







<p>1. Official abbatoir stamp present</p>	<p>Clean premises</p> 	<p>Low/marbled fat</p> 	<p>Fresh red meat</p> 	<p>Price ETB/kg 38</p>
<p>2. Official abbatoir stamp present</p>	<p>Unclean premises</p> 	<p>High fat meat</p> 	<p>Non-fresh pale meat</p> 	<p>Price ETB/kg 34</p>

Demand for livestock products in developing countries with a focus on quality and safety attributes: Evidence from Asia and Africa

# Demand for livestock products in developing countries with a focus on quality and safety attributes: Evidence from Asia and Africa

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# Chapter 11 Estimating willingness to pay for quality and safety attributes of pork: Some empirical evidence from northern Vietnam

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## Abstract

This study assessed consumers' willingness to pay a premium for specific quality and safety attributes of pork and the accompanying socio-economic factors that influence this choice decision. A survey was conducted among 600 randomly selected consumers from three regions in northern Vietnam representing three levels of urbanization: Hanoi as an urban centre, Hai Duong as an average-sized secondary city and Nam Sach as a rural commune. A dichotomous choice model was estimated to examine the factors that influenced the likelihood of willingness to pay a premium for selected quality and safety attributes that were identified as important by Vietnamese consumers in previous studies and through stakeholder consultations.

The results provide empirical support to validate some stylized facts about consumer preferences for specific attributes of fresh pork and a traditional processed pork product, *gio*. Socio-demographic characteristics of consumers influence their preference for specific attributes and, specifically, the nature of their demand for such attributes. Household income and location were found to be strong determinants of preferences and hence should be

given due consideration when designing production and marketing strategies for fresh and processed pork. Higher household income was strongly evident as a factor for increasing demand for quality attributes such as lower fat content, better hygiene and more desirable nicer colour (associated with freshness), but also for traditional attributes associated with products from niche markets such as meat from pigs reared without industrial feed or from local pigs. Higher level of education of consumers was also associated with lower likelihood of willingness to pay a premium for pork from pigs with more exotic blood. These results suggest that there is a group of consumers who demand quality attributes of hygienic, fresh and low-fat pork and these are relatively high income, well-educated consumers in Hanoi. Similarly, these consumers also preferred pork with local flavour/taste (e.g. from local pigs and pigs reared without industrial feed) that may be met by producing pork from crossbreeds with high local blood content and reared on traditional feeds such as grasses and local or mixed feeds as opposed to industrially processed feed.

These findings can be used to guide strategies for designing production and marketing options that can be piloted by a small group of collaborating households. Given the differential preference behaviour for different pork attributes by different types of consumers, there is need to identify target consumers for better targeting of interventions that can be prescribed on the ground. Efforts to ensure credibility and reputation for delivering products with these stated attributes will also need to be given attention.

**Key words:** consumer preference, willingness to pay, quality, safety, pork, Vietnam

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# Introduction

Demand for quality as a driver of markets and production is appearing as a global phenomenon (Reardon et al. 2001; Humphrey 2005; King and Venturini 2005; Regmi and Gelhar 2005). Rising consumer incomes, changing demographic patterns and lifestyles, and shifting preferences due to new information about the links between diet and health all contribute to new demands for food (Jensen 2006). At the same time, technological changes in production, processing and distribution, structural change and growth in large-scale retailing, and expansion of trade worldwide have contributed to a rapidly changing market for food products. These recent developments are reflected in the changes in demand for meat and other animal products.

In Vietnam, where incomes are rising due to the country's economic reforms over the last decade and the ensuing urbanization has accompanied economic growth, increased product (and price) differentiation is emerging as evidence of increasing demand for better quality products among urban consumers and of willingness to pay differential prices based on such attributes (Ginhoux 2001; Figuié and Dao 2002; Moustier 2006; Tung 2006; World Bank 2006). 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 pork products or those with certain attributes.

This study was aimed at assessing Vietnamese consumers' willingness to pay for specific attributes of quality and safety in pork and the accompanying socio-economic factors that drive this behaviour. It is hoped that the results of this research will inform action research for pilot testing of specific interventions that will facilitate more effective production and marketing strategies tailored to fit smallholder pig producers' resources and conditions that will subsequently allow them to participate more effectively in the changing markets for pork in Vietnam. Understanding the drivers of consumer behaviour is an important initial step to achieve this overall objective (see for example Sanders et al. 2004).

## Modelling willingness to pay

### Survey methodology

A survey was conducted covering a sample of 600 consumers living in three regions of northern Vietnam: Hanoi, Hai Duong and Nam Sach, representing three levels of urbanization. Hanoi is the capital of Vietnam, Hai Duong an average-sized secondary city and Nam Sach a rural commune. Out of the 200 consumers interviewed in Hanoi, 120 were met in supermarkets and 80 in regular markets. The 200 consumers each from Hai Duong and Nam Sach were interviewed in regular markets because supermarkets had not

yet been set up in these zones. The respondents in each category were chosen at random; customers were interviewed on the scene, on a one-to-one basis. Only persons in charge of food purchasing in the household were interviewed, a task most often handled by women in Vietnam which explains why 92% of interviewees were female. The contingent valuation method (CVM) is a standard approach to elicit willingness to pay through dichotomous choice, market-type questioning with a direct survey. In the dichotomous choice CVM, respondents are asked whether they would be willing to pay a particular price for a particular good in a hypothetical market, letting them answer 'yes' or 'no' to the 'bid' amounts offered.

In our survey, a contingent valuation question regarding willingness to pay a premium for fresh pork and *gio* (locally processed pork sausage) was included. Survey respondents were asked if they were willing to pay a premium for fresh pork and *gio* with specific attributes (other than the regular fresh pork and *gio* they usually purchased) and if so, to indicate using a payment card how much more than the current price they would be willing to pay in increments of VND 500 until the maximum amount they would be willing to pay. A similar question was then asked about a hypothetical product, i.e. fresh pork with less extramuscular fat, nicer colour and guaranteed hygiene and *gio* with no borax and MSG compared to what they usually bought. Full details of the descriptive statistics of the survey results are presented by Luan et al. (2006) and Pedregal et al. (in this volume). The primary focus of this report is econometric analysis of the data as descriptive analysis cannot adequately or satisfactorily disentangle the effects of different factors.

## The econometric model

Product attributes can be categorized into search, experience and credence goods (Nelson 1970; Darby and Karni 1973; Nelson 1974 as cited in Mojduszka and Caswell 2000) and, in most cases, attributes associated with quality are credence or experience goods and thus not easily observable without additional quality signals. Given this information asymmetry in the market of experience and credence goods, eliciting a consumer's true demand for specific quality attributes would require transforming credence and experience attributes into search attributes through provision of information about food quality through some visible quality signals. An alternative approach is to derive demand via a consumer's stated preference for specific attributes and assign a value to it. This can be done using a contingent valuation approach that was used in this study to elicit a consumer's willingness to pay for specific quality and safety attributes of fresh and processed pork.

The binary dichotomous choice CVM was applied to examine survey data on willingness to pay. Two outcomes were possible, namely, the respondent was either not willing to pay a premium for the fresh pork or *gio* with specific attributes (responded 'no' to the willingness-to-

pay question) or willing to pay a premium (responded 'yes' to the willingness-to-pay question). Probit, a dichotomous choice model, was used to examine the factors that influenced the likelihood of willingness to pay for a particular set of attributes (Maddala 1983; Greene 1997). The choice of which specific attributes to include for investigation were based on previous surveys by Ginhoux (2001) and Figuié and Dao (2002) that indicated what attributes were important to Vietnamese consumers, and also determined in consultation with stakeholders in Hai Duong province (Figuié et al. 2006). Models were run on STATA version 9.

It was hypothesized that consumers were heterogeneous with regard to their tastes in that they differed in the types and levels of quality that they desired when making their purchase decisions. This was subsequently reflected in their willingness to pay for products with the desired attributes. This heterogeneity in tastes might be conditioned by socio-demographic factors, including consumer perceptions and attitudes about quality (Carriquiry and Babcock 2005). For example, socio-demographic variables influence household demand for product and product attributes by altering the utility derived from goods and/or the costs of household production (Miller and Unnevehr 2001). Hence, for the present study, factors that were hypothesized to affect the likelihood of willingness to pay for specific attributes included socio-demographic characteristics such as household income, household size, gender, age, education and location. Variables that proxy for consumer attitudes about specific attributes were also included. Purchase habits such as frequency of purchase and choice of outlets, as well as consumption of other types of meats as substitutes, were likewise hypothesized to influence willingness to pay. Table 11.1 summarizes the socio-demographic characteristics of the survey respondents.

## Results and discussion

### Willingness to pay for fat content in fresh pork

Willingness to pay for three different forms of fat content was solicited: less extramuscular fat, more intramuscular fat and less intramuscular fat. Households in Hai Duong and Nam Sach were less likely to be willing to pay for pork with less extramuscular fat compared to households in Hanoi (Table 11.2). Higher income households, households that bought a higher proportion of their fresh pork in supermarkets, and those who ate beef once a week were more likely to be willing to pay for pork with less extramuscular fat. On the other hand, households that bought fresh pork less frequently in supermarkets, households for whom safety and fat content of meat were important factors in purchase decisions, and households that were satisfied with the breed of slaughtered pig sold as fresh pork were less likely to be willing to pay for less extramuscular fat in pork.



**Table 11.1.** *Socio-demographic characteristics of survey respondents*

	Percentage of respondents			
	Hanoi	Hai Duong	Nam Sach	All
Gender				
% female	90	95	91	92
Age (years)				
16–24	19	13	4.5	12
25–40	43	38	35.5	38
41–55	32	40	51	41
>55	7	9	9	8
Total	100	100	100	100
Mean	39.4	42.7	39.6	36.7
Education (years)				
No school	0	4	10	5
Primary and secondary school	5	18	56	26
High school (class 10–12)	20	28	25	24
Undergraduate	17	11	3	10
Postgraduate	59	39	7	35
Total	100	100	100	100
Main occupation				
Government/private sector employee	68	36	8	37
Unskilled labour	7	14	16	13
Agricultural producer	1	10	52	21
Student	12	11	3	8
Retired, not working	7	12	9	10
Merchant	5	17	12	11
Total	100	100	100	100
Household size				
Mean	4.26	4.41	4.33	4.33
Number of children < 10 years	0.35	0.39	0.31	0.35
Number of people > 60 years	0.22	0.19	0.21	0.21

Source: Consumer survey, DURAS Project (2006).

Specifically, consumers who bought pork at least once a month in supermarkets had a 16% lower probability of paying a premium for pork with less extramuscular fat. This was relatively lower than the predicted likelihood of non-payment of a premium by a consumer who was most concerned about safety (21%) or the lean meat content of pork (27%), but higher than the predicted likelihood of non-payment of a premium by a consumer who was satisfied with the breed of the slaughtered pig (14%). In terms of location, consumers from Hai Duong and Nam Sach were less willing to pay a premium for less extramuscular fat in pork than consumers from Hanoi; that is, a consumer in Hai Duong had an 18% lower probability of paying a premium for pork with less extramuscular fat compared to a consumer in Hanoi while a consumer in Nam Sach had a 14% lower probability of paying a premium for the same attribute compared to a consumer in Hanoi.

**Table 11.2.** Factors influencing willingness to pay for less extramuscular fat, more extramuscular fat and less intramuscular fat in pork

Variable	Less extramuscular fat		More intramuscular fat		Less intramuscular fat	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
Location dummy (Hai Duong = 1)	-0.588*** (0.228)	-0.176*** (0.063)	-1.195** (0.580)	-0.002 (1.190)	-0.940*** (0.234)	-0.220*** (0.048)
Location dummy (Nam Sach = 1)	-0.475* (0.285)	-0.144* (0.081)			-1.145*** (0.299)	-0.258*** (0.056)
Income of household	0.163*** (0.036)	0.053*** (0.012)			0.160*** (0.002)	0.043*** (0.001)
Market outlet						
% of fresh pork bought at supermarket	0.016** (0.008)	0.005** (0.003)				
Buy pork monthly at supermarket	-0.588* (0.322)	-0.159** (0.070)				
Consumption pattern						
Consume beef at least once a week	0.441* (0.250)	0.150* (0.088)				
Consume beef at least once a month					0.450* (0.253)	0.118* (0.064)
Consume buffalo at least once a month					1.899* (1.008)	0.658** (0.261)
Consume buffalo at least once a year					1.721* (0.988)	0.524* (0.294)
Never consume buffalo					1.748* (0.984)	0.405** (0.194)
Consume duck at least once a year					-1.079* (0.556)	-0.279** (0.137)
Consume fish at least once a week			-1.471** (0.726)	-0.006 (3.312)		
Consume fish at least once a month			-1.191* (0.697)	-0.001 (0.554)		
Important factors considered in meat purchase						
Safety is the most important factor	-0.701* (0.414)	-0.207* (0.111)				
Fat content is the most important factor	-1.650*** (0.633)	-0.266*** (0.032)				
Satisfaction with attributes						
Satisfied about race of fresh pork	-0.392* (0.221)	-0.138* (0.083)	-0.792* (0.467)	-0.003 (1.548)		
No. of observations	596		357		596	
LR Chi <sup>2</sup>	153.06		48.27		152.52	
Pseudo R <sup>2</sup>	0.21		0.325		0.229	

Standard errors in parentheses. \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Source: Consumer survey, DURAS Project (2006).

Location, consumption of fish and level of satisfaction with pig breed were the factors that significantly affected Vietnamese consumers' willingness to pay for pork with more intramuscular fat (Table 11.2). Specifically, consumers who consumed fish at least once a week or once a month, and those who were satisfied with the pig breed were less willing to pay a premium for more intramuscular fat in pork, although the likelihood of non-payment of a premium was below 1% for each of these covariates. Also, consumers from Hai Duong were less willing to pay a premium for this attribute (with less than 1% probability) than consumers from Hanoi. Household income was not a significant factor in influencing consumers' willingness to pay for more intramuscular fat in pork.

Factors affecting Vietnamese consumers' willingness to pay for pork with less intramuscular fat included household income, location and consumption of other meats like beef, buffalo meat, and duck (Table 11.2). Specifically, consumers with higher incomes were more willing to pay a premium for pork with less intramuscular fat, where a 1% increase in income would increase by 4% the probability of a consumer's willingness to pay for pork with this attribute. Also, consumers who ate beef at least once a month and buffalo meat at least once a month or year were willing to pay more for pork with less intramuscular fat. Consumers who never ate buffalo meat were more willing to pay for this specific attribute. It was expected that consumption of buffalo meat would increase the likelihood of a consumer's willingness to pay for less intramuscular fat in pork, with probabilities ranging from 40–66% depending on the frequency of consumption, with non-consumption having the lowest predicted probability (40%) among them. Consumers who ate duck meat at least once a year, on the other hand, were less willing to pay a premium for pork with less intramuscular fat, with likelihood of non-payment predicted at 28%. In terms of location, consumers from Hai Duong and Nam Sach were less willing to pay a premium for pork with less intramuscular fat than those from Hanoi, with expected probabilities at 22% and 26%, respectively. Consumers in Hai Duong also appeared to have relatively stronger preference for pork with less intramuscular fat (marbling) than consumers in Nam Sach and Hanoi.

### Willingness to pay for pork from pigs of different breeds and feeding systems

Factors that significantly affect Vietnamese consumers' willingness to pay for pork from exotic pigs are education, choice of market outlet, and consumption of other types of meat (Table 11.3).

**Table 11.3.** Factors influencing willingness to pay for pork from exotic and local pig breeds and from pigs fed with industrial feed

Variable	With industrial feed		Pork from exotic breed		Pork from local breed	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
Location dummy (Hai Duong = 1)	1.660*	0				
Location dummy (Nam Sach = 1)						
Income of household	0.215* (0.127)	0			0.271*** (0.043)	0.055*** (0.009)
Education of respondent			-0.074*	-0.007*		
Market outlet						
% of processed pork bought at supermarket			-0.163* (0.089)	-0.016** (0.008)		
Buy pork weekly at open market	24.402*** (2.01)	1.000***				
Buy pork weekly at supermarket			1.170** (0.587)	0.224 (0.163)		
Buy pork monthly at supermarket			1.170** (0.587)	0.224 (0.163)		
Consumption pattern						
Consume pork daily	24.084 (0.000)	1.000*** (0.001)				
Consume buffalo at least once a week	22.657 (70.75)	1.000*** (0.000)				
Never consume buffalo	-1.716** (0.729)	0 (0.003)				
Never consume duck			-0.643* (0.356)	-0.059* (0.031)		
Consume fish at least once a week			-0.977* (0.583)	-0.131 (0.101)	0.832* (0.458)	0.163* (0.087)
Consume fish at least once a month			-1.280** (0.623)	-0.090** (0.037)		
Satisfaction with attributes						
Satisfied about race of fresh pork					-0.801*** (0.234)	-0.226*** (0.082)
No. of observations	236		346		568	
LR Chi <sup>2</sup>	39.8		40.08		117.48	
Pseudo R <sup>2</sup>	0.481		0.192		0.228	

Standard errors in parentheses. \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.  
Source: Consumer survey, DURAS Project (2006).

Specifically, consumers who bought pork from supermarkets at least once a week, month or year were more willing to pay a premium for this attribute. On the other hand, consumers who purchased a larger share of processed pork products from supermarkets, never consumed duck meat and consumed fish at least once a week or month were less

willing to pay a premium for pork from exotic pigs. Note that the effect of education on the likelihood of a consumer's willingness to pay for pork from exotic breeds was much less than that of choice of market outlet, specifically weekly purchase from supermarkets (less than 1% *vis-à-vis* 77%, respectively). Since exotic pig breeds are highly associated with pork with high lean meat content, this finding suggests that three out of four consumers who frequently shopped in supermarkets had a higher probability of paying a premium for lean meat. Fish consumption, on the other hand, lowered the probability (by 9–13%, depending on frequency) that a consumer would be willing to pay a premium for this same attribute. Location and household income did not significantly influence willingness to pay for this attribute, unlike the other attributes as previously shown. On the other hand, the effect of a one-unit increase in education would result in a less-than-one-unit increase in the probability that a consumer would be willing to pay a premium for this attribute.

Vietnamese consumers' willingness to pay for pork from local pigs was found to be significantly influenced by household income, fish consumption and level of satisfaction with pig breed (Table 11.3). Specifically, a 1% rise in household income would increase by 6% the probability that a consumer would be willing to pay a premium for pork from local breeds. Households consuming fish at least once a week were also more willing to pay a premium for this attribute with 16% probability. On the other hand, consumers who indicated being currently satisfied with the pig breeds in the market were less willing to pay a premium for pork from local pigs with 23% probability. Note that pork from local breeds was generally associated with higher fat content.

Vietnamese consumers' willingness to pay for pork from pigs raised on industrial feed was significantly influenced by household income, location, choice of market outlet and consumption of other types of meat (Table 11.3). Specifically, consumers with higher household income, who bought pork at least once a week from open-air markets, and who lived in Hanoi were more willing to pay a premium for this attribute. Higher probabilities of willingness to pay for this attribute were predicted among consumers who purchased pork from wet markets and consumed pork daily and buffalo meat at least once a week. On the other hand, consumers who never ate buffalo meat were less willing to pay a premium for this attribute.

Vietnamese consumers' willingness to pay for pork from pigs raised without industrial feed was significantly affected by household income, location, beef consumption and level of satisfaction with pork attributes (Table 11.4). Specifically, consumers with higher household incomes and who ate beef at least once a week were more willing to pay a premium for this attribute. A 1% rise in household income would increase the probability of willingness to pay by 6%, while consumers who consumed beef at least once a week had a 21% probability of

paying a premium for pork from pigs reared without industrial feed. On the other hand, those consumers who were satisfied with the colour of pork that was currently available were 9% less likely to pay a premium for this attribute. Also, consumers from Nam Sach were 17% less likely to pay a premium for this same attribute than those from Hanoi.

**Table 11.4.** Factors influencing willingness to pay for pork with nicer colour and better hygiene, and from pigs reared without industrial feed

Variable	Nicer colour		Better hygiene		From pigs reared without industrial feed	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
Location dummy (Hai Duong = 1)	-1.105*** (0.228)	-0.347*** (0.061)	-0.724*** (0.220)	-0.282*** (0.081)		
Location dummy (Nam Sach = 1)	-1.655*** (0.293)	-0.475*** (0.062)	-0.996*** (0.267)	-0.378*** (0.091)	-0.625** (0.294)	-0.168** (0.071)
Income of household	0.145*** (0.037)	0.052*** (0.013)	0.116*** (0.036)	0.046*** (0.014)	0.207*** (0.010)	0.061*** (0.001)
Market outlet						
Buy pork weekly at supermarket	-1.643** (0.730)	-0.308*** (0.039)				
Consumption pattern						
Consume beef at least once a week					0.642**	0.208**
Satisfied about colour of fresh pork					-0.297** (0.139)	-0.091** (0.044)
No. of observations	596		598		592	
LR Chi <sup>2</sup>	194.83		108.89		141.96	
Pseudo R <sup>2</sup>	0.25		0.131		0.207	

Standard errors in parentheses. \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Source: Consumer survey, DURAS Project (2006).

## Willingness to pay for pork with nicer colour and better hygiene

Vietnamese consumers' willingness to pay for pork with nicer colour was influenced by their household income, location and choice of market outlet (Table 11.4). In the context of this study, 'nicer colour' was associated with reddish as opposed to pale pink colour; pale colour was generally less desired as an indicator of good quality fresh pork. The more desirable nicer colour of pork was associated with relatively higher quality. Specifically, consumers with higher income were willing to pay a premium for pork with nicer colour, with 5% likelihood for every 1% increase in income. On the other hand, consumers who purchased pork at least once a week from supermarkets were less willing to pay a premium for pork with nicer colour, with 31% probability of non-payment. Consumers from Hai Duong and Nam Sach were less willing to pay a premium for this attribute than those from Hanoi. The likelihood of non-willingness to pay was higher in Nam Sach (48%) than in Hai Duong (35%), suggesting

that colour as a quality attribute for fresh pork had relatively stronger impact among consumers in Hai Duong than in Nam Sach.

Household income and location were the factors that significantly influenced Vietnamese consumers' willingness to pay for more hygienic pork (Table 11.4), where hygiene pertains to cleanliness of the slaughtering process and the area where the meat is sold. Specifically, consumers with higher incomes were more willing to pay a premium for more hygienic pork, with the probability rising by 5% for every 1% increase in household income. On the other hand, consumers from Hai Duong and Nam Sach were less willing to pay a premium for this attribute than consumers from Hanoi, with probabilities of 28% and 38%, respectively. It may be inferred that pork hygiene was relatively more important among consumers in Hai Duong than those in Nam Sach.

### Willingness to pay for borax-free *gio*

Household income was a strong determinant of willingness to pay for *gio* that did not contain the food additive borax, as indicated by its highly significant positive coefficient (Table 11.5). More specifically, a 1% increase in household income would increase the probability of willingness to pay for borax-free *gio* by 13%, as indicated by the computed marginal effects. Male respondents were 12% more likely to be willing to pay for this attribute than their female counterparts; this is a curious result as it is usually the female buyers who are more concerned about food quality and safety issues than male buyers. Respondents who indicated that monosodium glutamate (MSG) food additive and product packaging were important in their buying decisions were also willing to pay for *gio* that did not contain borax. Choice of purchase outlet also influenced willingness to pay; consumers who never shopped in supermarkets and those who bought *gio* only once a year at supermarkets were more willing to pay for borax-free *gio*.

The factors that reduced willingness to pay for borax-free *gio* included household size, location and satisfaction with the presence of borax in *gio*. Specifically, the larger the household size, the less willing consumers were to pay for borax-free *gio*. This may be partly explained by the income constraint that households faced, in that larger households would incur higher food expenditures and hence their main concern would be to minimize costs of food purchases given a fixed level of income. Hence, willingness to pay a premium for certain product attributes would be lower because of the additional costs it would entail that would further add to total food expenditures. Specifically, a 1% increase in household size would decrease by 4.5% the probability that a household would be willing to pay more for borax-free *gio*.

**Table 11.5.** Factors influencing willingness to pay for *gio* attributes

Variable	Borax-free		MSG-free		Plastic packaging	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
Location dummy (Hai Duong = 1)	-0.458** (0.181)	-0.165** (0.066)	-0.279* (0.158)	-0.107* (0.060)	0.495*** (0.186)	0.121** (0.049)
Location dummy (Nam Sach = 1)	-0.726*** (0.218)	-0.263*** (0.080)	-1.217*** (0.212)	-0.424*** (0.061)		
Income of household	0.375*** (0.055)	0.131*** (0.018)	0.169*** (0.036)	0.066*** (0.014)	0.187*** (0.038)	0.042*** (0.009)
Sex of respondent (Male = 1)	0.386* (0.233)	0.122* (0.065)				
Household size	-0.129** (0.065)	-0.045** (0.022)				
Consumption of beef			0.639*** (0.212)	0.227*** (0.065)	0.598** (0.287)	0.105*** (0.036)
Consumption of buffalo			0.295* (0.176)	0.117* (0.070)		
Consumption of fish					-0.862* (0.445)	-0.273 (0.172)
Market outlet						
Buy <i>gio</i> annually at super-market	2.821** (1.119)	0.381*** (0.037)				
Never buy <i>gio</i> at supermarket	2.020* (1.088)	0.664*** (0.198)				
Buy <i>gio</i> weekly/monthly at open-air market			0.533* (0.282)	0.210* (0.108)	0.453* (0.240)	0.115* (0.067)
Satisfaction with attributes						
Satisfied with borax in <i>gio</i>	-0.259* (0.150)	-0.091* (0.053)				
Use of MSG is important	0.290** (0.147)	0.105* (0.054)	0.366*** (0.136)	0.139*** (0.050)		
Packaging is important	0.286** (0.132)	0.102** (0.048)				
No. of observations	598		600		600	
LR Chi <sup>2</sup>	219.78		181.38		107.09	
Pseudo R <sup>2</sup>	0.275		0.22		0.185	

Standard errors in parentheses. \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.  
Source: Consumer survey, DURAS Project (2006).

Consumers in Hai Duong and Nam Sach were less willing to pay for borax-free *gio* than consumers in Hanoi. Specifically, consumers in Hai Duong and Nam Sach would, respectively, be 17% and 23% less likely to be willing to pay for borax-free *gio* relative to consumers in Hanoi. This suggests that Nam Sach was less of a potential market for borax-free *gio* than Hai Duong. Also, consumers who were at the time of the survey satisfied with the presence of borax in the *gio* they bought were less willing to pay for borax-free *gio*, suggesting that they were generally satisfied with the *gio* being sold on the market.



## Willingness to pay for MSG-free *gio*

Household income also appeared to strongly influence willingness to pay for MSG-free *gio*; as income increased by 1%, the probability of willingness to pay for MSG-free *gio* increased by about 7% (Table 11.5). Purchase habits were also found to influence willingness to pay for MSG-free *gio*; specifically, consumers who bought *gio* weekly from open-air markets were 21% more likely to be willing to pay for this quality attribute of *gio*. Consumption of beef and buffalo meat were also shown to positively influence willingness to pay for MSG-free *gio*, with beef consumers having higher likelihood (23%) of willingness to pay for MSG-free *gio* than consumers of buffalo meat (12%). On the other hand, consumers from Hai Duong and Nam Sach were not willing to pay for MSG-free *gio*, suggesting that these regions would not be potentially lucrative markets for *gio* with this attribute. Note also that consumers from Nam Sach had a lower probability of willingness to pay for MSG-free *gio* (42%) than consumers in Hai Duong (11%) relative to consumers in Hanoi.

## Willingness to pay for *gio* packaged in plastic bags only

Factors found to positively influence willingness to pay for *gio* packaged in plastic bags were household income, being located in Hai Duong, purchase of *gio* once a month in wet markets and consumption of beef (Table 11.5). Specifically, a 1% increase in household income increased the probability of willingness to pay for *gio* packaged in plastic bags by 4%. Consumers in Hai Duong were found to be 12% more willing to pay for *gio* packaged in plastic bags relative to consumers in Hanoi. Also, consumers who purchased *gio* once a month in open markets were more willing to pay for *gio* packaged in plastic bags only. While consumers of beef were 11% more likely to be willing to pay for *gio* packaged in plastic bags only, consumers of fish were 27% less likely to be willing to pay for this quality/safety attribute of *gio*. It is likely that consumers of fish rarely or never purchased *gio*, hence the observed lower willingness to pay for this product attribute.

## Willingness to pay for *gio* packaged in banana leaves and plastic bags

Household income, satisfaction with the presence of MSG in *gio* and frequency of purchase of *gio* were found to positively influence consumers' willingness to pay for *gio* packaged in banana leaves and plastic bags. Specifically, a 1% rise in household income increased the likelihood of willingness to pay for *gio* with this type of packaging by about 9%. Consumers who indicated satisfaction with the presence of MSG in the *gio* they bought were 12% more likely to be willing to pay for *gio* packaged in banana leaves and plastic bags. Similarly, consumers who purchased *gio* once a year from wet markets were 11% more willing to pay

for this attribute of *gio*. On the other hand, consumers of buffalo meat were 12% less likely to be willing to pay more for *gio* packaged in banana leaves and plastic bags.

It should be noted that a separate model was run to estimate willingness to pay for *gio* packed in banana leaves only but no definite set of factors were obtained as the model was relatively unstable. As a result, no robust estimates could be reported.

## Summary and conclusions

This study investigated the attributes influencing Vietnamese consumers' willingness to pay a premium for fresh and processed pork. Specific attributes of fresh pork included the following: low extramuscular fat; low intramuscular fat; high intramuscular fat; from pigs with exotic blood; from local breeds; from pigs reared with industrial feed; from pigs reared without industrial feed; nicer colour and better hygiene. These attributes were identified based on previous pork consumption studies and in consultation with consumers and market actors.

Household income was found to be a strong predictor of the likelihood of willingness to pay a premium for most of the above attributes, especially for pork with less visible (extramuscular) fat and less marbling or intramuscular fat (with the exception of pork with more intramuscular fat, from pigs reared with industrial feed and from pigs with exotic blood). Specifically, the results provide empirical evidence for the significantly strong effects of household income on willingness to pay for quality attributes of pork.

Level of education influenced the willingness to pay (and with a negative effect) of only one quality attribute: pork from pigs with exotic blood. Location was also found to significantly influence willingness to pay for most quality attributes of fresh pork except for pork from local pig breeds, pigs with exotic blood and pigs reared without industrial feed. Consumers in Hai Duong and Nam Sach were less likely than those in Hanoi to be willing to pay a premium for pork with less extramuscular fat, more or less intramuscular fat, nicer colour, better hygiene, or pork from pigs reared without industrial feed (although for the latter, the estimated coefficient was not statistically significant). Hence, urban consumers seemed to exhibit stronger preference and willingness to pay a premium for these attributes than their rural counterparts.

Choice of market outlet for fresh pork was also found to be a significant predictor of the likelihood of willingness to pay a premium for attributes such as pork with low extramuscular fat and that from exotic pig breeds. Consumers who bought a higher proportion of fresh pork at supermarkets were found to be more likely to pay a premium for fresh pork with low extramuscular (visible) fat. On the other hand, consumers who bought a higher proportion

of processed pork from supermarkets were found to be less likely to pay a premium for fresh pork from exotic pig breeds. Since breed is not a visible cue of pork quality, consumers may not be willing to pay a premium for this attribute unless they can be sure that they are indeed getting the quality they are paying for, or unless they can access credible certification or indicators for this attribute (exotic blood) via other cues such as reputation of the market outlet. For example, consumers who bought fresh pork at least once a year from supermarkets were also more likely to be willing to pay a premium for pork from exotic pig breeds. This is consistent with observations that the pork generally available in supermarkets is from exotic pigs or crossbreeds with higher proportion of exotic blood, given the nature of their supply procurement.

Consumption patterns were also important in determining the likelihood of willingness to pay a premium for quality attributes of fresh pork. Consumers who ate beef at least once a week were more likely to be willing to pay a premium for fresh pork with low extramuscular fat and from pigs reared without industrial feed. Consumers who ate beef at least once a month or buffalo meat at least once a year or who never consumed buffalo meat were more likely to be willing to pay a premium for fresh pork with low intramuscular fat. These consumers are more likely to be less avid meat eaters and hence may have been more conscious of the quality of meat they purchased, particularly the fat content. On the other hand, consumers who ate duck at least once a year were less likely to be willing to pay a premium for fresh pork with low intramuscular fat. Those who ate fish at least once a week or a month were less likely to be willing to pay a premium for fresh pork with more intramuscular fat but more likely to be willing to pay for fresh pork from local breed pigs. Fish eaters appeared to be more fastidious about visible fat in meat and about taste as evidenced by preference for pork from local pigs. Survey respondents and some key informants said that pork from local pigs tasted better than that from exotic pigs. Consumers who ate buffalo meat at least once a month were more likely to be willing to pay a premium for pork with low intramuscular fat.

Consumers who considered fat content to be an important factor in buying fresh pork were less likely to be willing to pay a premium for fresh pork with low extramuscular fat, suggesting an underlying preference for fatty meat. This is an interesting result and runs counter to the growing perception of increasing demand for lean meat and will be worthwhile investigating further. Consumers who indicated satisfaction with the colour of purchased fresh pork were also less likely to pay a premium for fresh pork from pigs reared without industrial feed. This may suggest that the effect of feeding system has no clear visible impact on the physical appearance of the pork that could affect consumer choice. Rather, colour is more likely to be associated with freshness, an attribute that appears to be highly desired by consumers in Vietnam, especially high income consumers and those who prefer to purchase meat from traditional or wet markets. On the other hand, consumers who indicated

satisfaction with the breed of pigs for fresh pork were less likely to pay a premium for fresh pork with low extramuscular fat, with more intramuscular fat, and from local pigs.

Household income was found to be a strong positive predictor of the amount of premium that consumers would be willing to pay for fresh pork with low extramuscular fat and nicer colour; the average consumer would be willing to pay about VND 1800 more for pork with nicer colour than that with less visible fat. This result indicates the relative importance that consumers place on the attribute that is associated with freshness (i.e. nicer colour) and is consistent with the prevailing dominant preference for fresh (newly slaughtered, warm) pork *vis-à-vis* frozen pork. Gender and education also had a strong influence on the amount of premium consumers were willing to pay for pork with low extramuscular fat (lower for male than female consumers) and education (higher for consumers with more education).

Location was also found to have a strong influence on willingness to pay for pork with various attributes. For instance, consumers from Hanoi were more willing to pay a higher premium for pork with nicer colour while those in Hai Duong were less willing to pay for pork with low extramuscular fat and better hygiene. This may suggest that consumers in Hanoi were more conscious about pork quality attributes than their Hai Duong counterparts, although the specific attributes desired were not similar in these two locations. Consumers who purchased pork at least once a week from supermarkets also exhibited a lower extent of willingness to pay a premium for pork with nicer colour. This suggests that consumers who have already shifted to shopping for food in modern outlets like supermarkets may be less likely to pay a premium on the attributes of pork associated with freshness (e.g. nicer colour) and that the driving force behind their consumption patterns may likely be convenience. This aspect needs further validation as it was not adequately captured in this study.

Consumers who ate chicken at least once a week or once a month were more likely to pay a higher premium for pork with low extramuscular fat, while non-consumers of fish were more likely to pay a higher premium for better pork hygiene.

As with fresh pork, household income was also found to strongly influence the likelihood of willingness to pay a premium for quality attributes in *gio*, namely, borax-free, MSG-free, packaged in plastic bags only, and packaged in both banana leaves and plastic bags. Household size and gender had an influence on willingness to pay for only one quality attribute of processed pork, namely, *gio* that did not contain borax. Consumers with large households were less likely to pay a premium for borax-free *gio*. Location also strongly influenced the likelihood of willingness to pay a premium for borax-free *gio* (lower likelihood for consumers in Hai Duong and Nam Sach), without MSG (lower likelihood for consumers in Nam Sach), and packaged in plastic bags only (higher likelihood for consumers in Hai

Duong). These results could inform production and marketing strategies for *gio* in each of these locations.

Consumer attitudes about specific attributes of *gio* were also strongly evident as predictors. For example, consumers who did not object to the presence of borax in *gio* were less likely to be willing to pay a premium for borax-free *gio*, while consumers who did not object to the presence of MSG in *gio* were more likely to be willing to pay a premium for *gio* packed in banana leaves and plastic bags. Consumer attitudes about use of MSG suggest that those who consider use of MSG to be important are more likely to be willing to pay a premium for borax- and MSG-free *gio*, while those who consider packaging to be important are more likely to be willing to pay a premium for borax-free *gio*.

Purchase patterns were also shown to strongly influence the likelihood of willingness to pay a premium for quality attributes of processed pork. Specifically, consumers who bought *gio* from supermarkets at least once a year were more likely to pay a premium for borax-free *gio*. On the other hand, those who preferred to purchase pork from open-air or wet markets were more likely to be willing to pay a premium for borax- or MSG-free *gio* and for *gio* packed either in plastic bags only or in both banana leaves and plastic bags.

Consumption patterns of other meat products also had a strong influence on the likelihood of willingness to pay for specific attributes of *gio*. Specifically, consumers of beef had a higher likelihood of willingness to pay for MSG-free *gio* and *gio* packaged in plastic bags only. Consumers of buffalo meat, on the other hand, were more likely to be willing to pay for MSG-free *gio* but less likely to be willing to pay for *gio* packaged in both banana leaves and plastic bags. Consumers of fish were less likely to be willing to pay for *gio* packaged in plastic bags only. Since consumption patterns of other types of meats are likely to be correlated with income (beef consumption with higher income, for example), these results suggest that the type of packaging of *gio* matters when targeting marketing strategies to consumers of different income levels.

In terms of extent of willingness to pay a premium, household income was shown to be a strong predictor of the amount of premium that consumers were willing to pay. For example, higher income consumers were more likely to pay a higher premium for borax-free *gio* and for *gio* packaged in plastic bags only or in both banana leaves and plastic bags. The effect of household income on the amount of premium that an average *gio* consumer was likely to pay was relatively stronger for the attribute 'packaged in plastic bags only' compared to other packaging alternatives.

Location variables had contrasting effects on the amount of premium that consumers would be willing to pay for quality attributes in *gio*. For example, consumers in Nam Sach and Hai

Duong were less likely to pay a premium for MSG-free *gio* relative to consumers in Hanoi. On the other hand, consumers in Hai Duong were more likely to pay a higher premium for *gio* packaged in plastic bags only relative to consumers in Hanoi. These results are useful indicators of production and marketing strategies that can be implemented to improve consumer acceptance of *gio* in these locations.

Consumer attitudes about the presence of borax and MSG in *gio* and the type of packaging were also found to influence the amount of premium that consumers would be willing to pay for specific quality attributes of *gio*. For example, consumers who did not object to the presence of borax in *gio* were likely to pay a lower premium for borax-free *gio*, while those who did not object to the presence of MSG were likely to pay a higher premium for *gio* packaged in both banana leaves and plastic bags. Meanwhile, consumers who felt that use of MSG and packaging were important for *gio* were more likely to pay a higher premium for borax-free *gio*.

Purchase patterns and choice of market outlet, specifically consumers who purchased *gio* in open air or wet markets, were found to be significant determinants of the extent of willingness to pay for *gio* packaged in both banana leaves and plastic bags.

In addition, consumers of beef were found to be more likely to pay a higher premium for borax- and MSG-free *gio* and *gio* packaged in plastic bags, while consumers of buffalo were likely to pay a lower premium for *gio* packaged in both banana leaves and plastic bags. Meanwhile, consumers of chicken were likely to pay a lower premium for borax-free *gio*, unlike consumers of fish who were likely to pay a higher premium for the same. However, they were likely to pay a lower premium for *gio* packaged in plastic bags only.

## Implications of results

The results of this study provide empirical support to validate some stylized facts about consumer preferences for specific quality and safety attributes of fresh and processed pork. In general, socio-demographic characteristics of consumers influence their preference for specific product attributes and the nature of their demand for such attributes. Household income and location are strong determinants of preferences and hence should be given due consideration when designing production and marketing strategies for fresh and processed pork. Higher household income is shown to be a strong factor for increasing demand for quality attributes such as low fat content, better hygiene and nicer colour, and for traditional attributes such as pork from local pigs or those reared without industrial feed. These findings indicate the existence of preference among higher income consumers for traditional attributes that are usually associated with products from niche markets, e.g. for very specific product attributes that are neither widely available nor demanded by the

average consumer. Higher level of education is also associated with lower likelihood of willingness to pay a premium for pork from pigs with more exotic blood. Specifically, the results suggest that there is a group of relatively higher income, better-educated consumers in Hanoi who demand hygienic, fresh and low-fat pork. Similarly, these consumers also prefer pork with local flavour/taste (e.g. from local pigs reared without industrial feed) that may be met by producing pork from crossbreeds with high local blood content and reared more on traditional feeds (e.g. grasses and local or mixed feeds) and less on industrially processed feed. The results also seem to suggest that consumers are likely to pay a premium for less visible fat (low extramuscular fat), although this need not necessarily suggest preference for lean meat (i.e. exotic pigs) as extramuscular fat in pork from crossbreeds can be trimmed by sellers.

The income effect also seems to be evident in the effect of consumption of other meat products and fish on preference for pork attributes. For example, consumers of beef, fish and duck meat—which are all relatively more expensive than pork—also exhibited preferences for low-fat pork and attributes associated with traditional pig feeding systems.

There are indications that lean pork (i.e. from exotic breed pigs) is preferred by consumers who purchase pork from supermarkets and they are likely to pay a premium for this attribute. Again, this behaviour is highly associated with income and being located in an urban area such as Hanoi, and has implications on marketing strategies for lean pork.

For processed pork like *gio*, income is a strong determinant of willingness to pay a premium for safety attributes such as absence of borax and MSG and more hygienic packaging. These attributes were better appreciated and valued by consumers in Hanoi than those in Hai Duong and Nam Sach so a price premium for such attributes could be potentially achieved when sold in Hanoi. On the other hand, packaging *gio* in plastic bags would be preferable for consumers in Hai Duong but not in Nam Sach.

Price premium for borax- or MSG-free *gio* is more likely to be paid by consumers who buy pork in supermarkets than those who shop in other market outlets. Consumers who frequent open-air or wet markets will likely pay a premium for MSG-free *gio* if it is also packaged in plastic bags or in a combination of banana leaves and plastic bags.

These findings are recommended to be used as indicators of potential strategies for designing production and marketing options that can be piloted by a small group of collaborating households. There is a need to identify target consumers given the differential preference for various pork attributes exhibited by different consumer income groups. Understanding these differences could lead to better targeting of interventions that can be prescribed on the ground. More importantly, the potential price premium that consumers may be willing

to pay for specific quality and safety attributes can only be realized when consumers trust the product. This indicates a need for producers and suppliers to achieve credibility and reputation for delivering products with these stated attributes.

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