UK Groceries Market Definition

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EXECUTIVE SUMMARY

I have been asked by the Competition Commission (CC) to give my expert opinion on several studies that are concerned with geographic–market definition in UK groceries: the CC papers on entry and profit margins and the Tesco/Frontier SSNIP model. In particular, my opinion has been sought on the validity of the econometric evidence and what it has to say about the scope of geographic markets for one–stop grocery shopping in the UK.

Entry:

I find that, although the CC entry study does not capture all of the motives for and effects of entry, and some of the effects that they estimate are probably biased, to the extent that they err, they tend to underestimate the consequences of *de novo* entry for incumbent revenue. In particular, since entry normally occurs in locations where conditions have become more profitable for grocery sales, there are two countervailing forces: the positive exogenous change in conditions that is favorable to incumbents and the negative endogenous (entry) change that is unfavorable. Furthermore, incumbents are not totally passive in the face of entry and can attempt to encourage their customers not to switch to a new entrant. Both of these factors, which are not controlled for in the CC regressions, lead to an underestimate of the negative impact or entry. Nevertheless, their regressions provide evidence in support of the hypotheses that virtually all significant entry effects are negative. In addition, those effects occur almost exclusively within 15 minutes drive time of the entrant. Finally, the major chains appear to constrain one another whereas the discount chains have little affect on the majors.

Profit Margins:

The profit margin analysis is more difficult to perform. This is true because profits and market structure are jointly determined and it is therefore difficult to determine causality. In particular, the CC specifications are free of endogeneity problems under some assumptions but not others. Nevertheless, all of the statistical tests that they perform indicate that either the endogeneity problem has been overcome or it is minor. Furthermore, in spite of potential difficulties, I find the CC regressions to be surprisingly robust to changes in the measure of market structure, the functional form of the equation, and the choice of instruments. The evidence is thus supportive of the hypothesis that very local market conditions are important determinants of grocery–store profits.

The SSNIP test:

Tesco/Frontier (TF) claim to find evidence that geographic markets are larger than 15 minutes drive time. However, their study is problematic. First, it relies on an important parameter — the consumer's value of time — that was obtained by Decision Technology (DT), and that parameter is biased, since DT fail to take into account the endogeneity of consumer expenditure. Furthermore, DT themselves feel that their crucial parameter is too low, but they do not attempt to remedy the situation. A model that is based on an underestimate of the value of time will predict too much switching. There are other reasons to suspect that the TF model overestimates switching. First, the consumer has only one option — to switch or to stay and pay the higher price — since less drastic alternatives such as purchasing less expensive brands in the same store are excluded by assumption. Furthermore, TF do not consider the possibility that neighboring stores will respond to a local price increase. In other words, they do not compare two equilibria, one before and one after a price change. Finally, the neglect of consumer heterogeneity in their preferences over travel and income, and the focus on price at the expense of overall offerings (PQRS) are additional reasons for believing that the model predicts too much switching.

I conclude that, faced with difficult data problems, TF produced a SSNIP model that is useful but flawed. I therefore think that something has been learned from the exercise but that it would be a mistake to take the model too seriously and allow its findings to dictate the size of geographic markets. The CC has also performed some useful exercises, and all of that evidence points to the fact that markets are at least as small as they originally hypothesized. The bulk of the evidence therefore appears to confirm their original definition of geographic markets for retail groceries.

Detailed Opinion of the Documents

1. My name is Margaret Slade. I am the Leverhulme Professor of Industry and Organization in the department of economics at the University of Warwick, where I have been employed since 2002. Prior to that I was a professor of economics at the University of British Columbia in Canada. At Warwick, I teach courses in competition policy, regulation of natural monopoly, and organizational economics at both undergraduate and postgraduate levels. I have consulted for private parties and public agencies, including the EU Directorate–General for Competition, the US Department of Justice and Federal Trade Commission, and the Canadian Competition Bureau and Restrictive Trade Practices Commission. I have conducted academic research in the areas of horizontal mergers, pricing, and market definition, vertical integration and restraints, and the boundaries between firms and markets. I am a past president of the European Association for Research in Industrial Economics (EARIE), and I hold an honorary doctorate from the Helsinki School of Economics. My curriculum vitae is attached as annex A.

2. The Competition Commission (CC) has asked me to provide an expert opinion of their submissions on i) entry and ii) profit margins, and on iii) the Tesco/Frontier SSNIP–test analysis. Specifically, I have been asked to evaluate the validity of the concepts employed, the statistical techniques used, and the conclusions drawn with respect to the definition of geographic markets for one–stop grocery shopping in the UK. In the course of my evaluation, I have consulted a number of other documents that are relevant to the submissions. A complete list of the documents that I have read is attached as annex B. I have not attempted to duplicate the CC or Tesco/Frontier estimations nor do I have access to the data that was used in the analyses. I merely comment on the documents that have been written.

The Competition Commission's Entry Analysis

3. The CC has used regression analysis on a firm–level panel data set to evaluate the effect of *de novo* entry of grocery stores of different sizes on the revenues of incumbent stores of different sizes located in different regions and at various distances from the entrant. This analysis is performed in aggregate (i.e., a single equation is estimated in which the chains are distinguished only by seasonal dummy variables) as well as chain by chain (i.e., separate regressions are estimated for each incumbent chain).

4. The CC concludes that i) entry has a negative impact on incumbent revenues, ii) that this effect decays with distance between entrant and incumbent, iii) that this effect disappears at a distance of about 15 minutes drive time, iv) that larger entrants tend to have a greater impact on incumbent revenues, and v) that entry by a store that belongs to a discount chain has little impact on the revenues of incumbents that belong to one of the major chains — Tesco, Sainsbury, Asda, and Morrison.

5. Before evaluating the CC's entry analysis, it is useful to think about why entry occurs. Both economic theory and common sense tell us that new stores enter particular locations because the management of the chains to which they belong think that the stores will be profitable. Furthermore, entry did not occur at an earlier date, probably because it was considered to be premature at that time. This means that local conditions must have changed, which can occur for at least two reasons. First, stores can become so out of date that demolition is thought to be preferable to renovation and a new building is constructed (replacement entry). Second, the local area might be growing or its characteristics might be changing in a manner that is favorable to grocery sales. For example, a poor neighborhood might experience gentrification, which could trigger entry of a high–end grocery store. In this case, the number of stores in the market increases (*de novo* entry). In what follows, I will argue that although the CC regressions do not capture all of the motives for and effects of entry, and some of the estimated effects may be biased, to the extend that they err, they tend to underestimate the revenue effect of *de novo* entry.

6. First consider replacement entry. I am not sure how the CC regressions handle this issue. However, it is probably difficult to distinguish replacement from *de novo* entry in the data. The effect of replacement entry on incumbents'

revenues, however, should be smaller than that of genuine additions because construction is coupled with demolition. Even if the new store is a stronger competitor than the one that it replaced, which will normally be the case, its effect on the revenue of incumbents should be attenuated by the fact that the number of stores has not changed. To the extent that replacement entry occurs, its (possible) inclusion in the data will thus lead to an underestimate of the revenue effect of entry.

7. Now consider *de novo* entry. In a static environment only replacement entry would occur. However, the economy is not static, and new stores enter particular locations because those locations have become more desirable.[1] This could be due to, for example, a growth in population, an increase in per capita income, or a change from rural to more urban environment. Furthermore, the conditions in neighborhoods where entry occurs can be quite different (usually more favorable) than those that prevail in the broad region in which those neighborhoods are located. Indeed, that is why entry occurs in a particular neighborhood and not in another. Firms in neighborhoods where entry occurs are therefore apt to be experiencing positive revenue growth. To the extent that growth in incumbent revenue encourages entry, the fall in revenue that is triggered by that entry is offset in the data. In other words, the two countervailing effects tend to cancel one another. The net result is a bias in the estimates of entry effects. That bias, however, can be signed; the coefficient is too small, which implies an underestimate of the negative effect.

8. Another aspect of the entry decision that the CC regressions don't capture is the potential change in a chain's image/management over time, and thus its ability to draw customers from its rivals. For example, it is possible that a chain's revenues are growing because management have adopted practices that customers like. When this occurs one expects to see the growth in incumbent revenue accompanied by entry of stores owned by the same chain. This effect could be captured by including chain–specific time period fixed effects instead of merely seasonal effects. I presume that this was not done due to considerations of degrees of freedom. Whatever the reason, however, this omission also leads to an underestimate of the revenue decline associated with entry for stores that belong to the same chain as the expanding entrant.

[1]Economic theory posits that, in a symmetric equilibrium, the number of stores in market m, n_m, is determined by the fact that n_m stores can make a profit but $n_m + 1$ stores can not. *De novo* entry is thus triggered by a favorable change in conditions, such as market growth.

9. Grocery stores clearly compete on price. However, they also have a whole range of nonprice variables at their disposal. Tesco claims that, not only are prices set nationally but also every aspect of quality, offerings, and service are nationally determined. However, this is just a claim and there are no data that confirm it. To me it seems possible that a store that is faced with entry and experiences a loss in revenue might try a bit harder. In other words, the local manager might exert the extra effort that could keep customers from switching. This could be accomplished through, for example, better management of personnel (e.g., making sure that questions are answered informatively and in a friendly fashion), opening more cash registers to shorten queues, or responding faster to unforeseen conditions (e.g., being quicker to replace items that have sold well). It is difficult to believe that the changes that I describe could not be implemented without national directive. Indeed, if local initiative is not possible, all store managers would be equally efficient and there would be no role for promoting one manager over another. To the extent that entry triggers an improvement in nonprice competition, the associated revenue decline will be attenuated and the estimated decline will be biased downward.

10. To summarize, entry occurs for a number of reasons. However, we expect to see *de novo* entry only in locations in which conditions have become more favorable to grocery sales. When entry occurs there are thus two countervailing forces: the positive exogenous change in conditions that is favorable to incumbents and the negative endogenous (entry) change that is unfavorable. Furthermore, incumbents are not totally passive in the face of entry and they can attempt to encourage their customers not to switch to the new entrant. Both of these factors, which are not controlled for in the CC regressions, lead to an underestimate of the negative impact or entry.

11. Tesco claims that the decline in revenues that the CC regressions detect is due to a decline in quantity, not price. Economists usually like to separate price from quantity changes since, for example, a decline in the first is often considered to be good whereas a decline in the second is not. Unfortunately, changes in revenues, which are defined as price times quantity, cannot distinguish between the two effects. In this case, however, one must consider the purpose of the exercise, which is to define the geographic market, not to estimate changes in profits or consumer welfare. In other words, we must answer the question 'who competes with whom?' If entry at a distance of 20 minutes drive time

has no effect on incumbent revenue, it will not change incumbent behavior.[2] In particular, when an incumbent is setting the variables that are under his control to maximize pre–entry profits, if sales don't decline the same choices will maximize post–entry profits. This means that the two stores don't compete and that they are therefore not in the same market. Furthermore, it is important to remember that market definition, which is a hypothetical exercise, should not depend on the conduct of the firms in that market. For example, suppose that a market is competitive and that firms equate price with (constant) marginal cost. Under those circumstances, incumbent price will be the same before and after entry. However, if the incumbent and entrant are (not) in the same market, incumbent sales and revenue will (not) fall.

12. The regressions that the CC perform are equivalent to a difference–in–difference evaluation, with the stores that experienced entry in their markets as the 'treatment' group and those that did not experience entry as the 'control' group. This analysis is refined by comparing stores in the same broad region, of a similar size, and from the same chain. Other confounding effects, such as recent refurbishment, are also removed. Tesco claims that the CC could do better. In particular, it could choose a control group that more closely matches the treatment group. Whereas the suggested approach is possible, it is also fraught with difficulties. For example, one possibility is to choose a 'matching' store that did not experience entry for every store that did, where the 'match' would be determined by store characteristics. Clearly there are many possible choices. Furthermore, for every choice by the CC, Tesco could claim that they had found a better one. This process could result in endless disputes. The advantage of the procedure that was used is that it is transparent, less prone to manipulation, and therefore less likely to lead to time–consuming claims and counter claims.

13. The principal results of the CC's entry analysis are summarized in tables 3, 4 and 7 of their paper. Those tables show that, with the exception of the last regressions in table 7, i) all significant revenue effects of entry are negative and ii) there are no significant effects at distances greater than 15 minutes drive time. These results are quite striking since, as I have argued above, in addition to the negative revenue effect of entry, there are countervailing forces

[2]This assumes that entry does not change incumbent costs, which seems reasonable. If, however, it were to lower costs due to, for example, an improvement in regional distribution (e.g., entry of new wholesalers), incumbent revenues would go *up*.

that lead to revenue improvement. The regressions therefore provide evidence that geographic markets are small and do not exceed 15 minutes drive time.

14. The results from the chain–by–chain regressions are summarized in tables 5 and 6. Those tables show that i) entry of a store from a major chain (Tesco, Sainsbury, Asda, and Morrison) has a significant negative effect on the revenues of a store from the same chain, ii) the major chains constrain one another, iii) with the exception of the effect of Lidl on Sainsbury, the discount chains have little effect on the majors, and iv) the effect of entry of Marks&Spencer or Waitrose on a major chain is almost as large as the effect of entry of a major. The first regularity is expected, since same–chain stores are close substitutes for one another. The second finding is evidence in favor of the majors belonging to the same product market. The third provides evidence that the discounters belong in a separate market. Finally, the last regularity is consistent with M&S and Waitrose being in the same market as the big 4.

The Competition Commission's Profit Margin Analysis

15. In the second paper, the CC uses regression analysis to assess the relationship between a firm's price/cost margin $(p-c)/p$ (hereafter margin) and the structure of that firm's local market. A reduced–form margin equation is estimated using cross sectional data on stores. For most of the analysis, competitors are assumed to be homogenous. However, in the later regressions an attempt is made to distinguish among types of local competitors.

16. The CC concludes i) that competition is local, ii) that stores belonging to the four major chains exert significant constraints on each other, and iii) that large competitors exert more restraint than small ones.

17. As with the entry paper, it is useful to think about the question first. Furthermore, in this case it is informative to discuss the history of such exercises, which have been fraught with econometric problems, before discussing whether the current exercise suffers from the same problems. Regressions of profit margins, π, on measures of market structure such as concentration, MS, dominated empirical IO until the early 1980s. Although many of those cross–sectional regressions used firm–level data, it is easier to demonstrate the problems by assuming that the data are a cross section of markets, as was more apt to be the case. Such regressions suffered from at least two sorts of endogeneity problems: feedback from profits to market structure and an efficient–firm effect. Feedback occurs because high profits attract entry. The efficient–firm effect occurs because low cost firms grow and dominate the market leading to an increase in concentration. With the second possibility, however, high profits do not signal market power, they signal low costs. These endogeneity problems and the difficulty of finding good instruments caused the virtual demise of such exercises in the academic literature.[3]

18. In general, when faced with endogenous explanatory variables, one needs to find additional variables (instruments) that are i) correlated with the endogenous variables (MS), ii) not correlated with the dependent variable (π), and iii) not highly correlated with each other. Furthermore it is desirable to have more instruments than endogenous right–hand side variables. Finally, when

[3]This problem is not as acute for competition agencies, since they have access to more and better data. Nevertheless, it is not always easy to find variables (instruments) that can shift market structure but do not affect profits directly.

an equation contains several endogenous explanatory variables, there must be instruments that can shift each one while holding the others constant. This is a difficult task. The problem here is that measures of market structure tend to be highly correlated, implying that it is difficult to shift one measure without shifting the others. One solution is to include only one measure in a given regression. Unfortunately, when measures are correlated, this can result in a bias. Nevertheless, when faced with such problems, considering one measure at a time is standard practice in the profession.

19. The CC regressions use very disaggregate data and, when such data are used, it is often easier to find valid instruments.[4] However, I suspect that some endogeneity problems remain, and clearly instrument availability poses a problem. In spite of these caveats, the results are very robust across specifications, which is a sign that the problems may not be severe.

20. First consider the problems that are associated with feedback from π to MS, which is a *market* effect. Although the instruments (population and population density around competitors) vary by firm, they tend to measure conditions in the local market. However, this fact does not pose a problem here, since it is the structure of the local market that matters. In other words, when profits are high in a particular area, stores tend to enter that area, which causes a change in the structure of the market. In this situation, the instruments should be valid, and the test statistics indicate that they are.

21. Now consider efficiency, which is a *firm* effect. When a firm is efficient, it normally has lower costs and thus higher profits. At the same time, the presence of a low–cost firm can discourage entry, which can result in fewer firms and a more concentrated market. As long as average variable costs (c) are constant, as the CC assumes, the fact that the firm is large will not affect margins directly. However, if c rises (falls) with output, all else equal, margins will fall (rise). In other words, size can be a common causal factor that affects both concentration and profits. Unfortunately, if a common causal factor is present, the estimate of the market structure effect will be biased. Moreover, since the direction of the effect depends on the shape of the average variable cost function, the bias cannot be signed.[5] Can the instruments do the job here? *A priori* I would

[4] In other words, variables that are endogenous to the industry can be exogenous to a firm.

[5] Unfortunately, a knowledge of returns to scale, which is a long–run concept, is not sufficient to sign the bias. This is true because, due to the presence of quasi–fixed factors, short–run average

say no, since they have been chosen to measure market size, which is assumed (perhaps wrongly in this case) to be uncorrelated with π. Nevertheless, the test statistics that could indicate problems with over and underidentification do not do so, which is an indication that the problem is not present or, if present, is not large. Even when average variable costs are not constant, there are circumstances under which no bias will occur. For example, a large efficient firm might increase its share without causing exit, implying that the number of competitors remains constant. With this example, there will be no problem if the first two measures of market structure are used, since those measures depend only on numbers and not sizes of competitors. *A priori* I would expect the problem to be most severe when the fourth measure of market structure — the market share of firm i's competitors, which is one minus firm i's market share — is used. The appendix shows that in fact the test statistics, especially the one that measures the ability of the instruments to explain the endogenous explanatory variable, are the worst for this measure. Nevertheless, they are within acceptable levels, which is again an indication that the problem is not severe.

22. Having indicated the problems that could cause difficulties, I can now say that I find the initial regressions to be surprisingly robust to changes in the measure of market structure, the functional form of the equation, and the choice of instruments. I conclude that very local market conditions do matter. The later regressions that attempt to distinguish among different sorts of competitors are less convincing, since as is pointed out in the paper, the instruments are highly correlated with each other and are not capable of shifting one endogenous variable without shifting the others.

variable costs can increase with output under constant or mildly increasing returns.

The The Tesco/Frontier Market–Definition Analysis

23. The Tesco/Frontier (TF) geographic–market analysis is an application of the SSNIP (small but significant nontransitory increase in price) test that makes use of a very disaggregate cross–sectional data set on consumer and store locations and consumer purchases. Based on their analysis of this test, TF conclude that geographic markets are larger than the 10–15 minute drive–time radius that has been used by the CC. They then make the large leap from 'probably at least 20–minute isochrones' to 'the market is national.' Finally, they claim that the CC should carry out their SSNIP test for every store in the country.

24. As before, it is helpful to consider the standard SSNIP test before discussing the TF application. The idea is to start with a very small region and assume that the stores in that region are controlled by a hypothetical monopolist (HM). That monopolist considers making a small price increase (often 5%) in his region. If that increase can be sustained in the sense that it is profitable, the region is a geographic market. If not, the region is expanded and this process continues until the price increase is profitable. The smallest region that passes the test is considered to be a geographic market.

25. The standard method of implementing the SSNIP test involves estimating a demand equation for the stores in a region and using this equation, along with information on costs, to calculate profitability. As the region expands, demand for the HM's products becomes more inelastic and the profitability associated with raising prices grows. At some point, incremental profits become positive.

26. It should be clear that this is not a scientific experiment like, for example, determining the freezing point of water, and one should always be careful in interpreting the results. In particular, those results can be very sensitive to assumptions about demand and cost (e.g., functional forms), the data used, and the estimation technique.[6] Nevertheless, the SSNIP text is a useful method of organizing one's thinking about the scope of markets. In addition, it can be used to help answer many sorts of 'what if' questions.

[6]For an analysis of the sensitivity of merger simulations to those factors, which is a similar issue, see Slade (2007).

27. It is not possible to preform a standard SSNIP test using the data that TF had at their disposal. In particular, the fact that most UK grocery chains practice national pricing implies that all price variation in a cross section is inter (not intra) chain. Unfortunately, many other aspects of a chain's position in the product market (high or low end), promotional effort, and product offerings are also nationally determined. This means that the effect of a chain's pricing policy cannot be separated from its overall image. Faced with these difficulties, TF decided to use a different approach based on consumer switching. The switching model makes use of the idea that consumers compare total cost — grocery expenditure plus travel cost — in choosing a store, where the latter depends heavily on an estimate of the value of their time.

28. The TF SSNIP test takes the important value–of–time parameter as given. In particular, it uses the value that was obtained in an earlier study by Decision Technology (DT, April 2006) without questioning the method that was used to obtain it. I find that study to be flawed and briefly discus why.[7]

29. DT assume that consumer i's utility from shopping in store j, u_{ij}, is a function of cost variables x_{ij}, where costs include trip and mission costs,

$$u_{ij} = -f(x_{ij}) + \epsilon_{ij}. \tag{1}$$

In equation (1), ϵ_{ij} represents factors that influence utility that are unobserved by the analysist (the error). Consumer i chooses to shop in the store that yields the highest utility. In other words, she chooses store j if $u_{ij} \geq u_{ik}$ for all stores k.

30. One of the cost factors that DT consider is the time that it takes to travel between consumer i's home and store j's location. Her value of time is the reduction in utility that she incurs when she has to travel one extra unit, say an extra minute.[8] This parameter is estimated by the coefficient on the travel–time variable.

[7] I describe the DT study as I understand it. Unfortunately, their description of what they did is not very precise.

[8] Note that this reduction in utility is assumed to be the same for all consumers regardless of, for example, income and employment status.

31. Notice that store j's 'price' is not included in equation (1), but the amount that i spends on the basket that she purchases is. I presume that this was done because price is perfectly correlated with the chain dummies that appear in x_{ij}. However, it causes a problem. Specifically, mission size or total expenditure, unlike price, is an endogenous choice for the consumer. In particular, the decisions about how much to spend and where to to spend it are normally determined simultaneously. DT assume that the consumer's market basket is fixed and that the only choice is which store to patronize. In other words, they assume that the choice of mission size determines the store. However, the reverse could be true. For example, the consumer might think 'I will be driving by Asda this afternoon so I will replenish all of my stocks of nonperishables.' In other words, it is possible that the choice of store determines the mission size.

32. The endogeneity of mission size would not lead to a bias in the value–of–travel parameter if travel time were not correlated with expenditure. However, they are positively correlated. Unfortunately, it is difficult to determine the direction of the bias by inspection, since mission size is interacted with a number of other variables. Nevertheless, DT themselves appear to consider that their estimated parameter is too small. In particular, they state that *'The results of the model suggest that customers travel further than is rational for small savings on groceries.'* and *'This figure is lower than most customer's wages (a good measure of the value of their time) and the cost of travel (petrol, running costs, etc.).*'[9] I certainly wouldn't travel for an hour to save six pounds!

33. Finally, DT appear to be confounding two situations: i) the behavior of a given household when it makes large (small) purchases, and ii) a comparison between rich households, who purchase expensive items or brands, and poor households, who purchase inexpensive items. If one considers the first comparison, it is clear that people are apt to travel greater distances when they wish to purchase many items. If one considers the second, in contrast, it is likely that rich consumers are less likely to switch, even though they spend more. This problem arises because all consumers are assumed to be identical except for location and expenditure. It would have been straight forward to allow both the value of time and the disutility of expenditure to depend on consumer demographics, but this was not done.

[9]DT (April 2006, p. 15).

34. TF take the value–of–time parameter (and indeed the entire DT study) without questioning it and use it in their SSNIP test. In particular, they perform the following conceptual exercise. Suppose that the hypothetical monopolist (HM) in a local area raises the price in all of its stores by 5%. For a customer who purchased from the HM, this would cause the amount spent on the basket that was purchased to increase by 5%. Given this increase in expenditure, the consumer decides whether it is worthwhile switching to a store that is outside of the HM's control. To do this, she calculates how much the same basket would cost in other stores and chooses to patronize the one where the sum of travel cost plus grocery expenditure is lowest. In other words, she compares the increase in expenditure in the given store to the difference in utilities at the old prices and switches if the first is larger than the second. Clearly if the value–of–time parameter is too small, the model will predict too much switching.

35. To the extent that the TF study relies on the DT model, it suffers from all of its shortcomings. In addition, it has shortcomings of its own. First, the set of options that are available to consumers are very limited — they can switch to another store or they can remain where they are. They don't have the possibility of reducing the number of their purchases or of substituting cheaper brands for more expensive. We know, however, that demand slopes down for several reasons including i) consumers can stop purchasing an item, ii) they can reduce their volume of purchases of that item, or iii) they can purchase a cheaper variant of the item. With the TF model, however, they have only the first option, which is more drastic than the alternatives. Failure to take the alternatives into account will result in an overestimate of the number of customers who switch. A more traditional analysis based on demand equations, in contrast, encompasses all responses to a price increase.

36. A further shortcoming is related to the fact that real–world markets are not partitions of geographic space. In particular, as Frontier points out, they overlap. However, the conceptual exercise that they perform does not take that overlap into account. In particular, if stores compete on the basis of price, a price increase by the HM will be followed by price increases in other stores and so forth until a new equilibrium is reached.[10] A model that does not allow for this possibility overestimates switching, and the bias is more acute if the

[10]With merger simulations, in contrast, it is standard to compare pre and post–event equilibria. In other words, all firms anticipate that the merged firm will raise its price and set their prices accordingly.

HM and nonHM stores are in the same market, as TF claim. Even if they are not, the bias persists, since there is bound to be some interdependence across markets, especially at the boundaries.

37. Finally, although the TF exercise depends heavily on the DT model, it is inconsistent with that model. In particular, DT assume that the marginal disutility of expenditure depends on the size of the store and on the chain to which that store belongs (i.e., on the entire price, quality, range, and service — PQRS — package). In fact, DT go to great lengths to demonstrate that their assumptions are superior to assuming a constant marginal utility of income. However, when the HM varies his price in the TF model, it is assumed that consumers care only about pounds spent and that the marginal utility of expenditure is the same, not only for all consumers, but also for all stores. In particular, this implies that consumers don't care about QRS.

38. *Summary*

    Faced with difficult data problems, TF produced a SSNIP model that is useful but flawed. Moreover, it would be very hard to find remedies for the flaws. It would help if panel data were available. However, I presume that such data would have been used if it had been possible. Furthermore, panel data would not solve all problems because intra–chain price variation would only be observed over time, not across stores, which is inconsistent with the HM exercise. I therefore think that something has been learned from the exercise but that it would be a mistake to take the model too seriously and allow its findings to dictate the size of geographic markets. In particular, the use of a cost–of–travel parameter that is probably biased downwards, the neglect of consumer heterogeneity in their preferences over travel and income, and the neglect of QRS probably lead to over prediction of switching. The CC has also performed some useful exercises, and all of that evidence points to the fact that markets are at least as small as they originally hypothesized. The bulk of the evidence therefore appears to confirm their original decision.

38. *Price flexing*

I agree with RBB (June and August 2007) that there is no canonical SSNIP test. That test can be a useful device when combined with other qualitative and quantitative methods. However, even in the best of circumstances, it cannot be relied upon to define markets precisely. Furthermore, it is most useful if it remains flexible and one is allowed to tailor the test to the circumstances of the market. In particular, it can be used to help answer many 'what if' questions such as what if the HM varies only some of the prices that are under his control. This is true for both geographic and product markets. To illustrate, we might believe that draft and bottled beer are in the same market. However, this does not imply that the elasticity of demand for the two products is the same. One might therefore want to assess the effect of changing prices in different proportions, which is what a profit–maximizing HM would do, or even holding one price constant while varying the other. In addition, 5% is not a hard–and–fast number that must be rigorously adhered to. In fact, this number could vary depending on the importance of the product (e.g., a small percentage increase in petrol prices has a bigger impact on the economy than a large increase in the price of sugar.)

Reference Cited:

Slade, M.E. (2007) "Merger-Simulations of Unilateral Effects: What Can We Learn from the UK Brewing Industry?" in B. Lyons (ed.) *Cases in European Competition Policy: The Economic Analysis*, Cambridge University Press, forthcoming.

Annex B
List of Documents Received

1. Decision Technology, Total Customer Cost: Superpanel Models, 18 April, 2006.
2. Tesco, Market Investigation: The Supply of Groceries by Retailers in the United Kingdom, 8 December, 2006.
3. Tesco, annex to item 2 (maps)
4. Frontier, Geographic Market Definition and the SSNIP Test, 31 January, 2007.
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