

## Supplier pricing analysis

### Introduction

1. This appendix presents an analysis of the prices charged to grocery retailers and wholesalers by their suppliers. It updates and expands on the preliminary results first reported in our Emerging Thinking, published in January 2007 and the subsequent results published in the working paper on supplier pricing (July 2007).
2. A number of parties, including the ACS, the FWD and the British Brands Group (BBG), have argued that larger grocery retailers are able to make purchases from suppliers at substantially lower prices than smaller retailers and wholesalers. They submitted that this cost advantage distorted competition and, in particular, contributed to a 'waterbed' effect. This effect suggests that smaller grocery retailers and wholesalers pay higher prices for supplies, reflecting a weaker bargaining position.
3. The ACS submitted a formal theoretical model of the waterbed effect, and we provide an analysis of this model in our appendix on the waterbed effect (see Appendix 5.4). For a waterbed effect to exist, it is necessary that a retailer or wholesaler's size<sup>1</sup> influences the price that it pays for its products. Without this, the growth of a retailer will not lead to the necessary reduction in price that enables it to acquire customers at the expense of a rival, nor will the loss of these customers worsen the rival's terms.
4. A number of parties have submitted analytical work which they argue is evidence of a waterbed effect in operation. The ACS has conducted a comparison between the

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<sup>1</sup>In this appendix 'retailer' refers to the various types of customer that are served by suppliers. These customers include retailers, wholesalers and symbol groups.

prices paid by three grocery wholesalers<sup>2</sup> for supplies and the retail prices charged by Asda, Sainsbury's and Tesco across 317 branded SKUs. The results indicate that in 25 cases (8 per cent of the total), the price paid by the wholesalers was, on average, higher than the Tesco retail price. When compared with the average retail price charged by Tesco, Asda and Sainsbury's, the figure rose to 32 cases, or 10 per cent. On the basis of this analysis, the ACS observed that a convenience store charging the same retail price as the aforementioned major grocers would earn margins that were lower than average in approximately 50 to 65 per cent of cases.<sup>3</sup> The ACS acknowledged that the exercise it had carried out was subject to certain limitations, given what it saw as a widespread lack of transparency in buyer price differentials, but it felt that the overall picture it described was accurate. We consider that there are a number of reasons why this analysis is of limited use in understanding the extent to which price differentials exist between small and large grocery buyers, and for these reasons, we have placed limited weight on this analysis in reaching our provisional findings in this area.<sup>4</sup>

5. [redacted] submitted a report [redacted]<sup>5</sup> which, on the basis of interviews with the sales directors of eight grocery suppliers, indicated that the 'majority of suppliers stated that "almost always" the largest customers would obtain the best trade terms'. They also stated that the differences in the net price across grocery retailers and wholesalers would usually exceed 10 per cent, but that a substantial fraction of this difference would not

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<sup>2</sup>[redacted]

<sup>3</sup>The average margins used as benchmarks were derived from data on gross margins earned by Convenience Retailers across a number of different categories in 2002.

<sup>4</sup>The retail and wholesale prices being compared by the ACS were not observed at the same point in time. The ACS told us that as a result 'the comparisons of individual SKUs are open to challenge, though we do not think the exercise as a whole is thereby undermined'. However, given the frequency of price movements in the sector, we cannot be sure that the comparisons being made by the ACS in its analysis are robust. Secondly, the prices used to generate the wholesale benchmark are invoiced prices which therefore exclude any additional discounts, eg promotional support, and overrides that these wholesalers may have obtained. We were told by one of the wholesalers which provided the data that this would be a particular problem in beer but 'much much less significant' in other categories. Thirdly, we question whether the wholesale benchmark used (ie simple average across wholesalers) is representative, particularly given the wide variations observed between the constituent members (on average, approximately 30 per cent). In addition to these, Asda noted a number of extra criticisms including: convenience store gross margins in 2002 are arbitrary benchmarks and are higher than Asda gross margins in 2005; that the supermarket retail price may reflect non-buying efficiencies that a convenience store may not share; that the ACS has not conducted an analysis based on the best price offered by the wholesalers—Asda would expect convenience stores to be able to buy disproportionately at this price by shopping around; and that convenience stores can, and do, form buying groups.

<sup>5</sup>[redacted]

show up in the headline or invoice price and would instead be reflected in other payments by suppliers to their customers. However, a number of caveats were placed on this finding. For example, faster-growing customers with smaller overall volumes were thought to achieve better margins.<sup>6</sup>

6. In what follows, we set out our empirical analysis of the extent to which supplier prices vary between individual grocery retailers and wholesalers. To the extent that a waterbed effect has existed, we might expect to see large retailers and wholesalers paying lower prices for products than their smaller counterparts. Whilst these results are useful in assessing which customers have buyer power, the fact that there are a number of other factors, unrelated to size, which affect prices<sup>7</sup> implies that we have to be careful in drawing inferences about the relationship between size and price based on this analysis alone. We therefore undertake a second analysis in which we employ an econometric model to identify the effect of size (as measured using SKU-level volume) on price controlling for a number of these factors.
7. Our comparison of the unit and net prices paid by retailers and wholesalers (average price analysis) shows that, on average, the four major grocery retailers, when analysed together, pay between 4 and 6 per cent less than the mean for products in our sample.<sup>8</sup> Within this group, Tesco consistently pays the lowest wholesale price which is, on average, between [X] and [X] less than the mean. [X]
8. Conversely, smaller wholesalers and symbol groups pay prices that are on average 8 to 9 per cent above the mean and larger wholesalers and symbol groups pay

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<sup>6</sup>Also, 'legacy' effects may mean that grocery retailers that previously had a favourable sales profile for suppliers are still able to maintain good deals with suppliers based on the difficulties suppliers faced in making substantial price adjustments. Further, suppliers may be willing to encourage sales through the wholesale and convenience retail channel through special deals, such as price-marked packages, thus facilitating price competition with the larger grocery retailers and so assisting sales volumes. Finally, some [X] seem to reduce their net prices through buying proportionally more on promotion while some [X] may miss out on some of the promotional discounts [X].

<sup>7</sup>For example, the costs of manufacturing and distributing a product, the negotiating skill of a buyer and the nature of a buyer's retail offer.

<sup>8</sup>6 per cent less for unit price and 4 per cent less for net price.

between 2 and 3 per cent above the mean, on average. However, these averages mask some underlying variations within these groups. In particular, we find that some fascias, wholesalers and symbol groups pay prices that are commensurate with those paid by the four major grocers.

9. We have found no evidence that the differentials between the groups paying the lowest and highest prices have widened over the last three years (and to the extent that we can rely on data for 2002/03, the last five years).
10. Our econometric analysis identifies a statistically significant negative relationship between a customer's volume and both measures of price. In other words, it shows that an increase in the volumes purchased by a retailer or wholesaler is associated with a reduction in both the unit and net price paid. The slope of the relationship implies that, holding everything else equal, growing from a very small customer (purchasing 10 per cent of the mean volume) to a very large customer (purchasing three times the mean volume) would lead to a reduction in unit prices of around 9 per cent and a reduction in net prices of around 12 per cent under a linear specification. However, our results indicate that, at least for net price, the data may be consistent with a non-linear relationship. This could imply that net price benefits from scale are exhausted beyond a certain threshold (around four times the mean volume).
11. Our results appear to be largely driven by the volume–price relationship that pertains to non-primary brands. When we isolate primary brands, we find no statistically significant relationship between volume and unit price and a statistically significant but flatter linear relationship for net price. In contrast, the results for non-primary brands are statistically significant and imply greater differentials between very small and very large buyers, under both the linear and quadratic models, than the pooled results imply. Again, the data indicates that the relationship between price and

volume could be non-linear (quadratic) for non-primary brands where buying benefits from scale are exhausted around 3.5 to 4 times the mean volume.

12. Taken together, our econometric analysis provides evidence for the existence of price differentials that are related to the volume a customer purchases. However, the extent of the implied price differentials is not uniform across brand strengths. The lack of uniformity, together with the possibility that volume-related price differentials may apply only across certain volume ranges, suggests that any waterbed effect may be limited in scope.
13. In the remainder of this appendix, we set out the methodology used to analyse the pricing data the CC has collected from suppliers and discuss the results that have been obtained.

## **Methodology**

14. We have based our price comparisons on SKU-level pricing data rather than over an aggregation of products (as per the aggregate gross margin analysis conducted in the 2000 investigation). We consider that it is possible to mitigate the effect of any over/under-allocation of brand-level discounts by constructing a large sample. Analysing prices (or margins) at a brand/company level risks biasing the results because of underlying differences in the product mix purchased by different retailers and wholesalers.
15. The results we present below are therefore based on SKU-level data collected from 29 suppliers in relation to sales made to a range of their customers.<sup>9</sup> These suppliers vary in terms of both sector and size. [✂] In all cases, other than one, suppliers

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<sup>9</sup>We received data from a further six suppliers but the data is not included in the results either because we were unable to generate the required price measures or because they provided insufficient customers for the average benchmarks to be robust.

submitted data to us without our needing to utilize our statutory powers to require the provision of information.

16. In total, our sample covers 141 SKUs and represents approximately £1.8 billion of annual sales at wholesale prices.<sup>10</sup> This contrasts with an overall size of the UK grocery market equal to approximately £101.7 billion based on annual retail sales (rather than wholesale). As a result, we estimate that the current sample covers at least 2 per cent of total grocery retail sales in the UK. For more information about the coverage of our sample in terms of suppliers and SKUs, see Annex 1.
17. From each of these suppliers, we have collected detailed volume, pricing and (where possible) cost data for a number of SKUs<sup>11</sup> sold to a range of customers<sup>12</sup> for up to five years. In particular, we requested the following on a monthly or annual basis: the volumes sold to each customer, the net prices paid by each customer, data on each of the components that made up the net price paid, and finally, all cost data where recorded at the customer level.
18. Examples of the components itemized include: variable promotional discounts (eg BOGOF, multi-buys, price-marked packs, per cent off packs), fixed promotional discounts (eg payments for gondola ends and point-of-sale materials), settlement discounts, overrides (growth/volume/value/per unit related) and other payments (eg payments for scanner data, achievement of distribution targets, marketing monies, advertising allowances). Using this information and drawing on the [X] study

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<sup>10</sup>The basis of the revenue figure is sales invoiced to their customers in the last full fiscal year for which we have data. However, some suppliers have not provided us with this information, in which case we have used net revenues earned (which will therefore understate the true coverage). This also excludes observations which we have dropped for reasons set out below.

<sup>11</sup>In many cases, we have asked for this information for a supplier's six top-selling SKUs. However, for some suppliers, we have requested this information for a broader range of their brands.

<sup>12</sup>For example, large national retailers, convenience chains and grocery wholesalers. Where we have been provided with data relating to retailers and wholesalers who are not primarily involved in the supply of grocery products (eg specialist stores, [X], food service wholesalers), we have excluded them from the analysis.

submitted by [REDACTED], we cross-checked with suppliers that all the discounts/payments pertinent to our analysis were included in the data submitted to us.

19. Using this data we generated two measures of price: unit price and net price. Economic theory suggests that a retailer will only have an incentive to pass through discounts that directly affect the unit price they pay. Therefore, price reductions to fund promotions, or per unit retroactive rebates that effectively lower the unit price that a retailer pays, need to be factored in when assessing the waterbed effect. For this reason, one of the two price measures we focus on in our analysis is the price net of all discounts, which are largely variable in nature. Termed 'unit price' in the remainder of this appendix, this is net of settlement discounts, all types of variable promotional support and any overrides that are linked to volume or value of sales (including growth targets).<sup>13</sup>
20. Since lump-sum transfers (or fixed discounts/payments such as point-of-sale support and marketing monies)<sup>14</sup> can affect retailers' ability to compete on non-price dimensions, and therefore for customers, we also analyse the impact volume has on net prices.<sup>15</sup> For this reason, we compute a 'net price' measure which is net of all discounts, both variable and fixed in nature.<sup>16</sup>
21. Differences in suppliers' accounting systems meant that the extent and nature of the cost data that we received varied significantly by supplier, with the result that we were unable to generate a margin measure that would be comparable across

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<sup>13</sup>[REDACTED]

<sup>14</sup>However, in some cases it was not possible for suppliers to provide us with data on marketing monies since these were not recorded at the customer level.

<sup>15</sup>The BBG has told us that large retailers appreciate that any form of discount can be put back into their business to improve the retail offer in ways not related to price (eg improved store amenity, increased sales area, product availability etc).

<sup>16</sup>In practice, the extent to which suppliers were able to itemize net price varied considerably depending upon the sophistication of their accounting systems, with the implication that we generated fewer observations for unit price than we were able to do for net price.

SKUs.<sup>17</sup> Moreover, many of the costs that were recorded typically reflect accounting, rather than economic, costs and therefore their ability to reflect the marginal cost considerations that determine pricing is likely to be limited.

22. To draw some comparisons between customers across SKUs and time, we have generated relative price and relative volume indexes. For each SKU purchased, we compute the annual relative price paid by each customer (relative to the average paid by all customers). For more details on the construction of this price index, see Annex 1.
23. We have undertaken some cleaning of the data. Further detail is provided in Annex 1; however, in summary we have dropped/amended data:
  - where one year's annual unit price and/or net price and/or volume was negative or zero;
  - where we considered that the volume used to negotiate prices might have been significantly overstated or understated; for example, because the data supplied did not reflect completed M&A activity or membership of a buying group;<sup>18</sup> and
  - where we have too few customers to generate a reliable average price measure and hence relative price index—we have classified this as when the number of customers purchasing a given SKU in a given year is less than five.
24. Otherwise we have sought to minimize the amount of data cleaning undertaken. Rather than impose subjective conditions on what constitutes an outlier, we have

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<sup>17</sup>It was common for suppliers to be unable to provide research and development and cost of sales data, often because this data was not recorded by customer.

<sup>18</sup>Some of these observations were retained for the average price analysis where we were confident we could attribute the transaction to the correct buyer as the problem lay not with the pricing data, rather the volume data with which it was incorrectly matched.

retained as much data as practicable, on the basis that, in our large sample, outliers are unlikely to bias our results.<sup>19</sup>

25. Table 1 shows the number of suppliers, number of SKUs, number of customer–SKU relationships<sup>20</sup> and number of observations that remain after applying these rules.<sup>21</sup>

TABLE 1 **Sample size by price measure**

<i>Measure</i>	<i>Number of suppliers</i>	<i>Number of SKUs</i>	<i>Number of customer–SKU relationships</i>	<i>Number of observations</i>
Unit price	14	66	511	1,713
Net price	28	137	1,117	3,758

Source: CC analysis of supplier information

### **Average price rankings**

26. Using these measures, we have analysed the average performance of different customer groups over the most recent three-year period, and by year. To do so, we have classified each customer into one of four categories: (a) the four major grocery retailers, ie Tesco, Asda, Sainsbury’s and Morrisons; (b) other fascias;<sup>22</sup> (c) small wholesalers/symbol groups; and (d) large wholesalers/symbol groups.<sup>23</sup> A detailed breakdown of the constituents of each group is provided in Annex 2.

27. Tesco told us that it has worked hard to improve the efficiency of its distribution system over recent years and one element of this has been to introduce and expand primary distribution, ie where it collects goods from the suppliers’ site and distributes to its own depots. It told us that, where it engages in primary distribution, it would

<sup>19</sup>Following all the data cleaning, we find that 3.4 per cent of the observations for relative unit price are less than 70 and greater than 130. For net price the comparable figure is 3.6 per cent.

<sup>20</sup>That is, the sum over all customers of the number of SKUs each buys.

<sup>21</sup>These figures exclude all those observations discussed in footnote 18.

<sup>22</sup>ie fascias which are outside the four main grocery retailers. This may include pre-merger data from retailers that were subsequently acquired by one of the four main grocers.

<sup>23</sup>In response to our July working paper on supplier pricing, the ACS criticized the classification of customers into large retailers vs small retailers/wholesalers and proposed that we classify customers into one of: Big 4, other large retailers, large independent wholesalers, medium-sized independent wholesalers and small independent wholesalers. In this analysis we have split out the major grocers and distinguish between different-sized wholesaler/symbol groups. We have not split independent wholesalers out from symbol groups because we consider that the distinction between the two is becoming increasingly arbitrary, a point the ACS recognized in querying how we might have classified Spar.

expect to pay a lower cost price to the supplier because part of the suppliers' costs have been reduced and are borne by Tesco.<sup>24</sup> We recognize that the inclusion of factory gate prices is likely to undermine the like-for-like price analysis we are undertaking and therefore, in cases where we understand that a retailer receives a factory gate price, we have excluded them from the average price analysis.<sup>25</sup>

28. The results of the analysis of average relative prices, by customer category, over the last three years are reported in Table 2. In this analysis, a relative price of 100 indicates that a customer would pay exactly the average price.

TABLE 2 **Average relative prices and volumes by customer group over last three years**

<i>Customer type</i>	<i>Average relative unit price</i>	<i>Average relative net price</i>	<i>Average relative volume</i>
Major four grocers (excl Safeway)	93.8	95.8	180.0
Other fascias	100.1	100.4	76.7
Large wholesaler/symbol group	103.4	102.0	50.1
Small wholesaler/symbol group	109.0	107.8	18.8

Source: CC analysis of supplier information

29. We find that the four major grocery retailers combined achieve some of the lowest prices, paying, on average, prices that are between 4 per cent (net price) and 6 per cent (unit price) below the mean. Conversely, the small wholesalers/symbol groups pay, on average, between 8 and 9 per cent above the mean whilst large wholesalers/symbol groups pay between 2 and 3 per cent above the mean.
30. However, these results mask important variation within the groups (see Figures 1 and 2—a full table of results is set out at Annex 3).<sup>26</sup> Within the major grocers, on average Tesco pays the lowest relative unit price [X], followed by [X], [X] and [X].

<sup>24</sup>Tesco response to Q83 of the main party questionnaire.

<sup>25</sup>We have not excluded these retailers from the econometric analysis as the factory gate pricing arrangement is reflected in the fixed effect.

<sup>26</sup>The table shows only those customers for whom we have at least ten data points to underpin their average price data.

Of the major grocers, Tesco also pays the lowest net price [redacted], followed by [redacted]. These results represent the average price performance over a number of SKUs: it is not the case that Tesco always pays the lowest price.

31. Whilst on average the prices obtained by 'other fascias' and the two wholesaler/symbol groups are higher than those obtained by the four major grocers, some individual companies [redacted] extract unit and net prices that are commensurate with those paid by some the four major grocers. [redacted]<sup>27</sup>

FIGURE 1

**Scatter plot of three-year average unit price by customer**

[redacted]

Source: CC analysis of supplier information.

FIGURE 2

**Scatter plot of three-year average net price by customer**

[redacted]

Source: CC analysis of supplier information.

32. An analysis of the evolution of unit and net prices by customer category (plus each of the four major grocers) over the past five years indicates that there has been little variation in the price performance of each category over time. With the exception of [redacted], Tesco consistently pays the lowest prices of the group and the small wholesalers/symbol groups consistently pay the highest. However, it does not appear that the differential between the customer groups has widened over the period (although Asda appears to have improved).
33. Subject to some year-to-year variations, Tesco's average prices do not seem to have improved since 2003 despite having grown in size over the period. This may indicate

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<sup>27</sup>Tesco pointed by way of example to items that it found T&S Stores Ltd had been buying at lower cost prices, prior to acquisition by Tesco, despite being a much smaller business.

that the gains associated with volume have already been exhausted (implying a non-linear relationship between volume and price, whereby beyond a certain point, any increase in volume does not yield lower prices).<sup>28</sup> The full table of results is presented in Annex 4.<sup>29</sup>

FIGURE 3

**Relative unit price by customer type, 2002 to 2006**



*Source:* CC analysis of supplier information.

*Notes:*

1. Years denoted represent suppliers' fiscal years which in some cases are not the same as calendar years.
2. Highlighted data (ie for years 2002 and 2003) are based on few observations—caution should be exercised in drawing conclusions based on these results.
3. Data for 2001 has been excluded altogether since the results are based on very few observations.

FIGURE 4

**Relative net price by customer type, 2002 to 2006**



*Source:* CC analysis of supplier information.

*Notes:*

1. Years denoted represent suppliers' fiscal years which in some cases are not the same as calendar years.
2. Highlighted data (ie for years 2002 and 2003) are based on few observations—caution should be exercised in drawing conclusions based on these results.
3. Data for 2001 has been excluded altogether since the results are based on very few observations.

34. As discussed above, caution needs to be exercised in using this data to infer the existence of a relationship between size and price (and in particular, how changes in size will affect the price paid). The absence of a significant widening of the differential between the smallest and largest grocers/wholesalers over the last three years and the observation that some smaller individual companies obtain comparable or lower prices than some of the major grocers might indicate the absence of a systematic

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<sup>28</sup>In response to Q85 of the main party questionnaire, Tesco has submitted an analysis of the relationship between its cost price and volumes purchased for a small sample of products that were analysed by the CC in 2000. It notes that it is difficult to draw conclusions from this analysis because of the small sample size and because variations in cost prices could be driven by factors other than size, eg exchange rates, changes in input prices. However, subject to these caveats, it notes that no systematic trends can be identified and there is no strong sign of a volume effect on prices. We concur that it is difficult to draw conclusions from this analysis because of the confounding factors listed but note that it is consistent with our observation that Tesco's prices do not seem to have improved relative to other retailers, despite having grown over the period.

<sup>29</sup>The table shows only those customers for whom we have at least five data points to underpin their annual average price figure.

waterbed effect. Alternatively, it could mean that any waterbed effect has been exhausted (ie non-linearity in the relationship).<sup>30</sup>

35. More importantly, price differences may reflect other factors such as differences in distribution costs,<sup>31</sup> cost of goods sold,<sup>32</sup> retail offers, the negotiating skill of the buyer and the legacy of the account.<sup>33</sup> We cannot therefore simply use these results to isolate the effect of size on price and in particular how changes in size affect price (which is what matters for the waterbed model). In the following section, we therefore endeavour to identify the effect of volume on prices whilst controlling for a number of these non-size factors.

### ***Regression analysis***

36. Ideally, we would collect data on these non-size factors that affect price and include it in our analysis of prices, but data limitations prevent us from doing this. However, we can take advantage of the fact that we have a panel data set (ie for each supplier, we have prices by customer and over several years). To the extent that these 'omitted variables' are time-invariant, we can use a fixed-effect estimator to control for them. We estimate a fixed-effect model to assess the effect of volume purchased on price. Factors that remain constant over the sample period such as legacy of the account, negotiating skills, and some aspects of cost (including delivery and packaging) are

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<sup>30</sup>In investigating supplier pricing in 1999/2000, the CC examined the average net price paid by different grocery retailers and wholesalers across the top five branded products supplied by a sample of 26 suppliers. The results indicated that Tesco paid the lowest net prices on average (3.8 per cent less than the main party mean) and that warehouse clubs and wholesalers paid 8.7 per cent more than the main party mean. We are unable to contrast our results with these to determine whether these differentials have widened over time because we do not have data for many of the wholesalers included in the 2000 wholesale group.

<sup>31</sup>[redacted]

<sup>32</sup>[redacted] has told us that large retailers often enjoy significant support from suppliers, with suppliers' manpower being dedicated to individual retailers, often in the retailer's own premises. Such support comes at a (heavy) cost to the supplier and also yields a benefit to the retailers who receive it. Conversely, we were told by one supplier that it incurs higher costs in store calling through third party sales forces for its high street and convenience store formats than it does for its multiple retailer customers. [redacted] also told us that Tesco's requirement for product to be supplied in shelf-ready packaging represents a significant improvement in its effective net terms: the cost, which it told us was borne by suppliers, ran into millions of pounds in the case of some suppliers. [redacted]

<sup>33</sup>In particular, Tesco told us that the terms agreed with suppliers might vary between retailers for reasons other than scale. By way of example, Tesco told us that a supplier is more likely to offer a lower cost price if other terms are favourable (such as quick payment and efficient processes). Tesco told us that one of the more important considerations of the agreed terms is distribution.

controlled for with the fixed-effect estimator.<sup>34</sup> The results of this model indicate how an increase in SKU-level volume, holding everything else equal (eg time invariant distribution costs and cost of goods sold, along with negotiating skill, legacy of the account etc) affects price.<sup>35</sup>

37. Using such a fixed effect estimator<sup>36</sup> we performed a regression on each price measure on volume using a linear specification. The analysis for unit price, reported in Table 3 and Figure 5 below, yielded a negative relationship between unit price and volume which is statistically significant at the 1 per cent level. These results imply that a very small customer (purchasing 10 per cent of the average volume) could expect to pay 2.7 per cent above the average price. A very large customer (purchasing three times the average volume) could expect to pay 6.1 per cent below the average price. This results in a price differential of 9.4 per cent.
38. Table 4 and Figure 6 report the results for the net price regressions using the linear specification. We find a negative relationship between net price and volume which is statistically significant at the 1 per cent level. The results imply that a very small customer could expect to pay 3.4 per cent above the average price. A very large customer (purchasing three times the average volume) could expect to pay 7.4 per cent below the average price. This results in a price differential of 11.7 per cent.

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<sup>34</sup>In its response to our working paper on supplier pricing and the waterbed effect (4 September 2007), the BBG submitted that one of the reasons why net prices may vary between retailers, [X], is the payment of marketing monies by suppliers to retailers. It noted that, if its belief that suppliers pay more to larger retailers to maintain distribution is correct, understanding whether [X] they are cost justified is crucial to an understanding of why net prices differ. We have not analysed how marketing monies vary by retailer size since our objective is to establish whether, having accounted for all payments and discounts, larger retailers obtain better terms than smaller retailers. In doing so, we include payments for marketing activities and advertising allowances except in those cases where, as discussed above, we are unable to because these payments are not allocated to customers, within the suppliers' accounting systems.

<sup>35</sup>The ACS raised the possibility that the use of SKU-level data may underestimate the discount that large buyers obtain because 'for different SKUs larger buyers may account for a smaller or a larger fraction of total purchases'. We agree that in some cases, SKU-level volumes may be an imperfect proxy for overall market size. However, in general we expect the amount purchased of a given SKU to be correlated with overall size. Moreover, we consider that any disparities between relative SKU-level volume and relative overall size are unlikely to be systematic.

<sup>36</sup>Where we use a 'fixed effect' for each customer product relationship.

39. The fact that the relative price differential is wider for net price than for unit price suggests that larger customers may receive greater fixed discounts (on a per unit basis) than smaller customers; when fixed discounts are deducted from the price, large customers do better relative to small customers than they did in the relative unit price analysis.
40. The ACS has told us that it considers that a non-linear regression would be a 'more appropriate' representation of the relationship between size and price.<sup>37,38</sup> For this reason, we have conducted a series of diagnostic tests to determine whether a non-linear specification would improve the explanatory power of our model. To do this, we have plotted the augmented component plus residuals (ACPR) from our linear model against relative volume. We have then fitted both our linear regression and a smoothed average of the ACPRs, to see whether a nonlinear specification would better fit our dataset. The results of this analysis for unit and net price are reported in Figures 1 and 2 in Annex 5.
41. The ACPR graphs are not conclusive: for both unit and net price the smoothed average of the ACPRs does not follow a straight line, suggesting that non-linearity is likely. However, the difference between the linear fit and the smoothed average is relatively small, and without a more pronounced difference, it is not possible to infer non-linearity from these graphs alone.
42. We also performed F-tests for both unit and net price, using a quadratic model as the unrestricted model,<sup>39</sup> and the linear model as the restricted model to determine whether adding  $\text{relvol}^2$  to the regression improves its explanatory power. In the case of unit price, the p-value on the F-test was 0.1701, indicating that using a quadratic

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<sup>37</sup>ACS response to the CC working paper on supplier pricing (July 2007), 3 August 2007.

<sup>38</sup>Tesco told us that scale effects in most parts of the supply chain are usually modest, quickly exhausted (and so accessible by all larger retailers) and/or easily outweighed by the substantial procurement savings that can be made in skilful supply chain management techniques (which are not the preserve of large firms).

<sup>39</sup>With  $\text{relvol}$  and  $\text{relvol}^2$  as explanatory variables.

rather than a linear model did not significantly improve its explanatory power. This implies that the relationship between volume and unit price is linear. Conversely, performing an F-test on the net price model yielded a p-value of 0.0242, indicating that the explanatory power of the model is improved by the inclusion of  $relvol^2$ . This implies that the relationship between volume and net price is non-linear (quadratic). The results of the quadratic specification indicate that whilst the price differential between the very small and the very large is approximately 14 per cent, the reductions in net price associated with increases in volumes are exhausted beyond approximately four times the mean volume.<sup>40</sup> (For information, the results of both the linear and quadratic specifications for both unit and net price are set out in Tables 3 and 4 and Figures 5 and 6.)

TABLE 3 Regression output for different model specifications (linear and quadratic)—unit price

<i>Specification</i>	<i>Variable</i>	<i>Coefficient</i>	<i>P-value</i>	<i>95% confidence interval</i>	
Linear*	relvol	-0.030431	0.001	-0.0478838	-0.0129783
	_cons	103.0431	0.000	101.2524	104.8339
Quadratic*	relvol	-0.0495371	0.008	-0.085832	-0.0132423
	relvol2	0.0000446	0.17	-0.0000192	0.0001084
	_cons	104.0695	0.000	101.4372	106.7018

Source: CC analysis of supplier information.

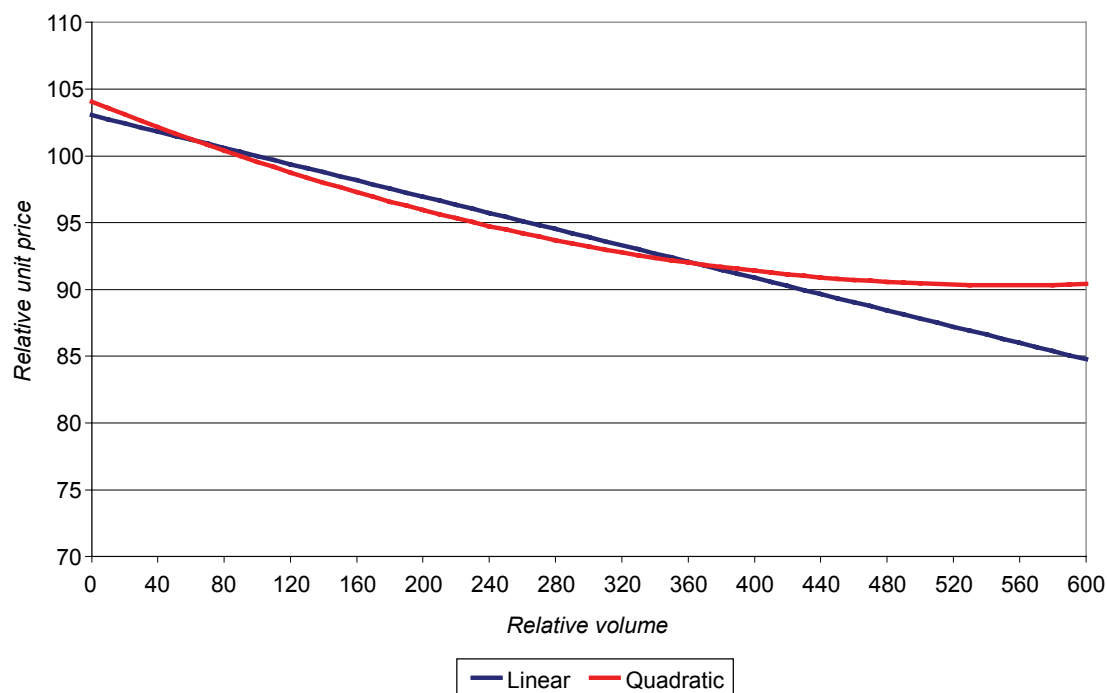
\*Joint F test significant at the 1 per cent level.

Note: We report the results for both the linear and quadratic specifications for completeness.

<sup>40</sup>The quadratic specification for net price also implies that growth beyond approximately five times the mean volume would lead to higher prices. Given that the majority of our observations fall outside this level, we place little weight on this.

FIGURE 5

**Predicted relationship between relative unit price and relative volume for linear and quadratic specifications**



Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

TABLE 4 Regression output for different model specifications (linear and quadratic)—net price

Specification	Variable	Coefficient	P-value	95% confidence interval	
Linear*	relvol	-0.0372357	0.000	-0.0518443	-0.0226271
	_cons	103.7236	0.000	102.2271	105.22
Quadratic*	relvol	-0.0688045	0.000	-0.1022737	-0.0353352
	relvol2	0.0000755	0.024	9.85E-06	0.0001412
	_cons	105.4563	0.000	103.119	107.7937

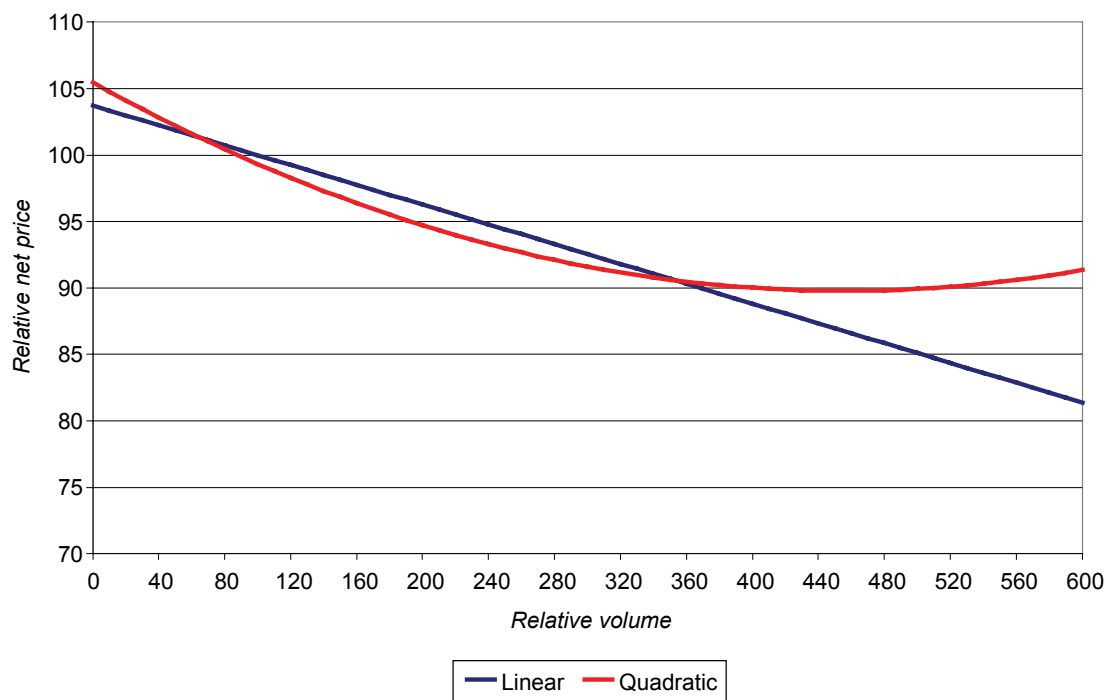
Source: CC analysis of supplier information.

\*Joint F test significant at the 1 per cent level.

Note: We report the results for both the linear and quadratic specifications for completeness.

FIGURE 6

**Predicted relationship between relative net price and relative volume for linear and quadratic specifications**



Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

43. We have employed a variation of our model to examine the extent to which the predicted relationship between price and volume varies by brand strength. Table 5 shows the balance between primary and non-primary brands in our dataset.<sup>41</sup>

TABLE 5 **Sample size by price measure and brand strength**

Measure		Number of suppliers	Number of SKUs	Number of customer-SKU relationships	Number of observations
Unit price	Primary	5	21	181	569
	Non-primary	11	45	330	1,144
Net price	Primary	19	79	669	2,254
	Non-primary	16	58	448	1,504

Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

<sup>41</sup> [X]

44. Splitting the data into two datasets (primary brands vs non-primary brands) and using the linear specification on both samples separately, we continue to find a statistically significant negative relationship between relative volume and relative unit price for non-primary brands. Indeed, the projected relative unit price differential between a very large and a small firm (of RelVol=10 and RelVol=300 respectively) is greater than reported above for the pooled dataset. However, the results of the ACPR plots (as reported in Annex 5) and F-tests on the inclusion of relvol<sup>2</sup> indicate that the relationship between unit price and volume for non-primary brands is better characterized as non-linear (quadratic).<sup>42</sup> In particular, the quadratic model predicts a larger price differential between a very small and a very large firm than the linear model (approximately 19 per cent), but that reductions in unit price associated with increases in volumes are exhausted beyond approximately four times the mean volume. This is a larger differential than predicted by the results of the pooled regressions (primary and non-primary together).
45. However, neither the linear nor the quadratic specification produces a statistically significant relationship between relative volume and relative unit price for primary brands.<sup>43</sup> The results of the regressions for both unit and net price are reported at Tables 6 and 7 and Figure 7).

TABLE 6 Unit price, non-primary

<i>Specification</i>	<i>Variable</i>	<i>Coefficient</i>	<i>P-value</i>	<i>95% confidence interval</i>	
Linear	relvol	-0.0453759	0.000	-0.06476	-0.0259917
	_cons	104.5376	0.000	102.5653	106.5098
Joint F-test of coefficients on volume			0.000		
Quadratic	relvol	-0.0898139	0.000	-0.1333966	-0.0462312
	relvol2	0.0001055	0.015	0.0000209	0.00019
	_cons	106.8183	0.000	103.8558	109.7808
Joint F-test of coefficients on volume			0.000		

Source: CC analysis of supplier information.

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Note: We report the results for both the linear and quadratic specifications for completeness.

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<sup>42</sup>P-value equal to 0.0145.

<sup>43</sup>As indicated by the coefficients on relative volume for the primary brand regression not being jointly significant.

TABLE 7 Unit price, primary

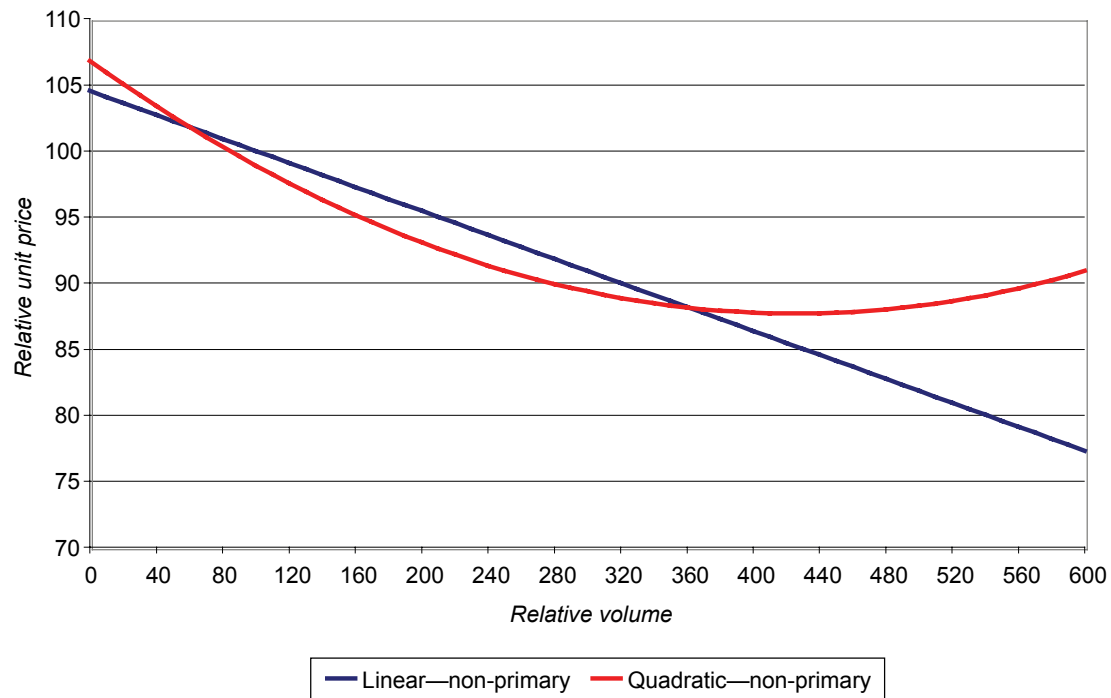
Specification	Variable	Coefficient	P-value	95% confidence interval	
Linear	relvol	0.00563	0.752	-0.029404	0.0406641
	_cons	99.437	0.000	95.81143	103.0626
Joint F-test of coefficients on volume			0.752		
Quadratic	relvol	0.0394134	0.256	-0.028707	0.1075338
	relvol2	-0.0000761	0.166	-0.0001837	0.0000316
	_cons	97.45836	0.000	92.18164	102.7351
Joint F-test of coefficients on volume			0.374		

Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

FIGURE 7

**Predicted relationship for relative unit price and relative volume for non-primary brands (using linear and quadratic specifications for volume)**



Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

46. Applying the linear specification to the two datasets continues to produce a statistically significant negative relationship between net price and volume for both primary and non-primary brands. However, the quadratic specification only produces a statistically significant relationship for non-primary brands implying that the relationship between net price and volume for primary brands is best characterized as linear:

this linear model predicts that the net price difference between a very small and a very large firm would be approximately 6 per cent, smaller than the net price difference predicted by the pooled data under either specification. The results of the ACPR plots (reported in Annex 5) and F-tests on the inclusion of  $relvol^2$  for non-primary brands<sup>44</sup> indicates that the relationship between net price and volume is best characterized as quadratic: this model predicts a larger price differential between a very small and a very large firm than the linear (approximately 26 per cent), but that reductions in net price associated with increases in volume are exhausted beyond approximately 3.5 times the mean volume. Again, this is a larger differential than predicted by the results of the pooled regressions (primary and non-primary together).

TABLE 8 **Net price, non-primary**

<i>Specification</i>	<i>Variable</i>	<i>Coefficient</i>	<i>P-value</i>	<i>95% confidence interval</i>	
Linear	relvol	-0.052553	0.000	-0.0746735	-0.0304325
	_cons	105.2553	0.000	102.9761	107.5345
Joint F-test of coefficients on volume			0.000		
Quadratic	relvol	-0.135317	0.000	-0.1920894	-0.0785445
	relvol2	0.0001845	0.001	0.0000746	0.0002943
	_cons	109.7197	0.000	105.9517	113.4876
Joint F-test of coefficients on volume			0.000		

Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

TABLE 9 **Net price, primary**

<i>Specification</i>	<i>Variable</i>	<i>Coefficient</i>	<i>P-value</i>	<i>95% confidence interval</i>	
Linear	relvol	-0.0190265	0.044	-0.0375406	-0.0005125
	_cons	101.9027	0.000	100.0085	103.7968
Joint F-test of coefficients on volume			0.044		
Quadratic	relvol	-0.0096712	0.607	-0.0464987	0.0271563
	relvol2	-0.0000245	0.507	-0.0000971	0.000048
	_cons	101.3999	0.000	98.71444	104.0853
Joint F-test of coefficients on volume			0.062		

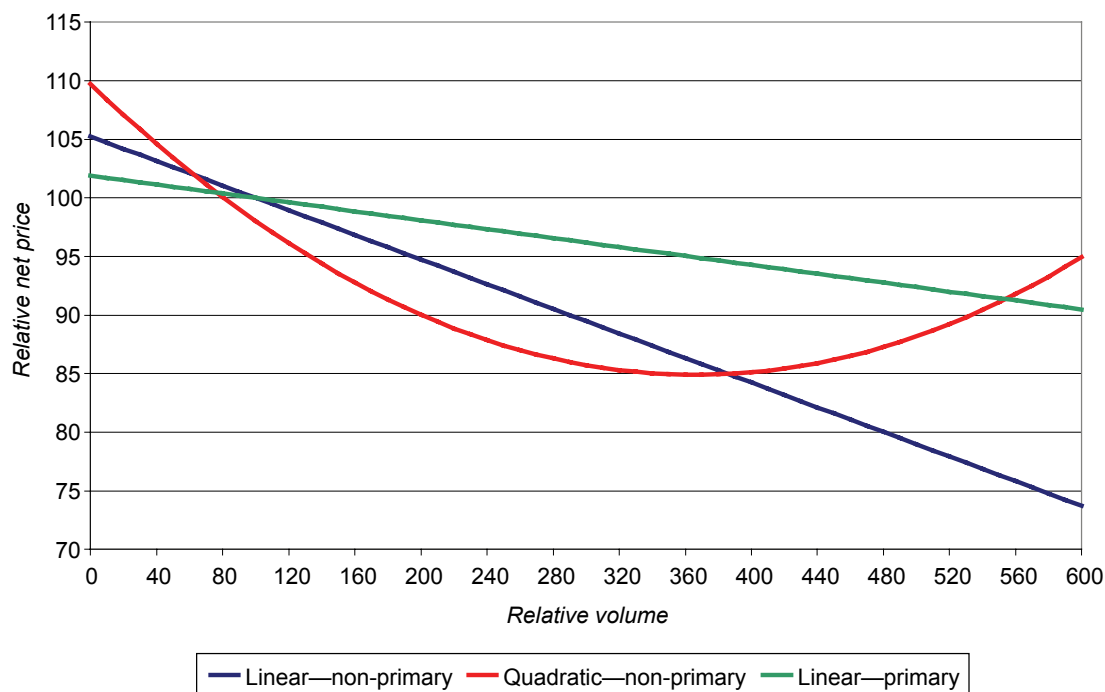
Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

<sup>44</sup>P-value equal to 0.001.

FIGURE 8

**Predicted relationship for relative net price and relative volume for primary and non-primary brands (using linear and quadratic specifications for volume)**



Source: CC analysis of supplier information.

Note: We report the results for both the linear and quadratic specifications for completeness.

47. There are a number of possible explanations for the different relationships between relative volume and relative price for the two types of product. It may be the case that suppliers of primary brands are sufficiently strong to resist any countervailing buyer power that could be used to extract discounts. This may not be the case for non-primary brands because suppliers' bargaining power is weaker and therefore large customers' buyer power is then more effective—large customers could credibly threaten to leverage private labels, and this has a more material impact upon suppliers of non-primary brands. It is also possible that the restrictions on dominant companies engaging in non-cost-related price discrimination under Chapter II of the *Competition Act 1998* or Article 82 of the EC Treaty constrain primary brand suppliers from charging large price differentials.

48. According to the ACS model of the waterbed effect, it is necessary for larger buyers to be able to extract non-cost-related discounts in order that a waterbed effect might give rise to consumer harm. This is essentially because if discounts are cost related, retail price reductions or increases merely reflect efficiencies. Ideally, we should like to analyse the extent to which SKU-level margins vary in relation to volume to address this issue. However, as discussed above, the data that suppliers have been able to provide in relation to costs is limited in a number of ways. To some extent, the use of a fixed effect estimator captures cost differences, although it will only capture cost differences that are time invariant. So, if a customer is always cheaper to serve because it picks up ex-factory, this would be captured in our fixed effects analysis. However, where an increase in volume means that a customer becomes even cheaper to serve as a result of some economies of scale, this will not be picked up.
49. Finally, we have employed a variation of our model to examine whether the volume–price relationship we have identified has changed over time (by including ‘year’ dummy variables).<sup>45</sup> This analysis does not reflect differentials in actual prices obtained; rather, the extent to which volume confers a price advantage. It is important to emphasize once again the small sample size relating to 2001, 2002 and 2003, and the fact that years refer to suppliers’ fiscal (rather than calendar) years, when drawing inference from these results.
50. The results are set out in Tables 10 and 11, and Figures 9 and 10. Our results show that the dummy variables for years are not jointly statistically significant for either unit or net price at the 5 per cent level. In other words, allowing the price–volume relationship to change over time does not materially improve our model.

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<sup>45</sup>Showing each year relative to 2006.

TABLE 10 Regression results for unit price including dummy variables for year

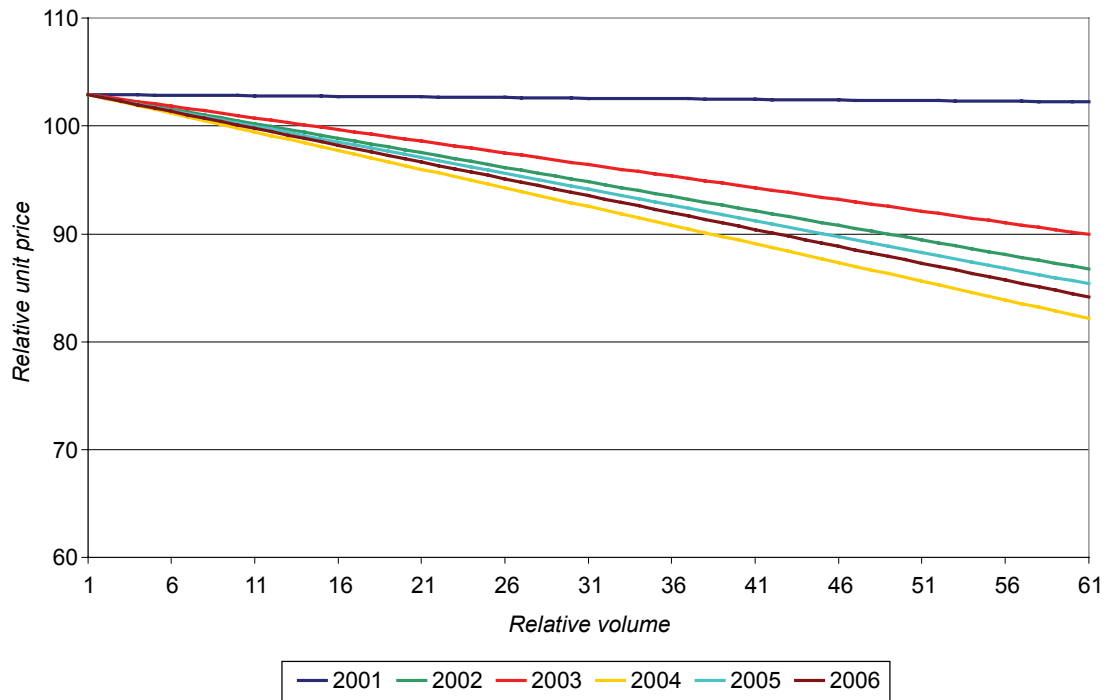
	<i>Coefficients</i>	<i>P-value</i>	<i>Confidence interval</i>	
Relvol	-0.0312662	0.000	-0.0482317	-0.0143006
FY2001Xrelvol	0.0301509	0.082	-0.0038749	0.0641768
FY2002Xrelvol	0.0043002	0.688	-0.0166717	0.0252722
FY2003Xrelvol	0.0096476	0.104	-0.0020027	0.0212979
FY2004Xrelvol	-0.0033681	0.409	-0.011366	0.0046299
FY2005Xrelvol	0.0019949	0.586	-0.0051957	0.0091854
_cons	102.9245	0.000	101.1528	104.6963

F-test on interacted year dummies 0.0951

Source: CC analysis of supplier information.

FIGURE 9

Relationship between relative volume and relative unit price by year



Source: CC analysis of supplier information.

Note: The data for 2001 is underpinned by very few observations.

TABLE 11 Regression results for net price including dummy variables for year

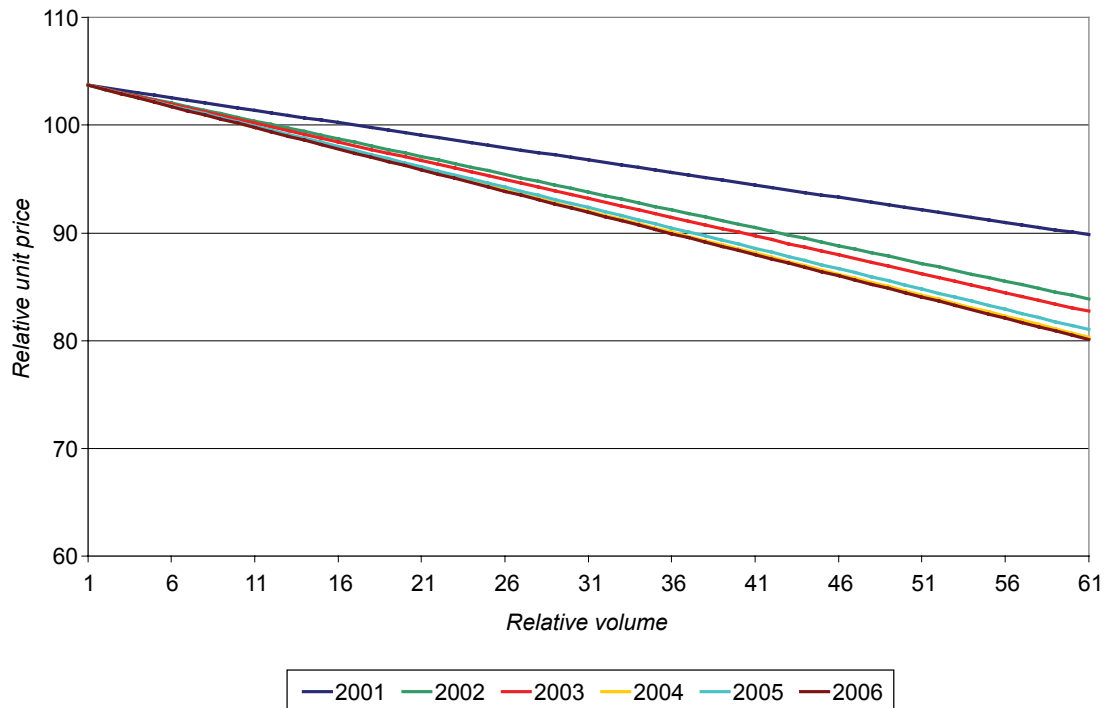
	<i>Coefficients</i>	<i>P-value</i>	<i>Confidence interval</i>	
Relvol	-0.0393259	0.000	-0.0542483	-0.0244034
FY2001Xrelvol	0.0161941	0.102	-0.0032307	0.0356189
FY2002Xrelvol	0.0062456	0.262	-0.0046802	0.0171715
FY2003Xrelvol	0.0043263	0.277	-0.0034808	0.0121334
FY2004Xrelvol	0.0003619	0.910	-0.0058865	0.0066103
FY2005Xrelvol	0.001481	0.602	-0.0040876	0.0070496
_cons	103.7123	0.000	102.2032	105.2215

F-test on  
interacted year  
dummies: 0.4738

Source: CC analysis of supplier information.

FIGURE 10

Graph of relationship between relative volume and relative net price by year



Source: CC analysis of supplier information.

Note: The data for 2001 is underpinned by very few observations.

## Sample and methodology

### Details of the sample

1. The following table provides summary information on the coverage of our sample. We report the identity of the supplier, the number of SKUs provided (and from which sector these are drawn), and the revenues that these SKUs account for.<sup>1</sup>

TABLE 1 **Details of sample**

<i>Supplier</i>	<i>Number of SKUs</i>	<i>Products</i>	<i>Revenue (m)</i>
✂			
Total	141		1,805.23

Source: CC analysis of supplier information.

### Construction of the relative price index

2. Grocery retailer/wholesaler *i*'s relative price for SKU *j* in year *t* will be the ratio of the annual price it actually pays divided by the average price over all customers of SKU *j* in year *t*. The exact formula is provided below:

<sup>1</sup>The basis of the revenue figure is sales invoiced to their customers in the last full fiscal year for which we have data. However, some suppliers have not provided us with this information, in which case we have used net revenues earned (which will therefore understate the true coverage). This also excludes observations which we have dropped for reasons set out below.

$$Rep_{ijt} = \frac{\bar{p}_{ijt}}{\frac{1}{n} \sum_{i=1}^n \bar{p}_{ijt}}$$

where  $\bar{p}_{ijt}$  represents the average annual price paid by customer  $i$  for SKU  $j$  in year  $t$  and  $n$  is the number of customers who purchased that SKU in that year in our sample.

## Data cleaning

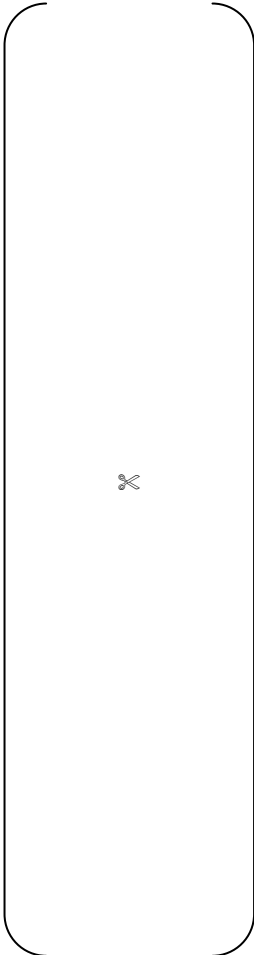
3. We have applied the following rules in cleaning the data:
  - We have dropped customer–product relationships when the annual data showed a negative or zero value for unit price and/or net price and/or volume. Since we were informed by suppliers that these tended to reflect retrospective entries relating to sales performance in the previous period, we considered that these negative values were likely to be accompanied by over/under-inflated values in other periods. As a result, we decided to drop entire customer-product relationships (ie for all periods in which the customer purchased the SKU) whenever we found a zero or negative value.
  - When customers in our dataset merged during the period, but have remained as two separate accounts in the dataset, we have accounted for this in our data cleaning whenever possible by aggregating their volume figures to arrive at a volume measure that represents sales to the merged entity, and by generating a price which reflects the average price paid by the merged customer, weighted by volume.
  - When a customer merged with another customer, whose sales were not reported in the relevant data submission, we dropped the company from our dataset. The exception to this rule is when a member of the major grocers acquired a smaller company (such as when Tesco acquired T&S Stores, and when Sainsbury's acquired Jackson's, Bells Stores, and Beaumont). In these cases, we judged that the reported volumes for the major grocers were likely to be close to the total for

the merged entity, and as such, represented accurately enough the volumes on which they were negotiating prices.

- In instances where suppliers indicated that the prices paid by a customer were related to their membership of a buying group, but they had only reported sales to some members, we have dropped these customer–product relationships.
- In the case of Nisa, it has proved very difficult to fully account for its relationships with some members (eg Costcutter and Booths). For this reason, we have dropped these three customers from our econometric analysis. We have kept these observations in the average price analysis, as the problem lies not with the interpretation of prices, but with our understanding of volumes attributed to different customers.
- We also dropped approximately 1,300 observations where we were unable to verify what had been assumed about membership of buying groups/mergers in preparing the data.

### Classification of customers into customer groups

The following table sets out the classification of customers in our dataset.

<i>Customer group</i>	<i>Name of customer</i>
Other fascias	
Large wholesaler/symbol group	
Small wholesaler/symbol group	

### Annual relative average price paid by customers over three years

<i>Customer</i>	<i>Average relative unit price</i>	<i>Number of observations</i>	<i>Average relative volume</i>
✂			

<i>Customer</i>	<i>Average relative net price</i>	<i>Number of observations</i>	<i>Average relative volume</i>
✂			

Source: CC analysis of supplier information

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### Average unit price, net price and volume by year and customer/ customer group

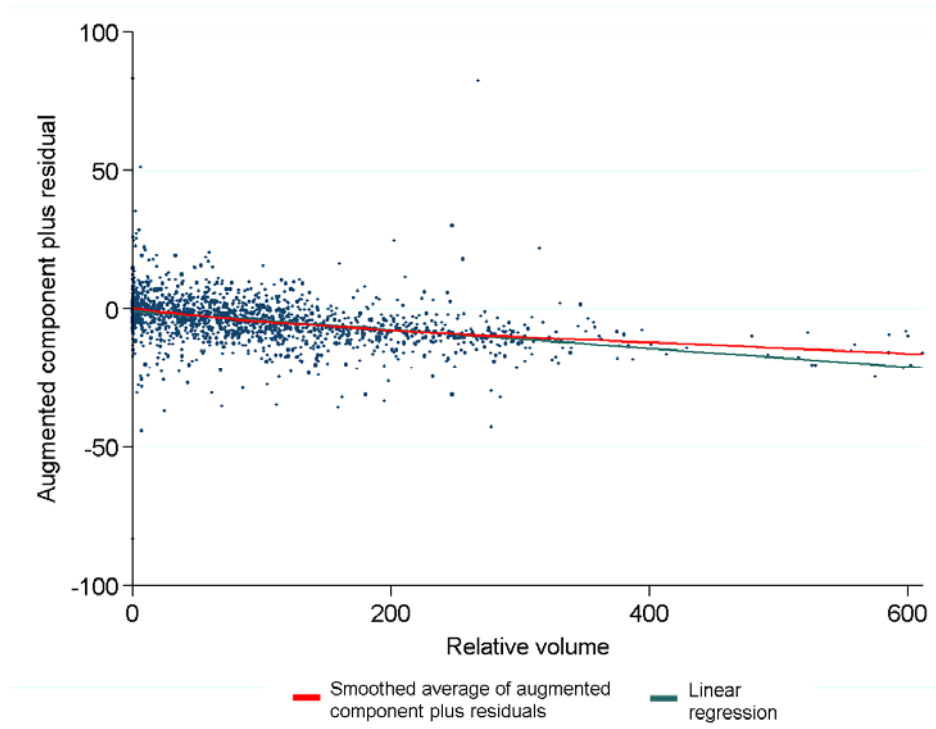
<i>Customer type</i>	<i>Period</i>	<i>Average unit price</i>	<i>Number of observations</i>	<i>Average net price</i>	<i>Number of observations</i>	<i>Average relative volume</i>					
Asda	2002	( )									
	2003										
	2004										
	2005										
	2006										
Morrisons	2002										
	2003										
	2004										
	2005										
	2006										
Sainsbury	2002										
	2003										
	2004										
	2005										
	2006										
Tesco	2002						( )		✂		
	2003										
	2004										
	2005										
	2006										
Other fascia	2002										
	2003										
	2004										
	2005										
	2006										
Large wholesaler/symbol group	2002										
	2003										
	2004										
	2005										
	2006										
Small wholesaler/symbol group	2002										
	2003										
	2004										
	2005										
	2006										

Source: CC analysis of supplier information.

### Testing for non-linearity

FIGURE 1

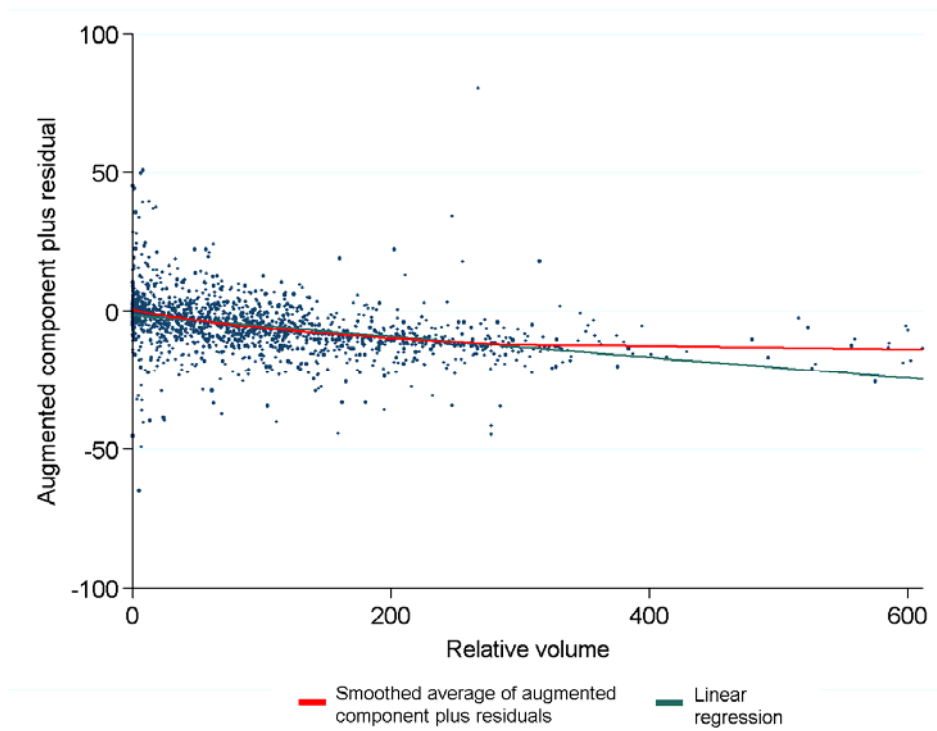
#### Augmented component plus residuals graph—unit price, pooled data



Source: CC analysis.

FIGURE 2

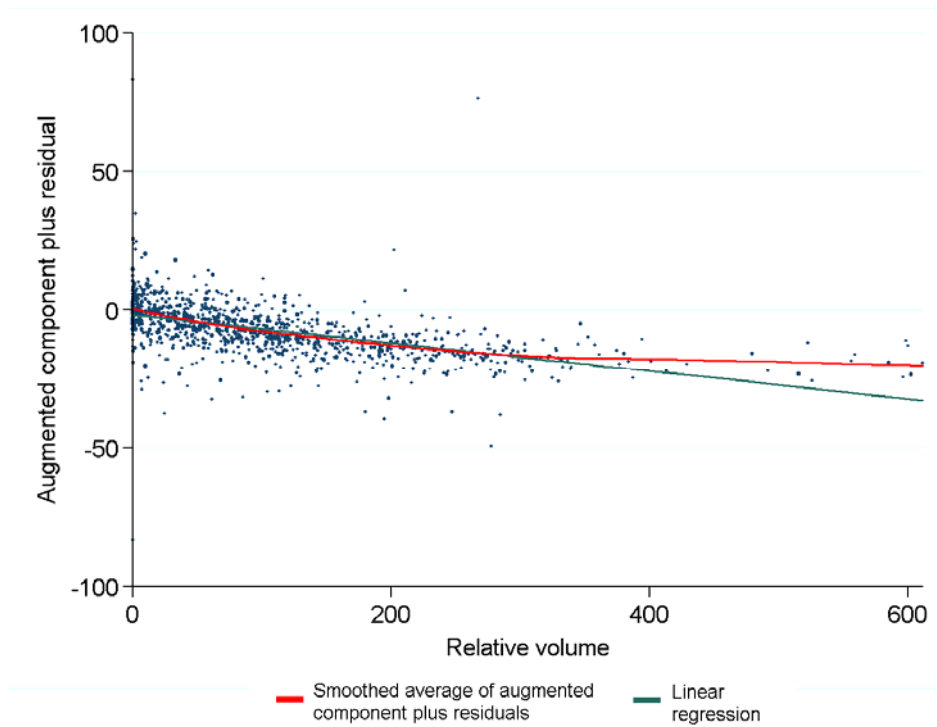
**Augmented component plus residuals graph—net price, pooled data**



Source: CC analysis.

FIGURE 3

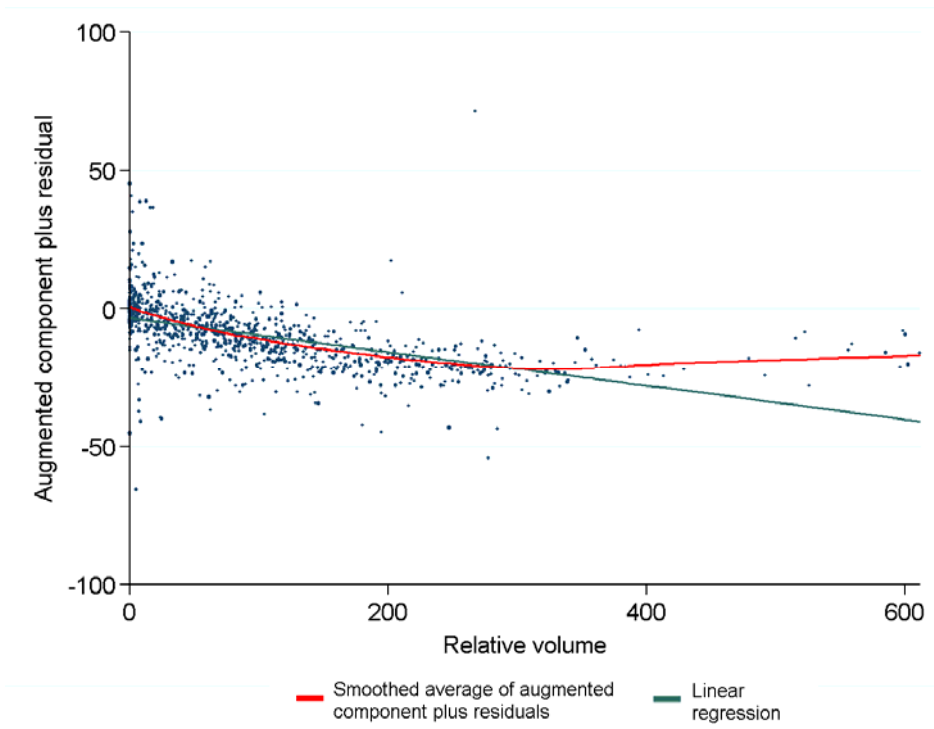
**Augmented component plus residuals graph—unit price, non-primary brands**



Source: CC analysis.

FIGURE 4

**Augmented component plus residuals graph—net price, non-primary brands**



Source: CC analysis.