Investigating Thai Shopping Behavior:
Wet-Markets, Supermarkets and the 'Big Middle'

Matthew Gorton[1], Johannes Sauer[2] and Pajaree Supatpongkul[1]

[1] School of Agriculture, Food and Rural Development, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK matthew.gorton@newcastle.ac.uk

[2] Sustainable Consumption Institute and Department of Economics, University of Manchester, Manchester, M13 9PL, UK johannes.sauer@manchester.ac.uk

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Abstract

Drawing on the Big Middle theory of retail evolution, an analysis of primary survey data on Thai shopping behavior seeks to understand the relative satisfaction of consumers with wet markets and supermarkets, identifying the factors that affect frequency of visit to, and purchase behavior within, these retail outlets. This provides the basis for engaging in a wider debate on the possibility of a 'Global Big Middle' for food retailing. On all salient attributes affecting retail outlet choice, supermarkets perform better than wet markets. However for fresh produce, wet markets continue to account for the majority of expenditure, albeit to a far lesser extent than in previous studies. A bootstrapped bivariate ordered probit model identifies that supermarkets are frequented more by higher educated and younger consumers in the capital city but penetration of supermarkets is high for all socio-economic groups. Bootstrapped bivariate Tobit models reveal supermarkets' share of fresh produce expenditure is neither biased to a particular educational group nor related to age or, with exception of fresh meat, household income. The analysis questions previous work which perceived wet markets in east Asia as possessing a long-term competitive advantage in food retailing.

Introduction

The "Big Middle" constitutes a framework for explaining the structure and evolution of retailing institutions (Arnold, 2005; Brown *et al.* 2005; Levy *et al*. 2005; Reynolds *et al.* 2007). It refers to the marketspace 'where the largest number of potential customers reside' (Levy *et al.* 2005, p.85). The latter authors argue that Big Middle retailers emerge by transcending innovative or low price segments, leveraging their relative strengths (superior value) and appeal to the mass market. The Big Middle marketspace is lucrative but highly contested; over time many firms are driven out of the segment. For instance, Levy *et al.* (2005) trace how department stores occupied the Big Middle in US retailing in the 1960s and 1970s, only to be ousted by value leaders and innovative rivals.

To date the Big Middle framework has been almost exclusively applied to the USA, posing the questions as Brown *et al.* (2005, p.104) note: what are the prerequisites for 'the development of a Global Big Middle?' and whether a particular retail format can work everywhere, 'or is it limited to more developed economies?' In North America and Western Europe, supermarkets and hypermarkets, such as Wal-Mart and Tesco, dominate food retailing and occupy the Big Middle. In East Asia, however, supermarkets and hypermarkets play traditionally a secondary role to small-scale retailers and markets, particularly wet markets[1], especially for the sale of fresh produce (Goldman *et al.* 1999; Goldman *et al.* 2001; Ho, 2005). While not using the Big Middle terminology, Goldman (1975) and Goldman *et al*. (1999, 2002) doubt whether supermarkets in East Asia can transcend a niche position and conquer the mass market for food.

The paper contributes to the Big Middle debate in three regards. First, we develop a customer-centric model for explaining the evolution of retail institutions that occupy the Big Middle, drawing on the initial insights of Levy *et al.* (2005). Second, we illustrate how the model can be applied, in our case to food retailing in Thailand. Finally, through the application we assess

[1] Also referred to as fresh or street markets.

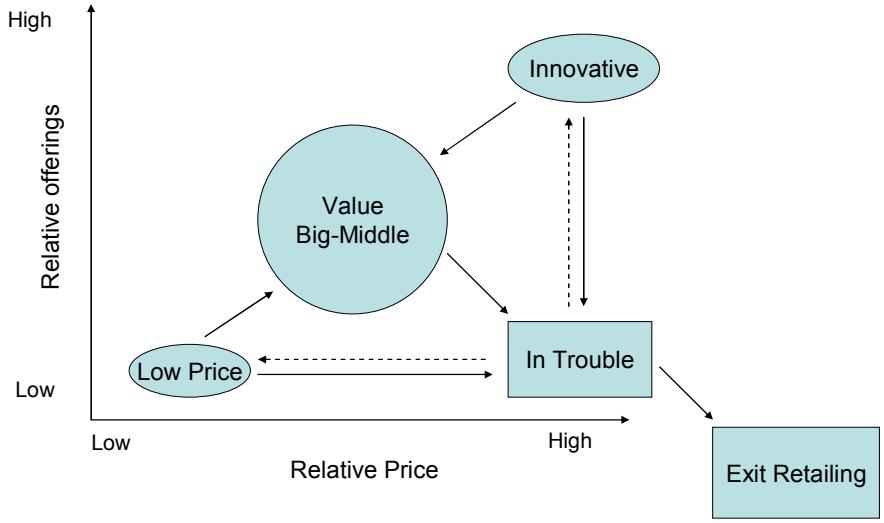
the extent to which supermarkets can capture the Big Middle for food retailing in east Asia, contributing to the debate on whether a Global Big Middle is possible.

Theory of the Big Middle

According to Levy *et al.* (2005) retailers occupy one of four segments: Big Middle, low-price, innovative, and in trouble (Figure 1). Retailers that address low price and innovative segments do so through price and quality conscious appeals respectively. Big Middle retailers succeed because of the superior relative value of their offerings, usually combining both innovation and low prices, which induce the bulk of consumers to gravitate to them. Levy *et al.* (2005, p.85) argue that Big Middle retailers migrate there from an initial price or innovative focus by becoming 'a hybrid of the two that appeals to a much larger customer base and provides great value for a broader array of merchandise'. In trouble retailers, in contrast, are unable to deliver high levels of relative value.

To protect their superior position, Big Middle retailers must maintain and enhance their value proposition. Those that fail to do so will slide into the in-trouble segment. For the USA, Levy *et al.* (2005) identify traditional department stores, as an example of retailers that shifted from the Big Middle in the 1960s and 1970s to the in trouble category. Value retailers such as Wal-Mart and Target and innovative retailers such as Best Buy and Home Depot, usurped the Big Middle from the 1980s onwards. The Big Middle is, hence, dynamic – retailers both enter and exit this segment depending on perceived value. Levy *et al.* (2005) outline five primary value levers – innovative merchandise / need satisfying assortment, technology, supply chain management, price optimization, and store image that may propel retailers into the Big Middle or maintain their status. To provide need satisfying assortments requires a customer-centric approach to retailing. Sethuraman and Parasuraman (2005) and Brown *et al.* (2005) discuss technology and supply chain levers in relation to the Big Middle.

Figure 1: The Big Middle and other Segments



Source: adapted from Levy *et al.* (2005), p.85.

As migration to the Big Middle depends on offering superior relative value, we outline below how this can be expressed formally, presenting a customer centric model of the Big Middle. Imagine, for instance, that consumers choose between two competing stores: *f* and *g*. Let ν (*f*, *i*, *t*) be the expected utility that arises if the *i*th consumer chooses retail format *f* in time *t*. The *i*th consumer will choose retailer *f* if:

$$v(f,i,t) > v(g,i,t) \qquad [1]$$

Where expected utility depends on the value offered, in the extent to which the store offers desired attributes:

$$V_{fi} = \sum_{j=1}^{n} W_{ij} B_{ifj} \qquad [2]$$

Where V_{fi} is consumer *i*'s score for retailer *f*, W_{if} is the importance weight assigned by consumer *i* to attribute *j*, B_{ifj} is consumer *i*'s belief as to the amount of attribute *j* offered by outlet *f* and *n* is the number of relevant attributes in the selection of a retailer (McGoldrick, 2002). In the simplest form, a dummy variable *d*(*f*, *i* ,*t*), may take the value of 1 if the *i*th consumer chooses to shop at retailer *f* in time *t* and 0 if otherwise. The econometric specification of retailer choice involves a probabilistic model, whereby the likelihood of the *i*th consumer choosing retailer *f* in time *t* is given by:

$$\Pr ob_{i,t}(d(f,i,t)=1/g=\Phi(V(f,i,t,/g)) \qquad [3]$$

Where *V*(*f,i,t* / *g*) is the deterministic component of the difference in expected utility between retailer *f* and *g* and Φ (.) is the cumulative distribution function (cdf).

In North America and Western Europe, a small number of super- and hypermarket chains occupy the Big Middle for food retailing, including sales of fresh produce (Brookes, 1995). For instance the market share of the four largest grocery retailers in 2008 in Germany, France and UK was 72.5%, 54.4% and 75.7% respectively (IGD, 2009).[2] In the same year the comparable figures for the USA and Canada were 41.6% and 58.2% respectively. In both North America and Western Europe the market share of specialist food retail chains (butchers, greengrocers etc.) and general independent grocers declined dramatically from the 1950s onwards (Ducatel and Blomley, 1990).

In Asia, the structure of food retailing appears very different with, traditionally, markets and independent, small, limited line retailers occupying the main marketspace (Big Middle). In many Asian economies such as Hong Kong, Singapore and South Korea, supermarkets emerged in the 1960s, targeting wealthier, urban consumers – in Levy *et al.*'s (2005) terminology an innovative

[2] IGD (2009) defines the grocery retail market as all food, drink and non-food products (e.g. health & beauty, pet care, clothing, DIY) sold through all retail outlets selling predominantly food in a given country. This definition includes both modern retail formats such supermarkets and hypermarkets, and traditional retail formats such as open air markets and traditional food stores such as bakers.

segment. However, in contrast to North America and Western Europe Goldman *et al.* (1999; 2002) argue that in Asian economies wet markets have not been squeezed out by supermarkets nor are likely to in future. Supermarkets have not traditionally accounted for the majority of expenditure on food in Asia and the structure of the supermarket sector is relatively fragmented. For instance, an analysis of IGD (2009) data indicate that in Japan, South Korea, Malaysia and China the market share of the four largest grocery retailers is 21.8%, 22.6%, 13.5% and 4.0% respectively.

Goldman *et al.* (2002) claim that the relatively low penetration of supermarkets in East Asia is because traditional formats, most notably wet markets, retain a value advantage over 'modern' alternatives, limiting the latter's ability to capture the Big Middle. Critically regarding value, they assert that wet markets possess advantages in terms of costs and freshness, which make them more attractive to consumers. This is because weak production and distribution systems raise the costs of supermarkets, limiting their ability to compete on price. For example for fresh produce, Asian supermarkets traditionally bought through the same supply system (wholesale markets) as wet market traders, implying a lack of buying advantages (Goldman, 2000). Moreover produce from wholesale markets is not presorted or pre-graded, functions that supermarkets have to take on themselves to sell fresh produce in a self-service environment (Goldman, 2000). Supermarkets also incur higher labor, rental and other overhead costs and greater losses from waste and shrinkage (Goldman *et al.* 1999). Wet markets can therefore undercut supermarkets on price for fresh produce. In contrast, according to Goldman *et al.* (2002), the strengths of supermarkets – convenience, variety, cleanliness – are regarded as relatively less important to Asian shoppers. In support of their arguments, the latter authors note that despite operating for a long period of time and a relatively high standard of living, supermarkets' market share remains well below 50% in Hong Kong, Singapore, South Korea and Taiwan.

Not all, however, accept Goldman and his colleagues' analysis. Reardon *et al.* (2007) argue that modern retail formats in East Asia 'took off' in the late 1990s while Goldman *et al.*'s (1999; 2002) conclusions draw on data for the mid-1990s. The latter's work therefore may fail to capture recent structural change. For example, since Goldman *et al.*'s (1999) analysis for Hong Kong, the share of total food expenditure accounted for by wet markets fell from a peak of 65 per cent in 1994–1995, to 49 per cent in 1999–2000 (Ho, 2005). Reardon *et al.* (2007) and Dries *et al.* (2004) argue that investments in procurement and distribution systems accompanied the rapid growth of, typically foreign owned, grocery retail chains in emerging economies. These investments delocalize supply networks, reduce reliance on traditional wholesalers, and allow for the greater use of private standards and contracting. This may allow grocery retailers to overcome some of their traditional disadvantages vis-à-vis wet markets and reap the benefits of economies of scale and greater buying power, increasing the penetration of supermarkets in fresh food markets, where their market share tends to lag that in processed goods (Reardon *et al.* 2003; Reardon *et al.* 2007). In other words, as proposed by Brown *et al.* (2005), reformed supply chain management could facilitate new actors and a new format to capture the Big Middle.

A lack of consensus therefore characterizes the literature on food retailing in East Asia and other emerging economies. One set of authors, the most prominent of which are Goldman *et al.* (1999; 2002), argue that food retailing differs significantly between Asia and western markets because of structural and cultural differences which limit the extent to which the Big Middle of Western Europe and North America can be replicated elsewhere - a global Big Middle is improbable. Others argue that emerging economies are subject to the globalization of food retailing, characterized by the growing dominance of a small number of multinational grocery retail chains, which marginalize traditional formats (Reardon *et al.* 2003; Dries *et al.* 2004). These chains utilize investments in supply systems and cross-national buyer power to overcome the barriers to their

development outlined by Goldman *et al*. (1999; 2002). This debate calls for further, theoretically informed consumer research – as Goldman (2000, p.14) notes there is a need to assess whether conclusions based on his and other earlier work 'are still relevant'.

To assess the relative merits of the competing arguments discussed above, a key task, in accordance with equations 1-3, is to understand current relevant attributes, the weighting placed on them and the extent to which competing retail formats satisfy consumer needs. The existing literature on retail attributes, however, presents a number of problems for understanding shopping behavior in East Asia. Notwithstanding some notable exceptions (Trappey, 1997), research instruments on the importance consumers place on particular retail attributes have been overwhelmingly developed for, and empirically tested in, North America and Western Europe (Arnold *et al.* 1983; Davies and Brooks, 1989; Lindquist, 1974; Louviere and Faeth, 1987; Ness *et al.* 2002; Stoltman *et al.* 1991). Given its Western origins, previous research principally focuses on understanding consumers' choice between competing 'modern retail' chains. In East Asia, however, this is not the critical decision made by consumers - the main retail choice is between supermarkets and wet markets (Ho, 2005).

The scales and research instruments designed to understand consumer shopping behaviour in Western markets may not incorporate the critical attributes that underpin decisions elsewhere. For instance, cleanliness and food safety are neither included as attributes in the scales of Lindquist (1974) nor in subsequent studies by Davies and Brooks (1989) and Ness *et al.* (2002), but these have been suggested as important factors, contributing to the declining use of wet markets in Asia (Ho, 2005). This suggests that for East Asia models should assume that consumers choose between two retail formats, *s* denoting supermarkets and *m* wet markets, so that in revising equation [2], the *i*th consumer will choose retail format *s* if:

$$v(s,i,t) > v(m,i,t) \quad [4]$$

Rather than a binary dependent variable, as indicated in equation [3] it is more appropriate to assume, however, that in time period *t*, consumers may use *both* formats s and *m* but differ in the frequency of visits and the percentage of total spending on a product category accounted for by *s* and *m.*

The Thai Context

Within the last decade, Thailand witnessed rapid structural change in food retailing characterized by the rapid growth of supermarket chains. Prior to the mid-1990s, supermarkets were largely confined to department stores. These department stores targeted higher income consumers and were restricted to the capital city, Bangkok, and its suburbs. Within Bangkok, convenience stores were successfully introduced in the late 1980s, most notably 7-Eleven, which fitted with the rising job market participation of women and a consequent reduction in time devoted to 'household' activities (Feeney *et al.* 1996).

Of the five largest retail chains by market share, all but one (7-Eleven), are supermarket operators. By 2008, the five largest operators' share of the grocery retail market was 23.5 per cent (Table 1). The share of total grocery sales accounted for by the largest multiple retailers grew dramatically from the late 1990s onwards. In the period 2006-2008 all the largest multiple food retailers increased their market share apart from Tops. Currently, the largest retailer by market share is the Thai subsidiary of UK based Tesco, which controls the "Tesco Lotus" chain. Tesco Lotus has a market share of approximately 8.6 per cent (GMID, 2008) and by 2009 operated 628 stores (IGD, 2009). The mean store size is approximately 1,000m^2. Tesco entered the Thai market in 1998, via a joint venture with the domestically owned CP group. CP sold their interest in 2003. There are 4,800 7-Eleven stores in Thailand, the most common convenience format, which account for 6.5 per cent

of the grocery market (IGD, 2009). The French owned Casino group operates 58 stores under either the Big C or Leader Price formats. It is the second largest supermarket group by market share (5.3%) and entered the Thai market in 1999 through the acquisition of a majority stake in the then locally owned retailer Big C. Carrefour entered the Thai market in 1994 and by 2008 controlled 27 stores, possessing a 2.0 per cent share of the retail grocery market. Finally, the Thai owned Central Food Retail Co (CFR) operates three supermarket formats (Tops Supermarket, Marketplace and City Market by Tops) which collectively account for 1.7 percent of the grocery market. For the supermarket sector as a whole, the number of outlets and selling space are currently rising at annual rates of 8 and 9 per cent respectively (GMID, 2008).

The rise of supermarkets has been partially at the expense of traditional street and wet markets and independent grocery stores. For instance, the number of traditional grocery stores fell from 283,009 in 2002 to 273,314 in 2003 (USDA, 2004). Using Thailand Development Research Institute data, Tokrisna (2002) estimates that 'modern retail's share[3] of total retail sales rose from 26 per cent in 1997 to 53.2 per cent in 2001. During the same time period, 'traditional' retail's share declined from 74.0 per cent to 46.8 per cent. Penetration of supermarkets is high: approximately 90 percent of urban Thai shoppers use the format at least once a month (USDA, 2007). While the turnover of traditional retail is difficult to estimate precisely, commentators nonetheless agree that Thailand experienced, what Reardon *et al.* (2003) terms, a supermarket revolution in the late 1990s – early 2000s (Tokrisna, 2005; USDA, 2007).

Methodology

Following the customer-centric model of the Big Middle, survey research focused on the use of supermarkets and wet markets and the identification of salient retail outlet attributes and other determinants of food shopping behavior. Development of a survey instrument began with the

[3] Modern retail includes supermarkets, hyermarkets, convenience stores and department stores.

verified scales of retail outlet attributes as developed by Lindquist (1974) and refined by Davies and Brooks (1989) and Ness *et al.* (2002). The applicability of these attributes for the Thai context and whether other salient factors were missing was discussed in a focus group of Thai shoppers. This led to the modification of the survey design to include 'cleanliness of place', 'speed of service', 'food safety' and 'atmosphere' as attributes. Other variables such as convenient location, low prices, assortment, product quality and variety of products, identified in previous studies, were seen as salient in the Thai context. A second focus group confirmed the appropriateness of the modifications.

The final version of the questionnaire consists of three sections. The first part measures the use of supermarkets and wet markets. Specifically, it includes questions on frequency of visits to supermarkets and wet markets. Respondents were also asked about the average percentage of their total spending on fresh fruit and vegetables [FFV], fresh meat, fresh fish, packaged goods and beverages accounted for by wet markets, supermarkets and other outlets in a typical month. This recognizes that patterns of behavior and motivations may vary across food product categories.

Following equation [2], section two considers retail attributes and the weighting attached to them by consumers. First, respondents were asked to rate the importance of individual attributes (e.g. cleanliness of place) in their decision for where to buy food on a five point Likert scale (1= not at all important, 5= most important). They then rated supermarkets and wet markets in their locality according to how well they scored on each attribute. This was based again on a five point scale (1 = very poor, 5 = excellent). Section 3 elicits socio-economic and demographic information (location, gender, age, income band and highest level of education achieved). Questions on this topic follow categories presented elsewhere (Neven *et al.* 2006).

To understand shopping behavior in greater depth, the paper presents two stages of econometric analysis. As a first step, frequency of visits to wet-markets and supermarkets are

modeled respectively. Secondly, we evaluate the determinants of proportionate spending in wet markets and supermarkets for selected product categories.

Bivariate ordered probit model

The first step is based on the estimation of a bivariate ordered probit model. This model can be treated as an extension of a standard bivariate probit model where the number of categories of the dependent variables is greater than two (see Kilkenny and Huffman, 2003; Sajaha, 2008).[4] As for the univariate ordered probability model, the bivariate model type can be derived from a latent variable model (Sajaha, 2008). Assume that two latent variables y_1^* and y_2^* are determined by:

$$y_{1i}^* = x_{1i}^{'}\beta_1 + \varepsilon_{1i} \qquad [5]$$

$$y_{2i}^* = x_{2i}^{'}\beta_2 + \varepsilon_{2i} \qquad [6]$$

where β_1 and β_2 are vectors of unknown parameters, ε_1 and ε_2 are the error terms, and subscript *i* denotes the individual observation. Further we assume that the explanatory variables in [5] and [6] satisfy the conditions of exogeneity such that $E(x_{1i}, \varepsilon_{1i}) = 0$ and $E(x_{2i}, \varepsilon_{2i}) = 0$. y_1 and y_2 are observed as categorical variables such that:

$$y_{1i} = \begin{cases} 1 \text{ if } y_{1i}^* \le c_{11} \\ 2 \text{ if } c_{11} < y_{1i}^* \le c_{12} \\ \quad . \\ J \text{ if } c_{1J-1} \le y_{1i}^* \end{cases} \qquad y_{2i} = \begin{cases} 1 \text{ if } y_{2i}^* \le c_{21} \\ 2 \text{ if } c_{21} < y_{2i}^* \le c_{22} \\ \quad . \\ K \text{ if } c_{1K-1} \le y_{2i}^* \end{cases} \qquad [7]$$

and where the unknown cutoffs satisfy: $c_{11} < c_{12} < ... < c_{1,J-1}$ and $c_{21} < c_{22} < ... < c_{2,K-1}$ and $c_{10} = c_{20} = -\infty$ and $c_{1J} = c_{2K} = \infty$. The categorical dependent variables y_1 and y_2 in this case equal the frequency of visits to wet-markets and the frequency of visits to supermarkets respectively. These variables carry the value '1' for "everyday", '2' for "2-3 times a week", '3' for "once a week", '4' for "2-3

[4] The analysis utilizes the BIOPROBIT Stata module (version 2/4/2008).

times a month", '5' for "once a month", and '6' for "less than once a month". The vectors of explanatory variables x_1 and x_2 contain the following independent variables related to retail outlet attributes: convenience of location, price of products, special offers, assortment, quality of service, speed of service, product quality, variety of products, payment by card, atmosphere, cleanliness, food safety as well as a cross variable for the combined effect of product quality and cleanliness. These variables emerged from previous research (Lindquist, 1974; Davies and Brooks, 1989; Ness et al. 2002) and their relevance for the Thai context verified in the focus groups. Further, socioeconomic variables are included: a location dummy for the household residing in Bangkok, gender, age, household income, and the level of education of the customer. Neven *et al.* (2006) demonstrate the significance of such variables for profiling food shopping behavior in emerging economies.

We check for the robustness of our models by applying a simple stochastic re-sampling procedure based on bootstrapping techniques (see Efron 1979). This appears necessary as our cross-sectional sample consists of a limited number of observations. If we suppose that $\hat{\Psi}_n$ is an estimator of the parameter vector ψ_n including all parameters obtained by estimating [5] and [6] based on our original sample of 201 observations $X = (x_1, ..., x_n)$, then we are able to approximate the statistical properties of $\hat{\Psi}_n$ by studying a sample of 1,000 bootstrap estimators $\hat{\Psi}_n(c)_m, c = 1, ..., C$. These are obtained by re-sampling our 201 observations – with replacement – from X and recomputing $\hat{\Psi}_n$ by using each generated sample. Finally the sampling characteristics of our vector of parameters are obtained from:

$$\hat{\Psi} = \left[\hat{\Psi}_{(1)m}, ..., \hat{\Psi}_{(500)m} \right] \qquad [8]$$

As discussed extensively by Horowitz (2001) and Efron and Tibshirani (1993), the bias of the bootstrap as an estimator of $\hat{\Psi}_n$, $B_{\tilde{\psi}} = \tilde{\Psi}_n - \hat{\Psi}_n$, is itself a feasible estimator of the bias of the

asymptotic estimator of the true population parameter ψ_n.[5] This holds also for the standard deviation of the bootstrapped empirical distribution, providing a natural estimator of the standard error for each initial parameter estimate. By using a bias corrected bootstrap we aim to reduce the likely small sample bias in the initial estimates.

Bootstrapped Bivariate Tobit

The second step of our analysis is based on the estimation of a bivariate Tobit model (see Maddala, 1994).[6] As for the previous model the main concern is to estimate the two parameter vectors β_1 and β_2 in the following two-equation model derived again from a latent variable model (Amemiya, 1984; Lee, 1993) as outlined by [5] and [6]. As for the previous model, we assume that the explanatory variables in [5] and [6] satisfy the conditions of exogeneity such that $E(x_{1i}, \varepsilon_{1i}) = 0$ and $E(x_{2i}, \varepsilon_{2i}) = 0$. In this case, the censored dependent variables y_1 and y_2 equal the percentage of spending accounted for by wet markets and supermarkets for the following product categories: fresh fruit and vegetables, fresh meat, fresh fish, and packaged goods. These variables are censored at 0 and 100 by definition. As in step 1, the vectors of explanatory variables x_1 and x_2 contain the following independent variables relating to retail outlet attributes: convenience of location, price of products, special offers, assortment, quality of service, speed of service, product quality, variety of products, payment by card, atmosphere, cleanliness, food safety as well as a cross variable for the combined effect of product quality and cleanliness. Similarly, the same socioeconomic variables are included as in step 1: a location dummy for Bangkok, gender, age, household income, and level of education. Finally, we check for the robustness of the estimates by applying again a simple stochastic resampling procedure as outlined in the previous subsection.

[5] Hence the bias-corrected estimator of ψ_n can be computed by $\hat{\psi}_n - B_{\tilde{\psi}} = 2\hat{\psi} - \tilde{\psi}$.

[6] We utilize the BITOBIT Stata module (version 11/8/2007).

Data Set

The data set consists of 201 questionnaire responses split almost equally between two locations: Bangkok and Chachoengsao. Bangkok has a population of over 6 million and has the highest penetration of supermarkets in Thailand (USDA, 2004). The provincial city of Chachoengsao has a population of only around one-tenth of Bangkok but has been subject to an influx of supermarkets in recent years. As the study seeks to understand choice of retail outlet, only districts within which both wet markets and supermarkets are located were included in the study. Quota sampling, based on four age groups, was utilized. The size of the each age group quota matches Thailand's demographic profile. As the study was limited to those responsible for the majority of food purchases in their household, approximately two-thirds of the sample is female. Data collection occurred via face to face interviews in 2007.

Analysis

Table 2 reports the average percentage spend in a typical month by type of retail outlet (wet market, supermarket / hypermarket and other)[7] for five food categories (FFV, fresh meat, fresh meat, packaged goods and beverages). Important differences are apparent across the food categories. For fresh produce (fruit and vegetables, meat and fish) wet markets continue to account for the majority of spending. For packaged goods and beverages, supermarkets are more important. This divide between fresh and 'longer-life' goods follows findings for other East Asian countries but the penetration of supermarkets into fresh market markets is greater than Goldman *et al.'s* (1999) assessment. For instance Goldman (2000, p.10) argues that 'fresh food items continue to be purchased in the wet and street markets', yet, the data for Thailand indicate that supermarkets account for 40 per cent of average expenditure on fresh meat. Supermarkets are no longer minor players in fresh produce markets.

[7] The other category includes convenience stores.

In accordance with equation [2], Table 3 details the average importance weighting given to retail outlet attributes in the choice of where to buy food (1= not important, 5 = most important) and the relative performance of supermarkets and wet markets on each attribute. Attributes are listed in descending order of importance. The most important factors are quality of products, food safety, variety of products, cleanliness of place and quality of service. Facilities to pay by card are of little importance. The latter two columns of Table 3 report how well wet markets and supermarkets in respondents' local area score (1= very poor; 5 = very good) on each of these attributes. On all items, supermarkets perform better. Differences in mean scores between supermarkets and wet markets are significant for every retail attribute considered. The greatest divide is apparent for food safety, cleanliness of place, assortment and, albeit of little importance, payment by card. These results are in marked contrast to Goldman *et al.'s* (1999) arguments that supermarkets lack price competitiveness and only outperform wet markets on attributes that are relatively unimportant. Overall, data in Table 3 suggest that any switch to supermarkets has been customer driven as they appear to offer a superior shopping experience.

Regarding the econometric analysis, the different diagnosis tests performed indicate that all estimated model specifications show a statistical significance at a satisfactory level and no severe signs of misspecification (see different model quality measures). These conclusions are supported by the bootstrapped bias-corrected standard errors which confirm the robustness of the various estimates. The linear hypotheses tests conducted with respect to the significance of explanatory variables indicate for all models the statistical relevance of the stated factors for retail outlet attributes and socioeconomic characteristics.

Table 4 presents the bootstrapped bivariate ordered probit model for frequency of wet-market and supermarket visits. Considering the determinants of wet market visits both retail outlet attributes and socio-economic characteristics are important. Males are significantly less frequent visitors to wet markets compared to females. Older consumers and those: in lower income groups,

with lower education achievement and residing outside of the capital city are more frequent visitors to wet markets. Frequency of supermarket visits is negatively related to age and educational attainment. Chachoengsao residents are significantly less frequent visitors to supermarkets. This socio-economic profile is consistent with supermarkets appealing to a greater extent to higher educated and younger consumers in capital cities. However there is no relationship between household income and frequency of visits to supermarkets.

Regarding retail attributes, frequency of wet market visits is positively related to the importance given to speed of service and product quality and negatively related to atmosphere and the interaction of quality and cleanliness. In other words, for instance, those that regard speed of service as being more important in their choice of retail outlet are more frequent visitors of wet markets. The frequency of supermarket visits is positively related to the importance given to a good atmosphere, convenient location, assortment and special offers. Frequency of supermarket visits is negatively related to the importance placed on price.

An analysis for all products however may mask significant variations in the determinants of format choice for specific product categories. This is accounted for in the second stage of the analysis which identifies the determinants of variations in the percentage of total spending for four product categories (FFV, fresh meat, fresh fish and packaged goods) accounted for by wet markets and supermarkets. Regarding FFV (Table 5), those with a higher proportion of spending in wet markets rate price and cleanliness as being of greater importance. Payment by card and atmosphere are significantly less important for this group. The percentage spent on FFV in wet markets is significantly higher in Chachoengsao. Gender, age, income and education are not significant in explaining variations in the percentage of total FFV spend accounted for by wet markets or supermarkets. In other words, for FFV supermarkets are not only restricted to higher income and better educated niches. There are positive relationships between supermarket spending on FFV and speed of service and variety of products. This suggests that supermarket shoppers value more highly

the convenience of ‘a one stop shop’. Those relying on supermarkets for FFV are biased to the capital city. Supermarket shoppers for FFV also rate food safety as being of greater importance.

Analysis of the bivariate Tobit model for percentage of total spending on fresh meat accounted for by wet markets and supermarkets (Table 6) reveals negative relationships between percentage spent in wet markets and the importance of speed of service, payment by card and atmosphere. As for FFV, wet market shoppers are biased toward Chachoengsao. However, positive relationships between wet market spending and the importance of product quality, cleanliness of place, quality of service and the interaction of quality and cleanliness are observed. This suggests that meat available in wet markets may be, overall, still perceived to be fresher with customers having greater control in selecting specific cuts. Those buying a greater proportion of fresh meat from supermarkets rate price as being less important and have higher incomes. This suggests that those relying on supermarkets for fresh meat are more affluent. They are also biased to the capital city. However gender, age and education are not significant in explaining the percentage of spending on fresh meat accounted for by wet markets and supermarkets. Use of supermarkets for fresh meat, as with FFV, is positively associated with consumers who place greater emphasis on food safety. This may reflect that quality assurance is seen as superior in supermarkets.

Table 7 details the results of the bivariate Tobit model for the percentage of total spending on fresh fish accounted for by wet markets and supermarkets. It reveals significant positive relationships between percentage spent in wet markets and the importance of product quality, cleanliness of place and the interaction of quality and cleanliness. These mirror the relationships identified for fresh meat and suggest that with regard to freshness wet markets retain an advantage. As in the case of FFV and meat, spending in wet markets for fresh fish is significantly higher in Chachoengsao. Those relying on supermarkets for fresh fish are biased to Bangkok. Other socioeconomic characteristics (age, gender, income and education) are not significant for explaining variations in the percentage spent in wet markets and supermarkets for fresh fish. Supermarket

shoppers for fresh fish are less concerned about assortment but rate quality of service as being of greater importance.

For packaged goods (Table 8), speed and quality of service are not significant for explaining variations in the percentage spent at supermarkets and wet markets. Those relying on wet markets for packaged goods rate convenient location and special offers as being of greater importance. As with fresh produce, spending in wet markets is significantly higher in Chachoengsao. A positive relationship between percentage spent in supermarkets and assortment is recorded, which suggests that multiple retailers appeal most to those who value convenience and 'one stop shopping'. Those relying most on supermarkets for packaged goods are significantly younger and also rate food safety as significantly more important. Household income and level of education are not significant for explaining variations in the percentage of spending on packaged goods accounted for by wet markets and supermarkets.

Conclusions

The Big Middle theory of the evolution of retail institutions assumes that the largest marketspace is occupied by those that provide superior relative value, combining price advantages with high relative offerings. We develop a customer centric model for understanding how a retailer may capture the Big Middle and adapt this to consider the penetration of supermarkets in East Asia, drawing on the example of Thailand.

Goldman *et al.* (1999; 2002) argue that supermarkets have not and will not capture the Big Middle for food retailing in East Asia due to a set of structural and cultural barriers. Specifically, Goldman *et al.* (1999, p.138) state that wet markets outperform supermarkets on price, assortment and product quality and that these advantages are 'entrenched'. This implies that we are unlikely to witness the emergence of a Global Big Middle, with a particular retail format or single company capturing the main marketspace in both Asian and Western countries. The analysis presented in this

paper, drawing on more recent data, questions some of Goldman *et al.*'s (1999) conclusions. Supermarket penetration is much higher than that recorded previously. While wet markets still account for the majority of expenditure on FFV, fresh meat and fresh fish, and econometric evidence suggests that wet markets retain an appeal on product quality for fresh produce, supermarkets can longer be regarded as marginal players. Moreover, an analysis of retail attributes and the weighting given to them by consumers reveals that supermarkets, overall, outperform wet markets on all salient attributes. Rather than their appeal being restricted to a particular socio-economic niche, the econometric results reveal that the supermarkets' share of fresh produce expenditure is not biased to a particular educational group nor related to age or, with exception of fresh meat, household income. Within a little over a decade supermarkets captured the majority of expenditure on non-perishable foods and beverages and account for a substantial share of the fresh market.

This poses the question: how did supermarkets overcome the structural barriers that Goldman *et al.* (1999) thought limited their appeal? In accordance with the primary value levers identified by Brown *et al.* (2005) and Levy *et al.* (2005), the major grocery retailers in Thailand radically restructured their supply chains, improving their cost competitiveness, and tailored their assortments and store image to imitate the best features of wet markets. All of the major grocery chains invested in new distribution networks and the foreign owned ones benefited from cross-national procurement. For instance, Tesco Lotus has two main distribution centers which, combined, can handle up to 3 million cases per week (IGD, 2009). In 2008 the company established a purchasing hub in Shanghai to co-ordinate the procurement of goods for stores in China, Japan, Thailand, South Korea and Malaysia. This international facility is designed to reap the economies of scale that emerged when Tesco pursed a similar cross-national strategy in Central Europe (Dries *et al.* 2004). These new distribution and procurement centers allow supermarket chains to bypass wholesale markets and obtain better terms from suppliers. Goldman *et al.* (1999) note a reluctance

of fresh producers to deal directly with supermarket chains. Yet the take-off of the latter in the late 1990s, coupled with the declining throughput of wholesale markets, gave supermarkets increased order size, and consequently privileged access. For example, Carrefour procures most of its locally produced fruit through direct relationships with agricultural co-operatives in Thailand (Planet Retail, 2007) and what Hingley (2005) calls 'super-middlemen'. Disintermediation occurred with wholesale markets bypassed. This improved supermarkets' appeal for fresh produce but has not yet given them supremacy.

Regarding store image and assortment, the major supermarket chains incorporate 'imitation wet markets' into their formats - stalls laid out with fresh fruit and vegetables, aquariums of live fish, and butchers and fishmongers cutting portions to customers' requirements. By incorporating the features of wet markets valued by Thai consumers and exceeding them on other salient attributes, supermarkets are capturing the Big Middle in Thailand by offering superior relative value. In accordance with the Big Middle model, the drift to supermarkets is consumer led.

In establishing supermarkets' strong, current position we do not argue that this is necessarily permanent. A feature of the Big Middle is its contested status, with different formats and retailers both capturing and losing it over time depending on their relative value. Rather the Thai case illustrates the importance and permanence of barriers limiting the replication of Western structures of food retailing in East Asia was overstated. A global Big Middle appears closer than much of the literature on developing and emerging markets suggested previously.

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Table 1: The five largest food retail chains' share of the Thai grocery market (%)

Chain	2006	2007	2008
Tesco Lotus	6.70	7.50	8.00
7-Eleven	5.10	6.00	6.50
Casino	4.40	4.70	5.30
Carrefour	1.60	1.70	2.00
Tops	2.00	1.80	1.70
Combined market share of 5 largest operators	19.80	21.70	23.50

Source: IGD (2009)

Table 2: Average percentage spent by type of retail outlet for different food product categories.

	Wet market	Supermarket	Other
Fresh Fruit and Vegetables (FFV)	55.5	36.8	7.6
Fresh meat	53.4	40.3	6.1
Fresh fish	62.4	31.0	7.1
Packaged goods	30.1	59.9	10.0
Beverages	17.9	69.1	13.0

Source: analysis of survey data

Table 3: Importance weightings for retail outlet attributes and mean score on those attributes for supermarkets and wet markets

	Average importance rating given to attribute	Average score of wet markets for attribute	Average score for supermarkets for attribute	Wet markets versus supermarkets Paired sample *t*-test[1]
Quality of products	4.45	3.41	3.87	-8.186***
Food Safety	4.34	3.05	3.95	-15.175***
Variety of products	4.28	3.44	3.95	-7.542***
Cleanliness of place	4.25	2.74	4.10	-18.289***
Quality of service	4.08	3.14	3.83	-10.440***
Speed of service	3.97	3.38	3.67	-4.557***
Convenience of location	3.87	3.16	4.06	-13.429***
Price of products	3.87	3.4	3.52	-2.223**
Atmosphere	3.55	3.01	3.95	-14.006***
Assortment	3.31	2.94	3.96	-17.717***
Special offers	3.24	2.68	3.61	-13.055***
Payment by card	2.21	1.79	3.67	-18.896***

[1] * - 10%-, ** - 5%-, *** - 1%-level of significance

Source: analysis of survey data

Table 4: Bootstrapped Bivariate Ordered Probit Model: Frequency of Wet Market and Supermarket Visits

(n = 201) independents	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
equation 1	***dependent 1*: *frequency of wet market visits***		
Retail outlet attributes			
Convenience of location	0.088	0.72	[0.108; 0.138]
Price of products	0.225	1.43	[0.138; 0.177]
Special offers	0.031	0.25	[0.107; 0.139]
Assortment	-0.209	-1.30	[0.141; 0.179]
Quality of service	-0.075	-0.50	[0.128; 0.167]
Speed of service	0.331**	2.10	[0.135; 0.179]
Product Quality	0.575***	3.21	[0.265; 0.493]
Variety of products	0.149	0.134	[0.116; 0.152]
Payment by card	-0.094	-0.96	[0.088; 0.107]
Atmosphere	-0.226***	-4.72	[0.128; 0.167]
Cleanliness	1.153**	2.24	[0.389; 0.639]
Food safety	0.029	0.19	[0.132; 0.172]
Product quality x cleanliness	-0.202***	-4.95	[0.102; 0.179]
socio-economic characteristics			
Location	0.522***	3.14	[0.154; 0.178]
Gender	0.352**	2.14	[0.152; 0.178]
Age	0.236***	2.56	[0.079; 0.099]
Household income	-0.223**	-2.53	[0.078; 0.098]
Level of education	-0.299***	-3.26	[0.079; 0.105]
equation 2	***dependent 2*: *frequency of supermarket visits***		
Retail outlet attributes			
Convenience of location	0.498***	2.84	[0.151; 0.199]
Price of products	-0.283*	-1.88	[0.131; 0.169]
Special offers	0.455***	2.94	[0.135; 0.174]
Assortment	0.164***	3.65	[0.152; 0.198]
Quality of service	0.257	1.27	[0.177; 0.228]
Speed of service	0.162	1.09	[0.124; 0.173]
Product Quality	0.615	0.76	[0.727; 0.901]
Variety of products	0.211	1.38	[0.135; 0.170]
Payment by card	-0.044	-0.43	[0.085; 0.118]
Atmosphere	0.404***	3.63	[0.183; 0.239]
Cleanliness	0.381	0.51	[0.656; 0.828]
Food safety	0.154	0.91	[0.133; 0.203]
Product quality x cleanliness	-0.173	-0.93	[0.166; 0.207]
socio-economic characteristics			
Location	-0.464***	-2.95	[0.148; 0.166]
Gender	-0.026	-0.16	[0.149; 0.169]
Age	-0.127***	-2.29	[0.084; 0.107]
Household income	0.058	0.68	[0.077; 0.095]
Level of education	-0.133***	-3.31	[0.078; 0.102]
constant	0.341***	3.73	[0.081; 0.101]

Table 4: Bootstrapped Bivariate Ordered Probit Model: Frequency of Wet Market and Supermarket Visits (continued)

	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
Rho	0.328***	4.05	[0.083; 0.112]
cut11	3.418**	2.34	[0.998; 1.878]
cut12	3.793***	2.58	[0.999; 1.886]
cut13	4.138***	2.81	[0.998; 1.889]
cut14	5.171***	3.51	[1.002; 1.892]
cut15	6.494***	4.32	[1.009; 1.898]
cut21	4.342	1.40	[2.757; 3.477]
cut22	5.021	1.63	[2.754; 3.475]
cut23	5.739	1.86	[2.752; 3.472]
cut24	6.682**	2.16	[2.758; 3.477]
cut25	8.619***	2.75	[2.783; 3.501]
LR-test of Independent Equations [chi2(1)]	15.69*** [0.001]		
Log likelihood	-574.948		
Wald chi2(18) [prob>chi2]	71.18*** [0.000]		
linear hypotheses tests on model specification ($chi^2(x)$)			
H_0: stated factors for buying decision have no significant effect for wet markets ($chi^2(13)$)			*37.60*** (rejected)*
H_0: stated factors for buying decision have no significant effect for supermarkets ($chi^2(13)$)			*29.84*** (rejected)*
H_0: socio-economic characteristics have no significant effect for wet markets ($chi^2(5)$)			*43.33*** (rejected)*
H_0: socio-economic characteristics have no significant effect for supermarkets ($chi^2(5)$)			*11.84** (rejected)*

1: * - 10%-, ** - 5%-, *** - 1%-level of significance; 2: 1000 replications.

Table 5: Bootstrapped Bivariate Tobit Model for Percentage of Spending on Fresh Fruits & Vegetables accounted for by Wet Markets and Supermarkets

(n = 201) independents	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
equation 1	***dependent 1: percentage of spending on fresh fruit and vegetables accounted for by wet markets***		
Retail outlet attributes			
Convenience of location	-0.169	-0.12	[1.214; 1.603]
Price of products	4.13**	2.19	[1.625; 2.146]
Special offers	1.42	0.95	[1.288; 1.701]
Assortment	-2.44	-1.31	[1.605; 2.120]
Quality of service	1.34	0.80	[1.443; 1.906]
Speed of service	-1.69	-0.93	[1.566; 1.068]
Product Quality	4.49	0.98	[3.948; 2.068]
Variety of products	0.189	0.12	[1.357; 1.792]
Payment by card	-3.19***	-3.41	[0.806; 1.065]
Atmosphere	-4.68***	-2.81	[1.435; 1.895]
Cleanliness	8.59**	2.81	[2.634; 3.479]
Food safety	1.35	0.75	[1.551; 2.049]
Product quality x cleanliness	-1.36	-0.80	[1.465; 1.935]
socio-economic characteristics			
Location	27.69***	7.70	[3.098: 4.093]
Gender	1.68	0.47	[3.080; 4.068]
Age	-0.45	-0.23	[1.686; 2.227]
Household income	-1.16	-0.63	[1.587; 2.096]
Level of education	-0.58	-0.29	[1.724; 2.276]
constant	-0.56	-0.03	[16.086; 21.247]
equation 2	***dependent 2: percentage of spending on fresh fruit and vegetables accounted for by supermarkets***		
Retail outlet attributes			
Convenience of location	-3.47	-1.70	[1.759; 3.323]
Price of products	0.01	0.01	[0.862; 1.138]
Special offers	0.56	0.33	[1.462; 1.931]
Assortment	2.36	1.22	[1.667; 2.202]
Quality of service	-1.91	-0.83	[1.983; 2.619]
Speed of service	2.84***	3.12	[0.784; 1.036]
Product Quality	-4.70	-0.51	[7.942; 10.489]
Variety of products	2.54***	-4.10	[-0.705; -0.534]
Payment by card	1.26	1.09	[0.996; 1.316]
Atmosphere	0.71	0.30	[2.039; 2.694]
Cleanliness	-7.55	-0.88	[7.393; 9.766]
Food safety	4.80**	2.49	[1.661; 2.194]
Product quality x cleanliness	0.87	0.41	[1.829; 2.415]
socio-economic characteristics			
Location	-31.47***	-9.07	[2.990; 3.949]
Gender	2.45	0.72	[2.932; 3.873]
Age	1.79	0.94	[1.641; 2.167]
Household income	1.12	0.63	[1.532; 2.023]
Level of education	1.45	0.73	[1.711; 2.261]
constant	84.68***	2.34	[31.185; 41.191]
lnsigma1	3.15***	59.98	[0.045; 0.059]
lnsigma2	3.09***	56.97	[0.047; 0.062]
atrho12	-1.32***	-17.60	[0.065; 0.085]
sigma1	23.27***	19.06	[1.052; 1.389]
sigma2	22.18***	18.38	[1.039; 1.373]
rho12	-0.86***	-46.24	[0.016; 0.021]
LR-test of rho12 [chi2(1)]	249.445*** [0.000]		
Log likelihood	-1603.524		
Wald chi2(36) [prob>chi2]	151.04*** [0.000]		

1: * - 10%-, ** - 5%-, *** - 1%-level of significance; 2: 1000 replications.

Table 6: Bootstrapped Bivariate Tobit Model for Percentage of Spending on Fresh Meat accounted for by Wet Markets and Supermarkets

(n = 201) independents	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
equation 1	***dependent 1: percentage of spending on fresh meat accounted for by wet markets***		
Retail outlet attributes			
Convenience of location	0.99	0.67	[1.273; 1.682]
Price of products	1.27	0.66	[1.658; 2.190]
Special offers	1.59	1.01	[1.357; 1.792]
Assortment	-1.51	-0.78	[1.668; 2.204]
Quality of service	2.71***	3.57	[0.654; 0.864]
Speed of service	-2.71***	-3.47	[0.673; 0.889]
Product Quality	13.50***	2.60	[4.474; 5.910]
Variety of products	-0.61	-0.38	[1.383; 1.827]
Payment by card	-3.28***	-2.80	[1.009; 1.333]
Atmosphere	-4.65***	-2.73	[1.468; 1.939]
Cleanliness	14.69**	2.20	[5.754; 7.600]
Food safety	1.812	0.71	[2.199; 2.905]
Product quality x cleanliness	3.75**	2.00	[1.616; 2.134]
socio-economic characteristics			
Location	28.27***	7.56	[3.222; 4.256]
Gender	0.21	0.05	[3.619; 4.781]
Age	-1.68	-0.84	[1.723; 2.276]
Household income	-2.41	-1.27	[1.635; 2.159]
Level of education	-0.84	-0.40	[1.809; 2.390]
constant	-16.04	-0.72	[19.198; 25.358]
equation 2	***dependent 2: percentage of spending on fresh meat accounted for by supermarkets***		
Retail outlet attributes			
Convenience of location	2.09	1.01	[1.783; 2.356]
Price of products	-3.18**	-1.92	[1.427; 1.885]
Special offers	0.45	0.26	[1.491; 1.970]
Assortment	-0.18	0.09	[-2.276; -1.723]
Quality of service	0.83	0.35	[2.043; 2.699]
Speed of service	0.37	0.20	[1.594; 2.106]
Product Quality	2.78	0.29	[8.261; 10.911]
Variety of products	-1.25	-0.73	[1.476; 1.949]
Payment by card	1.32	1.13	[1.007; 1.329]
Atmosphere	-1.41	-0.59	[2.059; 2.720]
Cleanliness	1.21	0.14	[7.448; 9.838]
Food safety	2.99***	2.50	[1.031; 1.361]
Product quality x cleanliness	-1.05	-0.48	[1.885; 2.489]
socio-economic characteristics			
Location	-32.68***	-9.15	[3.078; 4.065]
Gender	1.69	0.46	[3.166; 4.182]
Age	2.21	1.12	[1.700; 2.246]
Household income	3.37*	1.87	[1.553; 2.051]
Level of education	0.17	0.08	[1.831; 2.419]
constant	63.55*	1.69	[32.405; 42.802]
lnsigma1	3.26***	62.52	[0.045; 0.059]
lnsigma2	3.19***	61.19	[0.045; 0.059]
atrho12	-1.41***	-19.30	[0.063; 0.083]
sigma1	25.93***	19.21	[1.163; 1.536]
sigma2	24.42***	19.15	[1.099; 1.451]
rho12	-0.89***	-57.21	[0.013; 0.018]
LR-test of rho12 [chi2(1)]	264.284*** [0.000]		
Log likelihood	-1602.0945		
Wald chi2(36) [prob>chi2]	150.61*** [0.000]		

* - 10%-, ** - 5%-, *** - 1%-level of significance; 2: 1000 replications.

Table 7: Bootstrapped Bivariate Tobit Model for Percentage of Spending on Fresh Fish accounted for by Wet Markets and Supermarkets

(n = 201) independents	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
equation 1	***dependent 1: percentage of spending on fresh fish accounted for by wet markets***		
Retail outlet attributes			
Convenience of location	3.38*	1.98	[1.471; 1.943]
Price of products	1.74	0.66	[2.272; 3.001]
Special offers	-0.29	-0.14	[1.785; 2.358]
Assortment	-3.01	-1.17	[2.217; 2.928]
Quality of service	-0.11	-0.06	[1.579; 2.087]
Speed of service	-1.60	-0.65	[2.121; 2.802]
Product Quality	19.41***	2.87	[5.828; 7.698]
Variety of products	1.72	0.79	[1.876; 2.478]
Payment by card	0.44	0.28	[1.354; 1.789]
Atmosphere	-1.49	-0.64	[2.006; 2.649]
Cleanliness	27.13***	3.03	[7.716; 10.192]
Food safety	0.58	0.23	[2.173; 2.870]
Product quality x cleanliness	7.239***	2.90	[2.151; 2.841]
socio-economic characteristics			
Location	7.24***	2.49	[2.506; 3.309]
Gender	24.05***	6.14	[3.375; 4.458]
Age	0.28	0.07	[3.447; 4.553]
Household income	-2.19	-1.03	[1.832; 2.420]
Level of education	1.44	0.63	[1.969; 2.602]
constant	-56.73***	-2.07	[23.617; 31.194]
equation 2	***dependent 2: percentage of spending on fresh fish accounted for by supermarkets***		
Retail outlet attributes			
Convenience of location	0.17	0.05	[2.929; 3.870]
Price of products	-1.52	-0.57	[2.298; 3.035)
Special offers	-1.48	-0.57	[2.237; 2.955]
Assortment	-3.99***	-2.91	[1.181; 1.561]
Quality of service	7.33**	2.07	[3.051; 4.031]
Speed of service	-1.69	-0.61	[2.387; 3.153]
Product Quality	-5.96	-0.42	[12.229; 16.152]
Variety of products	1.28	0.48	[2.298; 3.035]
Payment by card	0.49	0.28	[1.508; 1.992]
Atmosphere	1.32	0.36	[3.159; 4.174]
Cleanliness	-11.78	-0.91	[11.155; 14.735]
Food safety	0.77	0.26	[2.552; 3.371]
Product quality x cleanliness	1.88	0.58	[2.793; 3.689]
socio-economic characteristics			
Location	-31.33***	-7.45	[3.624; 4.787]
Gender	-2.49	-0.58	[3.699; 4.887]
Age	0.68	0.28	[2.093; 2.764]
Household income	2.62	1.14	[1.981; 2.616]
Level of education	0.95	0.38	[2.154; 2.846]
constant	96.34*	1.76	[47.171; 62.306]
lnsigma1	3.29***	65.24	[0.043; 0.057]
lnsigma2	3.35***	58.30	[0.049; 0.065]
atrho12	-1.12***	-14.85	[0.065; 0.086]
sigma1	27.05***	19.78	[1.178; 1.557]
sigma2	28.52***	17.40	[1.412; 1.866]
rho12	-0.81***	-30.67	[0.023; 0.030]
LR-test of rho12 [chi2(1)]	249.445*** [0.000]		
Log likelihood	-1603.524		
Wald chi2(36) [prob>chi2]	151.04*** [0.000]		

1: * - 10%-, ** - 5%-, *** - 1%-level of significance; 2: 1000 replications.

Table 8: Bootstrapped Bivariate Tobit Model for Percentage of Spending on Packaged Goods accounted for by Wet Markets and Supermarkets

(n = 201) independents	coefficient[1]	z-value	bootstrapped bias-corrected standard error 95% confidence interval[2]
equation 1	***dependent 1: percentage of spending on packaged goods accounted for by wet markets***		
Retail outlet attributes			
Convenience of location	4.97*	1.83	[2.463; 2.969]
Price of products	1.69	0.47	[3.531; 3.661]
Special offers	5.39*	1.84	[2.675; 3.184]
Assortment	-2.84	-0.78	[3.533; 3.749]
Quality of service	-1.43	-0.43	[3.266; 3.385]
Speed of service	-2.59	-0.74	[3.398; 3.602]
Product Quality	9.62	1.11	[8.513; 8.820]
Variety of products	-0.82	-0.27	[2.999; 3.074]
Payment by card	-0.65	-0.30	[2.125; 2.208]
Atmosphere	-0.39	-0.12	[3.233; 3.267]
Cleanliness	-1.18	-0.10	[11.786; 11.814]
Food safety	-1.77	-0.51	[3.400; 3.541]
Product quality x cleanliness	-0.53	-0.16	[3.290; 3.335]
socio-economic characteristics			
Location	22.36***	4.72	[4.085; 5.389]
Gender	1.39	0.29	[4.753; 4.833]
Age	0.73	0.29	[2.477; 2.557]
Household income	-0.78	-0.31	[2.473; 2.556]
Level of education	-3.13	-1.20	[2.442; 2.774]
constant	-23.47	-0.69	[33.919; 34.109]
equation 2	***dependent 2: percentage of spending on packaged goods accounted for by supermarkets***		
Retail outlet attributes			
Convenience of location	-2.18	-0.46	[4.676; 4.803]
Price of products	2.32	0.58	[3.919; 4.080]
Special offers	-0.93	-0.23	[4.012; 4.075]
Assortment	9.93***	2.14	[4.344; 4.936]
Quality of service	7.33	1.35	[5.243; 5.616]
Speed of service	5.87	1.38	[4.063; 4.444]
Product Quality	-27.84	-1.27	[21.746; 22.097]
Variety of products	2.32	0.58	[3.919; 4.080]
Payment by card	2.57	0.93	[2.635; 2.892]
Atmosphere	-2.63	-0.47	[5.531; 5.661]
Cleanliness	-19.29	-0.96	[19.961; 20.226]
Food safety	7.22***	2.63	[2.382; 3.109]
Product quality x cleanliness	4.55	0.91	[4.874; 5.126]
Socio-economic characteristics			
Location	-26.09	-4.83	[4.734; 6.069]
Gender	-6.03	-1.08	[5.434; 5.733]
Age	-5.09***	-3.59	[0.922; 1.914]
Household income	2.53	0.86	[2.823; 3.061]
Level of education	-1.06	-0.34	[3.071; 3.165]
constant	188.03**	2.22	[84.391; 85.005]
lnsigma1	3.43***	59.76	[-8.204; 8.319]
lnsigma2	3.61***	68.61	[-9.432; 9.538]
atrho12	-0.83***	-10.92	[-1.434; 1.586]
sigma1	30.89***	17.42	[-0.635; 4.181]
sigma2	36.93***	19.01	[-0.685; 4.571]
rho12	-0.68***	-16.73	[-2.272; 2.353]
LR-test of rho12 [chi2(1)]	103.569*** [0.000]		
Log likelihood	-1730.620		
Wald chi2(36) [prob>chi2]	70.33*** [0.000]		

1: * - 10%-, ** - 5%-, *** - 1%-level of significance; 2: 1000 replications.