Negotiations and volumetric pricing

1. This Appendix discusses the analysis undertaken by the CC to investigate the negotiations between industrial sugar customers and their sugar suppliers. The discussion focuses in particular on the CC's analysis of the relationship between volumes and prices, and specifically the question of whether there is strict *volumetric pricing* in the British industrial sugar market. For the purpose of this Appendix, we define volumetric pricing as a pricing system that relates the price a customer pays to the volume of sugar that the customer is purchasing, in a predictable way.

2. This Appendix is structured in the following way:

   (a) First we describe the analysis undertaken by the CC in order to explore the nature of negotiations in the British industrial sugar market.

   (b) Following this, we discuss the number of suppliers participating in the negotiation process, and the incidence of NBF and JBS both competing against one another, using evidence derived from:

      (i) the negotiation data provided by NBF;

      (ii) the negotiation data provided by JBS; and

      (iii) the data arising from the customer survey, undertaken on behalf of the CC by NOP.

   (c) Thirdly, we discuss the relationship between volumes and prices as observed in the data provided by NBF and the data arising from the customer survey.

   (d) Finally, we discuss the CC's understanding of the nature of the relationship between volumes and prices in the British industrial sugar market.

The analysis undertaken by the CC

3. First of all, the CC analysed the data presented by NBF and JBS concerning their customer negotiations during the past three years. Specifically, the following analysis was conducted:

   (a) simple consideration of the number of alternative suppliers negotiating for each customer contract, and the incidence of NBF and JBS *both* negotiating for the same contract (discussed below);

   (b) analysis of the relationship between the price of granulated sugar per tonne and the number of alternative suppliers negotiating for each customer contract;

   (c) analysis of the difference between the starting price and final price in the negotiation process for granulated sugar;

   (d) analysis of the impact on price per tonne of granulated sugar when *both* NBF and JBS are involved in negotiations for the same contract, in competition with one another; and

(e) regression analysis of the various factors explaining the variation in price per tonne for granulated sugar (discussed below).

4. Having analysed the negotiation data submitted by NBF and JBS,[1] the CC then went on to examine the results of a customer survey that was conducted on behalf of the CC by NOP. A telephone survey was conducted, questioning 218 industrial sugar customers about their recent purchases of sugar and their views on the British sugar market. The list of customers approached to take part in the survey was made up of the industrial customer lists that NBF, JBS, British Sugar and Tate & Lyle provided to the CC. The final sample of 218 customers was representative of the full list of customers. The survey also questioned customers on their opinions about the acquisition of JBS by NBF. A presentation and report summarising the results of this survey have been prepared independently by NOP, and can be found on the CC web site.

5. The CC's analysis of the customer survey results, as they relate to the negotiation process, included the following:

(a) analysis of the general characteristics of customers and their purchases of sugar, (including main supplier of sugar, volume purchased, price paid and so on);

(b) examination of survey data relating to the negotiation process, including:

(i) type of purchase (contract vs spot purchase);

(ii) number of suppliers approached for quotes;

(iii) number of suppliers actually responding with a quote for sugar supplies;

(iv) companies refusing to provide a quote; and

(v) incidences of NBF and JBS both negotiating in competition with one another for the same supply contract.

(c) analysis of customer switching behaviour and the determinants of customers' choice of supplier;

(d) examination of customers' views of competition and the likely impact of the acquisition of JBS by NBF on the market; and

(e) finally, as a comparison to the analysis of the negotiation data supplied by NBF, the CC analysed the data arising from the customer survey, conducting a regression analysis of the various factors explaining the variation in price per tonne for granulated sugar (discussed below).

Suppliers participating in the negotiation process

Participating suppliers: NBF data

6. NBF provided the CC with data describing more than [✂] contract negotiations for the years 2002, 2003 and 2004.[2] This data predominantly describes contracts that

[1]Note that it was not possible to analyse the JBS data in as great detail as the NBF data, since the JBS data included less detail, providing information *by customer*, as opposed to *by contract* (as the data was provided in the NBF dataset).
[2]In 2004, the data represented [✂] contracts with [✂] customers.

NBF ultimately won, and for the majority of which NBF was the incumbent supplier. Specifically, the data includes information on:

(a) prices charged to industrial customers;

(b) volumes supplied to industrial customers; and

(c) NBF's and JBS's best knowledge with respect to which competitors were competing for the supply of each customer.

7. Whilst we are satisfied that the data represents NBF's best knowledge as to the true nature of competition for each customer, it should be noted that the information is, by their own admission, *(a)* incomplete and *(b)* potentially inaccurate, due to the necessity of relying on the recollections of sales staff when constructing the data set. In addition, the information that sales staff have about the identity of alternative suppliers negotiating for contracts in competition with NBF will generally have been provided by the customers. As such, it may be subject to an element of "game playing" on the customers' part, as they tried to strengthen their negotiating position. Nevertheless, it represents the information available to NBF when they were negotiating with customers, and hence the information on which they based their negotiation strategy.

8. The number of suppliers that NBF believed were negotiating in competition with one another for each contract varied between 1 (ie no competition) to 7 as shown in Table 1 and Figure 1.

TABLE 1 **NBF data: number of suppliers negotiating for each contract (proportion of total contracts each year)**

per cent

Suppliers	*2002*	*2003*	*2004*	*All contracts 2002–2004*	*Cumulative: all contracts 2002–2004*
1					
2					
3					
4	✂				✂
5					
6					
7					100
Total	100	100	100	100	

Source: NBF data, CC analysis.

FIGURE 1

NBF data: number of suppliers negotiating for each contract (proportion of total contracts each year)

[✂]

Source: NBF data, CC analysis.

9. In each year, over 80 per cent of customers agreed supply contracts following negotiation with three or fewer competing suppliers. In 2004 (the year for which NBF claims the data is likely to be most accurate), over [✂] per cent of contracts were agreed between NBF and their customers without competition from other sugar suppliers.

10. The Table 2 shows the frequency with which NBF believed they were competing with JBS for any given contract. The table shows that, when there were only two competing suppliers negotiating with the same customer over a contract, the second supplier was believed to be JBS in 5 per cent or fewer of cases. This figure rises as the number of suppliers negotiating for any given contract rises (as might be expected). Overall in 2004, NBF believe they competed with JBS for around 13 per cent of contracts.

TABLE 2 **NBF data: contracts for which NBF and JBS both negotiated (proportion of contracts in each cell)**

per cent

Suppliers	*2002*	*2003*	*2004*	*All contracts 2002–2004*
1				
2				
3				
4			✂	
5				
6				
7				
All contracts				

Source: NBF data, CC analysis.

Participating suppliers: JBS data

11. JBS provided the CC with similar data, but included slightly less detail than NBF.[3] The number of suppliers that JBS believed were negotiating to supply each customer varied between 1 (ie no competition) to 7 as shown in Table 3 and Figure 2.

TABLE 3 **JBS data: number of suppliers negotiating with each customer (proportion of total customers negotiating each year)**

per cent

Suppliers	*2002*	*2003*	*2004*	*All customers 2002–2004*	*Cumulative: all customers 2002–2004*
1					
2					
3					
4			✂		✂
5					
6					
7					100
Total	100	100	100	100	

Source: JBS data, CC analysis.

[3]The data provided by JBS showed the number of suppliers that *each customer* was believed to be negotiating with, rather than the number of suppliers negotiating *for each contract* with each customer (as provided by NBF). The data for 2004 described [✂] customer negotiations (with the data suggesting that those customers were collectively offering [✂] supply contracts). Similar to the data provided by NBF, the data provided by JBS predominantly describes negotiations that JBS itself won, and for which it was the incumbent supplier.

FIGURE 2

JBS data: number of suppliers negotiating for each customer (proportion of total customers each year)

[✂]

Source: NBF & JBS data, CC analysis.

12. The data supplied by JBS shows that, in each year, over 90 per cent of customers agreed supply contracts following negotiation with three or fewer competing suppliers (this compares with a figure of 80 per cent in the data set provided by NBF). JBS reported fewer competing suppliers negotiating to supply each customer, compared with NBF's data set. According to JBS, in 2004, almost [✂] per cent of customers negotiated contracts with JBS without competition from other sugar suppliers.

13. The Table 4 shows the frequency with which JBS believed they were competing with NBF for any given customer. The table shows that, when there were only two competing suppliers negotiating with the same customer, the two suppliers were believed to be NBF and JBS in around one-third of cases. This figure compares with a figure put forward by NBF of only 5 per cent of cases.[4] In total, JBS believe they compete with NBF for around 25 per cent of contracts.

TABLE 4 **JBS data: customers for which NBF and JBS both negotiated (proportion of customers in each cell)**

per cent

Suppliers	*2002*	*2003*	*2004*	*All customers 2002–2004*
1				
2				
3				
4			✂	
5				
6				
7				
All contracts				

Source: JBS data, CC analysis.

Participating suppliers: customer survey data

14. As part of the customer survey, conducted on behalf of the CC by NOP, customers were asked how many suppliers typically provided price quotes for each sugar contract. The results of this question are shown in Table 5. In the case of bagged white granulated sugar, the median number of quotes received is only one, suggesting that competition in this area is limited. On a mean basis, between 1.8 and 2.3 quotes are received for each negotiation undertaken by customers (on the basis of all customers considered together). This compares with Lexecon's estimates of a mean of 2.5 quotes per contract using the NBF data (and a mean of 1.7 quotes per contract using alternative data provided by JBS). Therefore, the results of the

[4]It should be noted that it is not possible to reconcile the two data sets provided by NBF and JBS; the two are inconsistent with one another. Therefore, such direct comparisons of the data should be approached with caution, and not too much weight placed upon such analysis. As noted above, the two data sets focus on contracts *won* by each company, and as such will have a tendency towards mutual exclusivity.

customer survey appear to be broadly consistent with the results of the Lexecon analysis.

TABLE 5 **Number of suppliers providing a quote to customers, split by current main supplier and sugar type**

Suppliers respond	*All*	*NBF*	*JBS*	*BS*	*TL*	*Import*	*Other*
Bulk white gran							
Mean	2.3						
Median	2.0						
Bagged white gran							
Mean	1.8						
Median	1.0						
Liquid sugar							
Mean	2.3						
Median	2.0						
Speciality sugars							
Mean	1.9						
Median	1.5						

Source: NOP data, CC analysis.

15. The survey went on to ask customers about the proportion of these contracts for which NBF and JBS were *both* negotiating in competition with one another. Of 146 responses provided concerning contract negotiations, NBF and JBS were found to be actively competing for the same supply contract in 13 per cent of cases. This figure appears to be consistent with Lexecon's analysis of NBF's negotiation data.

The relationship between volumes and prices

16. As discussed in Section 1.1, we have investigated the various factors that may explain the variation in price per tonne for granulated sugar, by conducting regression analysis of two sets of data:

    (a) data on negotiations provided by NBF; and

    (b) data arising from the CC's customer survey, conducted by NOP.

    We consider the analysis of each data set in turn below.

NBF data: regression analysis

17. The model in this section has been estimated using NBF's data on negotiations relating to granulated sugar.[5] It makes use of Ordinary Least Squares (OLS) analysis,[6] exploring the relationship between the price of sugar (in pounds per tonne), and a variety of factors affecting the negotiation process, such as:[7]

    (a) *Total volume purchased:* This is a continuous variable and represents the actual volume in tonnes of granulated sugar that the supplier has agreed to provide to the customer. (*volume*). In some cases, the total volume required by the customer was greater than the quantity that any one supplier was willing to provide.

[5]It should be noted that, since the data relates predominantly to negotiations that NBF won, and for which NBF was the incumbent supplier, there is a potential danger of sample selection bias. This should be borne in mind when interpreting the results of any analysis, particularly if attempting to draw conclusions that are informative concerning the market as a whole.
[6]An ANOVA specification has also been considered. In addition, a multinomial logit model of the suppliers negotiating for each contract was estimated (although the results of this model were not informative in this case).
[7]Note that the terms in brackets refer to the relevant variable names in Table 6.

(b) *Identity of participating suppliers:* This denotes the identity of the various suppliers negotiating for each contract in competition with one another. It separately identifies JBS (*jbs*), Tate & Lyle (*tl*), British Sugar (*bs*), importers (*imports*) and a combined set of other industrial sugar suppliers consisting of Kent Foods, BFP Wholesale and various other small resellers (*others*).

(c) *Number of negotiating suppliers:* This represents the number of suppliers negotiating for each contract in competition with one another (observed to be between 1 and 7 suppliers per contract).[8] Due to multicollinearity problems, we cannot include both 'number of bidders' and 'identity of participating bidders' in the model. In the model presented in Table 6 we are using the identity of participating bidders and not the number of bidders.

(d) *Identity of the winning supplier:* This variable (*nbf-win*) takes the value of 1 when NBF wins the contract and 0 when another sugar supplier wins.

(e) *Incumbent supply:* The purpose of this variable is to check whether incumbent players have an advantage over other suppliers in winning contracts with their existing customers. However, this variable appears to be highly correlated with the 'Identity of winning supplier' variable,[9] and so is excluded from the model in order to avoid problems of multicollinearity.

(f) *Initial vs final price:* Since negotiations do not follow a formal tender process, there is no information on the extent of the negotiation process in terms of the number of 'bidding rounds'. As an alternative, we can either:

(i) Include a dummy variable to denote whether the initial price in the negotiation process differs from the final agreed price; or

(ii) Include a continuous variable (*difference*) denoting the actual difference between the initial and final price in the negotiation process.

In the model presented in Table F, we adopt the second specification, that is, a continuous variable showing the actual difference between final and initial bidding price. (Note that this variable is generally either zero, reflecting no difference in the price, or negative, reflecting a reduction in the price during the negotiation process. However, positive values, reflecting a price *increase*, are also observed.)

(g) *Spot/contract purchases:* The type of negotiation is a categorical variable (*contracttype*) which consists of the values 1 and 0, denoting whether the negotiation was referring to a contract or spot purchase respectively.

(h) *Year*: The regression includes two dummy variables (*y2004, y2002*) to account for the fact that data relates to three different years.

(i) *Constant term:* A constant term was also included in the OLS model (*constant*).

The results of the model estimated on this basis are as follows:

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[8] When the number of bidders is 1, this implies that the only supplier negotiation for the contract was NBF.

[9] This is possibly due to the fact the NBF found it easier to provide data on contracts that they won, rather than contracts that they did not win, coupled with the fact that this market appears to display a high degree of inertia in terms of customers' choice of sugar supplier. This is discussed later in the paper.

TABLE 6 **OLS model: NBF's data on negotiations**
[✂]
Source: NBF data; 2002–2004, CC calculations.

18. Considering the R^2 statistic, the model appears to explain just over 43 per cent of variation in the negotiated price. The F statistic suggests that the model as a whole is statistically significant. The model suggests that:

(a) The volume of sugar purchased has a very small negative relationship with price (ie very large increases in volumes are associated with very slightly lower prices). In this case, the coefficient reflects the fact that a purchase volume that is 1,000 tonnes greater is associated with a price per tonne that is £[✂] lower.

(b) Competition from other suppliers during the negotiation process appears to be associated with a lower final price per tonne for the customer. For example, the coefficient of [✂] on the variable 'imports' suggests that the presence of one or more importers as alternative suppliers in a negotiation is related to an observed final negotiated price that is £[✂] lower than that observed in cases where no importers are competing for contracts.[10] Competition from importers appears to be associated with the largest reduction in price, followed by competition from [✂], then [✂], and finally JBS. Competition from other small resellers in the negotiation process does not appear to have a statistically significant relationship to the negotiated price.

(c) The 'contracttype' variable is significant and positive, indicating that spot purchases tend to be associated with higher prices than contract purchases.

(d) The coefficient on the variable reflecting the difference between the initial and final price is significant and positive, suggesting that a greater reduction in price during the negotiation process is related to a lower price overall for sugar.

(e) The variable reflecting whether NBF won the contract is positively related to the final price, suggesting that those contracts that NBF did not successfully win were generally agreed for lower prices.

(f) The 'year' variables appear to suggest that prices were generally lower during the 2002 round than in 2003. Between 2003 and 2004, prices may have risen slightly, but this effect was not statistically significant (at the 5 per cent level).

(g) The constant included in this regression is highly significant.

19. As an alternative to the above model, a second model was explored using the log of unit prices and the log of volume of sugar purchased (as opposed to the un-transformed variables used in the above model[11]). The results of this alternative log-specification are shown in Table 7.

TABLE 7 **OLS model: NBF's data on negotiations—log specification**
[✂]
Source: NBF data; 2002–2004, CC calculations

20. This alternative specification is significant as a whole, and explains 57 per cent of the variation in the log of price per tonne. It confirms the finding of a statistically

[10]Note that this does not imply that the removal of importers from the negotiation process would lead to an increase in prices of £[✂] per tonne. The customer survey suggests that any attempt to increase prices by over £[✂] per tonne would lead to a significant proportion of customers switching to cheaper alternative suppliers.
[11]Note that diagnostic tests of the model in Table 6 (specifically, a Breusch-Pagan / Cook-Weisberg test for heteroskedasticity and a Ramsey RESET test for omitted variables) did *not* reveal a problem with the original model specification.

significant negative relationship between prices and volumes. The coefficient of the variable ln(volume) suggests that a 1 per cent increase in the volume of sugar purchased is associated with a [✂] per cent reduction in the price of sugar per tonne. This result suggests that, in order to achieve a reduction in the price per tonne of [✂] per cent, a customer would need to double the volume of sugar purchased.

Customer survey data: regression analysis

21. As a comparison to the analysis of the negotiation data supplied by NBF, we have analysed data arising from the customer survey in order to determine whether it can provide us with useful information about the relationship between the price per tonne of sugar and other factors such as: [12]

    (a) type of sugar purchased: bulk white granulated (*bulk*), bagged white granulated (*bag*), liquid (*liquid*) or speciality sugars. This factor is entered as a dummy variable, reflecting price differences for different types of sugar compared with the reference case of prices for speciality sugar;

    (b) volume of sugar: the annual tonnage purchased from the main supplier (*ln(volume)*);

    (c) identity of current (main) supplier: this factor is entered as a dummy variable, reflecting price differences for the customers of various suppliers compared with the reference case of customers supplied by NBF (*jbs, bs, tl, imports* or *others*);

    (d) Number of alternative suppliers providing competing quotes for the supply of sugar (*quotes*);

    (e) whether or not both NBF and JBS submitted competing quotes for the supply of sugar;

    (f) whether purchases were made under contract or on an ad-hoc basis;

    (g) the incidence and level of rebates; and

    (h) a constant term was also included (*constant*).

22. Our analysis followed a similar approach to that adopted for the analysis of NBF's negotiation data, that is, OLS regression. Inspection of the data suggested the most appropriate model specification to be one using logged values for prices and volumes, and untransformed observations for the other variables.[13] The results derived are shown in Table 8. The key implications of the analysis are as follows:

    (a) The model as a whole is statistically significant, but only explains just under 20 per cent of the observed variation in the log of price.

    (b) A statistically significant negative relationship was identified between the price of sugar and the volume of sugar purchased, such that a 1 per cent increase in volume was found to be associated with a 0.014 per cent reduction in price per tonne. Therefore, in order to achieve a reduction in price per tonne of 1.4 per cent, a customer would need to double the volume of sugar purchased.

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[12] Note that the italicized terms in brackets refer to the relevant variable names in Table 8, where appropriate.
[13] Note, however, that running a model using the untransformed measures of prices and volumes resulted in a model which was not found to exhibit evidence of heteroskedasticity or omitted variables bias.

(c) The identity of the current supplier of sugar was only found to be significant in the case of 'other' suppliers (ie the dummy variable identifying 'others' as the current supplier was found to be significant, but the dummies for JBS, Tate & Lyle, British Sugar or imports were not). This implies that prices for customers of 'other' suppliers were found to be statistically lower than those charged by NBF, but there was no statistically significant difference between the prices charged by NBF and those charged by JBS, Tate & Lyle, British Sugar or importers.

(d) The type of sugar purchased was found to be significant, with bulk white granulated sugar, bagged white granulated sugar and liquid sugar each found to be associated with lower prices than those charged for speciality sugar.

(e) The number of quotes received from competing suppliers was not found to have a statistically significant relationship with the price charged.

(f) The constant term was found to be highly significant.

Table 8 **OLS model: data arising from customer survey**

Source	SS	df	MS		
Model	2.96402727	10	.296402727	Number of obs =	290
Residual	12.1310964	279	.043480632	F(10, 279) =	6.82
Total	15.0951236	289	.052232262	Prob > F =	0.0000
				R-squared =	0.1964
				Adj R-squared =	0.1676
				Root MSE =	.20852

ln(price)	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln(volume)	-.0140594	.0057795	-2.43	0.016	-.0254364	-.0026824
jbs	.0031048	.0354542	0.09	0.930	-.066687	.0728965
bs	-.0476967	.0405718	-1.18	0.241	-.1275623	.0321689
tl	-.0283436	.0526526	-0.54	0.591	-.1319903	.0753032
imports	-.0998698	.1523913	-0.66	0.513	-.3998525	.2001129
others	-.0720369	.0343103	-2.10	0.037	-.1395768	-.0044969
bulk	-.1538576	.040749	-3.78	0.000	-.2340721	-.0736431
bag	-.1513206	.0281591	-5.37	0.000	-.2067519	-.0958893
liquid	-.2739269	.0580533	-4.72	0.000	-.3882051	-.1596488
quotes	-.0034393	.0118405	-0.29	0.772	-.0267473	.0198687
constant	6.604355	.0351048	188.13	0.000	6.535251	6.673459

Source: NOP survey data, CC calculations.

23. The analysis was also conducted solely using data for (bulk and bagged) white granulated sugar. Constraining the analysis in this way, no statistically significant relationship was identified.

24. The variable identifying cases in which both NBF and JBS submitted competing bids for the same supply contract was not found to be statistically significant in any model that has been examined. Neither (a) the type of purchase (contract or spot), nor (b) the incidence or level of rebates, were found to be significant in any version of the model that was analysed.

25. The customer survey provides a large amount of information that may aid our understanding of the negotiation process in the British industrial sugar market. Regression analysis of data arising from the survey appears to confirm the results of the CC's analysis of NBF's data, suggesting that:

(a) Much of the observed variation in prices cannot be explained by variations in other observable characteristics.

(b) There is at most a small negative relationship between the volume of sugar purchased and the price per tonne of sugar.

(c) The observed price is influenced by factors which have not been observed, or else cannot be measured, such as the negotiating skill of the customer.

Volumes and prices: the CC's understanding

26. British Sugar state that there is a relationship between volume supplied and price per tonne, (volumetric pricing), due to economies of scale arising when supplying large volumes of sugar to a single customer. However, British Sugar also state that 'customers will achieve higher or lower prices depending on negotiations on their account and their precise circumstances',[14] and so the relationship between volume and price would appear not to be a formal one, but rather can be overridden by other considerations during the negotiation process.

27. This interpretation would appear to be confirmed by the analysis of both (a) NBF's negotiation data and (b) data arising from the CC's customer survey. The analysis undertaken by the CC suggests that there is at most a small negative relationship between volume of sugar purchased and the price per tonne of sugar.

28. As regards NBF's position concerning the relationship between volume and price for its customers, volume is only one of the factors that NBF takes into account when setting prices. The list of factors that NBF relies upon was listed in their response to the economics questionnaire as follows:

[✂]

[14]Source: British Sugar.