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AN APPLICATION OF THE HEDONIC PRICING TECHNIQUE TO CIGARETTES IN THE UNITED KINGDOM

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Abstract

Hedonic pricing provides a method of establishing implicit values for the non-priced attributes which comprise a marketed good. A model for cigarettes is posited and estimated using a sample of cigarette brands sold in the United Kingdom. A market segmented on the basis of cigarette size is found to exist and revised functions for the two market segments reported. Consumers in the two markets were found to differ in terms of their valuation of tar, nicotine and carbon monoxide contents of cigarettes and in terms of the importance they attached to a brand having what was considered to be a sophisticated image. For smokers of king/super king sized brands a positive value was attached increments to nicotine content and decrements to tar content over the range studied. For smokers of regular sized brands a positive value was attached increments to tar content and decrements to nicotine and carbon monoxide content. Both attached a positive value to the use brand names with connotations of sophistication. The models produced, while imperfect, suggest an additional policy instrument available to government in reducing incidences of lung cancer and heart disease is the encouragement of producers to exploit opportunities in the cigarette markets for further brand proliferation, an approach which is likely to meet with more success than existing methods based on coercion alone.

Introduction

A good may be considered as comprised of a vector of attributes and to be uniquely defined by that vector of attributes[1,2]. Implicit in the price paid for the good is a price paid for each of these attributes at the level observed. Using multivariate techniques to control for levels of other attributes, it may be possible to estimate variations in market price associated with variations in a single attribute. If a good's price can be assumed to be determined within a single competitive market, variations in market price associated with changes in the level of a particular attribute can be inferred to describe the value added implicitly by increments or decrements to that attribute i.e. as the implicit price paid for changes in the level of attribute under consideration. This approach to valuation of attributes is known as the hedonic pricing technique.

Under conditions of consumer homogeneity, estimates of implicit values can be differentiated. From the resultant bid function, willingness to pay for increments to a non-traded characteristic can be inferred[3] . Where conditions of homogeneity do not hold, the implicit values can be used as the dependent variable in a second stage regression incorporating characteristics of the consumer (such as income, education etc.) to generate estimates of willingness to pay[4] .

More formally let :

$$H_i = H(A_{i1},...,A_{iJ}) \qquad [1]$$

where H_i is the ith brand of a good H, described by a vector of attributes A, of which there are J.

$$P_i = P[A_{i1},...,A_{iJ}] \qquad [2]$$

P_i is the competitively determined market price of the ith brand and $\delta P/\delta A_j$ the market value of the level of the jth attribute present in the good.

$$MV_j = \delta P/\delta A_j \qquad [3]$$

$$WTP_j = \delta MV_j/\delta A_j \qquad [4]$$

i.e. $\delta MV/\delta A_j$, for a group of homogenous consumers, will be the willingness to pay for increments or decrements in the jth attribute. For hetrogenous consumers, as noted, these values are regressed on consumer characteristics to determine individual demand functions.

To legitimately infer that WTP_j estimates returned by the technique accurately reflect actual willingness to pay, the assumption of competitively determined prices must hold. If this is not the case, the price of traded goods observed will not reflect those individuals are in fact willing to pay, nor will estimated implicit prices.

The technique has been used, often in relation to property markets, to value a range of non-traded goods including adjustments to health risks[5]. It is debatable, however, whether in relation to such markets conditions for the production of accurate estimates of WTP_j hold. The number of attributes to be considered in relation to housing (and possible collinearity between these), the extent to which consumers can be assumed to be fully informed with respect to these , the role of transaction costs and possible market segmentation in limiting competition, could, for example, provide grounds for questioning the reliability of estimates[4]. Through a more thoughtful choice of traded good, however, the technique may well provide insights into consumer valuations of attributes including health risks and the implications for policy which follow from these.

Consider the marketed good cigarettes. For smokers, utility may be hypothesized as arising from the taste of the tobacco, the physiological effects associated with its consumption and any perceived enhancement of the smokers image associated with consumption of a particular brand. The relevant attributes of cigarettes, to the consumer, that is, may be considered to be taste, physiological effect(s) and its perceived image enhancing properties.

Each of these attributes will in turn be related to components of the cigarette. Factors likely to influence the taste of a particular brand, will be tar content, carbon monoxide content - related to how tightly the tobacco is packed in the cigarette - the presence or otherwise of a filter, and whether or not the cigarette is mentholated. By the same token, nicotine content, together with - over a period of prolonged exposure - tar and carbon monoxide levels and the presence or otherwise of a filter will be relevant to the physiological effects of smoking a particular brand[6] . Cigarette size i.e. whether king/super king size or regular size, in as much as it is related to the duration of the smoking experience, should be related to all of the aforementioned, as well as aspects of image. Finally, in relation to image, the connotations associated with a particular brand name will be relevant to the image associated with smoking that brand[7,8].

The number of attributes involved here are comparatively few and the extent to which consumers can be assumed to be well informed regarding them is high. Thus, information on many of these attributes is either published on the side of each packet (tar and nicotine levels) or can be readily obtained through frequent purchases (e.g. in relation to taste). Even for those characteristics to which the consumer may not be alerted by information on the side of the packet (the correlation between, for example, tar levels or the absence of a filter and the risks of particular types of morbidity) it seems unlikely given the efforts of various health promotion bodies that smokers will be ignorant as to the existence and nature of these[9,6]. In other words the assumption of informed choice in relation to the traded good seems plausible.

In relation to competitive pricing within a single market, the cigarette market, like most others, is not perfectly competitive. The nature of the market, however, is such that there is likely to be sufficient competition for prices to approximate competitive prices. For example, while just three tobacco companies are responsible for the bulk of cigarettes produced for the United Kingdom market - Imperial Tobacco P.L.C., Rothmans International and Gallagher Ltd. - competition between these and among the retailers who distribute the various brands is strong. Cross border trade in cigarettes will further increase the degree of market competition. It follows that, provided a single market can be deemed to exist, estimates of implicit prices on the attributes outlined, will approximate competitively determined values.

Method

To estimate an hedonic price function for cigarettes data on tar, nicotine and carbon monoxide content (milligram per cigarette) together with the presence or otherwise of a filter, for cigarette brands sold in the United Kingdom was obtained from the Department of Health's Tobacco and Alcohol Policy Unit (TAPU)[10]. From brand names it was possible to distinguish those which were king or super king size from those of regular size, as well as those which were mentholated from those which were not. A focus group of ten final year economics students was established and presented with the names of cigarette brands. The students were asked to vote, on whether the brand names put to them held connotations of "affluence or sophistication". If any of the group considered the brand name posited to have such connotations that brand was deemed to be "imaged".

Data on the retail price of brands sold in the United Kingdom (current at February 1998) was obtained from a supermarket chain. A sample of 60 brands, representing the more popular brands sold, was obtained for investigation. Details of the data set are re-produced in Appendix 1.

A function of the form:

$P_i = P(Tar_i, Nicotine_i, Carbon\ Monoxide_i, Size_i, Unfiltered_i, Menthol_i, Imaged_i)$

was specified.

Tar, nicotine and carbon monoxide levels as specified by TAPU were measured in terms of milligrams per cigarette. Whether cigarettes were filtered or unfiltered, mentholated or non-mentholated and king/super king size or regular sized was identified either using brand names and/or the data supplied by TAPU. Where a brand was unfiltered a dummy variable "Unfiltered" took the value 1 and zero otherwise. Where a brand was mentholated a dummy variable "Mentholated" took the value 1 and zero otherwise. Where a brand was king sized/super king sized a dummy variable "King Size" took the value 1 and zero otherwise. Where a brand was imaged, a dummy variable "Imaged" took the value 1 and zero otherwise. Finally, the brand price P was expressed in £ per pack of 20. No attempt was made to estimate a second stage regression incorporating socio-economic characteristics of the smoker in the analysis or to estimate actual willingness to pay. As this was an exploratory exercise in the use of the technique in this context rather than an attempt to estimate willingness to pay to avoid/enjoy certain risks this was not seen as a major failing.

Results

A Box-Cox model[11] was used to test the appropriateness of a linear-log functional form to the data, these results are reported in Table 1. The insignificance of λ in the Table indicates the semi-log functional form to be appropriate. (Other functional forms were experimented with but as these provided poorer fits to the data they were abandoned.) In Table 2 the results of a price function estimated using maximum likelihood techniques[12] are presented.

Examining the results it is evident that brands with the term “king size” or “superking size” in their title commanded a price below those brands where this suffix was not apparent. Assuming such brands were indeed longer than those where the suffix was not present, this result is counter intuitive. That is, longer cigarettes, as noted, would be expected, ceteris paribus, to be valued above shorter ones in as much as they would offer more of the various attributes purchased by smokers.

The result could be explained in one of two ways: either the function is mis-specified - e.g. king and super king sized cigarettes represent something qualitatively different to non-king sized variety, a separate market in these existing and the estimation of a separate function for them being appropriate. Alternatively it is possible that a negative utility is associated with the prolongation of the smoking experience for which consumers must be compensated if they are to be persuaded to purchase the longer brands. That is, a single market exists but various points within in it in terms of cigarette characteristics including size also exist.

To test the hypothesis of a segmented market, separate functions were estimated for the two subgroups of king sized and non-king sized cigarettes. Results from these regressions are reported in Tables 3 (for king sized brands) and Table 4 (for regular sized brands) respectively. As can be seen from the Tables the relationships between price and the regressors are markedly different in the two instances.

In relation to tar, nicotine and carbon monoxide the signs on regressors are reversed for the two groups, though it is noted that in respect of king sized brands the coefficient on carbon monoxide is not significant. For king sized /super king size brands, nicotine and carbon monoxide are positively related to price (though only the former significantly so). Tar levels are negatively related to price. For regular sized brands nicotine and carbon monoxide are negatively related to price and tar positively related to price (all in a statistically significant fashion). For both categories, a premium is attached to image and for neither was whether or not a brand was mentholated significantly related to price. Unfiltered brands (present only in the sub-group of regular sized brands) remained marginally significant and positively related to price.

It is clear from these results that estimation of a single function for the data set would be inappropriate. We interpret this as clear evidence of a segmented market in this good existing. Exploring further segmentations of the market, for example, on the basis of "imaged" versus "non-imaged", filtered versus non-filtered or mentholated versus non-mentholated brands, given overall sample size and the number of observations present in the sub-samples, was not possible. That such segmentations may exist is nevertheless conceivable and must be borne in mind when interpreting results. (The constraints imposed by sample size on the sophistication of the model generally are indeed worth bearing in mind. Thus, for example, the potential role of interaction effects between regressors was not investigated because of their implications for degrees of freedom.)

The caveats outlined notwithstanding, the results indicate that different types of smoker exist and that separate functions should be estimated for these. Smokers of regular sized cigarettes value increments in tar and decrements in nicotine and smokers of king sized brands value decrements in tar and increments in nicotine. Smokers of regular sized brands also attach a penalty to carbon monoxide while for smokers of king sized brands the effect of carbon monoxide is not significant upon price.

In Table 5 the results of a simple ordinary least squares regression of carbon monoxide and nicotine content regressed upon tar content is reported. As can be seen from the Table, the three attributes have a strong positive correlation. Bearing in mind the collinearity between these regressors it would appear that in terms of product space smokers of king sized and super king sized brands are obliged to consume rather more tar than they would ideally wish (at the level of nicotine they desire in the current configuration of attributes) tolerating this in order to obtain the nicotine levels they demand. The results indicate that over the range studied they are relatively unconcerned about carbon monoxide levels. For smokers of regular sized brands, on the other hand, rather more nicotine than they would ideally like at a given level of tar and carbon monoxide is being supplied in the current configuration of attributes, such smokers being obliged to tolerate this in order to obtain the tar levels they demand. This interpretation is given some support by the marginal positive significance for smokers of regular sized cigarettes of unfiltered brands - the filter inhibiting tar intake from a cigarette relative to nicotine intake[13] thus having a deleterious effect on tar consumption and thereby reducing the value attached filtered brands, ceteris paribus.

Discussion

Relating these results to health states, smoking is known to enhance the risk of diseases such as lung cancer and heart disease[6] . In as much as the purchase of cigarettes increases the risk of experiencing such diseases, but all data points from the hedonic function are predicated on such purchases having been made, the results presented shed no new light on the relative value of morbidity or mortality risks between smokers and non-smokers. In as much as the risk of contracting lung cancer and/or heart disease is known to vary with the characteristics of cigarettes included in the functions, differences in the valuation of health states between different types of smoker may, however, be inferred.

Smokers of unfiltered[6,8,9] and mentholated cigarettes[14] are known to experience elevated risks of contracting lung cancer compared to smokers of filtered and non-mentholated varieties. In relation to non-mentholated varieties this information may not be commonly known and the assumption of informed choice, upon which the functions are predicated, may not hold (i.e. inferences regarding differences in the valuation of health states in this instance could be questioned). In relation to the likely impact of a filter upon exposure to carcinogens, by contrast, it seems unlikely that smokers will be ignorant as to the likely implications for their health of smoking unfiltered brands. They may not possess the detailed information that the relative risk of developing lung cancer for smokers of unfiltered cigarettes is 1.7 that of smokers of filtered brands[15,16] but that they knowingly elevate their risk, by smoking such brands, ceteris paribus, seems a reasonable assumption.

Similarly, that increased tar content increases the risk of contracting lung cancer is likely to be well known[17,18,19]. Again, detailed knowledge on the relative risks associated with different tar contents may not be in the possession of smokers but that they knowingly increase the risk of lung cancer by smoking higher as opposed to lower tar brands, ceteris paribus, seems a reasonable assumption. (While published studies relating tar content to lung cancer do not cover the range of contents covered by the current sample, that in general such a relationship will be perceived to exist does seem a credible assumption).

The results reported in Tables 3 and 4 indicate that smokers of regular brands in relative (relative to smokers of king/super king sized brands) and absolute terms value enhanced exposure to the

carcinogens related to lung cancer. This result can be explained in three ways: it could be that smokers of regular brands (and regular unfiltered brands in particular) attach less weight to elevated risks of lung cancer than other smokers (at least relative to the utility they derive from taste, taste and tar being assumed to be positively correlated), that they discount more heavily future events including long term physiological effects such as lung cancer, or that they attach positive values to the elevation of lung cancer risks. That is, if the utility function of a smoker may be written as:

$$U = \alpha\Psi + \beta_1\Phi_{1 + ..+} \beta_k\Phi_k / (1 + r)^t + \tau I$$

(where for simplicity taste (Ψ) is seen a single homogenous concept with a weight α, there are k types of physiological effect (Φ) each of which is beneficial e.g. risk reduction, and each possesses its own weight β_k (which because they may arise in different time periods, may have to be discounted) and image (I) - again for simplicity seen as a single concept - with a weight τ),
for smokers of regular brands $\alpha > \beta/(1 + r)^t$ with respect to lung cancer, because of the relative values attached α and β (both being positive); the role of r in reducing β relative to α, or because the β weight, with specific regard to lung cancer, is in fact be negative. Intuitively a combination of the first two explanations seems the most credible explanation.

In terms of policy implications and with specific regard to lung cancer implications follow from these findings.

Compensating behaviour on the part of smokers could result in the effects of any enforced reduction in tar levels upon the industry in terms of the effect on health states being thwarted. Thus, for example, deeper inhalation[20,21,22] presents one strategy used by smokers to increase their tar consumption from a cigarette with given tar yield and is a strategy known to have been adopted in controlled trials of smokers obliged to switch to lower strength brands. However, by increasing the opportunity for smokers to select combinations of attributes which more closely match those maximising their utility, patterns of behaviour consistent with health enhancement could be promoted. Thus the results indicate that opportunities exist to sell new varieties of king sized brands with lower tar and higher nicotine contents. No evidence exists relating nicotine to adverse health states at the levels present in cigarettes. This being the case consumers, producers and government potentially stand to benefit from the development of new brands containing these characteristics -smokers in terms of the utility they derive from smoking brands more closely

matching their preferred characteristic blend; government by reducing the aggregate exposure to tar and thereby incidence of lung cancers requiring health care interventions and tobacco companies potentially by capturing a larger share of the existing market.

For smokers of regular brands, it is conceivable, given the sign and magnitude of coefficients on carbon monoxide and nicotine, that new brands containing lower quantities of these attributes as well as of tar would be preferred by at least a proportion of consumers. That is, consumers of regular sized brands might be induced to consume lower tar brands were they to offer reductions in nicotine and carbon monoxide mixes. Whether the assumption of ceteris paribus necessary for this to have the desired effects upon risks of lung cancer , is realistic is debatable - smokers of the new brands for example having an incentive to engage in the compensating behaviour not evident for smokers of king sized/ super king sized brands. That scope exists for brands offering lower carbon monoxide and nicotine levels at current tar levels is, however, clear.

Expanding product range in the manner described - new brands of king sized / super king sized with reduced tar levels and increased nicotine levels and new brands of regular sized with existing or reduced tar levels and reduced nicotine and carbon monoxide levels - should reduce aggregate exposure among existing smokers to carcinogens and thereby achieve desired reductions in the incidence of lung cancer. In as much as such gains are achieved by exploiting market opportunities these gains will be consistent with enhanced utility for smokers and potentially profits for producers. It follows that they are more likely to be successful than other health promotion measures adopted alone.

Smoking is known to enhance the risks of heart disease as well as of lung cancer, carbon monoxide being seen as the key constituent in elevating risks here[6]. In line with the arguments already outlined expanding the current product range to include brands with reduced carbon monoxide levels, ceteris paribus, for smokers of regular sized brands should see reductions in exposure to factors contributing to heart disease and as a result reduction in heart disease, ceteris paribus. Thus, given such smokers attach value to brands with reduced carbon monoxide levels the emergence of new brands in these niche areas should see some smokers switch brands to less harmful varieties.

Again the potential exists to use the market to achieve desired health care outcomes by exploiting differences in valuations attached different adverse health outcomes between smokers. Why smokers of regular sized brands should attach a negative value to higher carbon monoxide yielding brands but a positive value to higher tar yielding brands is unclear. It could be that this relates to elements of taste and/or to perceived health risks, though the former appears the more plausible argument. (For the latter to hold would imply smokers fear the risk of a heart attack more highly - and therefore value reductions in risk more highly - than the risk of lung cancer. While conceivable, a priori, there is no reason to believe that this is indeed the case.)

For both larger and regular sized types of cigarette, the brand's being "imaged" as defined by the focus group was positively correlated with price. While the validity of the focus group's assessments in this regard may - given the size of the group and the population from which it was drawn - be questioned, it does result in the production of significant relationships which are consistent with other results from the functions. Thus, image was less highly prized among smokers of regular sized cigarettes than smokers of king sized / super king sized brands indicating a difference between types of smoker. Why this should be the case is unclear, though that it supports the notion of there being two types of smoker one perhaps less image conscious than the other (as well as being more interested, relatively, in nicotine and less interested in tar content than the other) is clear.

The role of image in pricing is noteworthy. The results indicate that through the simple marketing strategy of using a particular brand name it is possible to induce some smokers at least to pay more. That all cigarettes are not labeled in a similar way is perhaps most easily explained by this strategy being related to brand proliferation as means of non-price competition and to parts of the market differing in terms of attitudes to this type of marketing.

Conclusion

The paper has demonstrated that it is possible to use hedonic pricing with an arguably sounder basis in economic theory for cigarettes than for housing. The analysis reported suggests that it may be possible to gain insights using the technique and this good into the relative valuation of health states by different types of individual. It follows that it may be possible to offer potentially useful advice to policy makers on strategies designed to reduce health risks associated with smoking. The

relatively small sample size - representing roughly 21% of all brands sold in the United Kingdom - did limit the degree of sophistication with which the function could be modeled. The size and structure of the focus group (which is unlikely to be representative of smokers generally in terms of age or educational qualifications) must also cast some doubt on the precision of the functions reported. Further work could address both of these issues and seek to incorporate socio-economic characteristics of the smoker into the analysis . It is, however, contended that the samples are sufficiently representative and the models sufficiently robust to warrant consideration of further work. That they suggest an additional, perhaps novel, way of achieving reductions in smoking related morbidity and mortality, (further brand proliferation) it is argued is at least worthy of further investigation.

Table 1

Results of Boxcox Estimation

Variable	Coefficient	t-value
Constant	3.4655	1.49
Nicotine	0.4749	0.43
Carbon Monoxide	-0.0318	-0.46
Tar	-0.0005	-0.01
Mentholated	0.1102	0.56
Unfiltered	0.2799	0.54
King Size	-0.1684	-0.62
Image	0.1557	0.62
λ	0.9716	0.70
σ^2	0.0334	0.33

n=60, log-likelihood=16.85

Table 2

Results of Regression Analysis

Price Per Pack of 20 Cigarettes the Regressand

Variable	Coefficient	t-ratio
Constant	2.8604	18.70***
LnNicotine	-0.1417	-1.96**
LnCarbon Monoxide	-0.3855	-2.35**
LnTar	0.4860	2.74***
Mentholated	0.0725	1.02
Unfiltered	0.2238	2.35**
King Size	-0.1797	-3.92***
Image	0.1351	3.59***

n=60, log-likelihood=16.6, χ^2=15.26**

*** denotes significant at α=0.01, ** denotes significant at α=0.05, * denotes significant at α=0.1

Results were corrected for multiplicative hetreoscedasticity related to the nicotine, carbon monoxide, size and image

Table 3

Results of Regression Analysis For King/Superking

Size Brands Price Per Pack of 20 Cigarettes the Regressand

Variable	Coefficient	t-value
Constant	4.3044	14.31***
LnNicotine	0.6177	3.86***
LnCarbon Monoxide	0.1241	1.36
LnTar	-0.6740	-4.91***
Mentholated	0.0300	1.32
Image	0.1989	6.79***

n=25, log-likelihood=9.08, χ^2=17.60***

*** denotes significant at α=0.01, ** denotes significant at α=0.05, * denotes significant at α=0.1

Results were corrected for multiplicative hetreoscedasticity related to the nicotine, carbon monoxide, size and image

Table 4

Results of Regression Analysis For Regular Size

Brands Price Per Pack of 20 Cigarettes the Regressand

Variable	Coefficient	t-value
Constant	3.0399	58.22***
LnNicotine	-0.0779	-3.46***
LnCarbon Monoxide	-0.5350	-2.78***
LnTar	0.5738	2.89***
Mentholated	0.1748	1.46
Image	0.0545	3.25***
Unfiltered	0.1748	1.67*

n=35, log-likelihood=9.87, χ^2=17.77***

*** denotes significant at α=0.01, ** denotes significant at α=0.05, * denotes significant at α=0.1

Results were corrected for multiplicative hetreoscedasticity related to the nicotine, carbon monoxide, size and image

Table 5

Regression Analysis of Carbon monoxide and

Nicotine Contents on Tar Levels for Sample (mg/cig)

Variable	Coefficient	t-ratio
Constant	1.4983	8.48***
LnNicotine	0.7121	8.49***
LnCarbon Monoxide	0.3936	5.87***

$\overline{R}^2 = 0.96$, $F_{2,57} = 800.36$, n=60

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Appendix 1.

Price (£)	Nicotine (mg.)	Carbon Monoxide (mg.)	Tar (mg.)	King Size/Super King Size 1= yes	Imaged 1 = yes
3.22	0.1	1	1	0	0
3.22	0.2	1	1	0	1
3.27	0.1	1	1	0	1
3.27	0.3	3	3	0	1
2.65	0.5	7	5	0	0
3.27	0.4	7	5	0	1
3.19	0.5	5	5	1	1
3.22	0.6	6	6	0	0
3.17	0.5	8	6	0	0
2.96	0.6	9	6	0	0
3.18	0.5	8	6	1	1
3.00	0.6	8	6	0	1
3.17	0.6	10	8	0	0
2.79	0.6	10	8	1	0
3.49	0.7	9	8	0	1
3.16	0.7	9	8	1	1
2.47	0.6	10	8	0	1
3.18	0.7	8	8	0	0
3.01	0.8	7	8	0	1
3.11	0.7	9	8	1	1
3.24	0.7	8	8	0	1
3.01	0.8	8	8	0	0
2.99	0.8	10	9	1	0
2.99	0.8	9	9	1	0
3.36	0.7	8	9	0	1
2.86	0.7	8	9	1	0
2.79	0.7	12	10	1	0
3.48	1.0	10	10	0	1
3.18	0.8	12	11	0	1
3.48	1.0	10	11	0	1
3.18	0.9	12	11	0	0
3.14	0.9	12	11	0	1
2.60	0.9	14	11	1	0
3.28	1.1	14	12	1	1
2.99	0.9	15	12	1	1
2.91	0.9	14	12	1	1
2.99	1.0	16	12	1	0
2.86	0.9	13	12	1	0
3.18	0.9	13	12	1	0

Appendix 1 cont'd					
Price (£)	Nicotine (mg.)	Carbon Monoxide (mg.)	Tar (mg.)	King Size/Super King Size 1= yes	Imaged 1 = yes
3.21	1.0	15	12	0	1
2.96	1.0	15	12	1	0
2.65	1.0	14	12	1	0
2.47	0.9	14	12	1	1
3.48	1.0	16	12	0	1
3.14	1.0	15	12	1	1
3.01	1.0	14	12	0	0
3.17	0.9	13	13	0	0
2.79	0.9	17	13	1	0
3.01	1.0	18	13	1	1
3.39	1.1	14	13	0	1
3.18	0.9	12	13	1	1
3.48	1.1	17	13	0	1
3.46	1.0	10	13	0	0
3.01	1.1	16	13	0	1
3.18	1.0	13	13	1	1
3.24	1.0	13	13	0	1
3.42	0.8	10	13	0	0
2.67	1.0	16	14	1	0
3.54	1.0	10	14	0	0
3.58	1.1	9	14	0	1