GUPPI in supermarket mergers: the UK's Asda/Sainsbury case[1]

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Abstract

The UK supermarket industry has a high profile because of its large share of household budgets. In 2003 the UK competition authorities blocked all potential mergers between the top-three firms and the fourth. After this, there was an apparent consensus that mergers between the largest four supermarkets would be unsuccessful with competition authorities. In 2018, Asda and Sainsbury two of the largest four firms, decided to challenge the consensus with a proposal to merge. Their bid failed. This chapter discusses the case. We discuss two changes in the 15 years between 2003 and 2018: (i) changes to the industry including the rise of new low-price firms and (ii) changes to the way mergers are assessed by competition authorities, particularly the use of a new indicator of competitive harm, namely, the Gross Upward Pricing Pressure Index (GUPPI).

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I. Introduction

The supermarket industry is the UK's most high-profile industry in terms of its share of household budgets. Almost every household in the country is a regular customer of this industry. The average household spends 11% of its budget at firms in the supermarket industry. For the poorest 20% this figure is over 14%.[3]

Supermarkets were the focus of a large amount of antitrust interest in the 2000s. At this time there was a public perception that UK grocery prices tended to be higher than other comparable EU countries and the USA.[4] There were numerous inquiries, which established a framework that was used by the Competition Commission (CC) for thinking about supermarket competition. These inquiries included two "market inquiries" into the sector – wide-ranging investigations which looked in general at the state of competition in the sector (see CC (2000, 2008)) -- and a number of merger inquiries.

In one of the key merger inquiries, the CC blocked all potential mergers between the top-three firms and the fourth. This was the *Safeway* case of 2003 (see CC (2003)). After this, there appeared to be a consensus that mergers between the largest four supermarkets would be unsuccessful with the competition authorities. Certainly, no such mergers were proposed for another 15 years.

In 2018, Asda (which was owned by Wal-Mart Stores Inc.) and Sainsbury decided to challenge this apparent consensus. They were the second- and third-largest of the supermarket firms. Why did they think that they had a chance of their merger being approved, when the *Safeway* case had suggested that mergers of top-four firms are

[3] See paragraph 15 of CMA (2019).
[4] See Introduction to CC (2000).

unacceptable? Perhaps it was because over the 15 years since 2003 the UK grocery market had experienced the expansion of new firms such as the discounters -- i.e., Aldi and Lidl -- and changes in the way that people shop for groceries, such as online shopping.

Or perhaps it was because the UK competition authorities had, since 2003, taken up new tools for assessing mergers, based on a relatively new indicator of competitive harm, namely, the Gross Upward Pricing Pressure Index (GUPPI). A great advantage of the use of GUPPI -- not shared by the old approach used in the *Safeway* case, which was based on market shares -- was that it was flexible enough to take account of the changes to the industry since 2003. In the old approach, the competition authority would have had to decide whether the discounters, online shopping firms, etc., were part of the relevant market. In the new approach such binary judgements were unnecessary.

Despite these changes, the Competition and Markets Authority (CMA), the CC's successor since 2013, blocked the merger. The parties raised many objections to this decision. They did not object to the principle of using GUPPI indicators. Their objection was to the CMA's way of doing so. The Authority calculated a GUPPI indicator for each store operated by the merging parties. It then adopted a decision rule: if the GUPPI for any store was above a "threshold" value then the merger was classed as being likely to cause harm to consumers at the store. The parties argued that: (i) the GUPPI is a theoretical predictor of price changes, and the CMA did not provide any direct evidence that a GUPPI exceeding the threshold causes price rises; (ii) the modelling method the CMA used for estimating store-level GUPPI indicators was imprecise, and could result in false positives from the decision rule; and (iii) the CMA's choice of GUPPI threshold was too low and much lower than in other recent merger cases.

The case therefore raised several questions about the application of GUPPI to retail mergers. It also raised broader questions about UK merger policy in the future: Given that the GUPPI threshold in this case is much lower than most recent merger cases, can the case be seen as a tightening of UK merger policy? This question is interesting in light of recent commentary that emphasises the desirability of such a tightening-up (see, for example, Baker (2018), Philippon (2019) and Berry et al. (2019)).

This chapter discusses the Asda/Sainsbury case. We focus on the main business activity of the two firms: in-store grocery retailing that is sold from supermarkets. We do not cover other aspects of the case, such as petrol retailing, convenience store retailing, and online retailing.[5] We also focus on the use of GUPPI at the level of the individual store---which can be seen as the centrepiece of the investigation---rather than on the CMA's assessment at what they call a "national" level, where national refers to effects across the stores in the UK as a whole.[6]

In Section II we discuss the UK competition authorities' framework for thinking about retail competition, and its application to the key *Safeway* case of 2003. In Section III we discuss changes since *Safeway* to the grocery market. In Section IV we discuss the GUPPI indicator and its application to retail mergers. In Section V we discuss the CMA's use of GUPPI in *Asda/Sainsbury*. In Section VI we discuss the areas of disagreement between the parties and the CMA. In Section VII we conclude with some reflections on the case.

[5] The CMA defined a *convenience* store as having a sales area that is less than 280m^2 and a *supermarket* store as having a sales area that is above this threshold.

[6] As we discuss in Section II, the CMA's framework allowed for firms to compete in some variables at a national level and others at a store level. However, the Authority's framework emphasised that national competitive effects should be seen as derived from the aggregation of local effects, so that the local analysis can be seen as the centrepiece of the analysis.

II. Background: the CMA's analytical framework and the landmark Safeway case

In the years 2000-2008, there was an abundance of UK supermarket inquiries: two market inquiries and a number of merger inquiries. During this time the UK competition authorities developed a framework for analysing the supermarket industry, which the CMA subsequently has developed further.

We can summarize this framework as follows:[7] The relevant market in product space is the supermarket store: stores are judged to be in the same product market depending on the firm that runs the store (which determines its positioning in quality/price space) and the size of the store (which determines the range of products in the store). The geographic market is a local area given by a drive-time around each store.

The dominant form of grocery shopping is the weekly one-stop shopping trip; two stores are good substitutes for this type of shopping only if the stores are large enough, are operated by firms that cater to one-stop shoppers in terms of product range, and are close enough to each other in terms of drive-time.

Supermarket firms compete in multiple variables: price, quality, product range, and service. The CMA uses the acronym PQRS to refer to these. Firms set some of these store-by-store (say, product range) and some nationally at a chain-wide level (say, prices or quality).[8,9] Even when firms set a variable nationally, however, the effect of changing the

[7] The CMA's approach to retail mergers is set out in its *Retail Mergers Commentary.* See CMA (2017a).
[8] Ever since about 2000 most UK supermarket firms tend to set national rather than store-by-store prices. See CC (2008) for a discussion.
[9] Hereafter for convenience we will mostly refer to prices when discussing the GUPPI analysis. However, the CMA interpret the GUPPI as indicating the competitive effect of a merger on any of the PQRS variables.

variable on overall firm profits is determined by the aggregation of store-level effects. Consequently, the analysis should generally start locally at a store level and build up.[10]

In a specific merger case the CMA must decide if the merger is likely to result in a "substantial lessening of competition" (SLC) at any of the stores that belong to the parties. To apply its framework the CMA uses a two-step approach:

1. In the first step, the Authority identifies the stores where there is the *potential* for a SLC, under the CMA's theories of harm, and filters out those where there is no such potential. This involves examining the drive-times between the parties' stores, alongside other store characteristics such as size and product offering.
2. In the second step, for each store that is identified in stage 1, the CMA determines whether a SLC is likely to arise because of the merger. This can be done by alternative means: e.g., a simple count of the number of competitors the store faces (as in *Safeway*); or pricing pressure indices calculated for each store (as in *Asda/Sainsbury*). Then, depending on how many stores with a SLC this this exercise finds, the CMA decides whether the merger should be blocked or some other remedy is found, such as divestiture of the problematic stores.

For present purposes, it is worth reviewing the key *Safeway* case: Safeway was the fourth-largest firm, and the CC ruled in 2003 that none of its three larger rivals -- Tesco, Asda, and Sainsbury – could buy it. This indicated in effect that mergers among the big four supermarket firms were unacceptable.

[10] The store-level choice modelling framework in Smith (2004) was used in the first market inquiry into the sector: see CC (2000). Since then UK authorities have used an approach founded at store-level when studying the industry.

The CC used the two-step approach that we mentioned above: In Step 1 the CC identified the stores with the potential for a SLC; and in Step 2 the CC examined the effect of the merger on the number of independent firms -- e.g., Sainsbury, Tesco, etc. – competing in each store's local area.[11] The CC had a rule: If the merger reduced the number of competitors from *four to three*, then it would lead to a SLC.

When this exercise was implemented the CC found many local areas with SLCs, for any merger of Safeway with its three larger competitors. The number of areas with SLCs was high enough in each case that divestiture of individual stores was not an option, and, consequently, these three mergers were all ruled out. Safeway was instead allowed to merge with a smaller rival, namely Morrisons. This case put down a very effective "marker": No merger between the top four firms was proposed for another 15 years.

III Changes in the grocery market: discounters, online shopping, and shopping frequency

Why did Asda and Sainsbury think that their merger could get approval 15 years after the *Safeway* case? In this section we discuss one potential reason: changes in the grocery market.

Table 1 provides information on the structure of the supermarket industry in 2018. The table classifies the main firms into a number of types. The "Big Four" are the top four firms by sales.[12] They operate many large supermarket stores that are suitable for one-stop shoppers. The "Discounters" (Aldi and Lidl) sell a more limited range of products in smaller stores at low prices. The "Convenience" firms sell from small stores in neighbourhood

[11] For these counts the CC excluded the discounters such as Aldi and Lidl. They were judged to be outside the market definition.
[12] Before 2003, when Morrisons acquired Safeway, there were five firms of this type, and the term "Big Five" would have been appropriate.

locations. The "Online" firms -- which are a recent addition to the list -- deliver products directly to consumers' homes.

The table reports the number of stores that each firm had in 2018. Together Asda and Sainsbury operated over 2000 stores. The reported numbers include smaller stores – "convenience stores" -- and larger stores -- "supermarkets" -- even though the former are not in the CMA's definition of the product market. Some of the Big Four including Sainsbury operated convenience stores as well as supermarkets.

The table also reports industry revenue shares from the market research company Kantar.[13] For each firm these revenue shares aggregate over online and in-store shopping and include revenue from both supermarkets and convenience stores. They should not be treated as shares of an antitrust market. The figures do however help us see changes between 2003 and 2018 the industry revenue shares. Both years are given in Table 1. The joint industry revenue share of the top four firms – reported as "C4" in the table -- did not change greatly between 2003 and 2018, which suggests that the industry has not changed greatly. There were however three changes to the industry in this period which the parties and the CMA agreed were potentially important.[14]

Industry change 1: The Rise of the Discounters

Whereas in 2003 the discounters – i.e. Aldi and Lidl -- were fringe firms with only a 3.1% joint industry share, by 2018 they had grown to a 13% share. This growth continued:

[13]Industry revenue shares from Kantar are for Great Britain and are available from https://www.kantarworldpanel.com/en/grocery-market-share/great-britain. The 2018 and 2022 figures are for 28 Jan and 7 August respectively. The 2003 figures are taken from https://www.fooddeserts.org/images/supshare.htm which does not provide information for the supermarket types in the final two rows of the table.

[14] See Chapter 4 of CMA (2019) for a more detailed discussion of these trends.

Table 1 shows that by 2022 their joint share had grown to 16.1%. There were a few factors that underlay this trend: In the early days their growth was accelerated during the recession that followed 2008, when price-sensitive consumers were keen to buy groceries at lower prices. More recently, their growth has been a consequence of a decision to rebrand: larger stores, a wider product range, and higher quality.

Industry change 2: The Rise of Online Shopping

Online shopping rose from a 0% to a 6% share of industry revenue between 2003 and 2018.[15] Most of this was supplied by the Big Four. Ocado was the only online-only firm in 2018; and, as Table 1 shows, its share was only 1% of industry revenue in 2018.

[15] See Chapter 4 of CMA (2019).

	Type	# Stores	Industry Revenue Share (%)		
		2018	2003	2018	2022
Tesco	Big Four	3,400	27.0	27.9	26.9
Sainsbury	Big Four	1,428	16.2	16.2	14.8
Safeway	Big Four		9.2		
Asda	Big Four	676	16.2	15.5	13.9
Morrison	Big Four	500	6.0	10.7	9.3
Aldi	Discounter	800	1.7	7.0	9.1
Lidl	Discounter	700	1.4	5.0	7.0
Co-op	Convenience	2,500	5.2	5.8	6.5
Somerfield	Convenience		6.2		
Waitrose	Premium	300	3.2	5.2	4.6
Iceland	Frozen Food	900	2.3	2.3	2.3
Ocado	Online			1.1	1.8
Other outlets				1.6	2.0
Symbols/independents				1.6	1.6
C4			68.6	70.3	64.9
HHI				1541.9	
Pro forma HHI post hypothetical Asda/Sainsbury merger				2044.1	
Change in HHI from the hypothetical merger				502.2	

Table 1 Industry Revenue Shares of the Main Firms.

Notes: Revenue shares are from Kantar and are for Great Britain. They include online as well as in-store shopping. Store numbers are from Figure 3.1 of CMA (2019) and include convenience stores (<280m^2) and supermarkets (>280m^2). The Big Four were the Big Five before Safeway was taken over by Morrisons in 2003. Symbols are independent retailers that are members of a larger group with joint marketing and buying initiatives.

Industry change 3: A decline in the importance of one-stop shopping

The third way in which the market had changed was that consumers were shopping more frequently, buying smaller bundles per store visit, and consequently making greater use of convenience stores and discounters. This had the potential to expose the main supermarkets to greater competition.

The Asda/Sainsbury merger in HHI terms

Table 1 also reports the Herfindahl–Hirschman concentration index (HHI) that we get from the industry shares in 2018, and the change in HHI if the *Asda/Sainsbury* merger had taken place. These HHI figures would flag the merger as having competitive concerns, by application of the thresholds for HHI and changes in HHI given in the US Merger Guidelines.[16] Of course, this exercise has many caveats: As we have already noted, the industry revenue shares are unlikely to be a good measure of the shares of a properly-defined antitrust market; the exercise does not account for sub-national variation; and market shares (even when properly defined) have an ambiguous relationship with market power, particularly when products are differentiated. For all these reasons, and others, upward-pricing pressure methods like the GUPPI were introduced.

IV The use of GUPPI in UK retail merger assessment

The GUPPI is one of the most commonly used indices in the upward pricing pressure (UPP) approach to measuring the competitive harm from a merger. The general idea of the

[16] The US Merger Guidelines state that a merger that involves an increase in the HHI of more than 100 points and that results in a moderately concentrated market -- with the HHI between 1500 and 2500 -- potentially raises significant competitive concerns.

UPP approach is that when setting prices, or setting other instruments of competition such as product quality, each party to a prospective merger imposes an externality on the other party. Post-merger, however, merging firms will account for this externality and compete less strongly. UPP indicators measure the size of the externality.

To fix ideas, consider a differentiated products Bertrand oligopoly model, with prices that satisfy a Nash equilibrium, where the stores represent the differentiated products. Let there be an imaginary Sainsbury store *S* which competes in a local market with other stores including an Asda store *A.* We assume that: consumers are one-stop shoppers who buy a fixed bundle of groceries; the costs and prices are for a unit of this bundle; the firm sets the price of the bundle at the bundle level; and the consumer never considers splitting the bundle across two stores.[17] The Sainsbury store sets price P_S for the bundle, which has a marginal cost C_S.

Prior to the merger the first-order condition for store *S* is given by

$$P_S + \left[\frac{\partial Q_S}{\partial P_S}\right]^{-1} Q_S = C_S \qquad (1)$$

where Q_S is the total quantity that is sold by store *S.* This equation is the standard condition for optimal pricing in the Bertrand oligopoly model: The left-hand-side is marginal revenue and the right-hand-side is marginal cost.

[17] See Thomassen et al. (2017) for an analysis of supermarket pricing that drops the one-stop-shopping and fixed-bundle assumptions.

After the merger first order condition for store *S* takes the form

$$P_S + \left[\frac{\partial Q_S}{\partial P_S}\right]^{-1} Q_S = C_S - \left[\frac{\partial Q_S}{\partial P_S}\right]^{-1} \left[\frac{\partial Q_A}{\partial P_S}\right](P_A - C_A).$$

(2)

The right-hand side has an extra term, relative to the previous equation: the externality on store *A* that store *S* accounts for post-merger. The externality is the value of sales that are diverted to store *A* from store *S* after the price increase. The derivative $\partial Q_A/\partial P_S$ is positive, since the two stores are substitutes, which implies that the externality on store *A* from a price increase at store *S* is positive.

The externality in equation (2) is the product of two terms. The first is the *diversion ratio* from store *S* to store *A* -- a measure of the closeness of substitution between the two stores. This is given by the number of consumers that switch from *S* to *A*, the event of a marginal price increase at *S*, as a fraction of all consumers who switch away, defined formally as follows:

$$D_{S\to A} = -\left[\frac{\partial Q_S}{\partial P_S}\right]^{-1} \left[\frac{\partial Q_A}{\partial P_S}\right].$$

(3)

The second terms is the profits per unit at the store *A* given by the markup: $(P_A - C_A)$. Multiplying these two pieces of information gives the externality: the value to *A* of the switching customers. This externality is referred to as the Upward Pricing Pressure -- $UPP_{S\to A}$ – at store *S* from the merger with store *A*:

$$UPP_{S\to A} = D_{S\to A} \times (P_A - C_A).$$

(4)

In order to provide a unit-free measure of the externality we divide the UPP by price which gives the GUPPI indicator:

$$GUPPI_{S\to A} = D_{S\to A} \times M_A \times \frac{P_A}{P_S}. \quad (5)$$

There are three components on the right-hand side of this equation: The first $D_{S\to A}$ is the diversion ratio as defined above. The second $M_A = (P_A - C_A)/P_A$ is the profit margin at *A*. The third P_A/P_S is the ratio of *A*'s and *S*'s prices.

The framework makes it easy for the competition authority to incorporate efficiencies from the merger into the analysis, assuming that there is a reliable estimate of efficiencies. To see this, note that the UPP term in the first order condition (2) is added to the marginal cost C_S. Hence, if the merger reduces marginal cost C_S by more than the UPP, it does not have a net upward effect on prices. Or, equivalently, if the reduction in marginal cost C_S expressed as a fraction of price P_A is greater than the GUPPI indicator.

The UPP and GUPPI indicators have important limitations. They only measure the impact of the merger on the unilateral pricing incentives of the merging partners (at the pre-merger prices) and do not measure how much equilibrium prices change as a result of the merger. As we noted in the previous paragraph, we can interpret the UPP term as a new marginal cost that the firms consider after the merger. How much of a cost change is passed through to equilibrium prices depends on the shape of the demand curve and how rivals respond to the price change, none of which is included in the UPP analysis. [18]

[18] See Salop and Moresi (2009), Valetti and Zenger (2021), and Miller and Sheu (2021) for a more extensive discussion of upward pricing pressure indicators.

Three issues of practical implementation have been at the fore in UK retail merger cases. First, how should the competition authority calculate the diversion ratio when there are many stores? The diversion ratios in the GUPPI are often estimated with the use of a consumer survey. In the case of retail mergers, these ask those consumers exiting store *S* which alternative store they would use if *S* is unavailable. This method is practical only when the number of stores is small. In a major merger there could be many hundreds of stores – Table 1 shows that Sainsbury and Asda together have over 2000 stores -- and the cost of conducting a survey in each store would be very high.

The second issue is how to use the GUPPI to determine if there is a SLC. The GUPPI measure can be used in a number of alternative ways: It can be used in a non-deterministic way alongside many other pieces of qualitative and quantitative evidence. Alternatively, it can be used in a deterministic *final decision rule*: If the GUPPI for store *S* exceeds a specific threshold, then the store is classified as having a SLC.

The third issue arises in cases where a final decision rule is used: To what level should the GUPPI threshold be set? If a marginal cost efficiency is expected from the merger, then the competition authority may adjust the threshold upwards by the appropriate amount. The competition authority might also take into account: the rate at which it expects pricing pressure to be passed through to consumers; the presence of measurement errors in GUPPI; and recent precedents in merger cases.

V. The CMA's findings

The CMA began its analysis by identifying the theories of harm through which there could be a SLC from the merger, and then gathering evidence with respect to each theory.

The Authority had many theories of harm. We focus on those that related to unilateral effects at the store-level.

The CMA used the two-step procedure that was discussed in section II: In Step 1 the CMA identified stores where a SLC is possible, because both parties to the merger are in close proximity (i.e. within a 15 minute drive time); this resulted in a high percentage of the parties' stores being identified (77% of Sainsbury stores and 85% of Asda's).[19] In Step 2 the CMA calculated a GUPPI for each of the stores identified in Step 1.

In light of the large number of stores that were identified in Step 1, the CMA used a decision rule approach in Step 2: the GUPPI for each store was compared to a threshold set by the CMA, as the final decider for whether there was an SLC at that store. This avoided the time-consuming process of making an "in the round" judgement for each store based on both the GUPPI score and other information.

The practical calculation of the GUPPI indicators required three pieces of information for each store: a profit margin, relative prices, and a diversion ratio. The most difficult of these was the diversion ratio. To obtain a diversion ratio for each store, the CMA could in principle survey consumers at all the stores identified in Step 1, to find out their second-choice store in the event of a price increase. However this would be very expensive in practice. So, instead, the CMA surveyed consumers at, and calculated diversion ratios for, a sample of the stores, and used these data in an econometric model to predict diversion ratios for all the stores.

The model was referred to by the CMA as the Weighted Share of Shops (WSS). It is worth writing it down, which requires some further notation. Consider the diversion ratio

[19] See CMA (2019) paragraph 8.20.

$D_{k\to j}$ for centroid store *k* and competitor store j. Let centroid store k have owner $F(k)$ -- which could be Asda or Sainsbury -- and the set $J(k)$ of competitors. The CMA assumed that $J(k)$ consisted of all supermarket-sized stores that were up to a 15-minute drive-time away from k. The competitor store j has owner $F(j)$. Let the drive-time between the stores be denoted x_{kj}.

Let $p_{F(k)F(j)}(x_{kj})$ be a weight, to be estimated using diversion ratios from the sampled stores, that indicates the competitive importance to centroid store k owned by firm $F(k)$ of a competitor store j owned by firm $F(j)$ and at a drive-time of x_{kj} from k. Let p_O be the probability that the shopper diverts to an option other than a store in J: e.g., online, a convenience store, or a store that is more than 15 minutes' drive-time away.

The CMA calculated the diversion ratio from store k to store j as follows:

$$D_{k\to j} = (1 - p_O)\frac{p_{F(k)F(j)}(x_{kj})}{\Sigma_{j^\star \in J(k)} p_{F(k)F(j^\star)}(x_{kj^\star})}. \quad (6)$$

In this expression $(1 - p_O)$ is the probability that the consumer diverts to a store in $J(k)$. The fraction gives the share of such shoppers that divert to store j.

To obtain the weights $p_{F(k)F(j)}(x_{kj})$ the CMA estimated a regression model of the following form

$$p_{kj} = p_{F(k)F(j)}(x_{kj}) + e_{kj} \quad (7)$$

for the 100 centroid stores in the sample and all their competitors. The left-hand-side variable p_{kj} is the observed diversion ratio from store j to store k from the CMA's consumer survey; $p_{F(k)F(j)}(.)$ is a flexible function; and e_{kj} is an econometric error. The equation was

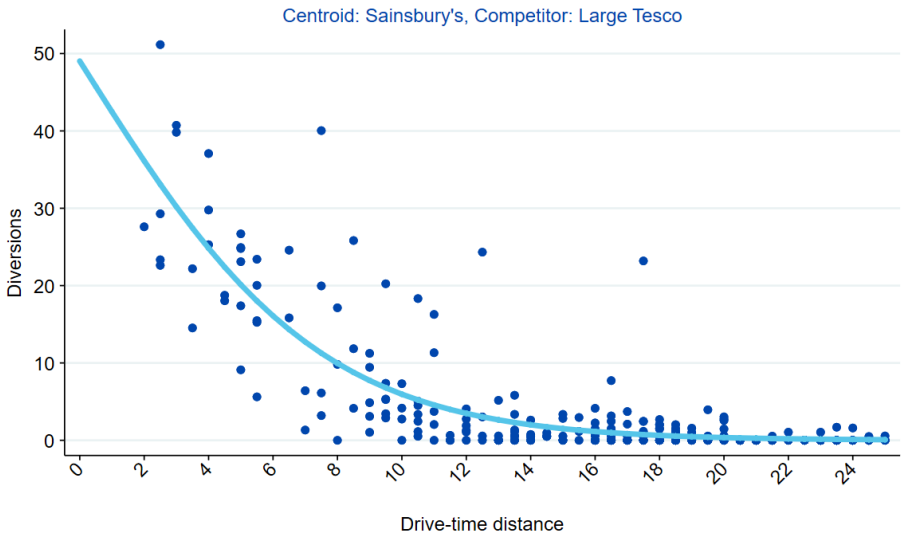

Figure 1: Estimated diversion ratio from Sainsbury to a Tesco; source Figure 8.3 of CMA (2018b).

estimated separately for each centroid-store firm (Asda and Sainsbury) and for each competitor firm (Tesco, Lidl, etc.).

Figure 1 provides an example of the data and estimated function for one of these regressions: the case where the centroid store k is a Sainsbury and the competitor store j is a Tesco.[20] On the vertical axis is the observed diversion ratio p_{kj} and on the horizontal axis is the drive-time x_{kj}. Each dot in the figure is an observation for a centroid Sainsbury and a competing Tesco. We can see that the number of observations in this regression is not particularly large: it is limited by the number of Sainsbury stores that are sampled (50).

The estimated functions $p_{F(k)F(j)}(.)$ from all these regressions was then used in equation (6) to predict the diversion ratios for all the stores for which a GUPPI is required: both for those that were in the sample and for those that are not.

The expression for the diversion ratio in equation (6) is in principle quite flexible: The set of rivals $J(k)$ varies from one centroid store k to another, and the weights $p_{F(k)F(j)}(x_{kj})$

[20] We have simplified the model slightly to help keep notation simple. The CMA in practice performed a separate regression for large and small competitor stores when the competitor store was operated by a Big Four firm. The figure shows the case where the competitor stores are large Tescos.

depend on the owner of the centroid store, the owner of the competitor store, and the drive-time between the stores.

It is interesting to note that the standard multinomial logit model is a special case of the WSS model. To see this concretely, assume that the weights in equation (6) are given by

$$p_{F(k)F(j)}(x_{kj}) = exp\left(f_{F(k)F(j)}(x_{kj})\right) \quad (8)$$

where $f_{F(k)F(j)}(x_{kj})$ is a function to be estimated. Then equation (6) is the standard multinomial logit choice probability expression. A feature of this specification is that the function $f_{F(k)F(j)}(x_{kj})$ can be estimated using standard maximum likelihood methods at individual consumer level with the consumer survey that the CMA carried out. The use of this standard model would bring a couple of advantages: (i) its estimated diversion ratios are unbiased under the maintained assumptions of the model and (ii) the statistical precision of the model estimates should be satisfactory given that the unit of observation is the individual consumer and the CMA had a large sample of consumers. These properties are valuable given that, as we discuss below, the parties argued that the CMA's estimates were biased and imprecise. The CMA did not discuss the option of using a logit model in their report, however it seems worth considering in future retail mergers where the WSS approach is taken. [21]

Margins and the GUPPI figures

[21] The logit approach has the further advantage that it allows the consumer's location easily to be incorporated into the analysis, which is likely to further improve accuracy of the diversion ratio estimates; to do this the survey would have to ask consumers either their home location or the distance/drive-time from their home to the store they have chosen. A criticism of the logit model, when estimated using first-choice data, is that the diversion ratios are determined by market shares rather than coming from observed substation patterns. However, this criticism does not apply in this setting, because the CMA in effect have first and second choice data for each consumer, and the model is being used to estimate substitution probabilities (i.e. second choice probabilities) directly from the data.

The GUPPI also required margins. Here the CMA relied upon accounting data supplied by the parties. A starting point would be to use the difference between revenues and the cost of buying the goods from suppliers. This is readily available from company accounts, but is likely to be an upper bound to the true variable margin because it does not include variable aspects of other costs such as distribution and labour costs.

The parties conducted their own econometric analysis to come up with a figure for how much of these costs are variable. The CMA accepted the parties' estimates while stating that it suspected that the cost estimates were too high and the consequent margins were too low (resulting, if so, in a GUPPI that was too low).

The CMA's choice of GUPPI threshold and the CMA's decision

To activate the store-level decision rule, which classified each store as to whether it would have an SLC from the merger, a GUPPI threshold must be set. To do this the CMA began with an assessment of the marginal cost reduction from the merger. The CMA concluded that the appropriate figure to use was 1.25% of each retailer's price. With this efficiency gain in hand, the logic of the model is that a GUPPI of 1.25% or less would imply no upward pricing pressure from the merger. Hence, 1.25% represents a lower bound to the threshold that the CMA could set.

The CMA decided to set the threshold at 2.75%. The Authority expressed the belief that this threshold allowed a sufficient margin above the lower bound of 1.25% to be satisfied that an SLC would probably follow from the merger. In making what was only a small upward adjustment to the GUPPI threshold relative to the lower bound of 1.25%, the CMA attached importance to the fact that groceries were an important part of household budgets and its high confidence in the accuracy of the GUPPI estimates.

Applying its decision rule using this threshold, the CMA found SLCs in 45% of Sainsbury stores and 57% of Asda stores identified in Stage 1. The CMA considered the possibility of store divestitures as an alternative remedy, but ruled this out because of the high percentage of stores with SLCs. The CMA therefore blocked the merger.

VI. The parties' response and the CMA's counter-response

The parties raised a number of objections to the CMA analysis. We focus on four that relate to the CMA's use of GUPPI at the store level.[22]

Objection 1: No evidence that a positive GUPPI causes price changes

The GUPPI is in essence a theoretical predictor of price changes, and it does not constitute direct evidence in support of the view that the GUPPI causes actual price rises. An example of the type of evidence the parties were seeking would be an analysis of how firms actually react at store level in terms of real decisions -- e.g., changes to prices, promotions, store budgets for refurbishment, etc. -- in response to an observed change in market conditions near a store, such as the entry of a rival. The parties suggested that this kind of evidence is particularly important when GUPPIs are used as a decisional rule rather than as one of many pieces of information.[23] The parties provided evidence of the sort that they considered valuable: data, from their own records, of how they adjusted budgets -- e.g., for store refitting -- in response to changes in local concentration. They argued that this evidence suggested that their stores did not react at all to entry by a competitor store

[22] The objections are discussed in *Parties' Response to the Provisional Findings Report*, available at https://www.gov.uk/cma-cases/j-sainsbury-plc-asda-group-ltd-merger-inquiry

[23] GUPPI was used as a decisional rule in the *Ladbrokes/Coral* case (see CMA (2016)), and in this case the CMA had indeed sought the kind of evidence that the parties were calling for in *Asda/Sainsbury*.

whose significance was equivalent to a store from the other merging party with a GUPPI similar to the CMA's threshold.

In reply, the CMA reviewed the evidence the parties put forward and argued that it had methodological flaws. After adjusting the methods for these flaws, the CMA found that the evidence supported the CMA's choice of threshold.[24] The CMA added that it was entirely plausible that a small but positive GUPPI would have real implications for prices or other variables: after all, the parties in this industry were sophisticated firms who adjust prices optimally, and fixed costs to price adjustment are not large enough to impede the effects of GUPPI.[25]

Objection 2: The CMA's estimates of store-level diversion ratios were biased and imprecise.

The CMA's diversion ratio estimates were obtained as was discussed in Section V: The CMA estimated a model from a sample of stores and used this model to predict diversion ratios in all stores including those not in the sample. The parties suspected that these estimates had two statistical problems: they were very imprecise and biased upwards. If either suspicion was correct, there would be the potential for many false positives: finding SLCs for stores where there were actually none.

To investigate these suspicions, the parties conducted a within-sample fit exercise: For the stores that were in the sample, the parties compared the diversion ratios predicted by the CMA's model with the diversion ratios from the data, which they took to be the true values. On the question of precision, the parties claimed that there prediction errors were large. On the question of bias, the parties claimed that the CMA's model tended to over-

[24] See CMA (2019) paragraph 8.301.
[25] See CMA (2019) paragraphs 8.285-8.286.

predict diversion ratios when the true diversion ratio was low. The parties argued that their exercise confirmed their suspicions of imprecision and bias.

These problems, they argued, called for a conservative approach to the GUPPI. Perhaps it should not be used in a final decision rule? Or, if it is used in a decision rule, perhaps the threshold for the rule should be set at a higher level so as to reduce the risk of false positives? Going further, they argued that the size of this adjustment should be separately itemized and set on a formal basis.

In response, the CMA argued that it did adjust the GUPPI threshold upwards to account for the effect of uncertainty in the GUPPI estimates. But they rejected the idea that they should identify the extent of this factor separately from other factors that affected the threshold. The CMA also disagreed with the parties' claim that the adjustment should be based on a statistical confidence interval standard; this, they argued, would set a higher standard for quantitative evidence than for qualitative evidence.[26] On the question of upward bias in diversion ratio estimates, the CMA again disputed the parties' claim.[27]

Objection 3: The CMA's assessment of substantiality was not well founded

For the CMA the test of whether the lessening of competition was "substantial" amounted to whether, on the balance of probabilities, the pricing pressure that was indicated by the GUPPI threshold would translate into harm to consumers. The CMA argued that "in assessing what may constitute 'substantial' […] we have had regard to the fact that groceries are a non-discretionary expenditure that accounts for a significant share of

[26] See CMA (2019) paragraph 8.294.
[27] The discussion of this point was quite technical and hinged on whether it was acceptable in this context for the expected value of the error in equation (7) to be positive when the dependent variable is low. See CMA (2019) paragraph 8.243-8.244 and Appendix E for a detailed discussion.

household spend, proportionally more so for low income households."[28] In practice this meant that the set a relatively low GUPPI threshold because of these features of the industry.

The parties objected to this by arguing that this test had no legal foundation: They noted that the Enterprise Act 2002, which sets out merger law in the UK, did not specify a different test for markets that are an important share of household budgets, or which cater to a non-discretionary type of expenditure. It is, however, the job of the CMA to interpret the legislation and the meaning of substantiality: they were not persuaded by the parties' objection, and did not adjust their approach.

Objection 4: The CMA's GUPPI threshold of 2.75% is too low relative to precedents

This objection was central to the case. As a starting point for thinking about the appropriate choice of GUPPI threshold, we note that CMA could not set anything lower than 1.25%, as this was the marginal cost reduction (expressed as a percentage of price) that the CMA expected from the merger. The threshold set by the CMA would have to be adjusted upwards from this level. The size of its upward adjustment was influenced by two main factors: (i) the fact that grocery shopping was non-discretionary and important in consumer budgets, which would suggest a relatively low upward adjustment, and (ii) the level of uncertainty in the store-level GUPPI estimates, which the CMA did not consider to be high. The CMA set the upward adjustment at 1.5% resulting in a GUPPI threshold of 2.75%.

[28] See CMA (2019) paragraph 8.283.

The parties were expecting a much higher GUPPI threshold. It was not wholly unreasonable that they were surprised. Consider the following quotation from the CMA's report on the 2017 *Tesco/Booker* merger inquiry.[29]

> *"In the past, for some (but not all) horizontal mergers, the CMA has taken the approach that a GUPPI of less than 5% indicates that concerns could be ruled out. Typically, this has been followed by closer examination of markets where the GUPPI was 5% or higher. In other cases, the CMA has signalled that a higher threshold may be appropriate." CMA (2017b), paragraph 9.46.*

This paragraph suggests at the very least that in horizontal mergers a 5% threshold is quite common -- and that a higher threshold might be reasonable -- as a safe harbour. It seems logical moreover that a threshold for the purpose of a decision rule, as used in Asda/Sainsbury, might be higher than that for the purpose of a safe harbour. The quoted paragraph did not bind the hands of the CMA in setting future thresholds. But it did summarize, in the CMA's own words, recent precedents.

The parties could find no domestic or international precedent for such a low GUPPI threshold.[30] The parties pointed in particular to two recent UK precedents: First, *Tesco/Booker*, which was a vertical merger between the UK's largest supermarket and the UK's largest wholesaler. In this case the CMA used a screening approach (rather than the decision rule approach used in Asda/Sainsbury) and set a safe harbour threshold of 5%: stores with a GUPPI below this were unlikely to be problematic. This made the Asda/Sainsbury threshold incoherent, the parties claimed: a store with a GUPPI of, say, 3% would be classified as giving rise to an SLC in *Asda/Sainsbury* but would be put in a safe

[29] The quotation is paragraph 9.46 of CMA (2017b); see also Footnote 250 in CMA (2017b) for case references that support the quoted text.

[30] The parties pointed out that the CMA's GUPPI threshold seemed to lower than the practice in the EU, which had not used such a low threshold.

harbour in *Tesco/Booker*. The second precedent was *Ladbrokes/Coral*: This case -- similar to *Asda/Safeway* -- used a decision rule approach. That case set a threshold of 10%. The parties used these two precedents to argue that a reasonable GUPPI threshold for Asda/Sainsbury should be at least as high as the 5% that was used in *Tesco/Booker* and potentially as high as the 10% that was used in *Ladbrokes/Coral*.

The CMA, in reply, argued that precedents are in general of limited importance in a big merger inquiry such as *Asda/Sainsbury*: The threshold should be assessed afresh for each case. They pointed out that the CMA's merger guidance does not provide any concrete GUPPI threshold figure, whether for a decision rule or for a safe harbour.

The CMA disputed the relevance of either of the two cases that the parties had used. Neither were horizontal merger cases for the supermarket industry.[31] If recent cases are to be referenced, the CMA argued, it would be better to use a horizontal merger case within the same industry. The most recent such case was *Somerfield/Morrison* in 2005. This was a horizontal merger case for supermarket firms, and one of the first to use an upward pricing pressure indicator. Although the indicator that was used in *Somerfield/Morrison* was not GUPPI – it instead used the "indicative price rise" (IPR) indicator – it is possible to "translate" from IPR thresholds to GUPPI thresholds. The threshold in *Somerfield/Morrison* translated to a GUPPI threshold of 3.2%: This was not much higher than the 2.75% that was used by the CMA in Asda/Sainsbury.[32] The CMA concluded that its GUPPI threshold was not out of line with precedent, with respect to mergers in the supermarket industry.

VII. Reflections on the case

[31] Ladbrokes/Coral was a betting shop merger, and Tesco/Booker was a vertical merger case (which had used vertical-GUPPI rather than the horizontal GUPPI in *Asda/Sainsbury*).
[32]See CMA (2019) paragraph 8.264.

At a broad-brush level, the Asda/Sainsbury merger always looked questionable. Precedent was against it: The most recent case that examined mergers between the Big Four -- the *Safeway* case of 2003 -- ruled them out. The simplest possible HHI-based test -- using the industry revenue shares in Table 1 – put it above standard thresholds in the US merger guidelines for flagging a detrimental merger.

The CMA's decision to block the merger was a reaffirmation of the view of the UK's competition authorities -- which emerged after many inquiries in the early 2000s -- that the supermarket industry was concentrated enough. The industry had not changed enough since then to overturn this.

There were many important questions that were raised by the parties about the appropriate use of GUPPI in retail cases and more broadly: Did the CMA's modelling method result in unacceptably noisy estimates of the GUPPI in individual stores? Should the GUPPI threshold take explicit account of these errors?

The question that became central in this case, however, was whether the CMA's choice of a threshold was too low. The parties thought so, and they were not alone: Third-party economists that commented on the case seemed to agree.[33]

Overall, it seems clear that the CMA did set a relatively low GUPPI threshold in this case, much lower than some recent merger cases that used a GUPPI approach. Moreover, this threshold was low by international standards. But it is also true that the Authority's threshold was similar to the implied GUPPI threshold in the most recent case of a major

[33] See, for example, Forbes and Hughes (2019).

horizontal merger in the supermarket industry: *Somerfield/Morrison*. This case is arguably the most relevant comparison, because it is in the same industry.

What this appears to tell us is that in practice the CMA can vary the GUPPI threshold that it uses quite widely from one merger case to another, particularly when the cases are in different industries. It also suggests that there are important industry-specific factors that can drive the level of the GUPPI threshold in a merger case. As we noted at the outset, one such industry-specific factor stands out where supermarkets are concerned: the importance of the industry to consumers. There is no other industry that occupies a greater share of consumer budgets -- particularly for the lowest-income consumers. And as the CMA emphasised, much of this grocery spending is likely to be non-discretionary. This has not changed since the early 2000s. The CMA took this factor into account, and behaved in a manner that was consistent with previous supermarket merger cases – GUPPI or no GUPPI.

Does the low GUPPI threshold, then, represent a tightening of UK merger policy? From the argument in the previous paragraph – the low GUPPI was a consequence of industry-specific factors – it seems not: As the CMA stressed throughout its report, the Authority takes a case-by-case approach to the choice of a GUPPI threshold and previous GUPPI threshold choices do not bind the CMA in the future.

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