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INFORMATION, RISK PERCEPTION AND DISEASE INSURANCE DECISION

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ABSTRACT

This study examines the risk reorganization and pricing behavior to the potential threat of a severe disease, Avian Influenza, by measuring the risk premium for domestic poultry farmers in Taiwan. Through questionnaires focused on how and where bird farmers accessed information related to the quarantine systems in Taiwan, we analyze possible factors which affect the decision of program participation, calculate the levels of premium, and evaluate the effectiveness of current disease management tools.

964 poultry farmers in Taiwan from three different bird sectors – chicken, ducks and geese – were interviewed and analyzed by adopting a two stage decision-demand process. The significance of risk perception and information were supported by the statistical results at both decision and demand stages of insurance participation.

Key words: Risk Perception, Information, Avian Flu, Risk Premium, Disease Management Policy

JEL Classification: Q12, Q18

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1. Introduction

The livestock sector plays an important role in agriculture development in Taiwan. It contributed over 30% of total domestic agricultural production value in 2006; and the value from poultry products was 45% of the livestock sector. After experiencing the 1997 foot-and-mouth disease (FMD) outbreak, which lost approximately US$531.25m, the Taiwanese government paid considerable attention to infectious diseases which are transmissible between animals and humans, including Bovine Spongiform Encephalopathy (BSE), Severe Acute Respiratory Syndrome (SARS), and Avian Influenza (AI).

Although Taiwan is one of only a few countries in southeastern Asia which, at the time this paper was written, was certified free of AI cases by the World Organization for Animal Health (OIE), it is nevertheless difficult to ensure a completely clean zone for birds in the sky. For example, some low-pathogenic AI cases, the H_5N_2 type, were detected in some counties in Taiwan in the early spring of 2004. To minimize the risk of potential outbreak of AI, the Taiwanese government decide to apply the "precautionary termination process" in this case, which caused the loss of 380,000 birds, US$1,580,000 on execution costs for the public sector and a US$515,000 gap in trade compared with the first five months of last year, due to the embargo on poultry products. Worse, panic prevailed among domestic consumers, reflected in 26% and 50% decreases in prices and sales of chicken meat and eggs. Total loss for the agricultural sector amounted to NT$2.5 billion (US$78.125m). Although another US$9.375m was spent by the Taiwanese government on this occasion to restore confidence with price stabilization programs, the inverse bounce-back by over-production, which was encouraged by the price programs, made the market prices of poultry products slide to low levels. In sum, policies were not able to benefit the producers to minimize producer risk by applying a "costly" policy when the plague was prevailing.

Therefore there is wide discussion whether a disease insurance program should be introduced to provide a more defensive gauge for domestic bird producers from potential external threats. But with the disease spread pattern, the risk perception of farmers, which can be measured by the risk premium to a given insurance program, needs to be analyzed to answer this concern. With a measurable base, public agents can evaluate the policy acceptance of bird farmers, based on their risk perception with the volume of information, to the possible insurance programs and their effectiveness in prevention of severe diseases under reasonable and consistent financial considerations.

This study, first of all, adopted the risk management approach to determine how risk perception and disease information on severe diseases, such as high-pathogenic AI, affect the decision behavior of poultry producers; next, the factors affecting the willingness of poultry farmers to join an epidemic insurance program were defined and analyzed; last, the "risk premium" was used to measure the possible range of momentums to a sustainable and consistent insurance program for government and insurance companies with business strategic planning.

2. Literature Review

2.1 Risk Management

Many studies define risk as a state when the decision making unit (DMU) faces varying results within a specific period of time under limited information. (Kulp and Hall, 1968; Mehr and Cammack, 1980; Williams and Heins, 1981). To neutralize the possibility of loss, people consider managing the risk at an acceptable level, i.e. pay more for less risk, as the efficient way to reach a stable state. Therefore, potential variation can be handled by improving the processes of risk management (Pender, 2001).

Hardaker, *et. al* (1997) consider that farmers can make many attempts to decrease the degree of loss or to neutralize unexpected damage in their farms. Workable considerations include: information collection, risk exposure reduction/avoidance, selection of less risky technologies, production diversification, flexibility. Or farmers can work together by sharing the risk with the options of farm financing, insurance and futures.

Insurance and Risk Perception

Applying the above concept to the actual examples, Lin (2006) concluded that the more consciousness a man has of the seriousness of AI, the more significantly he will be affected by AI awareness. Gender and awareness of risk were another two effective factors in forecasting the respondent's attitude toward AI.

After recognizing that AI is a disease potentially causing high losses but at a low probability, an analysis of farmers' behavior in deciding whether to join an insurance program if they sense the possibility of loss caused by "certain uncertain diseases" was needed. Tzeng (1999) agreed that when the DMU considered market uncertainty and insurance costs, a strong demand for insurance can be observed when the market becomes less and less transparent.

From economic theory, individual demand choices under a risky situation are analyzed with the utility model. Wealth, probability of loss, price of objective, value of hazard and degree of risk aversion[1] are the most mentioned factors (Smith, 1968). For collective decisions in business, the insurance decision for firms in a state of uncertainty is different from that of individuals (Mayer and Smith, 1982). But Browne and Hoyt (2000) argue that decisions made by independent parties are all affected by certain major factors, i.e. price, probability of loss and amount of loss. Further, more and more factors were considered and measured in the decision of personal insurance participation. These factors include: age, family structure, type of job, education, personal or total household income, family size, region, marital status (Liao, 1993; Lin, 1994; Jou, 1995; Lai, 1997; Chen, 1997; Chen, 2001, Yen, 2004, Chiu, 2006), health evaluation, sport condition (Chen, 2001) , risk perception(Wu, 2003; Yen, 2004, Chang, 2003), confidence in government implementation, and promise of subsidy (Chang, 2003; Luenberger, 1998). In conclusion, both the traditional demographic variables and some psychological concerns should be considered in the analysis of decision under risk.

3. Theoretical Model and Data

3.1 Risk and its Premium

As Hardaker, *et. al.* (1997) proposed, the potential risk of agricultural production can be diverted by means of some financial strategies. Since the futures market and farm financing for the agricultural sector in Taiwan are not yet mature, insurance becomes a workable option at the present time. Insurance programs with limited coverage for hogs, dairy cattle and goats have been implemented in Taiwan for decades; therefore, an application of insurance programs for poultry should be workable for farmers, insurance companies and government. In the current program for hog insurance, the government subsidizes 70% of the premium and hog farmers pay the rest for each insured animal. But even with this "sweet offer", the popularity of this policy in the countryside is fairly limited. Most critics complain of poor coverage and the high premium.

To measure the nominal trade-off between a risk perception and its premium, the certainty equivalent (CE) in the expected utility model was calculated under the utility maximization assumption. Suppose a risk averse individual, I, facing a gamble with two outcomes, W_1 and W_2, has a concave utility function, $U_A(W)$, it implies that when I faces a condition with two possible wealth levels, utility from the expected wealth, $U_A[E(W)]$, will be greater than the expected utility, $E[U(W)]$, of two levels of possible wealth, W_1 and W_2, which also equals the utility of a

[1] The curvature of the person's utility function, if there is one.

lower wealth level, U(k), where W>k (see Figure 1). The distance from the origin to k is defined as the CE, and the difference, defined as rp, between the expected wealth, E(W), and k, is defined as risk premium. This result describes that this individual prefers to pay a certain wealth, rp, to receive a certain utility, $U(k) = U[E(W) - rp]$ which is indifferent to the expected utility from risky outcomes, E(U(W)) (Arrow, 1965; Smith, 1968). Thus risk premium can equivalently be measured as a proxy for the willingness to pay (WTP) for an insurance program. Thus the more risk averse an individual is, the stronger his willingness to pay a high premium under a given risky situation.

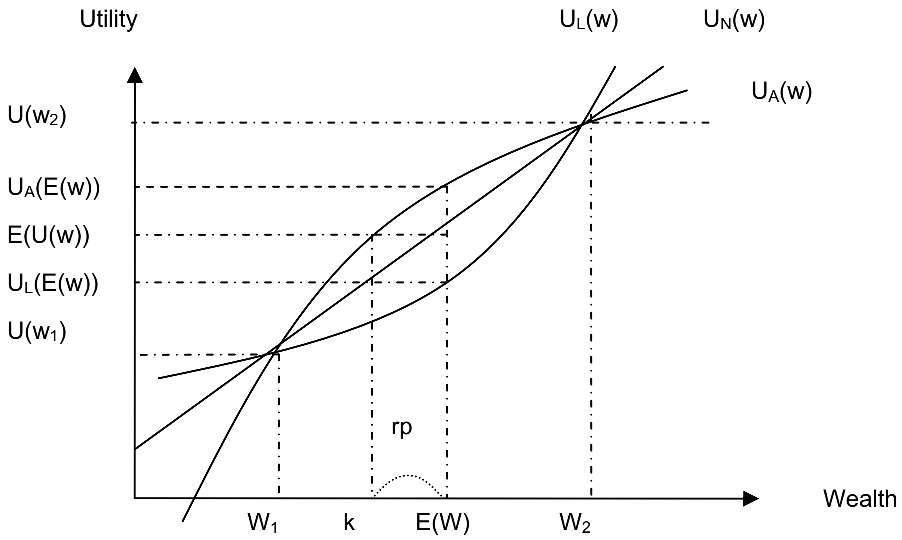

Figure 1: Expected Utility Function Form under Separated Risk Aversion

3.2 Research Structure and Variable Dimensions

After reviewing the literature, we concluded that the risk-averse attitude is the most influential factor in the insurance participation decision, thus we categorized the variables from previous studies into three dimensions: social economy, wealth and risk preference.

First, the background social and economic dimension includes gender (**GENDER**), age (**AGE**), education (**EDU**), bird kind (**GR**), farm working position (**PO**), and farm facility (**PH**). The relations between the decision/demand for insurance and these factors were inconsistent in different articles except education with a positive response (Meuwissen, *et. al,* 2001; van Asseldonk, *et. al*, 2002; Chang, 2003; Chen, 2001, Chiu, 2006). Therefore, the expected signs for GENDER, AGE, PO, GR and PH with risk response were all indecisive.

Next, the wealth dimension includes the farm scale (**AR**) and the number of birds per batch (**N**), which were treated as proxies of wealth and income for poultry farms. Based on studies by

Goodwin (1993) and Meuwissen, *et. al* (2001), the expected signs of the coefficients for these two variables are both positive. Logarithm form for both variables, named NAR and NN, was adopted in the latter function due to simplification concerns.

Finally, the risk preference dimension includes risk perception (**RPC**) and disease information (**INFO**) (Figure 2). Based on theory, more risk perception will raise the risk response (Yeung and Yee, 2003), but it will be decreased if further information can be accessed (Hardaker, et. al, 1997). Thus, two variables represented diverse relations with insurance concern.

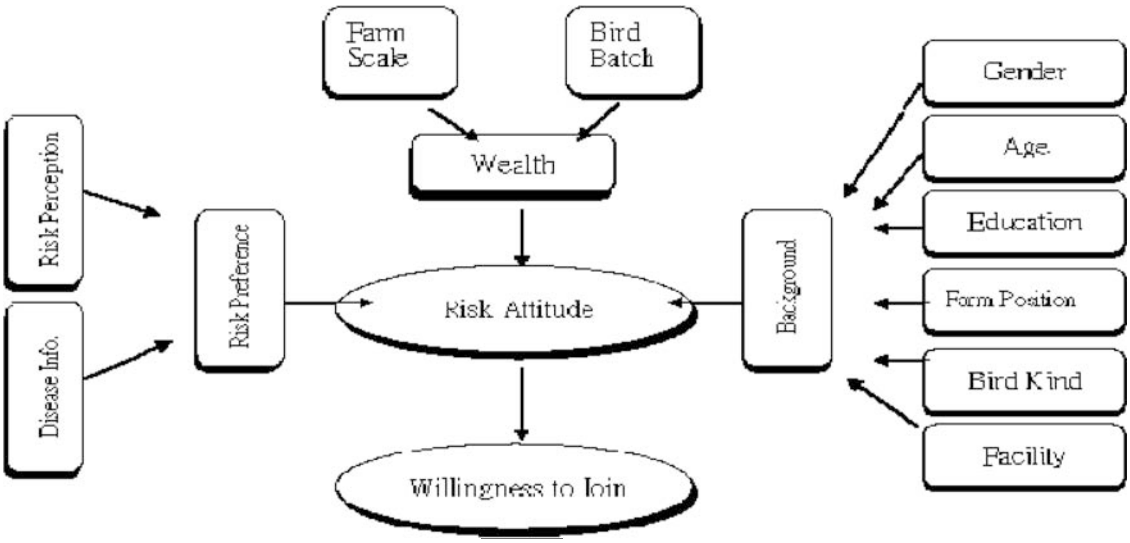

Figure 2: Structure of Research

3.3 Background Statistics

With the assistance of three major poultry farmers' organizations [2] of Taiwan, 1,179 interviewees were selected and visited by their members in the field during October and November, 2007. 964 effective responses were taken into analytical processes after these arrangements. Tables 1 and 2 present the sample statistics.

[2] Three birds are chicken, ducks and geese.

Table 1: Sample Statistics

Variable Name	Variable Definition (unit)	Mean	Standard Deviation	Minimum	Maximum
AGE	Age	50.64	11.53	18	83
AR	Farm Scale (Pin)	2549.08	10,833.52	25	240,000
N	Number of Birds	39,689	88,940	35	1,620,000

Source: This study.

Table 2: Statistical Distribution of Sample

Variable Name	Variable Def.	Description	Freq.	Total	Percentage
GENDER	Gender	0: Male	752	964	78.0
		1: Female	212		22.0
NAGE*	Age	1: 40 or less	188	964	19.5
		2: 41–50 years old	274		28.4
		3: 51–60 years old	336		33.8
		4: 61 or over	176		18.3
EDU	Education	0: Literate	37	964	3.8
		1: Elementary	210		21.8
		2: Junior High	207		21.5
		3: Senior High	356		36.9
		4: College	154		16.0
PO	Farm Position	0: Employee	283	964	29.4
		1: Decision Maker	681		70.6
PH	Facility	0: Non-Closed	841	964	87.2
		1: Closed	123		12.8
GR	Bird Kind	1: Layer	274	964	28.4
		2: Boiler	196		20.3
		3: Colorful Boiler	380		39.4
		4: Ducks	69		7.2
		5: Geese	45		4.7

Source: This study.
* Ages for interviewees were categorized into 4 levels as in the Table, and was defined as "NAGE".

4. Empirical Model and Statistical Results

4.1 Statistical Model and Variables

A two step decision-demand procedure was adopted to analyze the decision of poultry producers to take out insurance. The behaviour models for disease insurance in studies by

Goodwin, *et. al.* (1993) and Chang, *et. al.* (2003) were considered. Accordingly, the dependent variable was defined separately in two functions; they were "join willingness decision (Y_1)" measured by a zero-one response and "premium per NT$10,000[3] coverage ($Y_2$)" with the real nominal number.

By listing the expected signs of the coefficient of the selected variables in parentheses below the variables, the regression model is listed in the following form.

$$\underset{}{Y_i} = f(\underset{(?)}{\text{GENDER}}, \underset{(?)}{\text{AGE}}, \underset{(+)}{\text{NEDU}}, \underset{(?)}{\text{PO}}, \underset{(+)}{\text{PH}}, \underset{(?)}{\text{LWGR}}, \underset{(+)}{\text{NAR}}, \underset{(+)}{\text{NN}}, \underset{(+)}{\text{RPC}}, \underset{(-)}{\text{INFO}}) \qquad (1)$$

if i = 1, then Y_1 is the decision function for insurance

if i = 2, then Y_2 is the insurance expenditure function

4.2 Decision Analysis on the Insurance Program Join Willingness

From the statistical results of the survey, 86 respondents per 100 interviewees favor lowering the risk of a severe disease which may affect their farm business by joining an insurance program (Table 3). This implies that the market for a well-designed insurance package in poultry sector is buoyant. Furthermore, the elderly interviewees fewer years of education presented a relative weak attitude towards joining a given disease insurance program.

[3] The current exchange rates among New Taiwan Dollar, Japanese Yen, and US Dollar in February 2009, was 100: 267.23: 2.974.

Table 3: Statistical Results on Insurance Participation for Severely Diseases

Variable	Definition	Insurance Join Willingness			
		Nie (%)		Ya (%)	
Gender (GENDER)	Male	110	(14.6)	642	(85.4)
	Female	30	(14.2)	182	(85.8)
Age (NAGE)	40 or less	27	(14.4)	161	(85.6)
	41–50 years old	35	(12.8)	239	(87.2)
	51–60 years old	41	(12.6)	285	(87.4)
	61 or over	37	(21.0)	139	(79.0)
Education (EDU)	Literate	13	(35.1)	24	(64.9)
	Elementary	42	(20.0)	168	(80.0)
	Junior High	31	(15.0)	176	(85.0)
	Senior High	46	(12.9)	310	(87.1)
	College	8	(5.2)	146	(94.8)
Farm Work (PO)	Employee	38	(13.4)	245	(86.6)
	Decision Maker	102	(15.0)	579	(85.0)
Facility (PH)	Non-closed	127	(15.1)	714	(84.9)
	Closed	13	(10.6)	110	(89.4)
Bird Kind (LWGR*)	In-land Birds	126	(14.8)	724	(85.2)
	Aqua Birds	14	(12.3)	100	(87.7)

Source: This Study.
* Five kinds of birds are categorized into two groups: are in-land birds, layer, chicken and colorful chicken, and aqua birds, which are ducks and geese. This new variable was named as LWGR.

The Logit and Probit models were adopted in the discrete decision function estimation stage with a good performance by an 86% Point Ratio on the forecast (Table 4). Statistical results from two discrete models are listed and compared in Table 5. Statistical outcomes from the Logit model, which was more persuasive in function form, were taken in this study.

Table 4: Point Ratio Results on Insurance Willingness, Logit model

Forecast Actual	Nie	Ya	Sum
Nie	5	135	140
Ya	0	824	824
Sum	5	959	964

Source: This study

Table 5: Regression Results on Decision Functions – Probit and Logit Models

	Probit			Logit		
	Coef	S.E.	p-value	Coef	S.E.	p-value
GENDER	0.2116	0.1357	0.119	0.3618	0.2470	0.143
AGE	0.0124	0.0058	0.031**	0.0233	0.0106	0.028**
NEDU#	0.0874	0.0173	0.000***	0.1577	0.0316	0.000***
PO	−0.0569	0.1217	0.640	-0.1450	0.2244	0.518
NAR	0.1027	0.0654	0.116	0.1930	0.1249	0.122
PH	0.2528	0.1726	0.143	0.4492	0.3246	0.166
LWGR	0.3909	0.1874	0.037**	0.7406	0.3507	0.035**
NN	0.1034	0.0565	0.067*	0.2064	0.1023	0.044**
RPC	0.0563	0.0144	0.000***	0.1070	0.0265	0.000***
INFO	−0.0224	0.0094	0.017**	-0.0421	0.0172	0.014**
CONSTANT	−3.0080	0.7506	0.000***	-5.8658	0.000	0.000***
Log likelihood		−366.824			−366.399	
Number of obs		964			964	
LR chi2(10)		65.20			66.05	
Prob > chi2		0.0			0.0	
Pseudo R^2		0.0816			0.0827	

Source: This Study.
Education level was given as a continuous type instead of the 4-level one.
* Significant at 10% level; **5%; ***1%, two-tailed test.

After examining the results with the expectation, the signs of the coefficient estimate of variables in three dimensions, i.e. education, farm facility, farm scale, birds per batch, risk perception and information, were all consistent with the expected sign in theory. Coefficients for age, education, bird kind, birds per batch, risk perception and information are statistically significant. All the above variables apart from information had significant positive impact on the insurance participation decision.

Moreover, the estimate coefficients in Table 5 were inappropriate to measure the change effect of dependent variables caused by specific independent variables due to the non-linearity of the Logit model. Thus the marginal effects[4] (Caudill and Jackson, 1989; Roncek, 1991, 1993; Long, 1997; Greene, 2003) for each variable were calculated and listed in Table 6. As it shows, LWGR (6.38%), PH (4.21%), GENDER (3.57%), AGE (0.25% per one year old), NN (2.20%), NAR (2.05%), EDU (1.68%) were some robust variables which may cause the probability to

[4] "Discrete change in probability" approach can be applied to calculate the effect.

join an insurance program to increase by the difference in the parenthesis when those right-hand-side variables increase one percent, other things being constant.

More specifically, the producers interviewed who were in the ducks and geese business, had closed facilities, were female, senior, had more birds per batch, were larger scale, and were more educated, were more willing to join the disease insurance than those farmers in the chicken business, had non-closed facilities, were male, young, smaller scale and had fewer birds. Surprisingly, although their significances were both strongly supported by statistical diagnosis, the impact of two variables of the risk preference dimension was relatively limited in our study. The total marginal impact for risk perception and information on the join decision was only 1.59%.

Table 6: Results of Marginal Effect Analysis on Willingness to the Insurance

Variable	Probit			Logit		
	Coef	S.E.	P-value	Coef	S.E.	P-value
GENDER[a]	0.0407	0.0242	0.093*	0.0357	0.0225	0.112
AGE	0.0026	0.0012	0.030**	0.0025	0.0011	0.026**
NEDU	0.0180	0.0035	0.000***	0.0168	0.0032	0.000***
PO[a]	−0.0116	0.0244	0.635	−0.0151	0.0228	0.508
NAR	0.0212	0.0134	0.114	0.0205	0.0132	0.119
PH[a]	0.0466	0.0281	0.097*	0.0421	0.0265	0.112
LWGR[a]	0.0674	0.0264	0.011**	0.0638	0.0240	0.008***
NN	0.0213	0.0117	0.067*	0.0220	0.0109	0.043**
RPC	0.0116	0.0029	0.000***	0.0114	0.0027	0.000***
INFO	−0.0046	0.0019	0.017**	−0.0045	0.0018	0.013**

Source: This Study.
*Significant at 10% level; **5%; ***1%, two-tailed test. [a] defines the insurance willingness difference when the dummy variable diverts from 0 to 1.

5. Analysis of the Insurance Program Payment

5.1 Insurance Payment for Willingness to Join

Of the challenges facing the current insurance program for livestock in Taiwan, how to price an affordable premium is a must for a workable and consistent insurance system. This study considered the Single-Bounded Dichotomous Choice Contingent Valuation approach to estimate the willingness to pay for a disease insurance program with NT$10,000 coverage.

Statistic results described that the average premium was NT$162.08, which varied from 0 to NT$1,000. 140 out of 964 interviewers preferred not to pay to join (see Table 7).

Table 7: Statistical Results for Insurance Premium

Premium Range (NT$)	Frequency	Percentage	Cumulative %
0	140	14.5	14.5
1–100	530	55.0	69.5
101–200	95	9.9	79.4
201–300	56	5.8	85.2
301–400	2	0.2	85.4
401–500	99	10.3	95.6
501–600	10	1.0	96.7
601–700	1	0.1	96.8
701–800	4	0.4	97.2
801–900	0	0.0	97.2
900 above	27	2.8	100.0
Total	964	100.0	100.0

Source: This study.

To consider the potential participants, two models were used to describe the possibility for this concern. First of all, the OLS model was adopted to estimate the insurance expenditure function by using those respondents with a positive value on premium; next, the Tobit model, a censored regression model, was considered to estimate for all respondents. From the above, the statistical results from the OLS and Tobit regression models are listed in Table 8. The premium expenditure function with OLS estimate was listed as:

$$\begin{aligned} Y2_{OLS} = & -18.8450 + 10.8732 * GENDER - 2.9649 * AGE - 8.5386 * NEDU \\ & - 7.7927 * PO + 11.7534 * NAR - 43.958 * PH - 55.5904 * LWGR \\ & + 26.1187 * NN + 4.4831 * RPC + 2.3294 * INFO \end{aligned} \quad (2)$$

The premium expenditure function with potential market consideration with the Tobit estimate was listed as:

$$\begin{aligned} Y2_{Tobit} = & -340.4808 + 22.5338 * GENDER - 1.8459 * AGE - 1.4093 * NEDU \\ & -12.2293 * PO + 15.5741 * NAR - 23.6018 * PH - 19.0196 * LWGR \\ & + 32.2390 * NN + 8.1623 * RPC + 0.5123 * INFO \end{aligned} \quad (3)$$

Table 8: Regression Results for Willingness to Pay, OLS and Tobit Model

Variable	OLS			Tobit		
	Coef	S.E.	P-value	Coef	S.E.	P-value
GENDER	10.8732	18.9485	0.566	22.5338	19.4893	0.248
AGE	−2.9649	0.8055	0.000***	−1.8459	0.8265	0.026**
NEDU	−8.5386	2.4630	0.001***	−1.4093	2.5027	0.573
PO	−7.7927	17.3930	0.654	−12.2293	17.8352	0.493
NAR	11.7534	9.0437	0.194	15.5741	9.1794	0.090*
PH	−43.958	22.8101	0.054*	−23.6018	23.6205	0.318
LWGR	−55.5904	27.5238	0.044**	−19.0196	27.9023	0.496
NN	26.1187	8.4939	0.002***	32.3920	8.5709	0.000***
RPC	4.4831	2.1814	0.040**	8.1623	2.1904	0.000***
INFO	2.3294	1.3348	0.081*	0.5123	1.3660	0.708
CONSTANT	−18.8450	107.6944	0.861	−340.4808	108.3656	0.002***
	Number of obs = 824 F (10,813) = 5.73 Prob > F = 0.0000 R^2 = 0.0658 Adj- R^2 = 0.0544 Root MSE = 215.57			Number of obs = 964 Log likelihood = −5789.294 LR chi2(10) = 61.83 Prob > chi2 = 0.0000 Pseudo R^2 = 0.0053		

Source: This study.
*Significant at 10% level; **5%; ***1%, two-tailed test. Those respondents with WTP equals zero were skipped in OLS model. Total 824 samples were adopted.

Relatively low values of R-square indicated that the goodness of fit of the two models was not very persuasive. As we expected, the risk-preference dimension plays a significant role in equations (2) and (3). For the poultry producers interviewed, the more risk perception (RPC) or disease information (INFO) that he experienced, the higher the insurance premium that he would pay to avoid the potential threat. Also, two other variables – age (AGE) and number of birds for a batch (NN) – were significantly affected in two equations. It implied that elderly farmers will pay less even if they are more willing to join. And if they keep more birds in their hens, they preferred to pay more to divert the risk through joining the insurance program. Furthermore, education, farm facilities, bird kind all presented negative effects on premium amount. Comparing with the results from Table 6, we concluded that one who expressed a high willingness to join didn't mean he would pay a higher premium for insurance with given coverage in our study.

5.2 Estimation of Potential Market for Poultry Insurance Program

Based on the estimated coefficients from the previous section, average premiums for two separate groups can be calculated with their basic data (Table 9). For the group with positive premium expenditure, the average premium for a program with NT$10,000 coverage was NT$189.63, and NT$198.98 and NT$121.90 for chicken and ducks/geese farmers, respectively. And for the group with potential participants, the average premium for the same coverage was NT$140.13, which was less than the value in the previous result. Different bird farms also presented lower levels than the previous one. The premium was NT$147.32 for chicken farms and NT$86.53 for ducks/geese farms.

Taking the potential premium result, 1.4013%, from the Tobit model above and the total poultry products[5] value, NT$40,176,982,000, for Taiwan in 2007 as the estimate basis, the potential market scale for disease insurance for poultry sector was NT$563 million with full coverage (Table 10). 75%, 50% and 25% coverage levels were calculated with the same base as well.

Table 9: Estimate Results for Average Insurance Premium, OLS and Tobit Model

Variable	Obs	Mean	Std. Dev	Min	Max
$E(Y^*)_{OLS}$	824	189.63	56.8846	−4.2491	383.7646
$E(Y^* \mid LWGR=0)_{OLS}$	724	198.98	50.6241	16.8162	383.7646
$E(Y^* \mid LWGR=1)_{OLS}$	100	121.90	53.9574	−4.2491	259.3950
$E(Y^*)_{Tobit}$	964	140.13	61.7627	−132.5545	345.0155
$E(Y^* \mid LWGR=0)_{Tobit}$	850	147.32	57.4028	−132.5545	345.0155
$E(Y^* \mid LWGR=1)_{Tobit}$	114	86.53	66.8186	−98.8322	275.1026

Source: This study.
Notes: 1. *Significant at 10% level; **5%; ***1%, two-tailed test. 2. Those respondents with WTP equal to zero were skipped in the OLS model. Total 824 samples were adopted. 3. Unit: NT$.

[5] Value from egg products was omitted.

Table 10: Estimate Scale for Poultry Insurance Market

	Chicken	Ducks	Geese	Turkeys	Total
Product Value	32,854,147	5,082,590	1,903,577	336,667	40,176,982[1,2]
Insurance with full Coverage	460,385.160	71,222.337	26,674.831	4,717.716	563,000.043
75% Coverage	345,288.870	53,416.753	20,006.123	3,538.287	422,250.033
50% Coverage	230,192.580	35,611.168	13,337.415	2,358.858	281,500.022
25% Coverage	115,096.290	17,805.584	6,668.708	1,179.429	140,750.011

Source: Taiwan Agricultural Yearbook, 2007 edition, COA, Executive Yuan, Taiwan, ROC.
Notes: 1. Egg products were excluded. 2. unit: NT$1,000

6. Conclusions

This study explored the problem of disease management and risk tolerance for the domestic poultry sector in Taiwan, which faced the potential threat of AI from abroad. 964 farmers from three kinds of poultry business were interviewed in October, 2007. Three dimensions were designed to examine how the risk preference, social/economic background and wealth condition would affect the decision and its consequent premium expenditure on a specific disease insurance program. Several conclusions can be reached as follows.

- The two stage model provided a thought-provoking analysis in our work. Respondents' behavior at the decision and demand stages was significantly different. For example, those with a strong willingness to join the insurance program are not necessarily ready to pay a higher premium in the program.
- The risk preference of poultry producers affected their behavior at both decision and spending stages. But the statistical results implied that their subjective risk perception was more robust than the accessibility of disease information.
- Based on the statistical results, chicken producers were a more promising group for joining an insurance program than their ducks/geese peers. On the other hand, those poultry farms with large numbers of birds per batch were the most likely customers to join the program in the potential market based on this study.

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