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Consumer willingness to pay for animal welfare attributes in a developing country context: The case of chicken in Nairobi, Kenya

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Abstract

In developing countries, especially in sub-Saharan Africa, policy makers have been reluctant to formulate animal welfare policies. This is despite potential benefits of such policies including increased domestic and global consumers' demand for products that are compliant with humane treatment of animals. This study employed a choice experiment method to establish consumer willingness to pay (WTP) for animal welfare attributes in chicken. Data were drawn from 200 chicken consumers in Nairobi, Kenya and estimated using a random parameter logit model. The results indicate that consumers were willing to pay a premium for humanely-treated chicken. The consumers had a positive and significant preference for use of certified transportation means, humanely slaughtered chicken and animal welfare labelling. However, the consumers showed a negative preference for use of antibiotics in chicken production. These findings are vital for formulation of product differentiation strategies in the industry as well as food policy.

Keywords: Animal-welfare, Chicken, Choice Experiment, Kenya
JEL codes: D18; D63; F18.

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1. Introduction and Problem Statement

The debate on how animals should be treated has intensified in the last decade, specifically among animal industry advocacy groups in developed countries. Due to global consumer concerns on standards in food production and distribution, animal welfare has increasingly been recognized as one of the most important dimensions of responsible food chains (Maloni and Brown, 2006). The key aspects of animal welfare include appropriate mechanisms in disease prevention, shelter, management, nutrition, humane handling and humane slaughter (Botreau et al., 2007). According to Wilkins et al. (2005), the welfare of an animal should be considered in terms of the *five freedoms* that were originally developed in 1993 by the United Kingdom (UK) Farm Animal Welfare Council. These are: freedom from thirst, hunger and malnutrition; freedom from discomfort; freedom from injury, pain and disease; freedom to express normal behaviour; and freedom from fear and distress. Intensified advocacy by animal rights activists has expanded awareness on farm animal welfare and considerably reduced the incidences of animal welfare abuse in Europe and USA (Uzea et al., 2011).

In developing countries however, there is high level of animal welfare abuse. For instance, Mogoa et al. (2005) noted that many domestic animals in Africa suffer welfare abuses arising from: neglect; malicious physical injury; starvation; confinement; use of inappropriate modes or facilities for transportation; overcrowding; overworking, inhumane treatment at slaughter, inhumane treatment during capture, branding, and inappropriate working tools. In Kenya, chicken meat is a key delicacy to most consumers. However, the process of chicken production, transportation and slaughter is fraught with inhumane practices. At the production level, the pressure to earn more profits through intensification has led to confinement of chicken in overcrowded cages and even use of certain potentially harmful chemicals such as growth stimulants/hormones in order to expedite attainment of market weights. Further, it is not uncommon to observe chicken being transported in non-designated and/or poorly designed modes such as on top of passenger vehicles or tied upside down on moving bicycles or motorcycles for many hours over long distances. Very cruel methods including twisting of the neck, dipping live chicken in boiling water or plucking feathers of live chicken are used to slaughter them. These inhumane practices expose the chicken to extreme pain and suffering. The situation is exacerbated by lack of regulation on animal welfare in Kenya (AU-IBAR, 2010; Mogoa et al., 2005).

In developed countries, the existence of voluntary public concern for animals, tight animal welfare regulations as well as pressure from consumer groups helps to enforce compliance with humane practices in the value chains. Further, various studies that have assessed consumer willingness to pay (WTP) for animal welfare attributes in meat products in the developed world form a crucial basis for animal welfare-friendly practices (Carlsson et al., 2007a&b; Lijenstolpe, 2008; Lusk et al., 2003; Tonsor et al., 2009). In Kenya however, no study has focused on consumer preferences for animal welfare.

Generally, consumers vary in their perceptions regarding animal welfare and can be classified into three groups (Prickett et al., 2010): *naturalists* are more interested in allowing animals to exhibit natural behaviours and exercise outdoors; *price seekers* are mainly concerned with low prices; and *basic welfarists* value animal welfare but perceive it can be achieved by just providing food, shelter, water, treatment from injury and disease. The literature shows that consumers are generally willing to pay premiums for products made under good conditions (Elliot and Freeman, 2001). For example, Auger et al. (2003) found high valuations of consumers' aversion to animal abuse and child labour. Understanding consumer attitudes and preferences for animal welfare, and how people's demographic characteristics relate to concerns for animal welfare helps food producers and traders to target the compassionate consumer by developing niche market strategies that address specific market segments (Prickett et al., 2010). Moreover, Bennett et al. (2002) found that consumers with high moral concern for animal welfare issues are willing to pay more for products generated from production systems designed with due considerations of animal welfare aspects.

This study focuses on analysis of consumer WTP for animal welfare attributes in chicken in Kenya. It is envisaged that such insights will illuminate the understanding of policy makers to design and enforce appropriate animal welfare regulations. Moreover as noted by Bowles et al. (2005), effective concern for animal welfare can be used as an added-value product in the domestic as well as export market. In this respect, this study fits in the overall theme for the international conference of agricultural economists (ICAE 2015) of '*Agriculture in an interconnected world*' on the critical issue of animal welfare that forms an exciting integral part of trade policy debates. Indeed, Dentoni et al. (2011) observes that all companies along the global meat value chains, from farmers to retailers are obliged as a matter of necessity to cope with the issue of animal welfare. Therefore,

assessment of consumer preferences for animal welfare attributes is crucial to enhance compliance with humane practices in Kenya's chicken value chain.

The remainder of this paper is organized as follows. Section two describes the methodology, while the results are presented and discussed in section three. Finally, the conclusions and policy implications are offered in section four.

2. Methodology

2.1. Choice Experiment Method

The choice experiment (CE) method (Adamowicz et al., 1998) was applied to investigate consumer WTP for animal welfare attributes. The CE approach is a stated preference (SP) *ex-ante* method for assessment of goods/services that are not fully traded in the market and would not be easily evaluated through revealed preference approaches (Louviere et al., 2000). As noted by Lusk et al. (2003), choice experiments allow estimation of tradeoffs among alternatives by replicating realistic purchasing scenarios and enabling evaluation of multiple attributes. The CE method was considered to be the most appropriate approach for this study because concern for animal welfare is a relatively new concept in Kenya, hence its valuation through a non-market approach. In recent literature, applications of the CE method have been extended to include evaluation of preferences for improvements in existing policy interventions (Espinosa-Goded et al., 2010). Other empirical applications of CE include assessment of quality changes in environmental attributes (Garrod and Willis, 1999; Hanley et al., 2006), consumer preferences for food safety (Loureiro and Umbeger, 2007), and preferences for disease-free zones (Otieno et al., 2011). The present study contributes to literature through application of the CE method to understand consumer WTP for animal welfare attributes in chicken in Kenya.

2.2 Choice Experiment Design

The CE design of chicken animal welfare compliant practices involved extensive literature review; key informant interviews; and a focus group discussion (FGD) with 11 randomly selected consumers. Following suggestions by Bateman et al. (2002), the FGD was also used to validate attributes identified and levels for inclusion in the design. Six attributes were selected from the validation process, for the CE design. These included: method of transportation; freedom of chicken movement; use of growth hormones in chicken production; method of

slaughter; animal welfare labelling; and price per kilogram of chicken. The attributes and their levels are presented in Table 1 below.

[Insert Table 1 here]

Besides price which was set at three levels, two levels reflecting the current non-humane approaches and the globally accepted humane way of handling chicken, were used for each of the five other attributes. *Certified transportation* would entail use of spacious and well-ventilated trucks or vehicles that are fitted with comfortable feeding facilities and chicken are carried in upright position. *Confinement* of chicken in individual production cages restricts their movement and denies them the freedom to freely interact with others and to express normal behaviour (Wilkins et al., 2005). In order to prevent harmful residual effect on human health and animal welfare, the use of *antibiotics and growth hormones* either through feed or injections to fasten chicken growth during their entire life is prohibited (Botreau et al., 2007). The *method of slaughtering* chicken is very crucial in order to prevent extreme pain and suffering. Humane methods that are generally recommended include: professional stunning through use of captive bolt, gas or electric power; and '*Halal'*, which is associated with Islamic faith and entails use of a sharp knife without pre-stunning. However, as noted by Mogoa et al. (2005), various cruel methods are used to slaughter chicken in Kenya. These include: twisting chicken neck/strangling, manually plucking chicken feathers while they are alive, and painfully killing chicken by dipping them in boiling water before cutting the neck. *Labelling* of animal welfare compliance is meant to communicate to consumers and possibly entice them to buy humane products. Thus, as noted by Grebitus et al. (2012), consumer purchase behaviour for existing and new attributes can be signalled by appropriate labels. Finally, the average *price* per kilogram of chicken from various retail outlets (Kshs 600) was used as the base price level. Following suggestions from the FGD, two other levels representing progressive improvements in animal welfare compliance were included. In line with insights from Olynk et al. (2010), the price levels applied in the CE design are consistent and comparable with the prevailing retail prices at the time of the survey.

The CE design was generated following a two-step procedure using NGENE software (ChoiceMetrics, 2009). In the first step, a fractional orthogonal design was generated from the attributes and this was used in an exploratory survey on a preliminary sample of 42 respondents. The information gathered from this stage was analyzed to obtain prior parameters. In the second step, the '*priors*' were used to generate a *D-optimal* CE design

(i.e., a design which yields data that enable estimation of parameters with significantly low standard errors at relatively smaller sample) (Bliemer and Rose, 2010). The design had high *D-optimality*, *D-efficiency* measure of 89.61%, and a relatively good utility balance, a *B-estimate* of 92.15%, that surpasses the minimum threshold measure of utility balance, B-estimate of 70%. This shows there was an insignificant likelihood of dominance by any alternative in the choice situations. Further, the CE design generated had an *A-efficiency* measure of 88.66%; implying that the variance matrix could yield reliable estimates (Huber and Zwerina, 1996). The final design had 30 paired choice profiles that were randomly blocked into five sets of six choice tasks. Respondents were randomly assigned to one of the five sets. Each choice task consisted of two alternatives (A and B) and an opt-out/no buy alternative (C) in which all animal welfare attributes were set at the 'zero level'. During the survey, respondents were asked to consider only the attributes presented in the choice tasks and to treat each choice task independently. One of the choice tasks presented to respondents is illustrated in Table 2 below.

[Insert Table 2 here]

Overall, the design generated in this study fulfils the optimal CE design dimensions suggested by Caussade et al. (2005). A pretest of the CE questionnaire on a further 36 respondents showed that up to six choice tasks could be managed by a respondent.

2.3. Sampling and Data Collection

A random sample of 200 chicken consumers was surveyed. The consumers were purposively drawn from residential areas, main commercial centres and markets with high concentration of chicken trade in Nairobi city. Data was collected through face-to-face interviews using structured questionnaires at places of residence, retail outlets and restaurants. To qualify for interview, one had to be an adult of 18 years or above, and be a regular purchaser or consumer of chicken.

2.4. Data Analysis

In order to account for preference heterogeneity, the analysis of the CE data was explored using both the random parameter logit (RPL) and latent class model (LCM). The RPL model, commonly referred to as the mixed logit, was found to fit the data better and hence no further reference is made to the LCM. Following Revelt and Train (1998), the utility obtained by individual *n* from alternative *i* in choice situation or time period *t* was specified as:

$$U_{\text{int}} = \beta_n X_{\text{int}} + \varepsilon_{\text{int}} \quad (1)$$

where X_{int} is a vector of observable variables, β_n is an unobserved coefficient vector for each individual and varies in the population with a density function $f(\beta_n \mid \theta)$ whereby θ are the parameters of the distribution e.g., its mean and variance. The ε_{int} is an unobserved random term assumed to be identically independently distributed (IID). Conditional on β_n, the probability that individual n chooses alternative i in choice situation t is given by slight modification of the standard multinomial logit (MNL) model as:

$$L_{\text{int}}(\beta_n) = \frac{\exp(\beta_n X_{\text{int}})}{\sum_{j \in C} \exp(\beta_n X_{jnt})} \quad (2)$$

Let $i(n,t)$ denote the alternative chosen by individual n in choice situation t. The probability of individual n's observed sequence of choices, conditional on β_n, is simply the product of standard MNL models.

Assuming that the individual tastes, β_n, do not vary over choice situations for the same individual in repeated choice tasks but are heterogeneous over all individuals, this probability is expressed as:

$$G_n(\beta_n) = \prod_t L_{\text{int}}(\beta_n) \quad (3)$$

The unconditional probability for the sequence of choices made by individual n is expressed as:

$$P_n(\theta) = \int G_n(\beta_n) f(\beta_n|\theta) d\beta_n \quad (4)$$

There are two noteworthy sets of parameters in this expression: β_n is a vector of parameters specific to individual n representing the individual's tastes, which vary over people, and θ are parameters that describe the distribution of the individual-specific estimates such as the mean and covariance of β_n. The objective in RPL is to estimate the θ. This is usually done through simulation of the choice probability because the integral in Equation 4 cannot be computed analytically due to lack of a closed mathematical form. The log-likelihood function is expressed as:

$$LL(\theta) = \sum_n \ln P_n(\theta) \quad (5)$$

The $P_n(\theta)$ is approximated by a summation over randomly chosen values of β_n. For a selected value of the parameters θ, a value of β_n is drawn from its distribution and $G_n(\beta_n)$, i.e., the product of standard MNL models, is computed. Repeated calculations are done for several draws and the average of the $G_n(\beta_n)$ is considered as the approximate choice probability, as expressed in equation 5 below:

$$SP_n(\theta) = \left(\frac{1}{R}\right)\sum_{r=1}^{R} G_n\left(\beta_n{}^{r|\theta}\right) \tag{6}$$

where R is the number of draws of β_n, $\beta_n{}^{r|\theta}$ is the *r-th* draw from $f(\beta_n \mid \theta)$ and SP_n is the simulated probability of individual *n*'s sequence of choices. Following Train (2003), the simulation was based on Halton intelligent draws, which has been shown to yield more accurate results compared to independent random draws. Up to 100 Halton draws were used in the simulations. The simulated log-likelihood function is constructed as:

$$SLL(\theta) = \sum_n \ln\left(SP_n(\theta)\right) \tag{7}$$

The estimated parameters are those that maximize $SLL(\theta)$. With price as one of the animal welfare attributes in the X vector, the consumers' marginal willingness to pay (WTP) or '*part worth*' for each of the other non-price attribute levels was computed as:

$$WTP = -1 * \left(\frac{\beta_k}{\beta_p}\right) \tag{8}$$

where β_k is the estimated coefficient for a food quality or safety attribute level in the choice set and β_p is the marginal utility of the price attribute (Hanemann, 1984).

Finally, the overall WTP or compensating surplus (CS) measure for different animal welfare policy scenarios were analyzed as follows:

$$CS = \frac{-1}{\beta_p}(U_1 - U_0) \tag{9}$$

where U_1 represent the value of indirect utility associated with attributes of the animal welfare scenario under consideration, while U_0 is the indirect utility of the opt-out scenario. Discrete choice analysis of individual preferences was undertaken using *NLOGIT* econometric software (Greene, 2007).

3. Results and Discussion

3.1 Respondents' Socio-demographics

Descriptive results from the survey are reported in Table 3. Majority of the consumers were male, earned monthly income between Kshs 20,001 to 50,000, professed Christian faith and had completed secondary level of education.

[Insert Table 3]

3.2 Willingness to Pay for Animal Welfare Attributes

The consumers were asked on their preferences for various combinations of attributes that represent humane treatment of chicken. Utility parameters for all attributes except price were entered as random variables assuming a normal distribution. The rationale for this is that animal welfare is a relatively contentious subject that generally elicits both positive and negative opinions in public policy debates. The distribution of price is fixed to eliminate the risk of obtaining extreme negative and positive trade-off values (Revelt and Train, 1998). Results of chicken consumer preferences for animal welfare attributes are shown in Table 4.

[Insert Table 4 here]

The RPL model provides a better model fit as demonstrated by the improvement in the adjusted pseudo-R^2 from 20% in the MNL to 31% in the RPL, and log likelihood of -880.2 in the RPL compared to -934.2 in the MNL. Chicken consumers in Nairobi, Kenya had a positive and significant preference for use of certified transportation means, humane slaughter of chicken and animal welfare labelling of chicken. In addition, the consumers showed a negative preference for use of antibiotics in chicken production. However, the consumers preferred restricted movement of chicken, which violates free movement that is consistent with animal welfare requirements. A further probing of this revealed that the consumers were hesitant to allow free movement of chicken due to urban by-laws that prohibit animal rearing in public places and the fear of disease contamination if chicken were left to

wander freely. The statistically significant derived standard deviations show that chicken consumers in Nairobi have heterogeneous preferences for all the attributes considered in the study. Moreover, the statistical significance and negative sign of the price coefficient permits the computation of trade-off measures or willingness to pay (WTP) estimates that explain the monetary value that respondents attach to each attribute of animal welfare.

[Insert Table 4 here]

Marginal WTP estimates are presented in Table 5. *Ceteris paribus*, consumers are willing to pay Kshs 788 to 793 for use of certified transport; 399 to 406 for confinement of chicken; 2,007 to 2,017 to prevent use of antibiotics in chicken production; 1,405 to 1,410 for humanely slaughtered chicken; and 1,027 to 1,029 for animal welfare labelling. These absolute WTP values though much higher than the average chicken price, should only be interpreted as an indication of the strong preference by consumers on the need to incorporate animal welfare aspects in the chicken value chain.

[Insert Table 5 here]

3.3 Compensating Surplus Estimates

Compliance with animal welfare aspects requires consensus building among different stakeholders and a phased implementation approach involving different resource requirements at different stages. Four possible scenarios with different combinations of animal welfare aspects were considered and compensating surplus (CS) estimates were computed for these scenarios. The CS results are presented in Table 6.

[Insert Table 6 here]

Scenario 4 with certified transport, restricted movement, no antibiotics, humane slaughter and animal welfare labelling has the highest CS (3,629), while *scenario 3* that entails no certified transport, free movement, use of antibiotics, non-humane slaughter method and no welfare labelling has the lowest CS (-2,012). Generally, scenarios with humane slaughter (*scenario 1, 2, 4*) have positive CS while scenario 3 with non-humane slaughter has a negative CS. This suggests that the consumers are more concerned about the method of slaughter and indeed they would want chicken to be slaughtered in a way that does not cause extreme pain and suffering. Among the

scenarios with humane methods of slaughter, presence of antibiotics and lack of animal welfare labels tend to push the CS downwards as noted in *scenarios 1 and 2* (CS of 1,617 and 2,601, respectively). Although the CS estimates are higher than the price of chicken per kilogram, what is important to policy is not the absolute values *per se*, but the indication that consumers are indeed willing to pay more for inclusion of animal welfare aspects in chicken production and trade. In terms of implementation, these CS estimates would have to be considered together with other contextual issues such as the cost of chicken production and marketing, as well as costs of regulatory compliance in determining the actual chicken prices.

4. Conclusions and Policy Implications

The study used choice experiment to provide insights on consumer preferences for various welfare attributes in chicken. The RPL model was estimated to examine potential heterogeneity across consumers and their preferences for various welfare attributes in chicken. The derived standard deviations were highly significant indicating that chicken consumers in Nairobi, Kenya have widely varying preferences for the welfare attributes considered. The study also estimated WTP for five welfare attributes in chicken namely; certified transport, restricted movement, use of antibiotics, humane slaughter and animal welfare label.

Several important results were drawn from the analysis. First, consumers attached highest value against the use of antibiotics or growth hormones in chicken. This is believed to be due to consumers' perception of likely health risks of using such antibiotics. Second, consumers also attached high positive values in support of humane slaughter of chicken, animal welfare labelling and certified transport, in decreasing order of importance. Lastly, consumers were willing to pay less for free movement of chicken. A further examination of this finding indicated that the city's by-laws which restrict movement of animals had an influence on the findings.

This study makes an important contribution to pioneering literature on animal welfare studies in developing country context, especially within sub-Saharan Africa. It also provides policy makers in such countries with contextual novel ideas to inform policy formulation. Specifically, certain key interventions are necessary following on these findings in order to enhance compliance with animal welfare aspects. First, chicken producers should be sensitized on the potential benefits of animal welfare compliance. Second, enactment of laws that promote animal welfare and strict monitoring to ensure adherence are necessary. Third, punitive measures should

be instituted to deter exposure of chicken to extreme suffering. Such measures could include penalties in form of hefty fines and prosecution. Finally, targeted investments in the provision of welfare-conducive transport facilities and mobile abattoirs would minimize the exposure of chicken to unnecessary pain during transportation.

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Table 1: Description of Animal Welfare Attributes Used in the Choice Experiment Design

Attributes	*Description of attributes*	*Possible levels of attributes*
Transport to slaughter/sale point	Use of well-equipped and certified trucks	Non-certified; Certified transport
Freedom of movement	Confinement of chicken by restricting them in individual cages	No; Yes
Production by use of antibiotics/growth hormones	Use of antibiotics and growth hormones (and GMO) that fasten chicken growth but have residual effects in human health and animal welfare	Not permitted; Permitted
Method of slaughter	Use of humane methods of slaughter that do not involve stunning (i.e., *Halal* slaughter), twisting of neck or cruel removal of feathers and hot water while chicken is still alive	Conventional non-humane slaughter; Humane slaughter
Animal welfare labelling	Label indicating the chicken meat is compliant with animal welfare procedures	No; Yes
Price	Price per kilogram for fresh chicken (Kshs)*	600; 800; 1200

Note: *Eighty eight Kenyan shillings (Kshs) were equivalent to 1USD at the time of the survey.

Table 2: Example of Choice Options Presented to Respondents

Attributes	*Chicken type A*	*Chicken type B*	*Neither A nor B*
Certified transport facilities	No	Yes	
Confinement/restricted movement	Yes	No	
Use of antibiotics and growth hormones	Yes	No	
Slaughter method	Humane	Non-humane	
Animal welfare labelling	Yes	No	
Price (Kshs per kilogram)	1200	600	
Which ONE would you buy?			

Table 3: Respondents' Characteristics

Variable	*% of respondents (n=200)*
Religion	
Christian	81.0
Muslim	2.5
Others	16.5
Gender	
Male	58.0
Female	42.0
Monthly household income (Kshs)	
Below 20,000	35.5
20,001 – 50,000	46.0
50,001 – 100,000	13.5
100,001 – 150,001	3.0
Above 150,001	2.0
Highest formal education completed	
Primary	6.5
Secondary	30.5
Tertiary certificate	8.0
Diploma	20.5
Undergraduate degree	27.5
Postgraduate degree	5.5

Table 4: Random Parameter Logit Estimates for Animal Welfare Attributes

Variable	*Coefficient*	*Standard error*	*t-ratio*	*p-value*
Certified transport	1.390	0.199	6.976	0.0000
Restricted movement	0.708	0.186	3.804	0.0001
Use of antibiotics	-3.536	0.391	-9.053	0.0000
Humane slaughter	2.474	0.268	9.243	0.0000
Animal welfare label	1.807	0.216	8.383	0.0000
Price	-0.002	0.0003	-6.798	0.0000
Derived standard deviations of parameter distributions				
SdCERT	1.248	0.236	5.283	0.0000
SdRESTRICT	1.676	0.246	6.810	0.0000
SdANTIBIOTIC	2.513	0.391	6.426	0.0000
SdHUMANE	1.068	0.285	3.747	0.0002
SdLABEL	0.666	0.407	1.637	0.1017
Log likelihood		-880.198		
Adjusted Pseudo-R^2		30.60		
n(respondents)		200		
n(choices)		1200		

Note: MNL pseudo-R2 = 20.07; log likelihood = -934.242.

Table 5: Marginal WTP Estimates for Animal Welfare Attributes (Kshs)

Variable	*WTP*	*t-ratio*	*p-value*
Certified transport	790.89 (788 – 793)	8.143	0.0000
Restricted movement	402.63 (399 – 406)	4.157	0.0000
Antibiotics	-2011.63 (-2017 - -2007)	-7.860	0.0000
Humane slaughter	1407.59 (1405 – 1410)	10.550	0.0000
Animal welfare label	1027.88 (1027 – 1029)	9.570	0.0000

Table 6: Compensating Surplus (CS) for Animal Welfare Policy Scenarios

Scenario	*Attribute*					*Compensating surplus (in Kshs)*
	Certified transport	Restricted movement	Use of antibiotics in chicken production	Humane slaughter	Animal welfare labelling	
1	√	√	√	√	√	1,617.37ψ (175.03)
2	√	√		√		2,601.11 (220.89)
3			√			-2,011.63 (255.93)
4	√	√		√	√	3,629.00 (291.04)

Notes: √ indicates presence of an attribute at the non-zero level. Ψ; all the CS estimates are statistically significant at 1% level. Corresponding standard errors are shown in parentheses.