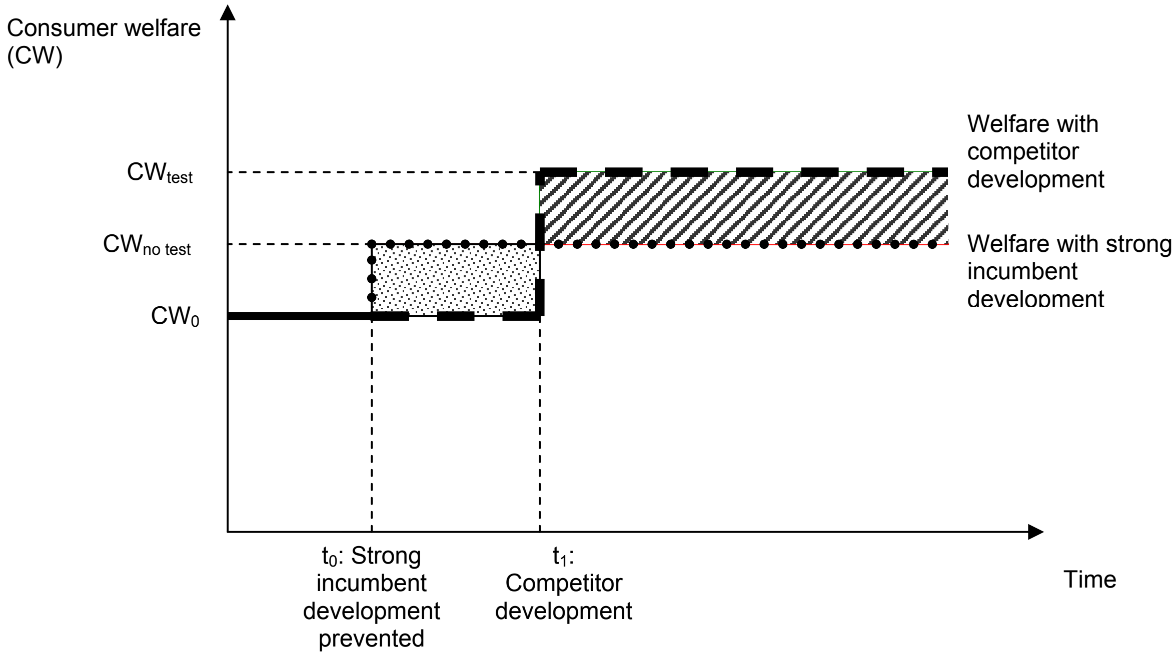
8. The market model described in this appendix is only one part of the assessment of the costs and benefits from the Test. It considers the (annual) welfare effects of different market outcomes under the range of scenarios that might be created by the Test, but takes no account of the time period over which these welfare effects occur. The length of time during which the Test delivers benefits or costs is addressed in our NPV model (see Appendix C).

9. Moreover, our modelling captures only consumer welfare changes stemming from changes in competition in individual local areas. We discuss other possible costs and benefits arising from the Test in paragraphs 5.18 to 5.33 of the decision.

10. Figure 1 shows schematically how consumer welfare might develop over time in a particular highly-concentrated local area. It is described in paragraphs 5.11 to 5.17 of the decision.

FIGURE 1

Impact of developments on consumer welfare in one highly-concentrated local area



Source: CC analysis.

11. The market model derives values for all three consumer welfare levels, ie for CW_0, $CW_{no\ Test}$ and CW_{Test}. The main outputs of the model are thus:

- the gain in annual consumer welfare when the development is carried out by a competitor, ie (CW_{Test} – CW_0). We refer to this as 'benefits' from the Test;
- the gain in annual consumer welfare from an incumbent's development, ie ($CW_{no\ Test}$ – CW_0). Since, if the Test is in place, this gain is foregone by consumers in a local area if and to the extent that the competitor development in the previous bullet point occurs with any delay, we refer to it as a 'delay cost' of the Test; and
- the 'net benefit' in annual consumer welfare when the development is carried out by a competitor instead of the incumbent, ie (CW_{Test} – $CW_{no\ Test}$).

Model description

12. In assessing which framework would be most suited for our analysis, we considered a number of options and different theoretical models. In certain standard theoretical models the Test could be seen as delivering substantial benefits compared with minimal costs. This is the case, for example, using a standard Salop 'circular city' model for a given market size.[1] While the use of models such as Salop's is common in the literature analysing competition between horizontally differentiated goods, we chose to adopt another well-established model of competitive interaction with which

[1] See J Tirole, *The Theory of Industrial Organization*, pp282–287. The 'Salop' model is a model of competition between horizontally differentiated goods. Products are differentiated since consumers have different tastes regarding their most preferred product and incur a progressively higher cost if they buy a product that differs more from their most preferred product.

to assess the costs and benefits of the Test. The model we adopt generates significantly lower levels of net benefits and therefore we consider it as a conservative framework within which to conduct our analysis. Furthermore, in developing our model to fit the characteristics of the groceries market we chose modelling options that were likely to lead to more conservative estimates of the net benefits of the Test (see, for example, paragraphs 30 to 44).

13. Our model of competition between grocery stores in local areas has the following structure:

- Each of *n* stores offers a single product (which could be interpreted as a product bundle). Retailers choose a quality variable which determines how attractive the bundle is to consumers.

- Consumer demand varies linearly with the quality variables of all stores.

- Stores compete by simultaneously setting the quality variable such as to maximize profits.

14. We assume a local area with $k = 0, 1, \ldots, n$ stores all of which offer a single product (or product bundle). We assume that stores $i = 1, \ldots, n$ are large stores while store *0* subsumes all convenience and mid-sized stores in the local area. Our model focuses on large stores and treats the characteristics and the behaviour of convenience and mid-sized stores as fixed.

15. To derive demand, we assume the existence of a representative consumer with a quadratic utility function. When the consumer buys q_k units of the product (or product bundle) at store 0 or stores $i = 1, \ldots, n$ the utility is given by:

$$u(q_0, q_1, \ldots, q_n) = \sum_{i=1}^{n} \alpha_i q_i + \sum_{i=1}^{n} g_i q_i - \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \beta_{ij} q_i q_j + q_0 .$$

q_0 denotes the quantity of an outside good which is purchased at, for example, convenience or mid-sized stores. This could also capture purchases on goods other than groceries. The values q_1 to q_n represent the consumption of products bought at large stores. $\alpha_i > 0$ and $\beta_{ii} > \beta_{ij} > 0$ are demand parameters. We assume $\beta_{ij} = \beta_{ji}$, ie stores exert a symmetric constraint on each other (see paragraphs 38 and 39). g_i denotes the quality of the product bundle at store *i.* This is a competitive variable chosen by the stores (see paragraph 21).

16. Given prices r_i the consumer maximizes utility subject to the budget constraint:

$$q_0 + \sum_{i=1}^{n} r_i q_i \leq M .$$

We have normalized r_0 to one. From the solution to the utility maximization problem we derive the following linear inverse demand functions:[2]

$$r_i - g_i := p_i = \alpha_i - \beta_{ii} q_i - \sum_{j \neq i} \beta_{ij} q_j \text{ , } i = 1, \ldots, n.$$

[2] We assume that *M* is sufficiently high for the demand of the outside good to be positive. As long as this holds true, consumer surplus is a valid measure of consumer welfare.

17. Inverting the inverse demand system we obtain the following linear demand functions:[3]

$$q_i = a_i - b_{ii}p_i + \sum_{j \neq i} b_{ij}p_j .$$

Under our assumption that $\beta_{ii} > \beta_{ij} > 0$ the goods are substitutes, ie we have $b_{ii} > 0$ and $b_{ij} > 0$. Demand for good *i* therefore falls when p_i goes up, ie when either the price of good *i* increases or if the quality of good *i* goes down.

18. Each store $i = 1 ,\ldots, n$ sets a competitive variable g_i which measures the quality of a store's offering such as service level or the freshness of products. This variable is normalized such that it is measured in the per unit expenditure for quality. Each store therefore incurs costs from quality given by $g_i \cdot q_i$. For example, if store 2 sets $g_2 = 5$, expenditure on quality at store 2 amounts to five times the quantity sold. In the context of this model, we further assume that prices r_i are given.[4] The p_i can therefore be interpreted as a store's per unit revenue in excess (or net of) quality expenditure. Each store's revenue net of quality expenditure is therefore given by $p_i \cdot q_i$.

19. Besides the quality costs we assume that each store incurs costs that depend on the level of sales. The cost function seeks to capture the relevant supply-side characteristics as well as being consistent with data and results collated during the groceries market investigation.

20. We use two different cost functions:

- when we model the impact of new stores, a linear cost function which gives rise to constant marginal cost; and
- when we model the impact of extensions, a quadratic cost function which gives rise to linearly increasing marginal cost.

21. We use a linear cost function of the form $C_i(q_i) = c_i \cdot q_i$, when examining new stores since a linear cost function underlies our margin concentration analysis. Since the margin concentration analysis can help in considering the consequences of new store entry, we use this to calibrate our model when applied to the development of new stores.

22. We use a quadratic cost function for our modelling of extensions in an attempt to capture capacity constraints of stores. In modelling extensions we could not rely on standard models of competition between stores as we did for our modelling of new stores. In order to conduct an analysis of extensions we assumed an appropriate relationship between consumer demand and the quality of a store that allows an extension to deliver benefits to consumers and therefore assumes that there is a cost associated with preventing such an extension from going ahead. In order to do this, we assumed that a store would incur progressively higher marginal costs in order to satisfy levels of demand greater than those it could comfortably meet given its size. This might involve, for example, employing extra staff to help pack groceries at the

[3] One retailer criticized our use of a linear demand and suggested we use an isoelastic demand function instead. It also pointed to analysis the CC did during the *Somerfield/Morrisons* case where the CC did not think it was appropriate to use a linear demand function. We note that the type of analysis conducted in this case is of a different nature to the one conducted in *Somerfield/Morrisons*. One feature that makes isoelastic demand unsuitable in this context is that it is not well equipped to examine the effect of large changes in quantity such as the ones examined in our analysis. Quadratic utility and linear demand functions for groceries are also used, for example, by P W Dobson and M Waterson, 'Chain Store Pricing across local markets', *Journal of Economics and Management Strategy*, 2005 (1), pp93–119.

[4] As set out in our report, prices are currently generally set uniformly across the country.

checkout in order to increase the flow of customers or restocking aisles more frequently.

23. In other words, our approach to modelling extensions is based on two broad considerations:

- The role of extensions is, at least in part, to relax a capacity constraint. A quadratic cost function is therefore an intuitive way to model extensions.

- Capacity constraints can be seen as capturing what Tesco described as 'unmet demand'. This could emerge if capacity constraints prevent stores from fully satisfying the demand in a local area. It is common to model capacity constraints via an increasing marginal cost curve reflecting the fact that it becomes increasingly costly for a store to attract or accommodate additional demand.[5]

24. Another difficulty in modelling extensions is that our margin concentration analysis focuses on the impact of different degrees of competition on store profit margins and does not specifically consider the role of extensions. In calibrating our modelling of extensions, we therefore have to rely on more indirect evidence. In using the results of our market model on extensions, we need to take this into account and ensure that the output that the model generates is considered in the round with other available evidence. We discuss this further in paragraphs 51 to 54.

25. We chose a quadratic cost function of the form:

$$C_i(q_i) = \frac{\bar{c}_i}{2}\left(\frac{q_i}{\bar{q}_i}\right) \cdot q_i$$

which gives rise to increasing marginal cost:

$$MC_i(q_i, \bar{q}_i) = \bar{c}_i\left(\frac{q_i}{\bar{q}_i}\right)$$

when examining extensions. $\bar{q}_i$ is a measure of the capacity (or size) of store *i*, q_i denotes demand and $\bar{c}_i$ is a cost parameter. Marginal costs increase with the level of demand and with the size of demand relative to capacity. In particular:

- Marginal cost equals $\bar{c}_i$ when demand q_i exactly equals capacity $\bar{q}_i$. Hence, $\bar{c}_i$ denotes the level of marginal cost when the store is neither too big nor too small for its demand.

- Marginal cost is higher than $\bar{c}_i$ when demand q_i exceeds capacity $\bar{q}_i$. For example, if demand exceeds capacity by 50 per cent, marginal cost will be 50 per cent higher than $\bar{c}_i$.

[5]While it is a standard assumption to use an increasing marginal cost curve to model capacity constraints (see, for example, J Tirole, *The Theory of Industrial Organization*, p215), the particular functional form we use is not as common. Most of the literature assumes kinked or discontinuous marginal cost curves (see, for example, Maggi, AER 1996). We view our marginal cost curve as a simple approximation of those more complex functional forms. We do not think that our choice biases our results in a particular direction. A very similar cost function to the one we adopt is used by M K Perry and R H Porter (1985): 'Oligopoly and the Incentive for Horizontal Merger', *American Economic Review*, vol 75(1), pp219–227.

26. As regards the *mode of competition*, we assume that all stores compete by setting quality expenditure g_i simultaneously and non-cooperatively.

27. Under our assumptions, the profit of store i is given by:

$$\pi_i = p_i \cdot q_i(p_1,...,p_i,...,p_n) - C_i(q_i).$$

28. We allow multiple stores to be owned by the same retailer. Whenever that is the case, we assume that the retailer maximizes the sum of profits at all of its stores. We note that, although prices are set nationally, quality (and therefore the value of the p_i) can vary across stores which are under common ownership.

29. The key assumptions of the model and the corresponding parameters are summarized in Table 1.

TABLE 1 **Model synopsis**

Model assumptions	*Parameters*
Linear demand	a_i, b_{ii}, b_{ij}
Marginal cost parameter, capacity	c_i, $\bar{q}_i$
Mode of competition: simultaneous choice of p	Variable number of stores n and fascias
Under joint ownership of multiple stores p_i can vary across stores	

Source: CC analysis.

Discussion of the model

30. Our model is a reduced form approach. This means, for example, that some store characteristics such as location are not modelled explicitly but can be implicitly captured by parameters of the utility function and the corresponding demand function parameters.

31. The demand parameters can capture different aspects of stores' offering:

- Our model allows the demand at a store to have a 'captive' element, reflecting the fact that some consumers may have a strong preference for one store (for example because it is much more conveniently located than others). The importance of this captive element is reflected in the parameter α_i.

- The demand function also allows demand to vary depending on the intensity of competition between stores which is influenced, among other factors, by the distance of stores: if stores compete more strongly then demand at one store will be more sensitive to changes in the price and quality at rival stores, reflected in the parameter b_{ij}.

Changes in consumer welfare

32. In general, we seek to provide a framework for the additional consumer surplus resulting from a change in market and ownership structure. We therefore have to take into account the consumer surplus that consumers previously derived from shopping both at existing large stores as well as at convenience and mid-sized stores.

33. The consumer surplus from existing large stores is calculated within our scenarios. The consumer surplus derived from convenience and mid-sized stores is captured by measuring consumer surplus in terms of the excess benefits consumers derive from shopping at the large stores rather than convenience and mid-sized stores. For example, in our model a consumer surplus value of 20 means that the opportunity to shop at large stores gives consumers a gain in consumer surplus worth £20 compared with a situation where they had to shop at convenience or mid-sized stores.[6]

Effects not included in the model

Competitive interactions between large stores and mid-sized and convenience stores

34. Our model does not include the competitive interaction between large stores and mid-sized and convenience stores.[7] As the Test changes the market structure and improves the competitive offering of large stores, we would expect that other smaller stores would react by improving their offering as well. By leaving this effect out, we tend to underestimate both the consumer welfare detriment from fewer stores and the consumer welfare gain from more fascias. This affects both the delay costs and the benefits of the Test.

35. As part of our analysis we looked at a model that explicitly incorporated competition between large and convenience or mid-sized stores in order to address this issue. However, since this model led to smaller values for the delay costs relative to the benefits, we decided not to use it. This again demonstrates that the approach we have taken is a conservative one.

Fixed-cost quality investment

36. We model quality investment as a variable rather than as a fixed-cost investment. Sainsbury's suggested that we should incorporate fixed-cost quality investment in our model as well.

37. We agree that some forms of quality investment are best modelled as fixed costs but decided to confine our analysis to the variable components of quality investment for two reasons:

- First, we draw on the margin concentration analysis which considered the variable component of quality investment and use this analysis to calibrate our model.
- Second, we believe that taking competition in fixed-cost quality investment into account would be likely to yield higher benefits from the Test.[8] Our model is therefore conservative in this context, since it biases the benefits from the Test downwards in this respect.

---

[6]To understand this it is useful to recall that our quality parameter p can alternatively be interpreted as a price. The normalization $p_0 = 1$ implies that utility is measured in monetary terms. As an example, assume that a consumer spends £30 in a large store and receives a utility of 50 from that. If that consumer spent the same amount of money in a convenience or mid-sized store he would obtain a utility of 30. Note that (i) the consumer receives additional utility of 20 from shopping at a large store and (ii) that the consumer surplus derived from the large store's offering is 20 as well. Since utility is measured in monetary terms the consumer obtains an additional benefit worth £20 from shopping at a large store.
[7]This issue was discussed extensively in the report. See paragraphs 4.20 to 4.63.
[8]This is because the possibility to invest in fixed-cost quality would give retailers an additional instrument which they could use to compete and would thus add an additional dimension of competition.

Asymmetric competitive constraints

38. Some parties also said that we should consider scenarios where stores imposed asymmetric competitive constraints on each other, for example that store 1 imposes a stronger competitive constraint on store 2 than store 2 does on store 1.

39. The empirical analysis we conducted during the market investigation points to an important source of such asymmetric constraints being the size differences between stores.[9] This is also corroborated by retailers' views. Asda noted how the ability to be of a similar size as a competitor ('catching up'), or even surpass it, are important factors in determining the competitiveness of an expansion in a given area.

40. This characteristic of the market implies that stores of a similar size tend to be closer substitutes from the point of view of consumers. In other words, it is reasonable to expect that, all else being equal, large stores which face other large stores that are of a similar size in a given area will tend to have a greater incentive to compete for customers than large stores which face other large stores that are much smaller than they are. This principle underpins the grouping of stores of different sizes in different markets (see paragraph 4.135 of the report) but is also relevant to large stores of different sizes even within the same relevant market.

41. Our analysis shows that variations in the degree of competition in a local area can have a significant impact on the delay costs and benefits of the test. Furthermore, as the degree of competition decreases with the asymmetry in the size of competitors, this reduces the estimated benefits and increases the delay costs in our analysis of extensions. This is because delay costs are measured in a context where a strong incumbent extends, leading to a greater difference in size between the strong incumbent and the weak incumbent, whereas the benefits are measured in a context where a weak incumbent extends, causing the weak and the strong incumbent to be more similar in size.

42. While we are aware that this is an important determinant of net benefits derived from our model, our market model cannot capture explicitly how a variation in the relative size of firms may affect the degree of competition. This is due to the fact that the parameters that describe the degree of competition between stores are independent of the stores' relative size. Our market model therefore, by failing to incorporate this aspect, necessarily overestimates delay costs and underestimates benefits.

43. We acknowledge that there might be other types of asymmetry in the market. For example, results from our margin concentration analysis show that the identity of a competing fascia also influences the degree of competition. However, we do not expect the market model to be biased in a given direction as a result of any such asymmetries.

Change in the variety of offer to consumers

44. Finally, our market model is not able to incorporate consumer welfare gains from larger inter-store variety since it assumes that the degree of differentiation between stores does not depend on whether the stores are owned by the same retailer or not. Neither does the model directly take into account consumer welfare gains from greater intra-store variety in larger stores since consumer preference for larger stores

---

[9] See, for example, our margin concentration analysis (eg Table 4 in Appendix 4.4 of the main report) or our entry analysis (eg Table 3 of Appendix 4.3 of the main report). We note that Tesco also refers to Appendix 4.3 in its submission from 20 August (see Annex D, paragraph 2).

is a function of increased expenditure on quality by those larger stores. We discuss these benefits in more detail in paragraphs 5.24 to 5.30 of our decision.

The welfare impact of the Test when applied to new stores

Calibration of the model—new stores

45. In this section we set out how we calibrate the model with constant marginal cost:

- First, we choose parameters such that our model yields results consistent with (i) data and results from the margin concentration analysis and (ii) a SSNIP test. Both the data and the outcome of a SSNIP test are independent of the size of demand in the local area. This first step therefore identifies the values of the parameters (and also the size of the annual delay costs and benefits from the Test) relative to each other but not their absolute size.

- Second, we choose a level of demand such that our model is consistent with our estimate of the profit of large stores in highly-concentrated areas to determine the absolute size of our parameters and the annual delay costs and benefits from the Test in the local areas considered.

46. First, we address which parameters need to be calibrated. Since our results only depend on the difference between the demand intercepts (ie a_i) and the marginal cost, we can fix the level of the a_i and focus on the marginal cost parameter. Hence, we calibrate three sets of parameters, namely the b_{ii}, the b_{ij} and the c_i. We focus mainly on symmetric stores,[10] ie local areas where the b_{ii}, the b_{ij} and the c_i are the same for all stores. There are hence three free parameters which must be jointly determined.

47. In order to be a relevant market, a monopolization of all stores in a local area must lead to a sufficiently large degradation in their offer. We said in the report[11] that a 5 per cent threshold for the SSNIP test might be too large since groceries retailing is a business with low profit margins and consumers' expenditure on groceries is large. We therefore first consider outcomes for the SSNIP test above 1 per cent to be consistent with stores being in a relevant economic market.

48. Second, we use data and quantitative results that were collated during the groceries market investigation. First, we note the following:

- One retailer suggested using 15 per cent as the average variable profit margin of large stores. This number is broadly consistent with our data.

- The effect of an additional competitor fascia store on a large incumbent store's profit margin was estimated to be an average of 3.79 per cent in our margin concentration analysis.[12]

[10]However, to investigate the welfare consequences when the Test encourages a locally weak incumbent to develop, we also consider different marginal cost parameters. See paragraph 64 for our approach in this case.
[11]See paragraph 4.11 of the report.
[12]One retailer submitted that 3.79 per cent was an overestimate for the profit margin reduction upon entry of a new fascia and that the CC should use 1.9 per cent instead. It pointed out that there was a difference between (i) the impact on incumbent profit margins of a new fascia entering while holding the number of stores in a local area fixed and (ii) the impact on incumbent profit margins of a new fascia entering while simultaneously increasing the number of stores by one. The retailer also noted that the margin concentration analysis (see Appendix 4.4. of the final report) captured the latter. We emphasize that for our calibration we use the impact on incumbent profit margins of a new fascia entering while simultaneously increasing the number of stores by one.

49. We consider both of these values to be conservative because they are averages over all local areas. In highly-concentrated areas we would expect higher profit margins. Moreover, in our margin concentration analysis we found that entry had a stronger impact on profit margins when the area was highly concentrated. We therefore adjust both values to obtain parameter values that we consider more relevant to those markets where the Test would apply.

50. We therefore use the following parameter values for our calibration which we consider are most likely to correctly describe highly-concentrated areas:

- We use a profit margin of 20 per cent, which we believe is an appropriate figure to use for profit margins in the representative local areas that we consider on the basis of the data that we have (see also paragraph 60).

- We know from our margin concentration analysis[13] that the impact of an additional competitor fascia store on incumbent profit margins almost quadruples when the analysis is restricted to large stores, instead of considering all stores larger than 280 sq metres.[14] If we assume that in highly-concentrated areas the competitive impact of large stores relative to all stores (larger than 280 sq metres) is also four times as big, we estimate the reduction in profit margin upon a large competitor fascia store entry in a monopoly area as 17.2 per cent;[15] similarly, in a duopoly area we estimate the profit margin reduction to be 14.4 per cent.

51. Tesco did not agree with the adjustment we made in relation to the profit margin impact of a new competitor in order to reflect highly-concentrated areas rather than average local areas. Tesco argued that this adjustment was inappropriate and that we should have used a scaling up factor of 1.15 rather than 4. Tesco pointed out that a failure to recognise this implied inappropriately increasing the benefits of the Test by a factor of four.

52. We considered Tesco's submission but did not find that it warranted a change to the figures discussed in paragraph 50. However, as mentioned in paragraphs 5 and 23, the data that we use to calibrate the model was not directly targeted to addressing the specific issues that we are addressing in this analysis. To check the reliability of our initial basis for calibration in the light of Tesco's argument, we performed an additional calibration of the model using results from the entry analysis that we undertook during our groceries market investigation.[16] This entry analysis contains estimates of the impact that a new entrant has on the revenue of an incumbent store.[17] Similarly to the estimates from the margin concentration analysis, the revenue impact of a new competitor also provides a measure for the degree of

[13]See Appendix 4.4, Annex 1, paragraph 36, of the report.
[14]For all stores larger than 280 sq metres, the profit margin decreases by 0.96 per cent upon entry, while the effect is 3.79 per cent when only considering large stores.
[15]The reduction in the profit margin for all stores above 280 sq metres when entry occurs in a monopoly area is estimated to be 4.3 per cent; the equivalent figure for a duopoly area is 3.6 per cent.
[16]See Appendix 4.3 of the final report.
[17]The figures in the table are based on analysis presented in Appendix 4.3 of the report, paragraphs 23 to 31 and Table 7. The relevant regression specification (specification 2 in Table 7 of Appendix 4.3) allows for the entry revenue impact to depend on both the size of the entrant store relative to the incumbent store(s) and the size of the entrant store relative to the market size pre-entry (the coefficient label takes an M to indicate this measure). The estimates reported in Table 7 of Appendix 4.3 are for the scenario where both measures of entry are equal to 1, that is the entrant store is the same size as the incumbent store and there are no other stores within 10 minutes of the incumbent store (so the incumbent is a monopolist in the area). In order to obtain estimates of the revenue impact for the scenarios we use (see paragraph 65 for blocked new stores and paragraphs 89 and 97 for blocked extensions) we have reduced the coefficients in Table 7 of Appendix 4.3 by applying different weights in different scenarios. Specifically, indicating first the coefficient for the size of the entrant store relative to the incumbent store(s) and secondly the coefficient for the size of the entrant store relative to the market size pre-entry, the coefficients used for the different scenarios are the following: (i) monopoly, blocked new store: (1, 1); (ii) duopoly, blocked new store: (1,1/2); (iii) monopoly, blocked extension: (1/2,1/2); (iv) duopoly, blocked extension (strong incumbent operates single store): (1/2,1/3); and duopoly, blocked extension (strong incumbent operates multiple stores): (1/2, 1/6).

competition between stores. The impact of a new competitor store on incumbent revenue and the impact of a new competitor store on incumbent profit margins are therefore related.

53. In our calibration we use a separate revenue impact for our different scenarios. The calibration is based on the numbers presented in Table 2 which we calculated from the report. We calculate the revenue impact controlling for both the incumbent's pre-entry local market position and the size of the entrant relative to the incumbent. For our calibration we use the mid-point revenue impact, in the Table 2's fourth column.

TABLE 2 **Revenue impact figures derived from the entry impact analysis**

per cent

Scenario	*Rev impact <5 min*	*Rev impact 5–10 min*	*Mid-point*
Monopoly, blocked new store	–22.41	–9.83	–16.12
Duopoly, blocked new store	–11.92	–6.03	–8.97
Monopoly, blocked extension (strong incumbent operates single store)	–11.20	–4.92	–8.06
Duopoly, blocked extension (strong incumbent operates single store)	–7.71	–3.65	–5.68
Duopoly, blocked extension (strong incumbent operates multiple stores)	–4.21	–2.38	–3.29

Source: CC analysis.

54. We looked at the implications of the entry analysis for the change in profit margin upon entry by a new competitor. Using the revenue impact in our market model, we find that these results imply profit margin changes upon entry by a new competitor that are broadly consistent with our calibration based on the margin concentration analysis. More specifically they generate greater margin changes than in our calibration for monopoly areas and lower than in our calibration for duopoly areas.[18]

55. Overall, this suggested to us that the values for margin changes that we used in our initial calibration assumptions, falling broadly in the middle of the range of margin changes generated in our model by the entry impact analysis, were reasonable.

56. In order to calculate the outcome of a SSNIP test, we derive the percentage decline in average spending on quality when all stores in a local area move from separate to common ownership.

57. We calculate the profit margin and the change in profit margin as follows:

- First, we consider the profit margin incumbents earn before a new development is undertaken. The profit margin is calculated as $(p^*_i - c_i)/p^*_i$ where p^*_i denotes the equilibrium value of p_i.
- Second, we calculate the percentage change in the incumbent profit margin resulting from a new store by a new entrant, ie the change in incumbent profit margins resulting from both a new store and a new fascia.

58. Table 3 gives an overview of how the parameters affect the relative size of delay costs and benefits and the values we use for the calibration, ie the outcome of a SSNIP test, the average variable profit margin and the change in the profit margin upon a competitor fascia entering. For example, the '-' in the first column of the first row means that a SSNIP test yields a lower value if we consider higher values of the

[18] These take values greater than 25 per cent for monopoly areas and as low as five per cent in duopoly areas.

b_{ii}. The '0' in the last row of the fourth column means that the choice of the marginal cost has no impact on the size of delay costs relative to benefits.

TABLE 3 **Relationship between parameters and target values for calibration**

Parameters	b_{ii}	b_{ij}	c_i
SSNIP	-	+	-
Variable profit margin	-	+	-
Change in variable profit margin	-	+	+
Size of delay costs relative to benefits	+	-	0

Source: CC analysis.

59. While the first step in our calibration fixes the parameter values and the size of the annual delay costs and benefits from the Test relative to each other, we need to calibrate the market size to identify their absolute values. The market size is varied by changing all demand parameters by a common factor, ie by multiplying all the a_i, b_{ii} and b_{ij} with the same (positive) number. This changes the market size but leaves demand characteristics such as, for example, elasticities constant. It also does not affect the size of the annual delay costs and benefits relative to each other.

60. We choose the size of the market such that our model predicts a large store earning a profit that is consistent with our data and our profit margin assumptions. Data that we collated during the groceries market investigation show that a large store with a 15 per cent variable profit margin earns a profit of £6.76 million on average. We consider that, for the purpose of our calibration, it is appropriate to use a figure of 20 per cent for the profit margin earned by stores in highly-concentrated areas (see paragraph 50). This implies that stores in highly-concentrated areas earn a profit margin that is one-third higher than the average profit margin (ie 20 per cent instead of 15 per cent). Consistently with this we also use a figure for a large store's profit in a highly-concentrated area that is one-third higher than the profit in an average local area, at £9.01 million.

Simulation results—new stores

61. We assess the impact of the Test for three market scenarios:

- First, we consider a local area with a single large store where a second store can be built either by the incumbent or a new entrant (the single-store market scenario).

- Second, we consider a local area with two independently-owned stores of equal size where a third store could be developed either by an incumbent or a new entrant (the two-store market scenario).

- Third, we consider a local area with two stores where one store is large (and is owned by a 'strong' fascia) and the other is small (and is owned by a 'weak' fascia) and where a third store could be developed by either of the two incumbents (the weak-incumbent scenario).

62. In all cases our measure of consumer welfare is consumer surplus.[19] The annual benefits and delay costs of the Test are derived as follows:

[19]This is valid in this context as we have specified a quasilinear utility function.

- We obtain the annual benefits from the Test by comparing (i) consumer welfare in an area where an additional store has been built by a new entrant or (in the third scenario) the weak incumbent with (ii) an area where no additional store is built.

- We obtain the annual delay costs of the Test by comparing (i) consumer welfare in an area where an incumbent fascia or (in the third scenario) the strong incumbent builds an additional store with (ii) an area where no additional store is built.

- We calculate the annual net benefits from the Test as the difference between the gross annual benefits and the annual delay costs.

63. The annual welfare consequences of an additional store are related to the following two factors:

- First, with an additional store of any fascia, consumers will make a larger part of their grocery purchases at large stores (the market expansion effect). An additional store may be more conveniently located for some customers. The resulting consumer welfare change is the prime determinant of the delay cost of the Test.

- Second, where the additional store is developed by a new entrant or the weak incumbent, more competition will emerge in the local area (the competition effect). The gain in consumer welfare caused by the additional competition is the main determinant of the benefit of the Test.

64. We make the following assumptions:

- In the single store scenario, we assume that the entrant store is identical to the incumbent store.

- In the two-store scenario, we assume that the incumbent stores are identical to each other and the entrant store is identical to the incumbent stores.

- In the weak-incumbent scenario, we assume that the weak incumbent operates a store with 20 per cent higher marginal costs than the store from the strong fascia in order to obtain a market share between 60 and 70 per cent for the strong incumbent[20] before the third store is developed.[21]

- In the weak-incumbent scenario, we further assume that the marginal cost of the new store is independent of the fascia which builds the store.[22]

65. In relation to the first two assumptions, we expect both an incumbent and a new entrant to have a similar view of the size of a store that might satisfy the level of demand in the market. Given that a new store opened by a strong incumbent would result in a lower degree of competition (and hence a lower level of output in the area) compared with a new entrant, it is more likely that a store opened by a strong

[20]Under our store size assumptions, the market share of the weak incumbent must be at one-third or lower prior to its expansion for its new store not to fail the Test. We also note that under more asymmetric initial market shares (and therefore under larger reductions in asymmetry brought about by the Test) the benefit from the Test will be higher. We consider our assumptions therefore as conservative.
[21]The higher marginal cost assumption solely reflects a capacity constraint of the small store, rather than different degrees of operational efficiency.
[22]While there may be differences in practice between different fascias, we do not think a different assumption is appropriate in this context as we are not aware of robust evidence on which to base any different assumptions and do not think this assumption biases our results in any given way.

incumbent might be smaller in anticipation of serving an overall smaller level of demand.

66. Table 4 sets out our calibrated results for the annual benefits and delay costs from the Test. We perform separate calibrations for monopoly and duopoly areas. For duopoly areas, we use the same parameter values in the two-store and the weak-incumbent scenario respectively.

TABLE 4 **Calibration results for new stores**

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*	*SSNIP %*	*Margin %*	*Change in margin %*
Single-store scenario	2,213	5,263	3,050	4.29	20.00	17.17
Two-store scenario	4,039	6,615	2,576	9.38	20.04	14.40
Weak-incumbent scenario	3,924	5,057	1,133	6.14	19.07	6.31

Source: CC analysis.

67. We note that, in terms of the annual net benefits from the Test:

- They are largest in the single-store scenario since an additional competitor in a monopoly area brings the largest increase in competition.

- They are smallest in the weak-incumbent scenario since the incremental effect on competition which would arise as a result of the weak incumbent retailer building a new store will be lower.

68. We note that the annual delay costs are higher in the two-store and the weak-incumbent scenario. This is due to the fact that in these two scenarios an additional store built by the (strong) incumbent has some pro-competitive effect (ie leads to an increase in quality), because the incentives of the incumbent are affected by its competitive interaction with the other retailer in the market. Conversely, an additional incumbent store has no impact on quality in the single-store scenario, where there is no competitive interaction.[23] This a specific feature of our market model. Alternative model specifications, using, for example, the Salop model mentioned earlier, or alternative versions of this model, imply that an incumbent who builds a new store actually faces reduced incentives to provide a high quality offer. In other words, our model is set up in such a way that an expansion by the incumbent, rather than creating incentives for the incumbent to exploit its market power, actually increases competition. This translates in our market model generating significantly higher delay costs for the Test than would have been the case under an alternative specification.

The welfare impact of the Test when applied to extensions

69. By preventing an incumbent retailer from strengthening its market power through the extension of a store, the Test can create a consumer benefit when, instead:

[23]This effect is known from the literature on multi-product oligopolies. Whenever a firm offers an additional product which is a substitute to its existing ones, its pricing incentives are governed by two effects: (i) the firm will lose some customers of its pre-existing products to the new one (and given the lower customer base, this gives an incentive to lower the price) and (ii) whenever the firm increases the price of one of its pre-existing products, some customers will switch to the new product (which makes the price increase more profitable). In case of a linear demand function and a duopoly, the first effect dominates the latter. In case of logit or nested logit demand, however, the introduction of a new product by an incumbent firm would lead to higher prices (see V Bilotkach, 'Two Results for Asymmetric Multi-Product Duopoly', *Applied Economics Letters*, 2005).

- a new entrant or a retailer already in the area with a weaker market position opens a new store; or
- a retailer already in the area with a weaker market position extends one of its stores.

In both of these cases the Test will lead to a more competitive market structure which in turn will result in a better competitive offering to consumers.[24] Moreover, where a new store is developed, consumers might also benefit from lower travel costs.

70. However, if weaker incumbent retailers or (in the case of the development of a new store) new entrants do not step in, consumers in that area may suffer a welfare detriment since the Test would prevent an increase in groceries sales area, at least in the short term.

71. Following the same approach as for new stores, we estimate the change in consumer welfare resulting from possible changes in individual local areas brought about by the Test.

72. In order to derive the delay costs of the Test which arise from blocking an extension, we compare consumer welfare after a strong incumbent has extended its store with consumer welfare without that extension and without any other extension or entry.

73. In order to derive the benefits of the Test, we distinguish between three cases. As a response to a blocked extension by a strong incumbent, it could be that:

- an entrant builds a new store;
- a weak incumbent builds a new store; or
- a weak incumbent extends an existing store.

74. In our framework for the assessment of the net benefits of the Test, we compare consumer welfare after a strong incumbent has built an extension with consumer welfare after a weak incumbent or new entrant has reacted by either building a new store or extending an existing one.

How to model extensions

75. The specification of our cost function allows us to model capacity constraints.[25] The cost and corresponding marginal cost function has the following form:

$$C_i(q_i) = \frac{\bar{c}_i}{2}\left(\frac{q_i}{\bar{q}_i}\right) \cdot q_i \quad \Rightarrow \quad MC_i(q_i, \bar{q}_i) = \bar{c}_i\left(\frac{q_i}{\bar{q}_i}\right)$$

76. An extension is modelled as an increase in $\bar{q}_i$ which results in a decline of the extended store's marginal cost. Hence, the specification of the cost function reflects

[24] We are aware that the benefits from a more competitive market structure can only be attributed to the Test if new entry would not have taken place had the incumbent extension gone forward. Sainsbury's argued that for this to be the case an incumbent extension must have a sufficiently large impact on the profit of rival stores. In our model we calculate that an incumbent extension reduces the variable profit of a rival by approximately 9 per cent. While we do not think it would be appropriate to use our model to derive specific figures for a type of analysis, such as this, for which it was not designed, we consider this figure to imply a potentially significant effect on the profitability of an entrant's investment.

[25] See the discussion in the footnote to paragraph 23.

the fact that the level of demand that a store can satisfy (its capacity) is determined by its size. If demand exceeds the capacity of a store, the store will eventually become congested. The cost function therefore suggests that congestion makes it increasingly costly for a store to attract or accommodate additional demand.

77. The level of marginal cost determines the competitive offering at a store. Higher marginal costs imply that it is more expensive to attract additional demand by raising quality. Since marginal costs increase with the level of congestion, a more congested store will find it optimal to degrade quality.

78. One retailer suggested that the functional form we adopt to capture the potential benefits from extending a store implies that average margins tend to be relatively high. This is a consequence of very high margins (implied by a cost close to zero) for the first units sold. While we recognize that this is one additional limitation of the model, we believe that in this context it is appropriate to calibrate the model with respect to the margin of the last unit sold (see also the discussion in paragraph 5).

Calibration of the model—extensions

79. The calibration of the model when applied to extensions follows the same two steps that we outlined for new stores in paragraph 45. We first calibrate our parameter values such that they are consistent with the data from the margin concentration analysis and a SSNIP test and then calibrate the market size which yields store profit levels of around £9.01 million.

80. In the first step, however, the quadratic cost function of our model for extensions implies that we do not have to calibrate the absolute level of the demand intercepts (ie all the a_i). This is because scaling all a_i up or down by a common factor neither affects the size of the benefits relative to the delay costs, nor the values we use for the calibration.[26] Since we focus on symmetric demand, we have to calibrate three parameters, namely b_{ii}, b_{ij} and $\overline{c}_i \;/\; \overline{q}_i$.

81. As for our analysis of new stores we use for calibration:

- a SSNIP test, ie there must be a sufficiently large reduction in per unit quality expenditure resulting from a monopolization of the local area;
- the profit margin of 20 per cent before an extension is built (see paragraph 43); and
- the change in the profit margin for a new fascia store entry of 17.2 per cent for a monopoly market and 14.4 per cent for a duopoly market (see paragraph 43).

82. However, we note that the results from our margin concentration analysis are not directly applicable to a local area where extensions occur (and therefore to our model) for two reasons:

- First, the margin concentration analysis focuses on the impact of different degrees of competition on store profit margins and does not specifically consider the role of extensions.

---

[26]However, the size of the a_i relative to each other does affect the relative size of benefits and costs.

- Second, the margin concentration analysis presumes constant marginal cost to calculate the profit margin while in the model we use an increasing marginal cost function.

Nevertheless, we use these results for the purpose of this analysis as the best evidence available to us, treating the results appropriately (see paragraph 24).

83. In calibrating the market size, we have to take into account that the level of demand also affects the marginal cost function. To keep the level of congestion constant when the market size is altered, the capacity at each store has to be changed by the same factor as the demand parameters. We therefore multiply the demand parameters and the capacity for each store by a common factor.

Simulation results—extensions

Blocked extension is replaced by a competitor's new store

84. We first consider a situation where, following an extension that is prevented by the Test, a rival develops a new store in the relevant local area. The annual delay costs and benefits we derive below are driven by the following factors:

- A blocked extension that is not immediately replaced by an alternative development leads to a welfare loss since the incumbent's extension would reduce marginal cost, making it profitable for stores to attract additional customers by improving quality. The absolute size of the annual delay costs depends both on the extent to which the lower marginal costs translate into higher quality as well as how many customers would benefit from these quality improvements.

- The annual benefits from the Test depend on the benefits consumers derive from increased competition in a local area arising from the entry of a new fascia (or a weak incumbent). The absolute size of these annual benefits depends both on the extent of quality improvements brought about by more competition as well as the level of demand in that local area.

85. In line with our approach for new stores, we analyse both a monopoly fascia and a duopoly fascia market:

- In the monopoly fascia scenario, we consider a local area with a single large store where a new entrant can build a second large store if a 'substantial' extension by the incumbent is prevented by the Test.

- In the duopoly fascia scenario, we consider a local area where two fascias compete and where a new store could be developed if a 'substantial' extension by the strong incumbent is prevented by the Test.

86. We calculate from our data that in an average duopoly fascia market where the Test would prevent one fascia from building an extension, the fascia that cannot expand (the 'strong' fascia) has a GSA share of two-thirds while the fascia that is not affected by the Test (the 'weak' fascia) has a GSA share of one-third. In the duopoly fascia scenario we therefore assume that a strong fascia exists which holds twice as much capacity as the weak fascia.

87. Our analysis of the 2000 to 2006 data shows that two scenarios reflect the vast majority of HCAs where a strong and a weak incumbent compete (163 of 173 cases):

- Both the strong and the weak incumbent operate a single store where the strong incumbent's store is on average twice as large as the weak incumbent's store.

- The strong incumbent operates two stores and the weak incumbent operates a single store.[27]

88. We consider each of these scenarios in turn. To calculate the expected annual delay costs and benefit from the Test, we weight the annual delay costs and benefits derived in both scenarios with their relative frequencies. Since our data shows that the strong incumbent operates a single store in twice as many instances as it operates two stores (109 rather than 54 cases), we assign a weight of two-thirds to the first duopoly scenario and a weight of one-third to the second duopoly scenario.

Case 1: The strong incumbent operates a single store

89. Since the replacement new store can be developed either by a new entrant or by a weak incumbent, we consider three scenarios:

- First, we consider a local area with a single large store where a new entrant builds a second large store in response to a 'substantial' extension is prevented by the Test.

- Second, we consider a local area with two stores where one store (which is owned by a 'strong' fascia) is twice as large as the second (which is owned by a 'weak' fascia) and where a third store could be developed by a new entrant if a substantial extension by the strong incumbent is prevented by the Test.

- Third, we consider a local area with two stores where one store (which is owned by a 'strong' fascia) is twice as large as the second (which is owned by a 'weak' fascia) and where a third store could be developed by the weak incumbent if a 'substantial' extension by the strong incumbent is prevented by the Test.

90. We also consider the delay costs when a small extension by a monopolist prevented by the Test does not lead to any entry or expansion (and in Appendix C we also consider the effect if larger extensions are prevented and no competitor entry or expansion occurs).

91. We make the following assumptions:

- We define a substantial extension as being 50 per cent of initial store size and a small extension as being 25 per cent of initial store size.[28]

- The new store is the same size as the blocked extension (see the discussion in the next two paragraphs).

- The small store owned by the weak incumbent in the duopoly scenarios has half the capacity ($\overline{q}_i$) of the strong incumbent's store (resulting in a strong incumbent's market share of two-thirds; see paragraph 86).

[27]In contrast, our data suggests that in the vast majority of monopoly fascia areas (393 out of 415), the incumbent operates only a single store.

[28]See paragraph 13*(d)* and *(e)* in Appendix C. As suggested by our data, we assume that an extension that adds 300 sq metres GSA amounts to roughly 750 sq metres NSA which corresponds to approximately 25 per cent of initial store size.

92. In response to our provisional decision, we received a number of comments and suggestions on a preliminary version of our market model. In particular, several retailers criticized our model in so far as it compared incumbents' developments that might be prevented by the Test with larger competitors' developments that might be carried out in their place. For example, Tesco argued that this assumption was 'counter-intuitive'; Sainsbury's told us that this assumption was 'inconsistent with the assumption that the blocked extension consumes sufficient residual demand in the local market to dissuade routine entry' and that it was 'therefore logical to consider an assumption that blocking an extension only facilitates entry of extension of a similar scale'.

93. We took these comments into account in developing our model. In paragraph 101 we explain why we think that competitors' developments may, in practice, be larger than the strong incumbent developments prevented by the Test. However, we do not include this scaling-up assumption in our estimates of benefits and delay costs which we include in our NPV model, using it instead as part of our sensitivity analysis (see paragraphs 102 and 114).

94. Table 5 presents our results where the parameters are chosen to yield results that are most consistent with our calibration values for highly-concentrated areas (see paragraphs 43 and 52).

TABLE 5 **Blocked extension, new store replacement**

Single strong incumbent store (Case 1)

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*	*SSNIP %*	*Margin %*	*Change in margin %*
Monopoly, small extensions—no replacement	498	-	–498	1.81	20.02	17.19
Monopoly, substantial extension—replaced by new store new fascia	981	1,223	242	1.81	20.02	17.19
Duopoly, substantial extension—replaced by weak incumbent new store	1,822	2,528	706	12.46	20.01	13.10
Duopoly, substantial extension—replaced by new store new fascia	1,822	2,853	1,031	13.69	20.01	14.35

Source: CC analysis.

95. We make two observations about the level of annual net benefits:

- Within the market model the Test delivers higher annual net benefits in a duopoly area (comparing the second with the third and the fourth row). While an additional competitor leads to the strongest increase in quality in a monopoly area, the quality improvement occurs at two stores in the duopoly area, implying that more customers benefit from quality improvements brought about by competition.

- A new store from a new entrant brings in more competition than a new store from a weak incumbent (comparing the third with the fourth row), resulting in higher net benefits if a blocked extension is replaced by a new entrant.

96. We also make two observations about the level of annual delay costs:

- Delay costs are larger the larger the extension (comparing the first with the second row).

- Delay costs are higher in a duopoly area (comparing the second with the third and the fourth row). This results from the higher level of competition in a duopoly which forces the extended store to pass marginal cost reductions on to consumers to a greater extent.

Case 2: The strong incumbent operates two stores

97. Next, we present the results of our modelling when the strong incumbent operates two stores while the weak incumbent operates a single store. We consider both the case where a blocked extension is replaced by a new entrant and where it is replaced by a weak incumbent new store. We assume (i) that all stores are of equal size and (ii) that the new store and the blocked extension are of equal size. Otherwise, we make the same assumptions and calibrate the model to the same values for the profit, profit margin and change in profit margin upon a competitor entry as above.

TABLE 6 **Blocked extension, new store replacement**

Two strong incumbent stores (Case 2)

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*	*SSNIP %*	*Margin %*	*Change in margin %*
Duopoly, substantial extension—replaced by weak incumbent new store	1,677	2,512	835	6.25	20.02	14.39
Duopoly, substantial extension—replaced by new store new fascia	1,677	2,750	1,073	6.25	20.02	14.39

Source: CC analysis.

98. The most notable result is that the net benefits from the Test are larger when the strong incumbent operates two stores compared with the situation where the strong incumbent operates a single large store. This can be explained by the fact that the extension from the strong incumbent would benefit only those customers at the extended store. Hence, blocking such an extension leads to a lower consumer detriment relative to the benefits.

Weighting Case 1 and Case 2

99. To calculate the annual delay costs and benefits from the Test when extensions are replaced by new stores, we weight Case 1 and Case 2 by their relative frequencies in the duopoly scenario. Since our data shows that Case 1 occurs twice as often as Case 2, we assign a weight of two-thirds to Case 1 and a weight of one-third to Case 2. The weighted results are shown in Table 7.

TABLE 7 **Blocked extension, new store replacement**

Weighted numbers

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*
Monopoly, small extensions—no replacement	498	-	–498
Monopoly, substantial extension—replaced by new store new fascia	981	1,223	242
Duopoly, substantial extension—replaced by weak incumbent new store	1,774	2,523	749
Duopoly, substantial extension—replaced by new store new fascia	1,774	2,819	1,045

Source: CC analysis.

Sensitivity testing with respect to replacement store size

100. The results that we have presented assume that the replacement store is the same size as the blocked extension.

101. However, we consider that there are reasons why the replacement new store might be expected to be larger than the blocked extension:

- A new store adds a new location to the market and will therefore attract more demand than the blocked extension. This in turn suggests that the new store will be larger.
- Strong incumbents may extend strategically and absorb only a part of the unmet demand in a local area to render rival developments unprofitable. In contrast, weaker incumbents have incentives to choose the size of the extension to optimally accommodate demand.
- We received evidence that weak incumbents may want to build larger extensions to achieve a store size similar to, or even greater than, the strong incumbent and establish 'a store that was best in town'.

102. Table 8 reports the net benefits from the Test if the replacement store is up to 100 per cent larger than the blocked extension. Those net benefits are again a weighted sum of the net benefits (i) when the strong incumbent operates a single store and (ii) when the strong incumbent operates two stores.

TABLE 8 **Blocked extension, new store replacement**

	Weighted net benefits, £'000			
Excess replacement store size	*0%*	*33%*	*67%*	*100%*
Monopoly, small extensions—no replacement	–498	–498	–498	–498
Monopoly, substantial extension—replaced by new store new fascia	242	675	1,113	1,547
Duopoly, substantial extension—replaced by weak incumbent new store	749	1,456	2,122	2,747
Duopoly, substantial extension—replaced by new store new fascia	1,045	1,836	2,583	3,287

Source: CC analysis.

103. We found that the net benefits increase strongly when the new replacement store is larger than the blocked extension.

Blocked extension is replaced by a competitor's extension

104. An extension prevented by the Test could also be replaced by a weak incumbent's extension. In this section we investigate the welfare consequences of a weak-incumbent extension replacing either a small or a substantial extension by a strong incumbent.

105. In line with our analysis in the previous section, we consider two cases:

- Both the strong and the weak incumbent operate a single store where the strong incumbent's store is twice as large as the weak incumbent's store (Case 1).

- The strong incumbent operates two stores and the weak incumbent operates a single store where all three stores are of equal size (Case 2).

106. Again, we calculate the expected annual delay cost and benefit from the Test by weighting the annual delay costs and benefits derived in both scenarios by their relative frequencies, based on the data that we have analysed for the period 2000 to 2006. We assign a weight of two-thirds to the first scenario and a weight of one-third to the second scenario.

107. We make the same assumptions as we did when considering a new store replacing a blocked extension. In particular:

- We use the same parameter values for the calibrations.

- We assume that the blocked and replacement extensions are the same size.

Case 1: The strong incumbent operates a single store

108. Table 9 shows the results for this case. Since there is no new store entry in this model, we cannot report a change in the profit margin.

TABLE 9 **Extension, extension replacement (Case 1)**

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*	*SSNIP %*	*Margin %*
Duopoly, small extension—replaced by weak incumbent extension	957	1,139	182	7.86	20.01
Duopoly, substantial extension—replaced by weak incumbent extension	1,822	2,176	354	7.86	20.01

Source: CC analysis.

109. We note two results:

- We observe both a smaller consumer detriment and consumer benefit if small extensions are considered.

- Compared with our results when a blocked extension was replaced with a new store, the net benefit from a replacement extension is lower.

Case 2: The strong incumbent operates two stores

110. Next, we present results when the strong incumbent operates two stores while the weak incumbent operates a single store. We assume that all stores are of equal size. Otherwise, we make the same assumptions and use the same parameter values as used when we considered a new store replacing a blocked extension.

TABLE 10 **Extension, extension replacement**

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*	*SSNIP %*	*Margin %*
Duopoly, small extension—replaced by weak incumbent extension	865	1,006	141	6.25	20.02
Duopoly, substantial extension—replaced by weak incumbent extension	1,677	1,953	276	6.25	20.02

Source: CC analysis.

Weighting Case 1 and Case 2

111. To calculate the annual delay costs and benefits from the Test when extensions are replaced by extensions, we again weight Case 1 and Case 2 by their relative frequencies. As above, we give the results from Case 1 a weight of two-thirds and the results from Case 2 a weight of one-third. The weighted results are shown in Table 11.

TABLE 11 **Extension, extension replacement (weighted numbers)**

	Gross benefit if built by incumbent in £'000 (delay cost)	*Gross benefit if built by a competitor that increases competition in £'000*	*Difference (net benefits due to competition)*
Duopoly, small extension—replaced by weak incumbent extension	927	1,095	168
Duopoly, substantial extension—replaced by weak incumbent extension	1,774	2,102	328

Source: CC analysis.

Sensitivity testing with respect to replacement extension size

112. The results that we have presented assume that the blocked and the replacement extension are of equal size. However, we consider that there are at least two reasons why the replacement extension might be expected to be larger:

- Strong incumbents may extend strategically and absorb only a part of the unmet demand in a local area to render rival developments unprofitable. In contrast, weaker incumbents have incentives to choose the size of the extension to optimally accommodate demand.

- We received evidence that weak incumbents may want to build larger extensions to achieve a store size similar to or even greater than, the strong incumbent and establish 'a store that was best in town'.

113. We note that our reasoning above applies primarily to the case where the strong incumbent operates a single large store as opposed to multiple stores. The results below therefore assume a larger size of the replacement extension only in Case 1 where the strong incumbent operates a single store. For Case 2, we maintain the assumption that both the blocked and the replacement extension are the same size.

114. Table 12 contains results for different assumptions on the small store's extension size in excess of the large store's extension size. The first column contains the results for same size extensions. The assumed level of excess size of the replacement extension increases up to 20 per cent as one moves to the right.

TABLE 12 **Sensitivity with respect to scaling up: extension, extension replacement**

	Weighted net benefits, £'000		
Scaling up	*0%*	*10%*	*20%*
Duopoly, small extension—replaced by weak incumbent extension	168	273	377
Duopoly, substantial extension—replaced by weak incumbent extension	328	519	706

Source: CC analysis.

We notice again that even small increases in the size of the replacement extension have a sizable positive impact on the net benefits.

Net present value model

Introduction

1. In this appendix we describe how we used an NPV model to combine our quantitative estimates of the costs and benefits of the Test in representative local areas. The aim of modelling the NPV is not to generate a single figure for the quantifiable elements of the costs and benefits, but rather to understand the NPV of the Test under a range of reasonable assumptions.

2. The NPV model estimates the impact of development decisions taken over a period of 25 years. It combines the results derived from our market model with our assessment of the number of developments that would be prevented by the Test annually, a number of other estimates set out in paragraphs 5.43 to 5.55 of the decision, Appendix B and data both from our groceries market investigation and from publicly-available sources. Over each of the 25 years the model calculates the NPV of the costs and benefits of the developments built (or not built) in the year, assuming a 25-year life for each of the developments built and, using an appropriate discount rate, discounts the values back to the present day to reflect the fact that present benefits and costs are considered more significant than those occurring in the future.[1] The model assumes a terminal value from year 25 based on the remaining life of the store developments built over the 25-year life of the model.[2,3]

3. We note that, as set out in the decision, this is only a partial view of the overall value of the Test (see paragraph 5.127). The results of our NPV model are therefore only one element that we use in reaching our view on the effectiveness and proportionality of the Test.

Key inputs

4. We established estimates for:

   (a) the number of developments affected by the Test, their associated market structures, and representative market scenarios;

   (b) the length of delay between when an incumbent development would have opened but for the Test and when we expect a competitor's development to open instead, together with the probability of a competitor's development opening;

   (c) the benefits of a competitor's development and the costs of delay;

   (d) the discount rate; and

   (e) the administrative costs of the Test.

[1] Retailers agreed that 25 years was the appropriate period to calculate the NPV of a store development.

[2] The calculation of a terminal value is an approach commonly used in financial modelling and represents the discounted value of future cash flows which are estimated to occur beyond the period of the model.

[3] Using the spreadsheet model we provided with our provisional decision Tesco said that the NPV model in reality operated over a period of 49 years, with £759 million of the discounted value (around 40 per cent of the value quoted in the provisional decision) arising after year 25, and said that the model relied on putative benefits from the distant future. We recognize that, in year 25 of the model, we are modelling investment decisions that a retailer would take based on a store life over the next 25 years. However, as discussed in footnote 2, the assessment of a terminal value is a standard approach to take in financial modelling.

We also set the period of the model. We discuss each of these in turn.

Number of developments, their associated market structures and representative market scenarios

5. Our analysis indicates that 19 extensions and three new stores each year would have been prevented by the Test between 2000 and mid-2006 if the Test had been in operation at the time (see decision, paragraph 5.72).[4]

6. There are several factors that might affect our estimate of the number of developments likely to be prevented by the Test in the future. These might include, for example, the general economic climate or the impact of the exceptional circumstances clause. However, for simplicity our model assumes that the number of developments impacted remains constant over the life of the model. We conducted sensitivities which assume decreases in the number of developments affected by the Test.

7. Tesco said that the CC's new store analysis did not distinguish between off-site replacements and new stores and that when an off-site replacement was blocked, the original store would remain open. It said that this would reduce the level of demand that a new store could serve. Tesco suggested we should therefore treat off-site replacements as extensions. Tesco said that consequently the total capacity following a like-for-like replacement would be substantially less, and there would be a materially lower probability of replacement for off-site replacements (as the original store remains). Tesco believed that off-site replacements are likely to account for the majority of the blocked developments in the CC's 'new stores' category.

8. During 2000 to mid-2006, just over half of the new stores that we identified that would have been prevented by the Test had it been in operation were new stores, with the remainder being off-site replacements. We treat off-site replacements as new stores because an alternative site is available for development by a competitor. If a competitor were to acquire the site that the incumbent had been intending to use for its off-site development, the resulting store would be in a different location to the incumbent's original store and might justify a larger store being built than just the increment in size of the incumbent store prevented by the Test. However, we recognize that off-site rebuilds are neither pure new stores nor extensions. We modelled them as new stores for the reasons set out above but recognize that this may overstate the size of the replacement store that a new entrant decides to build. However, we also modelled sensitivities where offsite rebuilds are treated as large extensions and a second case that recognizes that offsite rebuilds are neither pure new stores nor extensions and therefore assumes 50 per cent of the off site rebuilds are large extensions and 50 per cent are new stores.

9. We estimated the number of developments that would be likely to occur in a range of representative local areas, based on the market structures that we had identified from our analysis of store developments between 2000 and mid-2006. For each type of market structure, we looked at the likely competitor reaction that would occur when an incumbent store was prevented by the Test. This allowed us to vary our assumptions on delays, benefits and costs, depending on the market structure and the likely competitor reaction. We looked separately at new stores and extensions (see paragraphs 5.43 to 5.55 and 5.75 to 5.103 of the decision).

---

[4]These figures are slightly lower than the figures we calculated in our provisional decision (3 new build stores and 26 extensions). This is primarily because we have reduced the figures to account for entry within a few months of a development that would have been prevented by the Test, and routine entry. We also divide the total number of developments that would have been prevented by the Test by 6.5 years to calculate an annual rate rather than the 6 years we had previously used.

New stores

10. The average size of the new stores that would have been prevented by the Test between 2000 and mid-2006 was approximately 3,300 sq metres net sales area (see the decision, Table 2). We assumed that, given the large average size of the new stores and because a site would be available for a competitor to build on (see the decision, paragraph 4.18), all new stores prevented by the Test would be replaced by a competitor development. We discuss our assumptions on possible delays in paragraphs 16 to 21.

Extensions

11. The average size of the extensions that would have been prevented by the Test in the period 2000 to mid-2006 is approximately 1,400 sq metres net sales area, although some extensions were much smaller.[5] We consider it less likely that a new development would be built by another retailer to replace a small extension prevented by the Test. In the decision (paragraphs 5.113 to 5.120), we describe why we consider that we should include a de-minimis threshold of 300 sq metres groceries sales area below which an extension could proceed notwithstanding the operation of the Test. Accordingly the NPV model assumes that all extensions of up to 300 sq metres groceries sales area are allowed to proceed under the Test and therefore attract neither costs nor benefits.

Scenarios

12. We have assessed eight representative market scenarios (three for new stores and five for extensions) that reflect how competitors may react when a strong incumbent's development is prevented by the Test. In many cases we have estimated the number of times the scenario would be likely to occur based on our analysis of the 2000 to mid-2006 data. In some cases, however, we have used our judgement to make an assumption about the number of times a particular scenario would occur. In those cases, we used sensitivities to examine the impact of changing these assumptions.[6] Further discussion on this issue, including an analysis of the effects of changing this assumption, is set out in paragraphs 31 to 44 below.

13. The eight representative market scenarios were:

New builds

(a) *Scenario one:* A new store that would have been built by the only fascia present in an isochrone is prevented by the Test and the store is replaced by a new-entrant store.

- We estimated, based on our analysis of the 2000 to mid-2006 data, that around one-third of new stores prevented by the Test would be in single-fascia areas. This amounts to one store a year.

The remaining new stores that would have been prevented by the Test were in areas with more than one store present and are accounted for by scenarios two and three. We estimated, based on our analysis of the 2000 to mid-2006 data,

---

[5]We note that, excluding all extensions under 300 sq metres of groceries sales area, the average size of the remaining extensions is 1,500 sq metres.

[6]For the purposes of estimating the number of times each scenario will occur, we have assumed that all extensions prevented by the Test and not subject to the 300 sq metre de minimis will be replaced.

that two-thirds of new stores prevented by the Test would be in areas with more than one fascia. We assumed that half of these would be built by a new fascia and half by a weak incumbent fascia.

(b) *Scenario two:* A new store that would have been built by a strong incumbent fascia, where more than one fascia is present in an area, is prevented by the Test and replaced by a new-entrant store.

- We assumed, as explained above, that one store a year would fall into this category.

(c) *Scenario three:* A new store that would have been built by a strong incumbent fascia, where more than one fascia is present in an area, is prevented by the Test and replaced by a store from a weak incumbent.

- We assumed that one store a year would fall into this category.

As described in paragraph 8, we included two sensitivities in our NPV model which analysed off-site replacements as having some or all of the characteristics of large extensions rather than new stores. This is discussed further in paragraph 43 below.

Extensions

(d) *Scenario four:* An extension to a store has a grocery sales area of less than 300 sq metres and the de-minimis exclusion applies (see paragraph 11).

- We estimate, based on the 2000 to mid-2006 data, that of the 19 extensions that would be prevented by the Test each year, an average of 2.6 extensions each year would fall into this category.

(e) *Scenario five:* A large extension to a store operated by the only fascia present in an area is replaced by a new-entrant store.

- We estimate, based on the 2000 to mid-2006 data, that of the 19 extensions that would be prevented by the Test each year, an average of 6.9 extensions each year would fall into this category and would be replaced by a new-entrant store. We also analysed sensitivities where 50 per cent or all of the new stores that were off-site replacements in single fascia areas were included in this category (see paragraph 8).

- We estimate, based on the 2000 to mid-2006 data, that of the 19 extensions that would be prevented by the Test each year, an average of 9.5 of these extensions would be in areas where more than one fascia was present. Of these 9.5 extensions prevented by the Test, we assumed that competitors build developments in the area as follows: in one-third of cases a new store is built by a weak incumbent; in one-third of cases an extension to a weak incumbent store is built; and in one-third of cases a new-entrant store is built. Accordingly, an average of 3.2 extensions each year would fall into each of these three categories. We did not have any information relevant to assessing the possible reactions of competitors to an extension by a strong incumbent being prevented by the Test. We therefore modelled sensitivities that reflected the impact of assuming changes in the proportions built by new entrants, weak incumbents as extensions and weak incumbents as new stores. We also analysed a sensitivity where new stores that were off-site replacements in duopoly areas were included in these categories, divided equally into each of the three (see paragraph 8).

(f) *Scenario six:* A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by a new store of a weak incumbent (3.2 stores—see above).

(g) *Scenario seven:* A large extension to a store in an area with more than one fascia is replaced by an extension to a weak incumbent store (3.2 stores—see above).

(h) *Scenario eight:* A large extension to a store in an area with more than one fascia is replaced by a new-entrant store (3.2 stores—see above).

14. A summary of the number of stores that we estimated or assumed to be in each category is shown in Table 1.

TABLE 1 **Number of stores in each market structure and type of development**

Category of development	*Number of stores each year*
(a) A new store that would have been built by the only fascia present is replaced by new-entrant store	1
(b) A new store that would have been built by the strong-incumbent fascia, where more than one fascia is present, is replaced by a new-entrant store	1
(c) A new store that would have been built by the strong-incumbent fascia, where more than one fascia is present, is replaced by a store from a weak incumbent	1
(d) A small extension to a store is less than 300 sq metres grocery sales area and the de minimis applies	2.6
(e) A large extension to a store operated by the only fascia present is replaced by a new-entrant store	6.9
(f) A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by a new store of a weak incumbent	3.2
(g) A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by an extension to a weak incumbent store	3.2
(h) A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by a new-entrant store	3.2

Source: CC analysis.

15. Overall, we assume that the de-minimis threshold applies to 14 per cent of extensions (an average of 2.6 each year), 17 per cent of extensions prevented by the Test are replaced by extensions by weak incumbents (an average of 3.2 each year) and the remaining 69 per cent of extensions prevented by the Test are replaced by new stores. We modelled sensitivities to changes in these assumptions (see paragraph 42).

Length of delay and the probability of a competitor's development opening

16. In paragraphs 5.75 to 5.103 of the decision we set out our analysis of the likely length of delay for a competitor to enter or expand in a local area if the strong incumbent's development was prevented by the Test. We identified different delay assumptions, depending on the type of development that was prevented and what was developed in its place:

(a) a new store is built instead of the strong incumbent's new store;

(b) a new store is built instead of the strong incumbent's extension; and

(c) an extension by a weak incumbent is built instead of an extension by a strong incumbent.

17. In paragraph 5.77 of the decision we discussed the time retailers would have to adjust their strategies to the introduction of the Test. We found that there would be sufficient time during the introduction of the Test for retailers to adjust their commercial strategies appropriately. Since there is an active real estate market we assume retailers would be able to dispose of sites where they were unable to develop a store because of the Test. Therefore we assumed that, for new stores where there is a discrete site under development, another retailer would be able to acquire that site reasonably quickly in the same state of development and so there would be no delay in the future. However, we recognize that retailers will have a pipeline of sites under development and it will take time to adjust this pipeline to the introduction of the Test. We therefore assumed a one-year delay immediately after the introduction of the Test.

18. However, as discussed in the decision, paragraphs 5.92 to 5.100, the situation for extensions is different. Where an extension prevented by the Test is replaced by an extension to a weak incumbent store, we assume that there would generally be no delay. We recognize, however, that in some cases there may be site-specific issues associated with the weak incumbent's extension and so model sensitivities to look at the impact of introducing a delay (see paragraph 39).

19. Where a new store replaces an extension, a site needs to be identified and acquired. In paragraph 5.77 of the decision we noted that retailers would be able to draw up contingency plans for their investment that would enable them to select the appropriate investment choices depending on whether the Test would be introduced. In paragraph 5.84 of the decision we discussed the information received from retailers about site assembly, together with our own analysis in the report, and concluded that a reasonable average time for a retailer to develop a site and open a store was five years. We subtracted the average time to build a store, which we assessed as one year to arrive at an average site development time of four years. In the NPV model we have assumed, conservatively in our view, that immediately after the introduction of the Test, a retailer will still take an average of four years to develop a site.

20. However, after the Test has been introduced, we expect retailers proactively to seek opportunities to develop in areas where they recognize that the strong incumbent would be prevented from developing by the Test, and to begin developing sites for new stores in those areas. This process of development by a competitor would be independent of whether the strong incumbent retailer seeks to build a development in the area. Therefore we expect that four years after the introduction of the Test there would be no additional delay compared with an extension by a strong incumbent since the competitor retailer will have spent the previous four years developing a site. However, we have, again conservatively in our view, assumed a continuing average delay of one year to allow for the possibility that in some cases there may be difficulties in site assembly to replace extensions or other factors that cause some delay. We have also modelled sensitivities that assume longer delays.[7]

21. The delays are summarized in Table 2.

[7]This is also conservative because it does not allow for redirected investment.

TABLE 2 **Delay assumptions**

years

Category of development	*Short-term delay*	*Long-term delay*	*Transition period*
New store replaced by another new store	1	0	1
Extension replaced by a weak incumbent extension	1	0	1
Extension replaced by a new store	4	1	4

Source: CC analysis.

22. We also carried out a number of sensitivities to assess the impact of assuming greater delays before a competitor entered or expanded, or to take account of the possibility that a replacement extension or new build may not, in practice, take place (see probability of replacement sensitivities discussed in paragraphs 31 to 38 below). We modelled the impact of there being longer delays to replace any extension prevented by the Test and a probability of replacement below 100 per cent.

Benefits of a competitor's development and the costs of delay

23. Appendix B details how we estimated for a range of scenarios:

- the benefit from the strong incumbent building a grocery retail development (this amounts to the cost of delayed entry for the period from when the strong incumbent's development would have occurred to the time when a competitor development occurs);
- the benefit of another retailer providing the capacity instead and thereby increasing competition; and
- the net benefit due to competition, ie the difference between the two figures.

24. We use the benefits and costs set out in Appendix B for each of the scenarios described in paragraphs 12 to 15. The NPV model calculates the effect of each scenario according to the average size of stores included in the scenario. Table 3 shows the cost and benefit assumptions taken from Appendix B expressed per sq metre of sales area.[8]

[8]In all cases (both for new stores and extensions) the calibrations of the model were based on an average total store size (ie for extensions this was based on the overall size of the store). The average size of stores over 1,400 sq metres was calculated from the store data assembled during the groceries market investigation as 3,038 sq metres, so the costs and benefits described in Appendix B were divided by 3,038 sq metres to calculate the costs and benefits per sq metre.

TABLE 3 **Cost and benefit assumptions for each of the scenarios per sq metre of sales area**

£ per sq metre

		Gross benefit if built by strong incumbent (delay cost)	*Gross benefit if built by a competitor that increases competition*	*Difference (net benefit due to competition)*
(a)	A new store that would have been built by the only fascia present is replaced by new-entrant store	728	1,732	1,004
(b)	A new store that would have been built by a strong incumbent, where more than one fascia is present, is replaced by a new-entrant store	1,329	2,177	848
(c)	A new store that would have been built by a strong-incumbent fascia, where more than one fascia is present, is replaced by a store from a weak incumbent	1,292	1,665	373
(d)	A small extension to a store is less than 300 sq metres grocery sales area and the de minimis applies	N/A	N/A	N/A
(e)	A large extension to a store operated by the only fascia present is replaced by a new-entrant store	323	403	80
(f)	A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by a new store of a weak incumbent	584	830	247
(g)	A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by an extension to a weak incumbent store	584	692	108
(h)	A large extension to a store of a strong incumbent, where more than one fascia is present, is replaced by a new-entrant store	584	928	344

Source: CC analysis.

Discount rate

25. We applied a discount rate to future costs and benefits in order to estimate their NPV. We used a discount rate of 3.5 per cent, in line with the figure specified by HM Treasury in its guidance on economic assessments (the Green Book) as the Social Time Preference Rate (STPR). We consider the STPR to be the appropriate discount rate to use for this exercise since it is defined as the value society attaches to present, as opposed to future, consumption. The STPR is used for discounting future benefits and costs, and is based on comparisons of utility across different points in time or different generations.[9]

[9]The Green Book recommends that the STPR be used as the standard real discount rate. The STPR has two components:

- the rate at which individuals discount future consumption over present consumption, on the assumption that no change in per capita consumption is expected, represented by ρ; and
- an additional element, if per-capita consumption is expected to grow over time, reflecting the fact that these circumstances imply that future consumption will be plentiful relative to the current position and thus have lower marginal utility. This effect is represented by the product of the annual growth in per-capita consumption (g) and the elasticity of marginal utility of consumption (μ) with respect to utility.

The STPR, represented by r, is the sum of these two components, ie $r = \rho + \mu.g$.

Estimates of ρ

This comprises two elements:

- catastrophe risk (L); and
- pure time preference (δ).

The first component, catastrophe risk, is the likelihood that there will be some event so devastating that all returns from policies, programmes or projects are eliminated, or at least radically and unpredictably altered. Examples are technological advancements that lead to premature obsolescence, or natural disasters, major wars etc. The scale of this risk is, by its nature, hard to quantify. The second component, pure time preference, reflects individuals' preference for consumption now, rather than later, with an unchanging level of consumption per capita over time. The evidence suggests that these two components indicate a value for ρ of around 1.5 per cent a year for the near future.

Estimates of μ

The available evidence suggests that the elasticity of μ is around 1. This implies that a marginal increment in consumption to a generation that has twice the consumption of the current generation will reduce the utility by half.

Estimates of g

Administrative costs

26. In the report we estimated the administrative costs of the Test as £6–£8 million each year.[10] In the NPV model we used a mid-point of our estimate—£7 million each year.

Period of the model

27. As we explain in paragraph 2, we assumed the lifetime of a store as 25 years. Our NPV model also operates over a 25-year period.[11] We considered sensitivities with shorter timescales: 10, 15 or 20 years.

Summary of the results

28. The NPV produced by the model varies between £2.8 billion before any sensitivities are considered to £821 million in the most pessimistic compound downside that we considered. The sensitivities and compound downsides are discussed in paragraphs 31 to 51 below.

29. We used the sensitivity analysis to test the robustness of the Test to varying assumptions in order to form a view of what represented reasonable ranges for the value of the Test.

30. In response to our provisional decision, Tesco analysed the cash flows from the model and said that cumulative net benefits only started to arise after eight years from implementation of the Test. We note that the model before sensitivities shows cumulative net benefits are achieved between years five and six.

Probability of replacement and delay

31. The probability of replacement and delay are two key assumptions that underlie the assessment of our NPV model. The two are also related. In general terms, the probability of replacement is likely to increase if the incumbent continues to be prevented from developing by the Test and there is a continuing need for increased large grocery store sales area in the isochrone. We describe in our decision the reasons why we believe that competitors would have both the incentive and, in many cases, the ability to expand in local areas where the incumbent retailer is prevented from doing so by the Test.

32. There are three additional factors to take into account which reduce the impact of some developments not being replaced in local areas. First, we discuss in our decision (paragraphs 5.18 to 5.23) the likelihood that, if a strong incumbent's investment is prevented in one local area, it is likely to look to invest elsewhere. This may, in some cases, involve entry or expansion in another local area in which another retailer has a concentration of over 60 per cent.[12] Thus, replacement entry or expansion might occur as a retailer reprioritizes its investments as a result of the

---

Maddison (2001) shows growth per capita in UK to be 2.1 per cent over the period 1950 to 1998. Surveying the evidence, the Treasury paper *Trend Growth: Recent Developments and Prospects* also suggests a figure of 2.1 per cent for output growth to be reasonable. The annual rate of g is therefore put at 2 per cent per year.

The calculated STPR

Taking g = 2 per cent, ρ = 1.5 per cent, μ = 1.0, the STPR to be used as the real discount rate is 0.015 +1.0*0.02 = **3.5 per cent.**

[10]Paragraph 11.382.

[11]In that it models the investment decisions taken over 25 years (see paragraph 7).

[12]To the extent that it does not, there are likely to be additional benefits where the investment is used in some other way (often to the benefit of consumers) that we do not take account of in the NPV model.

Test. Second, as set out in paragraph 4.24 of our decision, we think it likely that, in some cases, 'replacement' developments will, in fact, take place sooner than the incumbent development would have occurred (in which case the delay would be negative). Finally the LPA may decide to utilize the override provision to approve the incumbent's development.

33. Table 4 shows the impact of assuming that not all developments prevented by the Test would result in a competitor development. As set out in our decision we found that if an incumbent is prevented by the Test from building a new store, the store would usually be built by a new entrant. However, Table 4 shows the impact of assuming incomplete replacement of new stores.

34. We thought it more likely that there might not always be a competitor development in the same area as an extension that was prevented by the Test.[13] As we set out in our decision, if an incumbent extension is prevented by the Test in an area where a competitor is present, the competitor could either build a new store or (if it was possible to extend given the site characteristics) seek to extend its existing store. If the incumbent extension that is prevented by the Test is to a store where no other fascias are present in the local area, a competitor would have to build a new store.

35. If an extension that was prevented by the Test did not result in a replacement competitor development, we have assumed that the delay costs of the extension not being built in the local area would remain for that extension over the period of the model. Recognizing the limitations of these modelling assumptions, we performed breakeven calculations to estimate what the proportion of extensions that did not lead to a competitor development would have to be to give a zero NPV across new stores and extensions for those local areas where the Test would bite.

36. We found that, when the proportion of extensions that did not lead to a competitor development fell to 35 per cent, the NPV fell to zero.[14] These figures exclude the de-minimis extensions, where we have assumed no replacement, and hence the incumbent expansion is allowed. However, they assume that the remedy applies across both extensions and new stores.

37. In paragraph 32 we noted that the probability of a competitor development depended on timescale, and that an LPA may apply its override. If, as an illustration, we assumed a maximum delay of ten years on all extensions before the LPA override was applied, the NPV across new stores and extensions would still be positive even with a zero probability of replacing extensions.

38. Where the Test prevents an incumbent monopolist from extending, the extension can only be replaced by a new entrant building a new store. Table 4 analyses the impact on the NPV calculation of assuming that such new entry does not always take place. We found that the NPV across new stores and extensions would remain strongly positive even when none of the single fascia extensions were replaced by new-entrant stores.

[13] We have assumed that extensions less than 300 sq metres groceries sales area would not be prevented by the Test (the de minimis). Since the smaller extensions are those where it is least certain that a competitor would wish to develop in response to the extension being prevented, the de minimis should increase the probability of a competitor responding where the incumbent would be prevented from extending by the Test.

[14] We note that the breakeven percentage for extensions alone is 78 per cent. However, we did not consider this figure to be the appropriate one to use because we do not think that the Test should apply only to new stores and not to extensions (see decision paragraph 4.22). We therefore thought it appropriate to include the benefits that would arise as a result of new store replacement.

TABLE 4 **Impact of probability of a competitor development and no redirection on NPV**

		NPV, £ million	
	New build	*Extensions*	*Total**
Replacement of all extensions			
Probability for extensions replacement 100%	1,968	931	2,782
Probability for extensions replacement 90%	1,968	501	2,351
Probability for extensions replacement 80%	1,968	71	1,921
Probability for extensions replacement 78%	1,968	0	1,851
Probability for extensions replacement 70%	1,968	–359	1,491
Probability for extensions replacement 35%	1,968	–1,851	0
Replacement of monopoly extensions			
75% replaced	1,968	662	2,512
50% replaced	1,968	393	2,243
25% replaced	1,968	124	1,974
14% replaced	1,968	0	1,850
None replaced	1,968	–145	1,705
Replacement of new build			
Probability for new build replacement 90%	1,451	931	2,265
Probability for new build replacement 80%	935	931	1,748
Probability for new build replacement 70%	418	931	1,232
Probability for new build replacement 62%	0	931	813
Probability for new build replacement 60%	–98	931	715
Probability for new build replacement 46%	–813	931	0

Source: CC analysis.

*All of the total NPVs in the tables include administration costs so the figures do not add across the row.

39. We also looked at sensitivities that reflected the effect of delay. We looked at the impact of assuming that all extensions prevented by the Test are not replaced for an initial four-year period, reducing to one year after four years. To model a more extreme case, we also assumed that there was a permanent four-year delay for all extensions to be replaced. Finally, for all extensions we assessed the impact of a zero delay after the transition period. In addition we examined the impact of assuming a four-year transition period for new stores, with and without a permanent one-year delay.[15] The impact of these assumptions is shown in Table 5. Increased delay for extensions reduces the NPV but in all cases the NPV is still strongly positive. We note, in connection with our comments on the probability of replacement (see paragraph 31 above), that the delay for all extensions would have to increase to over 14 years before the overall NPV became negative.

TABLE 5 **Impact of assuming longer delay**

		NPV, £ million	
	New build	*Extensions*	*Total*
New build assumes 1-year delay falling to zero after 1 year; single-fascia store small extension N/A; new store replacements for prevented extensions 4-year delay falling to 1 year after 4 years, extension replacements for prevented extensions 1-year delay falling to zero after 1 year	1,968	931	2,782
Low case 1: all extensions prevented by the Test have a 4-year delay falling to 1 year after 4 years	1,968	848	2,698
Low case 2: all extensions subject to 4-year delay throughout	1,968	183	2,034
High case: zero delay after transition period	1,968	1,122	2,973
New stores: assume 4-year transition period	1,853	931	2,667
New stores: assume 4-year transition period and permanent 1-year delay	1,584	931	2,398

Source: CC analysis.

[15]Note this is discussed in the decision paragraphs 5.83 to 5.91. We did not expect there to be a delay for new stores after a short transition period. However, we have modelled these sensitivities for completeness.

Reduction in the number of developments affected by the Test

40. We looked at sensitivities that reflected reductions in the number of developments affected by the Test. The first concerned an overall reduction in the number of stores affected by the Test. Table 6 shows that the NPV remains strongly positive when the number of stores is reduced significantly.

TABLE 6 **Reduced number of stores affected by the Test**

		NPV, £ million	
	New build	*Extensions*	*Total*
Number of new stores is 3, number of extensions is 19	1,968	931	2,782
Reduction by 10%	1,771	838	2,492
Reduction by 20%	1,574	784	2,241
Reduction by 30%	1,378	652	1,912
Reduction by 40%	1,181	559	1,622
Reduction by 50%	984	465	1,332

Source: CC analysis.

41. The second sensitivity looked at the impact of assuming an annual cumulative decline in the impact of the Test. This would model a situation where the Test cumulatively caused a reduction in the number of highly-concentrated areas. We found that the NPV remains strongly positive with large cumulative reductions in the impact of the Test (see Table 7).

TABLE 7 **Impact of assuming an annual decline in the impact of the Test**

		NPV, £ million	
	New build	*Extensions*	*Total*
No reduction	1,968	931	2,782
Annual reduction of 1%	1,762	828	2,472
Annual reduction of 2%	1,574	745	2,202
Annual reduction of 3%	1,428	661	1,972
Annual reduction of 4%	1,294	594	1,770
Annual reduction of 5%	1,177	535	1,594

Source: CC analysis.

Changes to the number of extensions replaced by weak incumbent extensions and new stores

42. In paragraph 13, we explained our assumption that, for extensions in non-monopoly areas, one-third are replaced by an extension to the weak incumbent, one-third are replaced by a new store built by the weak incumbent and one-third are replaced by a new-entrant store. Table 8 shows the impact of assuming, first, no new-entrant stores replace the prevented extensions and, secondly, only weak incumbent store extensions replace the prevented extensions. The values remain strongly positive in each case.

TABLE 8 **Impact of changing the assumptions for replacement of non-monopoly extensions prevented by the Test**

	New build	*Extensions*	*Total*
		NPV, £ million	
⅓ are replaced by an extension to the weak incumbent, ⅓ are replaced by a new store built by the weak incumbent and ⅓ are replaced by a new-entrant store	1,968	931	2,782
Assume no new entry stores; weak incumbent builds 50% extensions and 50% new stores	1,968	741	2,592
Assume extensions only replaced by weak incumbent extensions	1,968	581	2,432

Source: CC analysis.

Impact of treating off-site replacements as extensions instead of new stores

43. In paragraph 7, we discussed Tesco's suggestion that we should treat stores which are off-site replacements to an existing store as extensions rather than new stores. While we consider, as we discussed in paragraph 8, that there are reasons why we should treat such stores as new stores we recognized that they are neither pure new stores nor extensions. Table 9 shows the impact of assuming that off-site rebuilds are treated as large extensions and the impact of a second case that recognizes that offsite rebuilds are neither pure new stores nor extensions and therefore assumes 50 per cent of the off site rebuilds are large extensions and 50 per cent are new stores.[16] Overall NPV remains highly positive in both cases.

TABLE 9 **Impact of changing the assumptions for replacement of monopoly extensions prevented by the Test**

	New build	*Extensions*	*Total*
		NPV, £ million	
Assume off-site rebuilds are new stores	1,968	931	2,782
Hybrid case where 50% of the off site rebuilds are large extensions and 50% are new stores	1,509	958	2,349
Treat off-site rebuilds as large extensions	1,050	984	1,917

Source: CC analysis.

Shorter time period for the model

44. We also looked at the impact of shortening the time frame of the model. Table 10 shows the impact of reducing the time period. Using a shorter time period helps to account for the possibility of a significant change in the nature of the market.[17] The NPV is robust to reducing the time period significantly.

[16]The average size assumptions for the new stores and extensions were unchanged.
[17]For example, if the retailers developed larger stores, but substantially fewer stores overall.

TABLE 10 **Impact of reducing the time period**

	NPV, £ million		
	New build	*Extensions*	*Total*
25 years	1,968	931	2,782
20 years	1,695	795	2,388
15 years	1,370	633	1,920
10 years	984	440	1,365

Source: CC analysis.

Combination of sensitivities

45. In order to understand the impacts of particular changes to our assumptions, in paragraphs 31 to 44 we looked at the impact on value of varying individual parameters. However, we also considered the possible impact of a number of factors taking place in combination which could have a compound effect on value. We also recognize that some of the assumptions are related, particularly—as discussed in paragraph 31—the probability of replacement and assumptions about delay.

46. In combining the sensitivities we have used what we consider to be realistic combinations, without being overly optimistic or pessimistic. We considered that the probability of replacement for extensions and length of delay were the most significant factors that we needed to examine. We also looked at the effect on value of treating off-site store rebuilds as extensions instead of new stores. Table 11 shows the impact of the compound scenarios on value.

47. In the first combination, the probability of replacement for extensions is assumed to be 90 per cent. All extensions (including those replaced by competitor extensions) are assumed to be delayed immediately after the introduction of the Test by four years, falling to a delay of one year after a transition period of four years. This would therefore reflect a slower adaptation to the Test than we expect in practice. We note that the value remains positive.[18]

48. In the second combination, we have assumed a longer delay for extensions, with all extensions being delayed by four years. We also assume that the probability of replacement for monopoly extensions is reduced to 50 per cent because, as discussed in the decision (paragraph 5.93), a competitor would have to develop a site for a new store. The scenario shows that the value remains positive.[19]

49. In the third combination, we have made the same assumptions as for the second combination but have also included the effect on value of recognizing that offsite rebuilds are neither pure new stores nor extensions and assuming 50 per cent of the off-site rebuilds are large extensions and 50 per cent are new stores. The scenario shows that the value again remains positive.[20]

50. The fourth combination is the same as the third but treats all off-site store rebuilds as pure extensions. The scenario shows that the value again remains positive.[21]

[18]Under this scenario we note that the probability of replacement would have to fall to 36 per cent before reaching zero NPV.
[19]Under this more severe scenario we note that even if the probability of replacement for monopoly extensions was zero, the NPV for the Test would still be positive.
[20]Again we note that under this scenario even if the probability of replacement for monopoly extensions was zero, the NPV for the Test would still be positive.
[21]Again we note that under this scenario even if the probability of replacement for monopoly extensions was zero, the NPV for the Test would still be positive.

51. Tesco told us that our model did not reliably allow us to conclude that the benefits of the Test outweighed its costs. Tesco used the version of the NPV model made available to retailers with the provisional decision and said that, using the model, if we changed some of the key assumptions[22] the NPV would become negative. Tesco told us this showed the model was fragile and relied on extreme assumptions. However, we note that since the provisional decision we have held a plenary session with six of the largest grocery retailers to discuss their reaction to the provisional decision and taken into account all written and oral submissions (see decision paragraph 3.16). We have developed the market model and in doing so have taken into account comments made by the retailers and have considered further comments about the probability of replacement and delay. We recognize that it would be possible to make some assumptions that, singly or in combination with others, could make the overall NPV negative (without making assumptions for the benefits from redirection, variety and national effects). However, we considered that under a range of reasonable assumptions the model was robust and the NPV was likely to be positive.

TABLE 11 **Compound scenario**

NPV, £ million

	New build	*Extensions*	*Total*
1.Probability of competitor development for all extensions 90%; all extensions are delayed for 4 years, falling to 1 year after 4 years.	1,968	426	2,277
2.Probability of replacement where a monopoly extension prevented by the test 50%; All extensions replaced by new stores are delayed for 4 years throughout.	1,968	–59	1,791
3.Probability of replacement where a monopoly extension prevented by the test 50%; All extensions replaced by new stores are delayed for 4 years throughout. Off-site rebuilds are treated as hybrid developments with 50% the costs and benefits of large extensions and 50% the costs and benefits of new stores	1,509	–85	1,306
4.Probability of replacement where a monopoly extension prevented by the test 50%; All extensions replaced by new stores are delayed for 4 years throughout. All off-site rebuilds are treated as large extensions.	1,050	–111	821

Source: CC analysis.

[22]In particular Tesco modelled the impact assuming *(a)* a four-year delay for new stores, together with a 70 per cent probability of replacement; and *(b)* the impact of assuming that extensions prevented by the Test were not replaced by larger competitor developments. In both cases the NPV became negative.

Effects of the Test on national elements of the offer: an illustration of the effect on grocery prices

1. In this appendix, as an example of how the Test can affect elements of the retail offer that are set nationally, we set out an illustration of the way in which the Test may be expected to lower grocery prices. We followed the principles of an approach suggested by Morrisons during a plenary session we held with six of the largest grocery retailers to gather input on a preliminary version of our market model. We calculated what the effects of the Test would be on grocery prices under the following simple, but in our view reasonable, assumptions:

   - The starting point is the inverse relationship between the retailers' price cost margin and the aggregate price sensitivity of their customers (their aggregate demand elasticity).[1] Since retailers sell in many local areas, the aggregate demand elasticity that they face can be represented as an average of the elasticities in each local area.[2]

   - To derive the change in the aggregate elasticity brought about by the Test, we first calculate the change in elasticity at the local level to be about 0.6 using the market model (see Appendix B).[3] Furthermore, we assume that the Test will generate an average impact at the local level in over 15 areas on average each year.[4] Using an aggregate (national) margin of 15 per cent,[5] we derive a percentage reduction in the aggregate price cost margin[6] of about 0.05 implying a percentage reduction in prices of about 0.01.[7]

2. Given a market size of £110.4 billion,[8] this would generate cumulative savings of approximately £10 million a year.

---

[1]This is commonly referred to as the 'Lerner condition'.

[2]One simplification adopted here is to consider all local areas as unrelated. In reality, there are interactions between overlapping areas. Another simplification we used in these calculations is to consider all local areas as being of the same size. We believe that these simplifications are reasonable. We check for the implication of assuming that highly concentrated areas are of a smaller size in an indirect way by varying their share of the total number of areas. We found that this does not significantly alter our calculations.

[3]This number is derived by considering the impact on margins of new entry (we use a change in margin from 20 to 18 per cent) and using the inverse relationship between margins and elasticity to derive the change in elasticity. One simplification used here is to use margins that vary at the local level because of non-price factors to gain insight into the price sensitivity of consumers. While we acknowledge that this is a simplification, we do not think it introduces a bias in our calculations.

[4]This corresponds to 100 per cent of the new stores that would be prevented by the Test and two-thirds of extensions (see Appendix C). These are fewer than the number of areas where we consider that the Test will have an impact, however we think it is appropriate to use a lower figure to capture the possibility of lower changes in margins in some areas and more generally for producing a conservative figure. Furthermore, we note that by not considering the totality of areas affected by the Test, we ignore the possibility that diverted investment will generate additional price pressures. We consider that this assumption contributes to these calculations underestimating the price effects of the Test.

[5]See Appendix B for discussion of profit levels at larger stores.

[6]In order to derive the change in the aggregate price cost margin, we consider separately highly-concentrated and non-highly concentrated areas. We use a figure of 2,508 for the total number of stores and of 607 for the number of stores in highly-concentrated areas. We consider that an aggregate margin of 15 per cent, coupled with elasticities in highly concentrated areas leading to margins of 20 per cent, imply that elasticities in non-highly-concentrated areas will be greater in absolute value than –7. We calculate the aggregate elasticity as an average of the elasticity in these two areas weighed by the number of stores in each area. The change in aggregate elasticity is obtained computing the change in the average elasticity for highly-concentrated areas and using this to calculate the new aggregate elasticity. The new aggregate price cost margin is then obtained as the inverse of the new aggregate elasticity.

[7]The percentage price change (expressed in terms of current prices) can be expressed as the level change in margin divided by 1 minus the initial margin of 15 per cent.

[8]See paragraph 3.2 of the report.

3. As we explained, there are several assumptions and simplifications to make in order to derive an estimate of the effect of the Test on prices. We ran sensitivity checks on several of these assumptions, such as the levels and changes in local margins, or the number of areas where the Test would have an impact. These do not change the scale of the estimated effects significantly. While we did not incorporate these estimates explicitly in our cost-benefit assessment, we believe that this numerical illustration clearly shows the way in which the Test can generate benefits in terms of lower prices and that such benefits, even using what we believe are conservative assumptions, can be very significant. The reason is that they will be felt throughout the UK and not just in those local areas where concentration will be reduced.