

New Outlets & New Products

Ralph Turvey

Abstract: Through time, consumers shift their expenditures between outlets as well as between products, but price statisticians have taken more notice of product shifts than of outlet shifts. This paper discusses the decomposition of changes in unit values between different kinds of shift. It also shows that shifts between outlets are important. It then examines the issue of whether quality adjustments for the two kinds of shifts should and can be treated in similar ways in Consumer Price Indexes.

1. Introduction

As a preliminary, here are definitions of some of the terms used in this paper.

Unit value: The total value of sales of a product or product group divided by a quantity measure of those sales.

Characteristic: An objectively ascertainable attribute or feature of a product or outlet.

Substitution: Consumers change their purchases of a given set of products from a given set of outlets towards other products and/or outlets. When this is solely because some prices have fallen relatively to others, the substitution is what economists term the ‘substitution effect’ and here call the *pure substitution effect*.

Replacement: Statisticians supersede an product/outlet combination in the index by another. When this is done it may be that:

1. It is impossible to evaluate the quality differences between them, either because information about the price-determining characteristics of one or both of them is lacking or because no procedure for evaluating differences in their characteristics has been established. They have to be treated as, or are, *disparate*.
2. Their price-determining characteristics are recorded and are all the same, in which case the index computation can simply use the price of the replacement item instead of the price of the replaced item. They are *essentially similar*. (The word “comparable” is ambiguous; it can mean “Similar” but it can also mean “Capable of being compared”, as in 5.(1) of the EU Regulation. So, to avoid confusion, the word will not be used here.)
3. Their price-determining characteristics are recorded, some of them are different, and these differences can be evaluated in money terms. A *quality adjustment* is made to the price of one of them.

Replacements are of two kinds:

1. *Optional*. The range of items and outlets covered by the index is usually revised when an index is reweighted. Even between reweightings, this range may be revised, either routinely at regular intervals, or when the importance in the market of new items becomes apparent. Such revisions deliberately update the sample of representative items, or of varieties for given representative items, or the sample of outlets, so that varieties for the given representative items have to be selected in each new outlet. Overlap prices are normally obtained and the replacements brought into the index calculation in such a way that they do not affect the index.
2. *Forced*. These are made when it is decided to regard a missing observation as permanently missing. Overlap prices are not normally available in such cases.

Overlap signifies that prices are collected both for a replaced item and for its replacement in the same month.

A *direct index* is one where the ratio between the current mean price and the price reference-period mean price is computed.

A *proper Laspeyres, Paasche (or Fisher) index* would be one where the price and weight reference periods fully coincided and where all outlet/product combinations taken into account in the reference period(s) also existed in the other period(s) and were taken into account in computing the index.

2. Different kinds of bias

2a. Substitution bias

Substitution bias between outlets is defined like substitution bias between products. It relates to changes in the composition of purchased quantities of a given set of products from a given set of outlets induced by changes in the relative prices charged by different outlets. The *substitution bias*, for both products and outlets, is that, in consequence of the pure substitution effect, but *ceteris paribus*, a proper Laspeyres index would exceed, and a proper Paasche index would fall short of, a “true cost of living” or “constant utility” price index. A proper Fisher index would approximate it, however.

Some authors have estimated substitution bias from substitution between elementary aggregates, but not within them, by comparing a Fisher-type weighted average of elementary aggregate indexes with a Laspeyres-type weighted average of them. However, only some of the substitution may be the pure substitution effect; substitution can occur for other reasons. Thus measuring substitution bias in this way does not include substitution bias within elementary aggregates and assumes that incomes, preferences and all the other things affecting the composition of consumer expenditure have remained constant.

2b. New outlet & product bias

New outlet and new product biases¹ are different from substitution biases. They relate to shifts in the composition of expenditure which are influenced by changes in the availability of outlets and products - by the opening of new outlets, the closure of old outlets, the appearance of new products and the disappearance from the market of old products. They do not relate to relative price changes (except in the purely formal sense that if an item is not available its price is infinite).

A proper Laspeyres index could not cover products and outlets which have disappeared since the base period. A proper Paasche index could not cover products and outlets which have appeared since the base period. Either of them, computed only for products and outlets that had remained unchanged between the base and current periods would be imperfect, that is to say biased.

A “true cost of living” index would find the best-buy product/outlet combinations currently available that would have yielded consumers with unchanged preferences the same utility as the ones that had become unavailable or were initially unavailable. But this is not particularly helpful for statisticians. They are confined to observable phenomena, taking account only of characteristics that can be readily observed or ascertained by price collectors or by statisticians at head office.

As a preliminary, the next section explains why the importance of new outlet/product bias cannot be judged by comparing changes in base-weighted price indexes with changes in unit values.

3. Other shifts between outlets and products

3a. Milk chocolate case study

Marielle Prime and Alain Saglio (1995) examined the development of the prices of milk chocolate bars in France between February 1988 and February 1990 using data obtained from Nielsen. These related to a panel of 498 outlets, and consisted of the value of sales, quantity sold and unit value in each period, distinguishing 11 brand groups, three package sizes and six outlet types. They calculated the following figures for February 1990 with February 1988 as base:

Unit value index	96.77
Effect on unit value of shifts between outlet types	98.43
Effect on unit value of shifts between brands	98.86
Effect on unit value of shifts between package sizes	99.88
Laspeyres index	99.57
Laspeyres index × product of all 3 shift effects	96.77

thus reconciling the unit value index with the fixed weight Laspeyres price index.

¹ These words are meant to cover closure and disappearance bias as well.

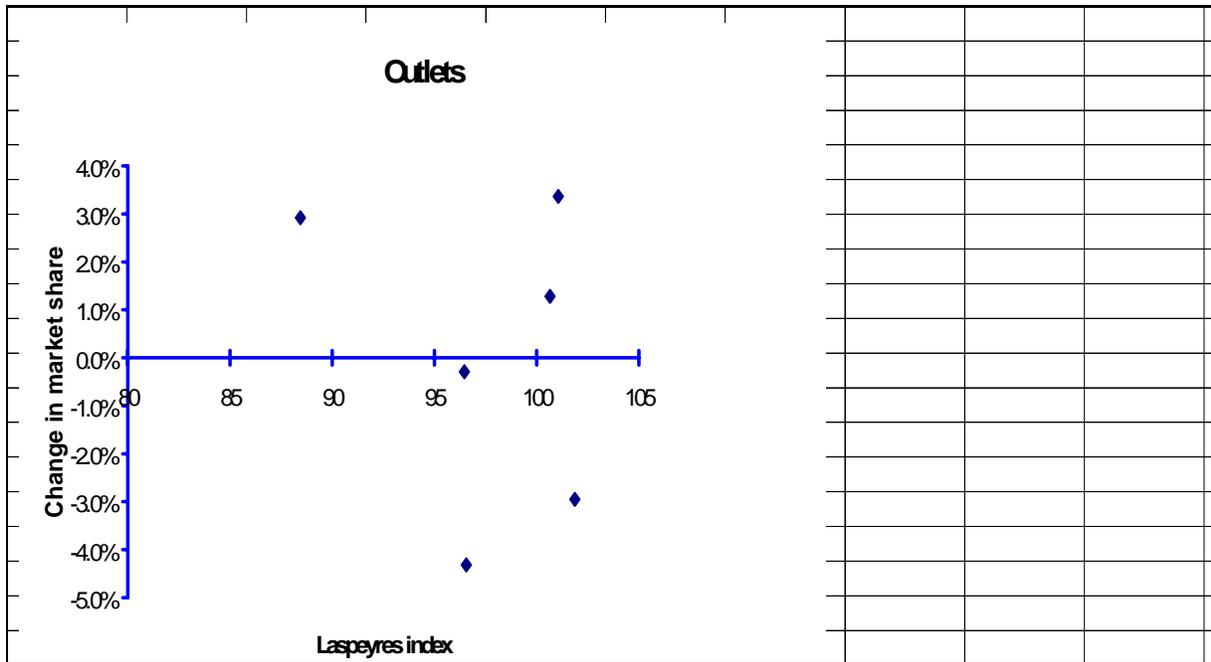
These numbers can be compared with the following calculations that I have made using only those outlet type, brand and size combinations which were sold in both periods:

Unit value index	96.08
Laspeyres index	99.13
Paasche index	98.23

The minor differences between these two tables in the unit value and Laspeyres index figures merely reflect slightly smaller coverage and, possibly, transcription errors.

Unit value 1988	4.21		
Unit value 1990	4.04		
Unit Value Index	96.08		
Laspeyres Index	99.13		
Paasche Index	98.23		
Fisher Index	98.68		
		Laspeyres P	Change in market share
	Suchard	98.7	1.85%
	Poulain	103.7	-0.22%
	Cote d'Or	104.0	-2.49%
	Larvin	116.4	-0.05%
	Menier	102.3	0.05%
	Nestlé	101.5	-0.06%

What is interesting is that although the Paasche index is lower than the Laspeyres, the difference between them is not nearly large enough to explain the fall in overall unit value. The Paasche-Laspeyres difference depends upon the inverse correlation between relative changes in prices and relative changes in quantities. In this case, correlation was weak, as the two diagrams show. The conclusion must be that the shifts between brand groups and outlet types were only partly towards those whose prices had fallen relatively; they were also towards those brand groups and outlet types whose prices were low in both periods. Changes in the market shares of different brand groups and outlet types were *not* just due to the pure substitution effects on which economists lay so much stress. They were also due to the fact that *other* sales-determining factors had changed too. Even if relative prices had not changed consumers, within their (reduced) total purchases from the outlets in the panel, would have shifted towards cheaper brands and cheaper outlets so that overall unit value would still have fallen more than a Laspeyres index. Some of the size, brand, outlet combinations that were sold in February 1988 were not sold in February 1990, but the effect of this was small, since they accounted for only 0.7% of February 1988 sales. Two combinations newly sold in February 1990 were even less significant.



In the case of milk chocolate, therefore, the greater fall in overall unit value than in the Laspeyres index reflected:

1. Some pure price substitution bias,
2. New outlet/new brand bias, though not much,
3. Changes in incomes and in consumer preferences.

The third group of changes are interesting and important phenomena, but a price index cannot and should not try to encompass them. Thus if, to give a non-chocolate example, without any change either in car prices or in the availability of outlets and models, consumers buy more Fords and fewer Mercedes, a car price index should not fall.

3b. Food products case study

Dominique Dubeaux and Alain Saglio (1995) used data from the French national food survey from 1979 to 1991 to examine the effect upon the weighted average reported prices paid for 29 fairly homogeneous kinds of food product of shifts in purchases between eight types of outlet. These shifts on average reduced unit values by 0.4% per year, the range lying between 0.7% and 0.1% with one or two exceptions. The following table shows the results for pasta, where the figure was 0.5% per annum, and for two of the extreme cases. In the case of pasta, hypermarkets and supermarkets gained 31 percentage points of market share.

1979 to 1991	Pasta	Baby food	Potatoes
Unit value index	182.22	151.82	279.06
Laspeyres index	200.05	183.31	278.97
Paasche index	193.34	169.20	279.66
Fisher index	196.67	176.11	279.32
Outlet effect	-5.9%	-17.3%	-2.5%

Outlet effect is approximated as sum of : change in % market share x % 1991 price
Deviation from 1979-quantity-weighted average

Their prices fell relative to other outlet types and they had prices fractionally below the weighted average. Traditional alimentations générales, whose prices were both higher and rose faster than the average, lost 14 percentage points.

In the case of baby food in pots, hypermarkets and supermarkets market share rose from 66% to 94%, their prices being well below prices in superettes and pharmacies and their price rise being smaller.

Thus in both these cases, though inverse correlation between relative price and quantity changes, presumably a pure substitution effect, contributed to mitigate the rise in unit value, other factors were at work. The gap between the Paasche index and unit value shows this. Subtracting the outlet effect from the Paasche index yields an approximation to the unit value index.

In the case of potatoes too, hypermarkets and supermarkets gained market share, from the more expensive alimentations générales, though their relative prices remained unchanged. Potatoes bought from producers and wholesalers were much cheaper throughout but lost some market share. Presumably, many consumers who shifted over to shopping in hypermarkets and supermarkets from more traditional outlets found it convenient to buy their potatoes there as well.

3c. Conclusion concerning unit values

What conclusion does all this lead to? It is that where unit values cover more than one brand and/or more than one outlet type, divergences between the change in unit value and the change in a Laspeyres index with the same coverage can *not* be used as a measure of the bias due to pure substitution effects and/or to the introduction of new brands or outlets (or the disappearance of old ones). There may well have been other components of these divergences, namely shifts between brands or outlets caused by other factors which should not be reflected in an unbiased price index. So observed excess increases in Consumer Price Index sub-components over the increases in corresponding unit values may have misled us about the amount of bias in our Consumer Price Indexes.

These other factors that cause shifts between brands and outlets can be numerous. They obviously include changes in income, fashion, marketing effort as well as other factors. Here is one example:

Sales of liquid detergent dropped 10% in the first half of 1994, making it one of the fastest declining products in Europe, according to data compiled for The Wall Street Journal Europe by the market research firm AC Nielsen. Sales of laundry detergent used for washing by hand also fell, by 6.2% in the period.

The change doesn't mean people are wearing dirtier clothes. But it does represent a shift in the way consumers are doing their laundry.

According to analysts, more Europeans are turning to powdered brands, which are viewed as less messy and more convenient than liquids. Price-conscious buyers are switching to traditional powders, and those looking to upgrade are buying concentrated powders.

An important cause of shifts between brands which is neither a brand substitution effect nor the result of the appearance of new products is changes in the price of *other* products and/or outlets. For everyday shopping items, changes in relative prices between outlets may explain more than the discussion of chocolate suggests, for they may play a greater role at an aggregate level than they do at an individual commodity level. If consumers bought some of their milk chocolate bars as part of their food shopping, the relative prices that influenced their outlet choice will have been the *total costs of whole food shopping baskets*, not just the cost to them of the chocolate.

More generally, the contribution of pure price substitution effects, the opening of new outlets and the closing of old outlets may account for a larger proportion of differences between changes in the average total cost of a basket and its price index than of index/unit-value differences for some of its components taken individually.

4. Product quality adjustment

4a. Available adjustment procedures

The various procedures followed in practice when one product replaces another are as follows. The first two are simple algorithms which avoid explicit quality adjustment:

1. Treating the whole of any price difference as representing a quality difference, so that the replacement does not affect the value of the index. Now, Article 5.(2) of the European Commission's Regulation No. 1749/96 lays down that "in no case should a quality change be estimated as the whole of the difference in price between two items, unless this can be justified as an appropriate estimate." This applies to forced replacements but Article 2.(c) relating to optional replacement states that "A quality change does not arise when there is a comprehensive revision of the HICP sample".
2. Treating the replacement as essentially similar, its price being used in the calculation as if the replaced product were still included, so that the whole of any price difference affects the value of the index. Article 5.(2) of the European Commission's Regulation No. 2494/95 requires this for forced replacements when no estimate of the value of the quality change is available.
3. Use of option prices to value characteristics present in the replacement product and absent in the replaced product or vice versa.
4. Manufacturers' estimates of cost differences grossed up to allow for their margins and distribution margins.
5. Price collectors make a quality judgement and report essential similarity or propose a quality adjustment, which may be reviewed at the head office.

6. An expert quality judgement is made and essential similarity or a quality adjustment is decided at the head office.
7. A quality adjustment is made at the head office, using hedonic coefficients.

The last five all require comparison of the characteristics of the replacement and the replaced product. None of the last six can be applied when a wholly novel product is introduced into an index.

4b. Prices and expert judgements

Expert judgements may consider performance characteristics (such as the fuel consumption of a car) as well as physical characteristics. Examples of one type of expert judgements are provided by the reports of consumer associations and by product evaluations in magazines. These are not bilateral comparisons between two products but award ratings to each of a set of products. They are presumably estimates of how a well-informed and thoroughly rational consumer would appraise products. It is far from obvious that they are relevant to a “true cost of living” index, let alone an inflation index.

Quality as such experts judge it is *not* well correlated with price. Two pieces of evidence support this proposition:

- They frequently recommend a Best Buy, meaning that the selected product offers more quality per ECU than the rest.
- William Wilkie (1990) quotes a study which calculated price-quality correlations for 135 different product categories using *Consumer Reports* product ratings. The average correlation was only +0.26. They ranged from +0.9 to -0.66. Just over a half of the products showed a positive correlation, just over a third showed no correlation and the rest showed a negative correlation.

4c. What is quality adjustment?

The word “quality” has so many meanings and aspects that it is perhaps unfortunate that we use it in discussing price indexes. A “quality adjustment” in an index should not reflect a statistician’s own subjective appraisal of the appeal or utility of a product. It should merely be an objective estimate of the market value of a difference in characteristics, not a judgement about how much a sensible consumer should pay for them, which is what the expert judgements discussed in the section above were about.

Quality adjustment is required only when one product sold in a given outlet is replaced in the sample by another product and/or outlet. Note that:

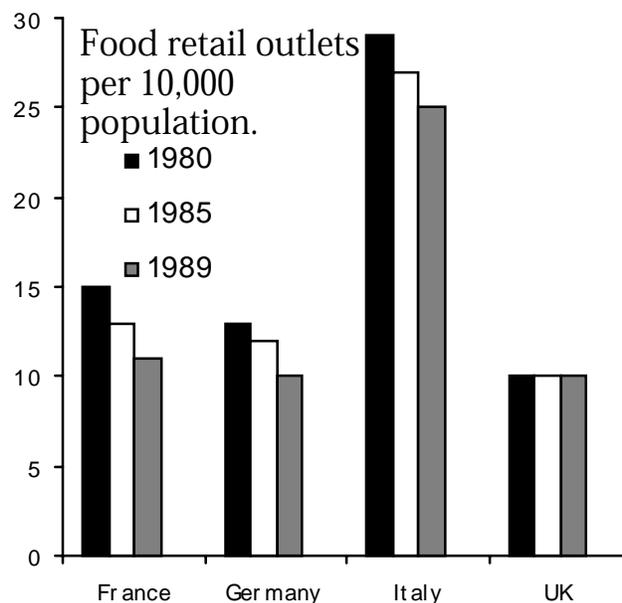
- Only differences in characteristics within product groups are relevant. Differences between beef and beer, for example, are not relevant, as beef is never replaced by beer in a sample.
- Differences in characteristics between outlet types are equally relevant in principle.
- Differences in characteristics which cannot easily be observed or ascertained by price collectors or statisticians at head office simply *have to* be ignored, though Brand or Country of Origin, which are easily ascertainable, may provide a useful proxy for some characteristics.

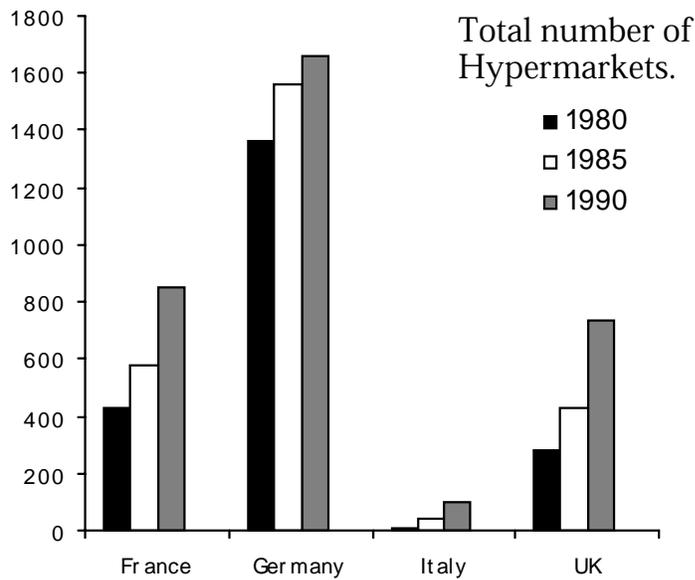
- Differences in characteristics *should* be ignored by index compilers unless option prices are ascertainable or systematic relationships between prices and the existence or amount of particular characteristics can be reliably estimated, using cost data, neural networks in experts' or statisticians' heads or hedonic regression. If, in other words, the market displays no clear evaluation of a characteristics difference, the estimate of the current market value of a basket of constant-characteristic items ought to take no notice of that difference.
- Estimates of how a well-informed and thoroughly rational consumer would appraise differences in characteristics are neither relevant in principle nor, as shown above, highly correlated with market price relatives, so procedures 5 and 6 should not be used.

5. Outlet quality adjustment

5a. The importance of outlet change

Here are some data from Zanderighi & Zaninotto (1994) illustrating the magnitude of the changes in outlet composition and differences between countries during the 1980's.





The next quotation is of interest because it shows that shifts towards new outlets may involve higher rather than lower prices. The characteristics that have made gas stations attractive are not capable of measurement by price statisticians.

Europe's Gas Stations Turn to Food Sales

(February 2nd 1994 Marketscan report)

Amid tough competition in fuel sales and consumers' growing interest in late-night shopping, more and more gas stations are turning into convenience stores. The UK subsidiary of Texaco Inc. of the US is planning to open its first gas-less station this summer. But all over Northern Europe, rigid store-closing hours are driving consumers to service stations for after-hours purchases.

"Gas stations are the mom-and-pop shops of today," observes Juergen Ziegner, head of the German Gas Stations Association. In Germany, sales of candy, cookies and potato chips at gas stations grew almost three times as fast as those in regular grocery stores, according to a recent study by market research firm ACNielsen.

Within that category, sales of salty snacks alone jumped 29% between February and November, compared with a meagre 3% growth in the grocery sector. Similarly, cookie sales shot up 28%, while supermarket cookie sales increased only 1%. And double-digit growth in gas-station food sales will continue in 1994, ACNielsen says.

To spur sales even further, gas stations are stretching their stores far beyond mom-and-pop concepts. Esso, the German subsidiary of US oil giant Exxon Corp., sells fresh meat and croissants, has sandwich stands and automatic teller machines, and currently is negotiating with Germany's ailing postal system to sell stamps and package services.

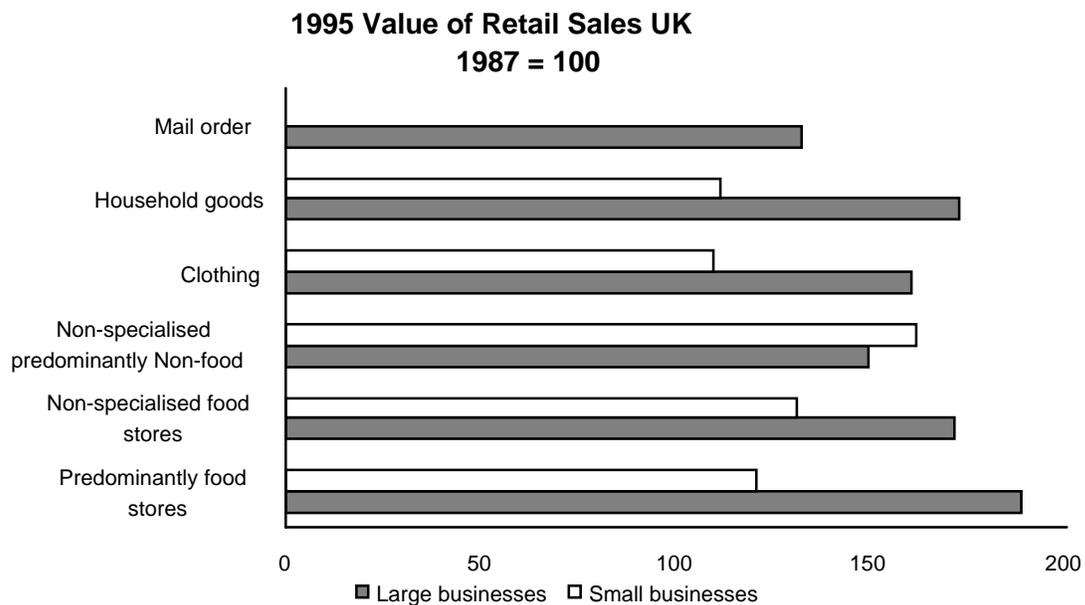
Rival station Aral, a unit of energy concern Veba AG, is selling car phones, phone cards, cassette tapes and compact disks, and computer software for route planning. In 20 of its 2,700 outlets, the company is testing vending machines for theatre tickets and even last-minute package holidays to Greece, Spain or Turkey. "The oil-smudged gas station attendant is part of the past," says Esso spokesman Alexander Geck. "When we occupy a new station, we look for a retail expert first," he explains. New Esso stations usually measure at least 130 square meters to accommodate the expanding grocery business, up from 40 to 50 square meters in decades-old stations.

In Britain, 800 of British Petroleum Co.'s 1,500 outlets already have large shops with services ranging from dry cleaning to video rentals. BP says half of its customers come to shop without pumping gasoline.

Gradual changes in consumer habits are also encouraging gas stations' diversification into the grocery trade. To a growing number of small households that prefer ready-made snacks to traditional shopping and preparation, fuel stations offer convenience and proximity. Most important, they allow for impulse and emergency purchases when other stores have closed. "It has been proven that gas stations cater to spontaneous needs," says Mr. Ziegner at the German trade association. "A bottle of champagne sold at a gas station at night wouldn't be bought at (German supermarket chain) Edeka tomorrow," he argues. Surprisingly, retailers agree. "Of course, their sales are hurting stores and supermarkets," says Wolfram Schmuck at Rewe, a store chain owned by Rewe-Zentralfinanz EG. "But they would attract impulse shopping even without the closing-hours law."

Retailers say gas stations' limited product range and higher prices will keep supermarkets filled for the foreseeable future. While gas stations claim they're trying to keep food prices within 10% above store prices, a regular chocolate slab may sell for twice the regular retail price. "We will never be as cheap as a supermarket," shrugs Esso's Mr. Geck. "We're catering to people who have little time and don't have to pinch pennies," he argues.

Finally, here are some recent Value of Retail Sales indexes for the UK from *Service Sectors: Retail Sales - Data for August 1996* published by ONS for 1995, with 1987 as 100, which distinguish large businesses from small businesses and show changes in their market shares.



5b. Outlet characteristics

The only procedure followed in practice when one outlet replaces another is no. 1 in the list above, which implicitly assumes that the whole of any price difference represents a quality difference, so that outlet replacements do not affect the value of the index. Could procedures like nos. 2 and 5 -7 be used for outlet substitution?

Procedures 5 -7 could only be applied if the major characteristics of two outlets could be compared as readily as the major characteristics of two products. So what are the important outlet characteristics? Here are just a few:

- Friendliness and helpfulness of sales assistants and checkout clerks,
- Policy on returned goods
- Parking facilities
- Hours of opening
- Queuing time at cash desks
- Spaciousness of sales area
- Range of products sold
- Number of varieties of each product type sold

There is no need to continue. Some of these characteristics

- Could be ascertained only with difficulty.
- Cannot be quantified and used in hedonic regression, even as categorical variables.
- Cannot have a money value attributed to them by price collectors or experts.

So procedures 5 - 7 cannot be applied to all major characteristics. Even if they could, the size of the data set of both product and outlet characteristics required to compute reliable hedonic coefficients would be forbiddingly large.

Nonetheless, outlet characteristics are certainly reflected in prices. Four examples are provided in a hedonic regression study of price differences for daily goods between Stockholm and Gothenburg (Norberg 1992). This used 10 assortment and service variables, 4 of which turned out to be statistically significant. Convenience shops (no more than 3,000 items sold, open on Sundays and at least 70 hours a week, no manual service counter and located close to dwellings) had 3%-14% higher prices - the 95% confidence interval estimate - than other shops. Shops with only a small number of varieties of mustard, paté, spaghetti and toothpaste had 4% - 11% lower prices than other shops. Shops closed on Sundays had 1% - 6% lower prices than other shops. But convenience shops without trolleys were more expensive than convenience shops with them, and the other 6 out of the 10 assortment and service variables that were tried turned out not to be statistically significant!

Marshall Reinsdorf (1993) made a statistically sophisticated comparison between the prices of 35 food items and 5 petrol and diesel prices in outlet samples rotated into and out of the US Consumer Price Index in 16 areas in 1987 and mid-1988 to mid-1989. He found that the mean price level change for the food items in these areas was minus 1.32%, and was much the same for motor fuels, though the latter estimate was not significant at the 5% level because of a small sample size. The outlet types are not described, but the household expenditure patterns reflected in the new outlet samples were five years later than those in the old samples. Hence it seems clear that shifts in purchase patterns over the five-year period towards lower-priced outlets accounted for the change, subject to a caveat concerning any quality

differences between the sampled varieties of the items in the two samples.² The change in prices between the samples presumably reflected all three of pure price substitution effects between existing outlets, shifts between existing outlets due to other causes and the opening of new low-price outlets.

5c. Two simple procedures

Consider first the simple case where the product is essentially similar in the replacement outlet and the replaced outlet. Procedure 2 from the list provided earlier in section 4a is clearly feasible: the index is reduced if the product is cheaper in the replacement outlet.

Regression on both years		
Adjusted R Square	0.57	
No. of observations	204	Exp of
	t Stat	Coefficient
Intercept	38.2	4.82
Year	1.0	1.02
Size 200	-3.7	0.90
Size 300	-7.3	0.81
Grands Supermarchés	0.2	1.01
Petits Supermarchés	-1.0	0.96
Supérettes	4.3	1.18
Magasins Populaires	1.5	1.07
Épiciers Traditionnels	7.8	1.33
Poulain	-1.3	0.95
Cote d'Or	3.4	1.14
Lanvin	-2.1	0.88
Nestlé	1.2	1.07
C.B.V.	3.1	1.18
Other brands	1.6	1.06
Carrefour	-1.7	0.82
Other Distributors	-5.1	0.83

² Reinsdorf also compared movements of unit values of various food items with changes in the corresponding Consumer Price Index subindexes over a nine year period, finding that the latter rose 2% faster per annum, but it subsequently emerged that much of this strikingly large difference reflected functional form biases in the index.

A second simple procedure, number 7 from that list, would use the type of outlet as one characteristic of a product and apply hedonic regression coefficients for outlet types for making outlet quality adjustments. An example of what such a regression would look like can be obtained by using the milk chocolate data. The individual observations should ideally be used, not the group averages for each brand/size/outlet combination. But the aim is simply to illustrate the form which this simple approach would take.

A 100 gramme Suchard bar sold in a Hypermarché was taken as base, so the equation gives its price as FF 4.82. The estimated price (per 100 grammes) for example of a Cote d'Or 200 gramme bar sold by an Epicier Traditionnel would be $4.82 \times 0.90 \times 1.33$. If this were replaced by a Cote d'Or 200 gramme bar sold by a Magasin Populaire, the quality adjustment would be $1.07 \div 1.33 = 0.8045$.

A superior example of the second simple procedure using between 3,700 and 9,400 individual price observations for each of nine fairly homogeneous food product groups from the US price collections made in the first eleven months of 1991 has been provided by Mary Kokoski (1993). She computed semi-logarithmic regressions where the variables were quality characteristics that could be identified from the data, and dummy variables for outlet type, month, geographic area and whether the price came from a sample newly rotated into the database. The table shows her outlet-type coefficients exponentiated. Those in bold type were statistically significant at the 5% level. The reference outlet type was the most common type – Chain grocery store. Since product characteristics were included in the regressions, the differences shown in the table are not due to differences in those product characteristics that were measured, which excluded brand names.

	Independent Grocery	Convenience Store	Chain Drug Store	Independent Drug Store	Warehouse Club	Gas Station
Flour mixes		1.79			0.90	
White bread	1.05	1.14	1.40		0.66	1.13
Cookies	1.00	1.07	1.90		0.84	0.52
Ground beef	0.94	1.08			1.00	
Fresh apples	0.93	1.06				
Candy, Gum	0.90	1.02	1.23	0.69	0.42	1.13
Cola beverages	1.04	1.28	0.93	1.14	1.03	1.22
Roasted coffee	1.07	1.02	1.08		0.76	
Canned soups	1.05	1.82	4.44		0.73	

5d. Can the simpler procedures be applied?

As regards the first simple procedure (treating the whole of any price difference as a price change when the replacement product is essentially similar), consistency in the case of *forced* replacements would appear to require subtracting the product quality adjustment from the price difference when the replacement product is not essentially similar, treating the residual as a price change. But when the replacement product was disparate it would have to be omitted from the index for one month, thus implicitly assuming no price change.

Optional replacements made when the sample of products and outlets is revised normally involve no one-to-one matching of a particular replaced product in a particular outlet with a specific replacement product in a specific replacement outlet. Hence the first simple procedure cannot be applied.

Is the second simple procedure a better candidate? Outlet type coefficients could be used to determine the price reduction or increase reflected in a shift of purchases towards new outlets and/or away from disappeared outlets. (Note that, as argued in section 3, it would be wrong to apply the coefficients to shifts between continuing outlets.)

Two problems would arise:

- What should the statistician do if, as seems likely, reliable coefficients for outlet types which are diminishing in number and for outlet types which are increasing in number could not be obtained for *all* the product groups sold in them which are in the sample?
- If the coefficients turned out to differ between product groups might they not be unstable?

6. Conclusions and a question

1. Substitution bias between elementary aggregates may be over or underestimated by comparing a Fisher-type weighted average of elementary aggregate indexes with a Laspeyres-type weighted average of them.
2. The importance of new outlet/product bias cannot be judged by comparing changes in base-weighted price indexes with changes in unit values.
3. Expert judgements of how a well-informed and thoroughly rational consumer would appraise products and empirical estimates of the price-determining characteristics of products are of dubious value.
4. Some important price-determining characteristics of products are quantifiable (alcohol content, processor speed), or binary (presence or absence of a sun roof); many others are capable of categorisation (brand). They are thus readily ascertainable by statisticians.
5. Some important characteristics of outlets are largely qualitative in nature and not capable of categorisation. Moreover, their evaluation differs much more between consumers (young people like a shop patronised by young people, their elders do not, but they agree that a bigger TV screen is a good thing).
6. So quality adjustments are feasible for differences in many product characteristics but for scarcely any outlet characteristics.
7. However it may be possible to estimate and use hedonic coefficients simply for outlet types.

I have argued that shifts towards cheaper outlets that are neither induced by relative price changes nor by appearances and disappearances of outlets and products should not lower a Consumer Price Index. But while this follows from a “True Cost of Living” approach - preserving constant utility with unchanged preferences - does it apply to an index designed to measure inflation?

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