Market Outlet Choices in the Context of Changing Demand for Fresh Meat: Implications for Smallholder Inclusion in Pork Supply Chain in Vietnam

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Abstract

This paper reports on the findings of a study to investigate market outlet choice decision-making of urban consumers in Vietnam with regards to fresh pork purchases and generate empirical evidence on factors that influence these choices. Data from a survey of 600 consumers in Hanoi and Ho Chi Minh City was used to estimate a multinomial logit model of market outlet choice based on three alternatives: traditional temporary market outlets, permanent open markets, and modern retail outlets. Results suggest that market outlet choice by consumers of fresh pork in urban cities of Vietnam is conditioned by factors related to mobility and level of affluence, time budgets, concerns about food safety and hygiene, proximity to market outlets, and geographical location which captures the effects of income differences, traditional marketing practices, and prevailing market infrastructure. There is a valid case for continued viability of traditional market outlets as suppliers of fresh pork to urban consumers in Vietnam.

Keywords: market outlet choice, pork supply chain, smallholders, Vietnam; D01, C25

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Introduction

The increasing affluence of Vietnam's population is driving changes in food consumption patterns. Real per capita gross domestic product (GDP) grew an average of about six percent per year during the period 2000-2008 (GSO 2008) and is expected to continue on an upward trend (WB 2008), while household final consumption expenditure grew at an average of about 11 percent per year during the period 1997-2007 (WB 2008). Dietary patterns are increasingly shifting from a predominantly starch-based diet to one with relatively high proportion of animal-sourced proteins, fruits, and vegetables. With higher purchasing power especially in urban areas, consumers are also becoming more discriminating, demanding more specific quality and safety attributes in their food, as well as in the sources of those foods (Humphrey 2005, King and Venturini, 2005, Reardon et al. 2001, Regmi and Gelhar 2005). Specifically, increased product (and price) differentiation is emerging as evidence of increasing demand for better quality products both among home consumers and consumers eating away from home in the urban areas of Vietnam, and of willingness to pay differential prices based on such attributes (World Bank 2006, Figuie and Dao 2002, Ginhoux 2001). Further, demand for better quality is reflected both in the demand for commercial as well as traditional product attributes, with the latter increasingly becoming important with the emerging niche markets for particular products, as is the case for pork products.

Alongside the changing nature of food demand is the remarkable pace of development in the food retail sector as has been happening in the rest of Asia. Such restructuring in response to food demand changes fueled by higher incomes and urbanization, has led to the anticipation of the likely dominance of the modern agri-food sector and the

contraction of the traditional food retail sector (Reardon and Gulati 2008, Coyle 2006). The ongoing restructuring of the food retail markets in the region is driven by a set of factors as summarized in Chen et al. (2005), namely: income growth with increasing urbanization; changing consumer preferences; changing consumer eating habits; increased infrastructure development; low margins and high competition; demographic, cultural, and social changes; and increased travel. The major consumer-driven dynamic of retail restructuring has been led by the more affluent group of consumers; i.e., busy, mobile people who find grocery shopping a time-consuming chore thereby limiting this to large, infrequent trips; their tastes are also becoming more diverse (Moore 1989). This type of socio-demographic may not as yet be as significant in Vietnam as in other more developed countries, but current trends likely point the shift in demographics towards this type with continued economic growth and rising participation of women in the labor force particularly in increasingly urbanizing areas of the country.

The pace at which the restructuring of the food retail sector is happening varies greatly because of different levels of economic development, as for example in the case of Vietnam where traditional outlets still account for more than 80% of sales even in urban cities (Chen et al. 2005). Despite the lure of modernity, some consumers at all income levels still prefer to shop at open-air markets where they expect to find higher quality meats and fresher fruits and vegetables; traditional retailers are also, in general, still found to be cheaper compared with modern outlets like supermarkets (Minten and Reardon 2008, Coyle 2006). Moreover, traditional tastes and preferences still prevail, e.g., Vietnamese consumers still prefer fresh meats from recently slaughtered animals

(Nguyen and Wade 2006), so that outlets that are able to meet these requirements, usually traditional wet markets, will likely remain in high demand.

Understanding the drivers of consumer choice for market outlets for fresh food will thus be important in the context of designing appropriate public policies that will marry the twin objectives of smallholder inclusion and competitiveness. This paper reports on the findings of a study to investigate market outlet choice decision-making of urban consumers in Vietnam with regards to fresh pork purchases and generate empirical evidence on the factors that influence these choices. Pork is the most preferred meat and accounts for at least four-fifths of meat consumed by Vietnamese consumers (Caldier 2006). The paper is organized as follows: Section 2 lays out the analytical approach and briefly discusses the data used, section 3 describes the characteristics and consumption patterns of urban consumers in Vietnam, section 4 discusses the empirical model and estimation results, and section 5 concludes with some implications of key findings.

Analytical Approach and Data

To investigate whether there have been visible changes in the pattern of meat consumption and outlet choice in urban Vietnam, a combined approach of descriptive and empirical analysis is considered. First, we demonstrate the characteristics of urban consumers in Hanoi and Ho Chi Minh City, their geographic and socio-demographic attributes, awareness of food safety and their choices of market outlets, using simple descriptive statistics. The aim is to give an overall picture of fresh pork consumers in the cities, spot potential causal links between households' characteristics and their choices of market outlets and provide a background that might help in understanding causality. The descriptive findings and hypotheses concerning households' choice of outlet are tested

against data using a discrete choice modeling framework. Discrete choice modeling provides an analytical framework with which to analyze and predict how people's choices are influenced by their personal characteristics and by the different attributes of the alternatives available to them.

Since the market outlet choice decision is taken at the household level, it is properly addressed using disaggregate choice modeling methods, an approach that provides much greater insight into consumer behavior (Penny and Broom 1988 as cited in Moore 1989). The underlying principle of disaggregate choice models is that an individual will always act to maximize his/her utility, or satisfaction, within a range of constraints. This principle has long been the central tenet of microeconomic consumer theory, which generally assumes that the goods or services that an individual demands are finely divisible, and there is therefore a continuous choice surface. However, in the context of market outlet choice, this assumption is 'patently unrealistic', as there are only 'a limited and constrained set of discrete alternatives' (Wrigley 1982 as cited in Moore 1989) from which the consumer may choose. The models that can accommodate these constraints and were developed by transportation scientists and urban modelers are known as 'discrete choice models',

The data generally used to calibrate disaggregate store choice models are known as revealed preference data. An individual's choice of market outlet is assumed to be the result of a 'subjective selection of the most preferred alternative from a restricted and unique set of spatial alternatives' (Timmermans 1979). In discrete choice model terms, the individual assigns a preference to each alternative according to his/her utility function, and this function (or preference structure) is revealed by the most preferred

alternative. In order to calibrate a model and, thus reveal the preference structure of a population of individuals, it is necessary to observe the choices of a substantial sample of consumers. In this particular study, the sample consumers were those included in the survey of urban consumers in Vietnam.

Three alternative market outlet choices are evident from available data generated from a survey of urban consumers, hence, suggesting that an extended unordered version of the binary logit model is appropriate. The stated-rank nature of the data suggests that we might resort to an exploded logit model *à la* Beggs *et al* (1981). This model assumes that the ranking of the alternatives can be considered as a series of choices made from successively smaller choice sets so that the ranked data explode into a series of choice observations. However, exploded logit model requires data on the attributes of the alternatives, which are not available in our survey. Therefore, in this paper, we employ a simple multinomial logit model, the most widely applied and tractable among discrete choice models, and using only information on the most preferred choices of households. That is, we will keep only the outlet that is ranked number 1 for each and every household and drop all lower ranked outlets. The choice of outlet is then modeled as a latent function of the characteristics of households. For our purpose, we group the outlets into three categories: traditional temporary outlets (mobile vendors and temporary neighborhood markets), permanent open market, and modern retail outlets (supermarkets, convenience stores). Details of the model will be presented in empirical analysis section.

Surveys of urban consumers were implemented in two major cities of Vietnam, namely Hanoi in the Red River Delta in the north and Ho Chi Minh City (HCMC) in the Mekong Delta in the south. A total of 600 urban households were interviewed of which 270 were

randomly selected from Hanoi and 330 from HCMC. The sampling frame used for selecting the household respondents was the Vietnam Household Living Standards Survey (VHLSS) 2006 sampling frame.

Characteristics of urban consumers in Vietnam

Table 1 presents a summary of descriptive statistics of sample respondents. The majority of household respondents in Hanoi (53 percent) and HCMC (75 percent) indicated preference for permanent open markets. Interestingly, a larger proportion of respondents in Hanoi (45 percent) than in HCMC (17 percent) indicated preference for traditional temporary outlets, while slightly more households in HCMC (about eight percent) indicated preference for modern retail outlets than in Hanoi (nearly two percent). In Hanoi, there is a culture of street vending, with mobile vendors roaming the streets of Hanoi a common sight and have become a way of life for people in this part of Vietnam. The situation is fast changing in the south of Vietnam, however, particularly in HCMC where modern retail outlets are quickly populating the neighborhoods thereby increasing their availability to consumers (Maruyama and Trung 2007, Manalili and Tumlos 2005). Hence, accessibility, availability and tradition are strong drivers of preference for the choice of market for fresh pork in Vietnam.

(Insert Table 1 here)

Female household heads or spouses who are relatively younger appear to prefer the modern retail outlets for buying fresh pork. Similarly, more female household heads or spouses with higher education (i.e., having completed at least high school) are observed to use modern retail outlets for purchasing fresh pork. On the other hand, slightly more households who indicated that hygiene is the most important consideration in food safety

in meats use permanent open markets for fresh pork purchases; permanent open markets are common market outlets in cities and towns in Vietnam before the advent of modern retail outlets (Cadilhon et al. 2006). In permanent open markets, fresh pork is usually sold by independent meat retailers or butchers cum retailers and business relationships are usually built by individual consumers over years of doing business with a butcher or meat retailer in permanent open markets. Such relationships developed trust in the supplier and this drives the decision in market outlet choice for fresh pork supply. Also, more consumers who consider form of meat as important consideration in pork purchases buy these from traditional temporary outlets (51 percent) or permanent open market (54 percent).

Households that are observed to use modern retail outlets appear to live farther away from these outlets than those who are using traditional temporary outlets or permanent open markets. The attraction of traditional temporary outlets is their accessibility and availability at all times of the day especially in the inner cities. Such outlets provide a convenient source of fresh meats to households who live in these areas. As cities grow and expand, households tend to locate farther away from the city center to avoid congestion, so that food shopping may have to be done less frequently; as such modern retail outlets for fresh meat that also include a selection of other food and non-food commodities for sale will be increasingly more attractive to these shoppers, particularly with increasing ownership of vehicles for transportation such as cars and/or motorbikes as well as refrigerators for food storage.

Table 2 shows the average ranking scores of different types of market outlets that are commonly used by consumers in Vietnam with the lowest average ranking being the

most preferred market outlet. Among consumers in Hanoi, the most preferred market outlet for fresh pork is the temporary neighborhood market, followed by permanent open market and retailers of branded meat. In HCMC, the most preferred market outlet for fresh pork by consumers is the permanent open market, followed by temporary neighborhood market, and retailers of branded meat. Modern retail outlets received relatively higher mean (rank) scores among consumers in HCMC than those in Hanoi suggesting that these outlets may be viewed more favorably by consumers in south Vietnam, although modern retail outlets in general obtained relatively lower average (rank) scores in both locations. Mobile vendors, a type of traditional temporary outlet, also got relatively lower mean (rank) scores in both locations.

(Insert Table 2 here)

Actual purchase patterns appear consistent when compared with ranking (or stated preference) scores, as shown in Table 3. That is, outlets that are most frequently used for purchase of fresh pork are also those that are shown to have been ranked highest.

(Insert Table 3 here)

Differences in choice of market outlets between consumers in Hanoi and HCMC may be explained by differences in purchasing power, where the average household income per month in HCMC is relatively higher than that in Hanoi (see Table 4). The mean household monthly income of households in HCMC is also slightly higher than the mean household monthly income of all sample respondents in the survey.

(Insert Table 4 here)

Income differences also show up across types of preferred market outlets, regardless of location, where average household monthly income is highest among households preferring modern retail outlets. A relatively higher proportion (i.e., almost half) of households that indicated preference for traditional temporary market outlets belong to the lowest income tercile, i.e. the poorest group (see Table 5). On the other hand, the majority of households that indicated preference for modern retail outlets belong to the highest income tercile, i.e., the richest group. In general the proportion of consumers who have indicated a preference for modern retail outlets is still a relatively small share (slightly more than five percent) of urban consumers in Vietnam interviewed for this study.

(Insert Table 5 here)

Empirical model and estimation results

The market outlet choice of households is modeled by a multinomial logit model where households consider three types of outlets for fresh pork: traditional temporary markets (mobile vendors and temporary neighborhood markets), permanent open market, and modern retail outlets (supermarkets, convenience stores, retailers of branded meat). The underlying assumption is that, a household selects its outlet according to a latent utility function y^* defined as:

$$y_{ij}^* = x_i \beta_j + \varepsilon_{ij} \quad (1)$$

Where y_{ij}^* is the utility that household i values outlet j (j=0,1,..,J; J+1 is the number of outlets), x_i is the vector of household-specific explanatory variables, ß is the set of parameters that reflect the impact of changes in household-specific explanatory variables

on the utility, and ε_{ij} is the error term, which contains information such as tastes, health status, etc. that are not included in x_i. The household would select the outlet y_i that maximizes its utility:

$$y_i = \arg\max(y^*_{i1,} y^*_{i2,} ... y^*_{iN,}) \tag{2}$$

where N is the number of households. McFadden (1973) shows that if ε_{ij} are independently and identically distributed with type I extreme value distribution, then the multinomial logit model of market outlet choice takes the form:

$$P(y_i = j \mid x_i) = \exp(x_i \beta_j) / (1 + \sum_{k=1}^{J} \exp(x_i \beta_k)) \tag{3}$$

This model can be estimated by maximum likelihood with the log-likelihood function defined as :

$$LnL = \sum_{i=1}^{N} \sum_{j=0}^{J} 1[y_i = j] \ln(\Pr ob(y_i = j)) \tag{4}$$

A household's decision of which outlet to choose for purchases of fresh pork is hypothesized to be influenced by a set of variables including socio-demographic characteristics of households and its members (including the household head and female spouse), some indicators of mobility and affluence, as well as their degree of concern about food safety and hygiene conditions (see Table 6 for variable definitions). It is hypothesized that those with higher income or living in higher income areas are more likely to purchase from modern retail outlets. In the model, location dummy HCMC is taken as a proxy that captures income differences across households in HCMC and Hanoi and also differences in incidence (or availability) of modern retails outlets and/or

infrastructure facilitating access to these outlets. Households in Ho Chi Minh City are expected to be more inclined to purchase fresh pork from modern retail outlets. Income differences are proxied by dummy variables for three income groups, namely the poorest (i.e., those belonging to the lowest income tercile), the richest (i.e., those belonging to the highest income tercile), and the middle income group; the latter was not included in the model following standard treatment of categorical dummy variables. It is expected that choice of modern retails outlets is positively associated with higher income levels. It is also expected that those with greater concern about food safety and hygiene would favor modern outlets. The possession of such assets as refrigerator and motorbike (as indicators of affluence and mobility, respectively) is hypothesized to condition households' market outlet choices through impacts in their accessibility to market outlets and food storage capacity. Households not having these assets might prefer temporary market outlets as they are more convenient, so do households which locate far from markets. The employment status of the female household head or spouse is hypothesized to influence the choice of market outlet in the context of their time budget; i.e., how much time is available for food shopping; when time for food shopping is constrained, the market outlet of choice is hypothesized to trend towards those that are located close to home or within easy access along the way home from work, characteristics usually associated with traditional neighborhood temporary markets.

Estimated coefficients and marginal effects of the variables in the multinomial logit (MNL) model are shown in Table 7, where permanent open market outlet is used as the base category, hence estimated coefficients for this category are derivable from the other two. Results suggest that households in HCMC are less likely than households in Hanoi

to purchase fresh pork in traditional temporary outlets than in permanent open markets (with 38 percent likelihood, as shown in computed marginal effects) and this is consistent with expectations. They are however, more likely than households in Hanoi to purchase fresh pork in modern retail outlets than in permanent open markets (with nearly 3 percent probability), and this conforms to expectations about the effect of income and availability of outlets.

Male-headed households are more likely to purchase fresh pork in traditional temporary outlets than in permanent open market; the likelihood that a similar household will purchase from a traditional temporary outlet than in a permanent open market is 10 percent higher than a female-headed household. Households with older female heads or spouses are less likely to purchase fresh pork in modern retail outlets than in permanent open markets (with nearly two percent probability). On the other hand, female household heads or spouses with higher education are more likely to purchase fresh pork from modern retail outlets than in permanent open markets, although the marginal change in probability is not statistically significant. Female household heads or spouses with full-time employment are more likely to purchase fresh pork from traditional temporary outlets than in permanent open markets (with nearly 11 percent probability); they are also less likely to purchase fresh pork from modern retail outlets than in permanent open markets although the marginal change in likelihood is not statistically significant. With employment status being an indicator of availability of time for shopping, those with full-time employment are likely to prefer easily accessible outlets close to home or the work place if they prefer to purchase fresh pork on a daily basis due to their reduced time budgets.

Households with refrigerators are less likely to purchase fresh pork from traditional temporary outlets (with 18 percent probability) than in permanent open markets. Households indicating that they are most concerned about food safety associated with animal diseases are less likely to purchase fresh pork from traditional temporary outlets. There is about 12 percent probability that households having this concern will not purchase fresh pork from traditional temporary outlets than households not having similar concern.

Households indicating they are most concerned about food safety related to hygiene in slaughtering are less likely to purchase fresh pork from traditional temporary outlets than in permanent open markets; they are also less likely to purchase fresh pork from modern retail outlets than in permanent open market. The likelihood that households having this concern are likely to purchase from temporary outlets than in permanent open markets declines by nearly eight percent relative to households having no similar concern. The long-term business relationship that consumers may have developed with a butcher or a meat retailer in a permanent open market may have been strong enough to be influenced by the attraction of gleaming shelves and air-conditioned facilities offered by modern retail outlets; the lack of personal touch in modern retail outlets or the non-regular, spot transactions that generally occur in temporary neighborhood markets may be a hindrance to break this relationship based on trust from long experience with regular suppliers from permanent open markets. Trust in the supplier is particularly important in the case of fresh meat due to its credence attributes; only through repeated transactions with a supplier will the consumer develop trust.

The farther away the household is located to the nearest market outlet, the less likely it is to purchase fresh pork from traditional temporary outlets (with 16 percent reduction in probability for every kilometer distance away from home); while it is more likely to purchase from modern retail outlets than in permanent open markets (with less than one percent increase in probability per kilometer distance away from home). These results suggest that the effect of distance on market outlet preference is stronger against traditional temporary outlets compared with its effect on choice of modern retail outlets by consumers. Dummy variables for the poorest and richest groups of consumers were also included to capture the potential differences due to purchasing capacity. In this case, the empirical results suggest that the poorest group of consumers is more likely to purchase pork from temporary market outlets than permanent open markets with about nine percent probability. On the other hand, the richest group of consumers is more likely to purchase from modern retail outlets than permanent open markets, although the marginal change in probability is not statistically significant. Hence, it appears that the income effect on choice of market outlet is relatively stronger among the poorest consumers than those among the richest consumers, highlighting the limited choices poor consumers have compared to their better off counterparts in sourcing their food.

Conclusions and implications of results

Market outlet choice by consumers of fresh pork in urban cities of Vietnam is shown to be conditioned by factors that are related to their mobility and level of affluence, time budgets, concerns about food safety and hygiene, proximity to market outlets, and geographical location which captures the effects of income differences, traditional marketing practices, and prevailing market infrastructure. That there is an apparent trend

towards use of modern retail outlets for fresh pork by urban consumers who are younger and more affluent (and can afford to invest in cooling facilities for storing fresh food) and opted to live farther away from the city centers is consistent with expectations and trends in other parts of Asia. On the other hand, there is still a substantial group of consumers who are dependent on traditional market outlets ranging from temporary neighborhood stalls to permanent open structures. Such choices are largely determined by constraints in time available for food shopping, so that accessibility and trust in the supplier being developed over time from repeated transactions (with positive outcomes) are of prime consideration. Purchasing power is also an important driver of choice by this group of consumers, particularly since they are likely to be in the lower end of the income distribution, thereby making it even more important that they maintain their access to their preferred outlets. Since preference for fresh pork from newly slaughtered pigs is still predominant among Vietnamese consumers, the importance of traditional market outlets for supplying fresh pork will likely remain, unless policies intended to modernize the retail food sector will eventually prohibit their continued existence. It is also important to note that these outlets are usually being supplied with meat from a network of market intermediaries that are strongly linked with smallholder pig producers; while modern retail outlets like supermarkets remain out of reach to these smallholder suppliers due to rigid supply requirements and standards that only large-scale producers linked with these supply chains can satisfy. The empirical evidence from this study presents a valid case for traditional market outlets as suppliers of fresh pork to mainstream urban consumers in Vietnam. The strong preference of Vietnamese consumers to purchase fresh pork at non-supermarket outlets provides a degree of market protection to small pig

producers in Vietnam from imports of pork. Imported pork is generally chilled or frozen or processed and their prime outlet is through supermarkets. The relevant policy debate will now have to focus on how to ensure that traditional open market outlets remain viable and up to par with the competition posed by modern outlets, since these outlets are key to smallholder producers' inclusion in the restructuring process going on in food retail sector, while keeping fresh meat easily accessible to relatively low income consumers. Instead of being unduly discriminated against in their continued participation in the growing market for pork in urban cities of Vietnam, smallholder producers will appreciate the opportunity to remain as viable participants in the pork supply chain serving the needs of urban consumers. Further empirical research to examine viable options for enhancing competitiveness to facilitate inclusion of smallholders in the fresh meat supply chain will be important contributions to inform the policy debate.

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Table 1: Characteristics of sample respondents in Hanoi and Ho Chi Minh City.

Characteristics	Traditional Temporary Outlets	Permanent Open Market	Modern Retail Outlets
Proportion of respondents in Hanoi having most preferred market outlet (%)	45.35	52.79	1.86
Proportion of respondents in Ho Chi Minh City having most preferred market outlet (%)	17.02	74.77	8.21
Proportion of male-headed households (%)	65.17	51.29	62.50
Average age of female head/spouse	53.5 (14.85)	53.91 (13.61)	49.73 (9,97)
Proportion of female head/spouse having completed high school (%)	51.12	48.71	71.88
Proportion of female head/spouse having full-time employment (%)	70.22	71.13	78.13
Proportion of households owning a motorbike (%)	91.01	92.53	96.88
Proportion of households owning a refrigerator (%)	88.2	91.24	96.88
Proportion of respondents who consider form of meat as most important (%)	51.12	53.61	43.75
Proportion of respondents who consider food safety as most important (%)	98.88	97.16	96.88
Proportion of respondents who consider disease free meat as most important (%)	80.90	85.82	84.38
Proportion of respondents who consider hygiene in slaughtering as most important (%)	24.72	38.92	25.00
Distance of market outlet from home (km)	0.47 (0.42)	0.55 (0.43)	0.85 (1.04)

Source of data: ILRI-CAP survey of urban consumers in Vietnam, 2007.
Figures in parentheses are standard errors of the mean.

Table 2: Ranking of preference for various types of market outlets for fresh meat including pork.

Type of market outlet	Average rank score of market outlet preference, by location		
	Ha Noi	HCM	Overall
Mobile vendors	2.83	2.61	2.74
Meat retailers in temporary neighborhood market	1.29	1.67	1.43
Meat retailers in permanent open market	1.36	1.25	1.29
Meat retailers of branded meat	2.80	2.14	2.27
Grocery shops/convenient stores	3.42	2.95	3.13
Supermarkets	3.02	2.69	2.79

Note: Ordinal ranking was used with 1 as most preferred; hence, average rank with lowest value would indicate highest preference among respondents.
Source of data: ILRI-CAP survey of urban consumers in Vietnam, 2007.

Table 3: Distribution of consumers by type of outlet used to purchase fresh pork (%)

	Hanoi	HCMC	Overall
Mobile (street) vendor	1	1	1
Temporary neighborhood market	48	15	31
Permanent open market	49	77	64
Meat retailer of branded meat (e.g., VISSAN)	0	4	2
Grocery shop/convenience store	1	0	0
Supermarket	1	3	2

Source of data: ILRI-CAP survey of urban consumers in Vietnam, 2007.

Table 4: Distribution of respondents by income level (in tercile) and average monthly income within tercile, by location.

	Ha Noi		HCM		Overall	
	No.	Average Income per month ('000VND)	No.	Average Income per month ('000VND)	No.	Average Income per month ('000VND)
Lowest tercile (lowest income)	98	684	111	644	209	663
Middle tercile (middle income)	106	1,186	108	1,182	214	1,184
Highest tercile (highest income)	66	2,392	111	2,655	177	2,557
All	270	1,299	329	1,489	600	1,407

Source of data: ILRI-CAP survey of urban consumers in Vietnam, 2007.

Table 5: Distribution of respondents by income level (in tercile) and average monthly income within tercile, by preferred type of market outlet.

	Traditional temporary outlet		Permanent open market		Modern retail outlet		Overall	
	No.	Average income per month ('000VND)	No.	Average income per month ('000VND)	No.	Average income per month ('000VND)	No.	Average income per month ('000VND)
Lowest tercile (lowest income)	81	648	122	674	6	645	209	663
Middle tercile (middle income)	59	1,169	151	1,190	4	1,185	214	1,184
Highest tercile (highest income)	38	2,334	115	2,634	22	2,369	175	2,534
All	178	1,180	388	1,456	32	1,892	598	1,397

Note: Two respondents were excluded due to missing responses in most preferred outlet.

Source of data: ILRI-CAP survey of urban consumers in Vietnam, 2007.

Table 6: Description of variables in the model.

Variable	Definition
Outlet	Dummy variable showing meat market outlets: 1. Traditional market outlets (mobile vendors, meat retailers in temporary neighborhood market); 2. Permanent open market; 3. Modern retail outlets (supermarket, convenient store, retailers of branded meat)
HCM dummy	Binary dummy which is unity if the household is in Ho Chi Minh city and zero if located in Hanoi.
Household size	Number of members in each household
Gender of household head	Binary dummy which is unity if household head is male and 0 if female.
Age of female head/spouse	Logarithm of the age of female head/spouse
Education of female head/spouse	Education level of the female head/spouse of household (1. Never go to school; 2. Primary school; 3. Middle school; 4. High school)
Employment status of the female head/spouse	Binary dummy which is zero if the female head/spouse is unemployed or retired and unity otherwise
Possession of motorbike	Binary dummy which is unity if the household possesses one or more motorbikes and zero otherwise.
Possession of refrigerator	Binary dummy which is unity if the household possesses one or more refrigerators and zero otherwise
Form of meat	Binary dummy which is unity if the household ranks form as the most important attribute of meat and 0 otherwise.
Food safety	Binary dummy which is unity if the household is concerned about fresh meat safety and 0 otherwise.
Disease free	Binary dummy which is unity if the household ranks disease free the most important concern and 0 otherwise.
Hygiene	Binary dummy which is unity if the household ranks hygiene of the outlet as the most important concern and 0 otherwise.
Distance from home	Variable measuring the distance (km) of the most frequently used outlet to home.
Poor household	Dummy variable which is unity if the household belongs to the lowest income tercile (based on household income per capita)
Rich household	Dummy variable which is unity if the household belongs to the highest income tercile (based on household income per capita)

Table 7: Estimated coefficients and marginal effects of variables in the MNL model.

Variables	Estimated Coefficients		Marginal Effects	
	Traditional Temporary Outlets	**Modern Retail Outlets**	**Traditional Temporary Outlets**	**Modern Retail Outlets**
HCM dummy	-1.84 (0.27)***	2.77 (0.99)***	-0.38 (0.05)***	0.03 (0.01)**
Household size	0.08 (0.07)	0.23 (0.15)	0.02 (0.01)	0.002 (0.001)
Gender of household head	0.52 (0.23)**	0.05 (0.54)	0.10 (0.04)**	-0.0007 (0.004)
Age of female head/spouse	0.13 (0.21)	-2.31 (0.67)***	0.03 (0.04)	-0.02 (0.009)**
Education of female HH head or spouse	-0.06 (0.12)	0.63 (0.35)*	-0.01 (0.02)	0.005 (0.003)
Employment status of female HH head or spouse	0.56 (0.25)**	-1.17 (0.64)*	0.11 (0.04)**	-0.01 (0.01)
Possession of motorbike	-0.25 (0.43)	0.53 (1.75)	-0.05 (0.09)	0.004 (0.008)
Possession of a refrigerator	-0.89 (0.38)**	-0.75 (1.14)	-0.18 (0.07)**	-0.004 (0.009)
Form of Meat	-0.25 (0.23)	-0.54 (0.52)	-0.05 (0.04)	-0.004 (0.005)
Food Safety	0.76 (0.85)	0.32 (1.98)	0.12 (0.11)	0.001 (0.01)
Disease free	-0.56 (0.31)*	0.67 (1.19)	-0.12 (0.07)*	0.005 (0.006)
Hygiene	-0.45 (0.24)*	-1.69 (0.72)**	-0.08 (0.04)*	-0.01 (0.006)
Distance from home	-0.78 (0.29)***	0.91 (0.34)***	-0.16 (0.06)***	0.009 (0.005)*
Poor HH	0.45 (0.26)*	0.19 (0.90)	0.09 (0.05)*	0.0004 (0.007)
Rich HH	0.12 (0.30)	1.75 (0.68)***	0.02 (0.06)	0.02 (0.02)
Log likelihood	-320.56		Pr(traditional temporary outlet) =0.276	
LR chi2(30)	486.06		Pr(modern retail outlet) = 0.008	
Prob>chi2	0.0000		Pr(permanent open market) = 1-0.01-0.28 = 0.716	
Pseudo R2	0.43			

Note: Base category is Permanent Open Market.

*** - significant at 1% level; ** - significant at 5% level; * - significant at 10% level.