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**An Evaluation of technical efficiency of small farms households
in Chuong My District, Ha Tay Province, Vietnam**

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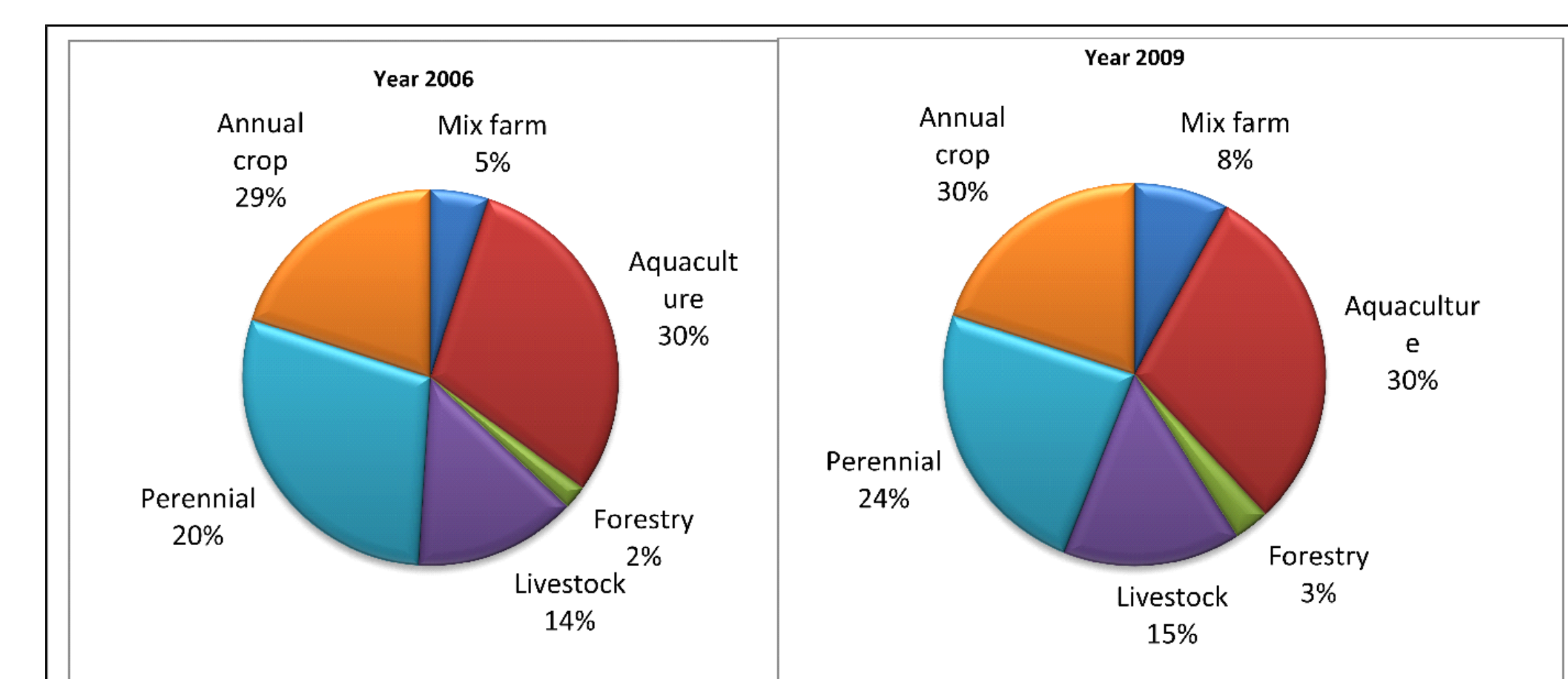
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Background

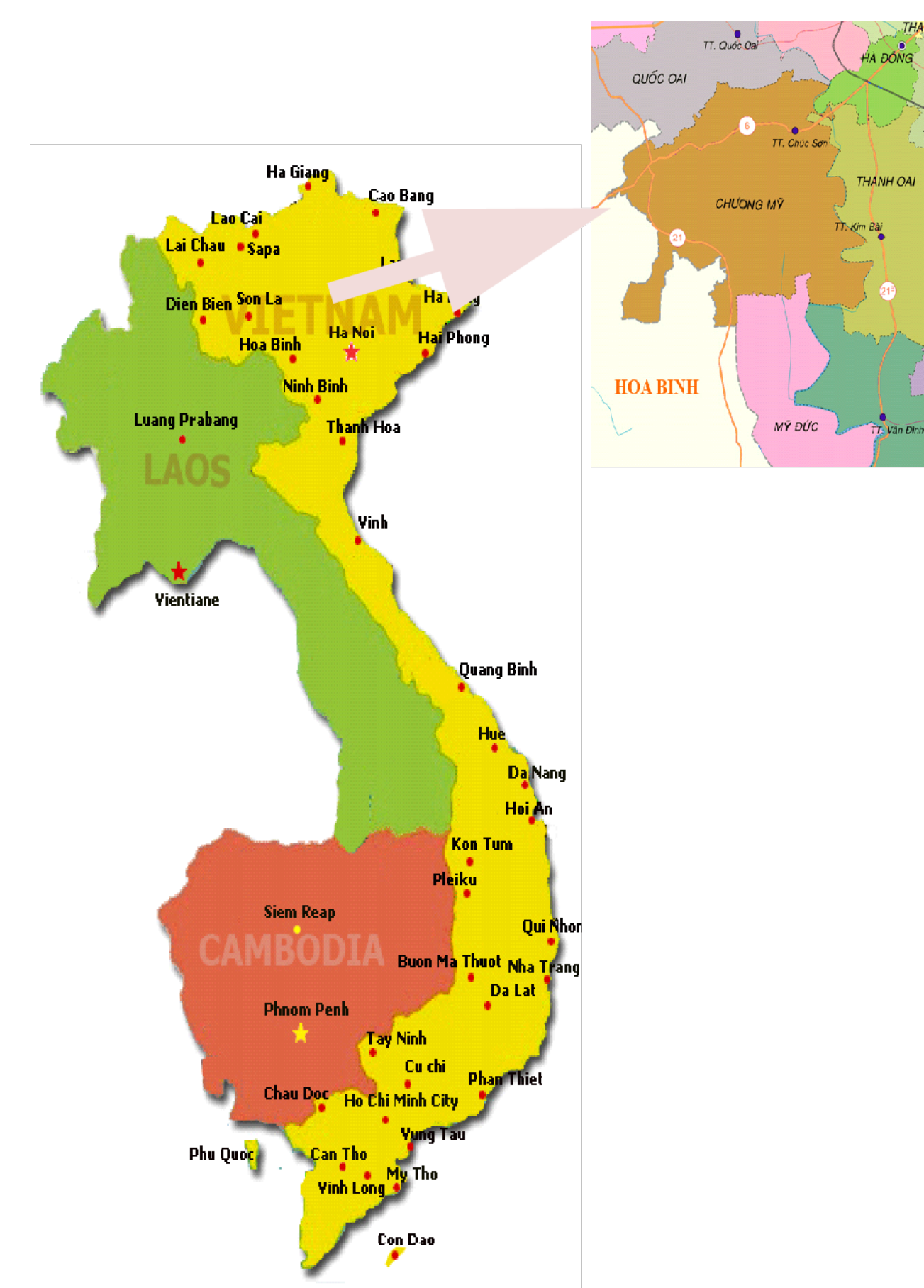
- Vietnam has 85 million people with a total area of more than 322 thousand square kilometers.
- Agriculture is considered a key sector of Vietnam's economic development. The total number of farms in Vietnam in 2009 was 120,699 in 64 provinces, of which nearly 50% were in the Red River Delta.
- After Vietnam's Renovation in 1986, and especially since Vietnam became a member of WTO in July 2003, a big transition is occurring in farming systems. Farmers are switching from specialized to diversified farming as the revenue is higher and the risk seems to be lower.

Diagram of Farming transition of Vietnam



The Issue

- In terms of technical efficiency, which way is better? Hoa asked, "which direction that farm development should take: small or large size, specialized or diversified" (2002).
- Unfortunately, there are not many studies on technical efficiency as well as overall efficiency on agricultural production in Vietnam (N.K Minh & Long, 2008). More importantly, we have not had any research focus on the effectiveness of diversification for the farms and their profits.
- In that context, we wish to measure technical efficiency for small farming in two different categories: specification and diversification in Chuong My District- Ha Tay Province, Vietnam.



Objectives

- Calculate and compare standard measures of efficiency, i.e cost, technical, scale and allocative efficiency, using multi-output/multi-input DEA approaches for the 2010 farms and 2006 farms.
- Use a two-step procedure, i.e Tobit regression, to investigate the effects of farm characteristics such as gender, education, age, paddy size, and off-farm work, loan, and other enterprises on farm's efficiency.
- Use results of the empirical estimation to shed light on and develop strategies that can improve farm's efficiency levels regarding the operational and social structure of the farming operation.

Methods

- The data envelopment analysis (DEA) approach is used to measure technical efficiency for agricultural production, and Tobit regression is used to see how the level of diversification and other farm characteristics affect the farm's efficiency and what factors are the most important in explaining farm efficiency measures.
- Data is used from two sources: the 2010 survey, and the 2006 survey. The first source is a survey questionnaire which was conducted by the author for this study in July 2010, this has 75 respondents. The second is the Vietnam household livelihood survey where the sample size is 81. In order to make it comparable with 2010 data, the production price index (PPI) is used to transform the 2006 values to 2010 values.

Production of farms		2010 farms		2006 farms	
Rice	Rice				
Chicken					
Pig	Pig				
Fish	Small fruit				
Off-farm	Off-farm				



- Tobit shows the model to evaluate the level of efficiency of farms.

$$T = \alpha + \beta d + \epsilon X + e$$

- T is a vector of farms efficiency for $K=1 \dots k$ farms, efficiency score is a function of farms specific explanatory factors,

- α , β and ϵ are parameters to be estimated.

- d survey factor: is used as a dummy variable, the survey factor would be 1 for 2010, and survey 2006 is 0. It represents all changes between two surveys: time period, different samples, different respondents, and technology.

- X is a vector of other factors that are used to examine the influence to the efficiency: age of household, education, gender, paddy size, loan, off-farm's income, and other enterprises.

Variables	Unit	2010 farms				2006 farms*			
		Mean	Min	Max	Std	Mean	Min	Max	Std
Total on-farm profit	000 VND	84,364	8,503	323,500	98,372	11,154	404.85	90,570	14,092
Off-farm income	000 VND	35,583	2,000	150,000	32,774	20,640	2,888	118,800	21,700
Total farm income	000 VND	109,759	8,503	323,500	87,905	22,366	952	126,991	22,535

*: All the prices are converted to 2010 VND using PPI

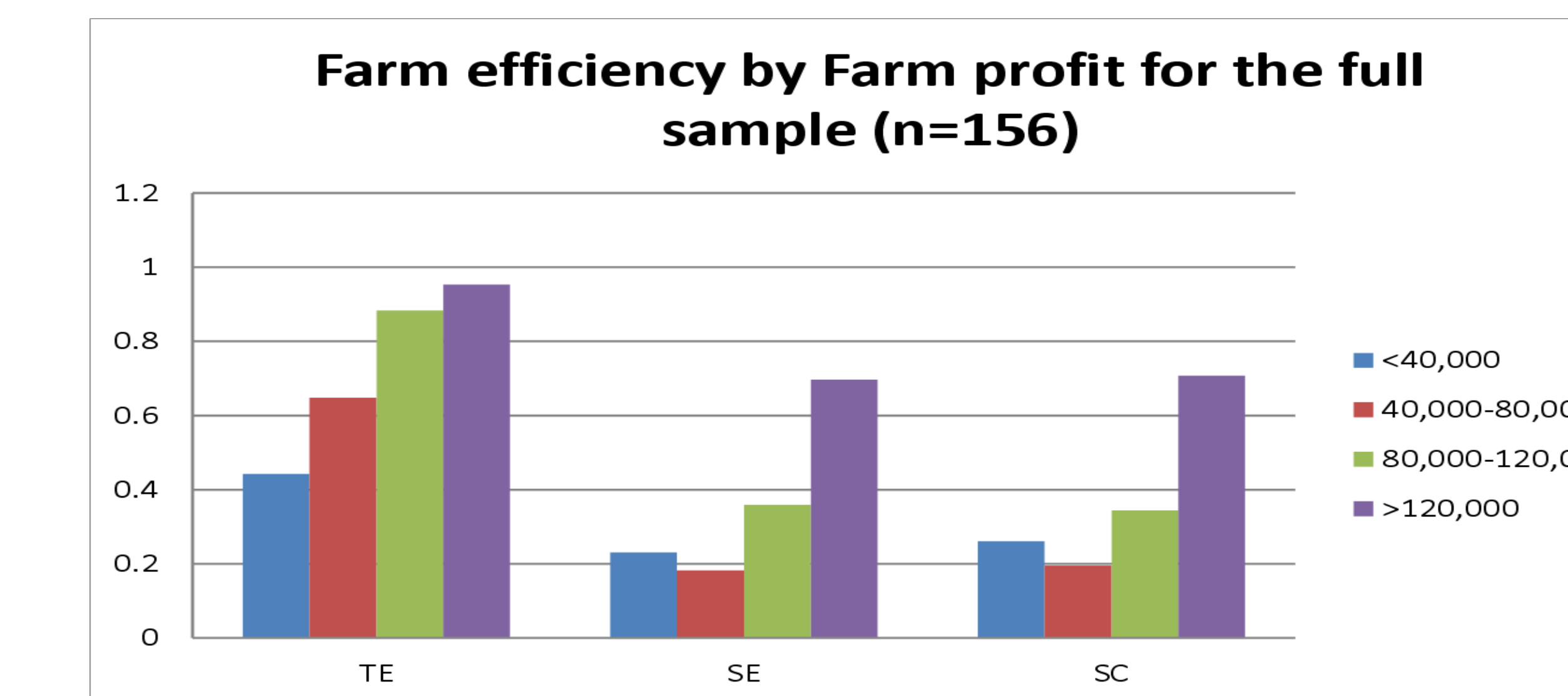
Results

- The efficiencies of 75 sampled farms are tested, the mean technical efficiency is 67%, which is a little bit lower than Vu's 2007 finding (76%). Farm profit appears to have a strong relationship with farm's efficiencies.
- The most significant variables affecting different efficiency measures are the added enterprises, such as quantities of chickens, pig, and fish.
- Land and Age are significant for technical efficiency; off-farm income dummy is significant for scale efficiency and scope economies. Among tested farms' characteristics: education, gender, and loan dummy don't have strong effects on any of the farm's efficiency measures or on scope economies.

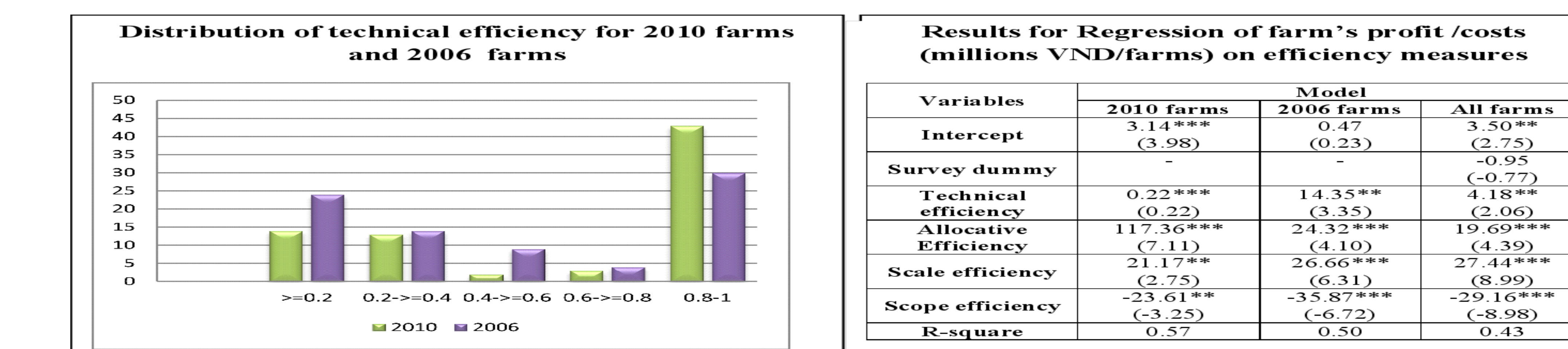
	Mean marginal effects on 2010 farms*			
	Technical efficiency	Allocative efficiency	Scale efficiency	Scope efficiency
Age	-0.0078**	-0.00013	3.49E-05	-0.0024
Education	-0.0037	0.00123	-0.004	-0.0113
Off-farm	-8E-05	-1.4E-05	0.0027***	0.0018**
Gender	0.0084	0.00228	0.0228	0.0156
Loan	-0.0346	0.00252	0.0435	0.0472
Land	-2.4652**	0.01100	0.4147	-0.0719
Number of Chicken (thousand)	0.3841***	0.00519	0.2328***	0.3180***
Pig Quantity (ton)	0.2643***	-0.00316	0.0940***	0.1156***
Fish Quantity (ton)	0.1342***	0.00259**	0.1058***	0.0973***

*calculated as the mean of marginal effects for each observation
 ***, **, * is significant at 10%, 5%, 1% respectively

- Using either the separate samples or the combined samples, technical efficiency, scale efficiency and scope efficiency all tend to increase as farm profits increase.



- Using regression analysis, a slightly different result is obtained. Technical, allocative, and scale efficiency are all highly significant and positively contributing to the profit-cost ratio. But holding constant for these three measures, scope efficiency has a negative effect on the profit-cost ratio.



Implications for future research

- Further study could test the efficiency based on regions of Vietnam using the Vietnam household survey data. The research should focus on one time period, and use regions as dummy variables.
- We would recommend deeper questions into gender roles in the farming operation so as to better identify gender impacts and management or "business skill" impacts.
- Nonparametric techniques could be applied to the same data sets used in this study. These techniques include non-radial measures, the use of "composite" frontiers which embody the best parts of different decision making units, the use of output distance functions, measurement of confidence intervals, optimization of the number of constraints, and finding a statistical basis for the non-stochastic approaches.

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