XÁC ĐỊNH CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN THU NHẬP CỦA CÁC HỘ GIA ĐÌNH TRỒNG HỒI TẠI HUYỆN BÌNH GIA, TỈNH LẠNG SƠN: NGHIÊN CỨU SỐ LIỆU CHUỖI

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Tóm tắt

Trong nghiên cứu này chúng tôi xây dựng một bộ số liệu chuỗi từ các cuộc phỏng vấn trực tiếp với 300 hộ gia đình trồng Hồi tại ba xã của huyện trong ba năm 2015 - 2017 và sử dụng phương pháp hồi quy đa biến Nhân tố tĩnh để xác định các yếu tố ảnh hưởng đến thu nhập của hộ. Mẫu điều tra sau đó được chia theo địa bàn nghiên cứu (xã) để so sánh. Kết quả cho thấy yếu tố ngày công ảnh hưởng rõ rệt và có ý nghĩa cao về mặt thống kê đến thu nhập của hộ đối với toàn bộ mẫu và cả ba xã điều tra. Ngoài ra, đối với mẫu điều tra, tuổi và trình độ văn hoá của chủ hộ cùng với phương thức canh tác đóng vai trò quan trọng đối với thu nhập của hộ. Bên cạnh đó, tại các xã khác nhau, các yếu tố ảnh hưởng đến thu nhập của các hộ trồng Hồi là khác nhau cả về mức độ tác động và ý nghĩa thống kê.

Từ khoá: *Thu nhập, hộ gia đình, số liệu chuỗi, Nhân tố tĩnh, Bình Gia, Lạng Sơn, Việt Nam*

DETERMINANTS OF HOUSEHOLD INCOME OF STAR ANISE GROWERS IN BINH GIA DISTRICT, LANG SON PROVINCE: A PANEL – DATA ANALYSIS

Abstract

The study constructed a panel data set from face-to-face interviews with 300 households in Binh Gia district, Lang Son province during 2015-2017 and used the Fixed-Effects regression method to examine the key determinants of household income of the Star Anise growers. The sample was then decomposed into sub-samples for a further analysis. The results show that the labour days significantly (at one per cent level) influence household income for the entire sample and the sub-samples. In addition, for the entire sample, the householder age, education and cultivation method play an important role on household income. The decomposition of the sample shows that the key determinants of household income vary among study areas.

Keywords: *Income, households, panel-data, Fixed-Effects, Binh Gia, Lang Son, Vietnam.*

1. Introduction

Star Anise has been grown in Lang Son province, Vietnam in early years of the 20th century by the French and the province is known widely for its Star Anise quality. Recently the product has been selected for the OCOP model (One Commune One Product). (Ha Noi Centre for Investment Promotion, 2017). Binh Gia district is the largest production area of the province with 8,340 hectares and the annual production is approximately 6,200 tons. The product is considered as an effective tool for thousands of householders (including a majority of ethnic minority groups) to combat poverty (Tung, Cuong, Thinh, Nhung, & Van, 2017; Viet Linh Company, 2016). Apart from Star Anise production and its price, which obviously have an impact on income, it is necessary to examine other key determinants of household income of the growers. These determinants may shed light on Star Anise growers' income improvement.

The structure of this paper is organised as follows: Section 2 reviews previous studies on determinants of income of households in both Vietnam and international. Methodology, data, and variable description are discussed in Section 3 whilst results and discussions are presented in Section 4 and Section 5 concludes.

2. Literature review

There has been a number of studies examined determinants of household income or consumption or both (known as "Living Standards") in both international and Vietnam context. These are briefly reviewed as follows.

Escobal (2001) used the Living Standard Measurement Studies surveyed during 1985 and 1997 to examine the determinant of non-farm income diversification in rural areas of Peru. The dependent variable was the net income shares while the independent variables included input and output prices, value of fixed assets, and householder and household characteristics. The

results showed that family size, householder education, householder experience, access to electricity, livestock, land size, distance to market, local market size and local land productivity had a significant impact on household income diversification. The significance level ranged from five to one per cent.

Balisacan, Pernia, and Estrada (2003) constructed a panel data set from Vietnam Living Standard Surveys during 1992-1993 and 1997-1998 to identify determinants of the welfare of the poor in Vietnam. The results showed that the householder age had a positive impact on household income, significant at one per cent level. Female householder generated more income than their male counterparts, significant at one per cent level. Both the household size and number of dependants had a negative impact on household income and the significance level was at one and five per cent, respectively.

Nguyen, Linh, and Nguyen (2013) used data from the Urban Poverty Surveys conducted in Ha Noi and Ho Chi Minh cities in 2009 to examine the determinants of urban poverty in Vietnam. The dependent variable included the household income and consumption. The independent variables included the individual and household characteristics. The results showed that the number of dependants (only below 15 years of age), household size, motorbike ownership, per capita living area, householder age, householder education, householder occupation had a significant impact on household income or consumption or both income and consumption.

Khan (1993) used longitudinal data from the China Health and Nutrition Survey and OLS and quintile regression models to inspect the income determinants of household in rural areas of China. The data were extracted from four waves, 2000, 2004, 2006 and 2009. The results generated from both models showed that the impact of householder education, occupation, marital status, gender and age was statistically significant during the study period.

Data used in the previous studies to examine the household income determinants are both cross-sectional and panel, the determinants vary and the results are mixed. To the best of the authors' knowledge, there has not been any study used interviewed panel data and fixed-effects methods to inspect the determinants of household income of Star Anise growers in Lang Son in Vietnam.

3. Methodology, data and variable selection

3.1. Methodology

The current study uses the following multiple regression model and the Fixed-Effect approach to inspect the determinants of household income:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \varepsilon_{it} \quad (3.1)$$

where:

Y_{it} is the household income of the i^{th} household in year t;

X_{1it} is a vector of the householder characteristics of the i^{th} household in year t;

X_{2it} is a vector of the household characteristics of the i^{th} household in year t.

Multiple regression analysis is more amenable to *ceteris paribu*s analysis because it allows researchers to explicitly control for many other factors that simultaneously affect the dependent variable. This is important both for testing economic theories and for evaluating policy effects when researchers must rely on non-experimental data. Since multiple regression models can accommodate many explanatory variables that may be correlated, researchers can hope to infer causality in cases where simple regression analysis would be misleading. Naturally, if more variables are added to the model that are useful for explaining y, then more of the variation in y can be explained. Thus, multiple regression analysis can be used to build better models for predicting the dependent variable. An additional advantage of multiple regression analysis is that it can incorporate fairly general functional form relationships. In the simple regression model, only one function of a single explanatory variable can appear in the equation, or in other words, the multiple regression model allows for much more flexibility (Wooldridge, 2012).

The most recognised advantage of OLS is that it is simple and straightforward. However, the OLS approach requires assumptions such as the Zero Conditional Mean and the

Homoskedasticity. In addition, the results may be biased due to including irrelevant variables in the model or in contrast relevant variables are omitted from the model. Also, the multicollinearity issue should be considered (Baltagi, 2011; Verbeek, 2004). These challenges can be mitigated by applying sophisticated methods such as Difference-in-Difference or Fixed-Effects. The current study applies the Fixed-Effects method to examine the determinant of household income of Star Anise growers in the study areas.

3.2. Data source and description

The data used for the present study are repeatedly collected during 2015-2017 from face-to-face interviews with 300 Star Anise growers in three communes representing three geographical and economic regions in the district. These communes include Hoang Van Thu, Mong An and Quang Trung. In each commune, 100 households are randomly selected from a list provided by the local authorities. The total number of observations is 900. The interviews were conducted in early 2018.

The data set contains a number of the householder, household, farm and regional characteristics. These characteristics are described in Table 1 below.

Table 1: *Descriptive Statistics of Selected Variables*

Variable	Mean	S. D.[a]	Min	Max
Householder age (years)	45.77	9.65	22.00	69.00
Householder education (schooling years)	7.20	2.53	2.00	12.00
Farm age (years)	22.67	8.50	3.00	43.00
Householder experience (years)	11.21	5.74	3.00	38.00
Dependants (persons)	1.71	1.21	0.00	7.00
Household poverty status (1=poor, 0=otherwise)	N/A	N/A	N/A	N/A
Regional poverty status (1=poor, 0=otherwise)	N/A	N/A	N/A	N/A
Cultivation method (1 = single cropping, 0 = intercropping)	N/A	N/A	N/A	N/A
Tree source (1= self-produced, 0 = otherwise)	N/A	N/A	N/A	N/A
Information source (1=TV/radio/Internet, 0 =otherwise)	N/A	N/A	N/A	N/A
Cultivation area (ha)	1.10	0.62	0.20	3.20
Number of trees	852.44	581.47	100.00	3,000.00
Investment (VND millions)	3.39	1.77	0.90	10.88
Labour days (days)	22.80	12.05	4.00	79.00
Income (VND thousands)	22,043.42	20,594.34	900.00	165,000.00

Note. [a]Standard Deviation, [b]Not available nor applicable.

Source: Author's calculations from surveyed data.

On average, a householder is almost 46 years old, spends approximately seven years in school and has approximately 11 years of experience in growing Star Anise. The number of dependents in a family is approximately two persons. A household has approximately one hectare of Star Anise and uses almost 23 labour days to look after the farm. Approximately, a household invests VND 3,390,000 per annum in the farm and earns VND 22 millions per year.

The dependent variable is the annual income, measured in VND millions. It is believed to be effected by a number of independent variables such as the householder age (measured in years). A household led by a younger or older may not generate as much income as that led by a mid-age householder. Similarly, a householder with a higher level of education (measured in schooling years) or with more experience (measured in years growing Star Anise) is expected to lead the family to

generate more income than a householder with a lower level of education or with less experience. The number of dependents is believed to obstacle the ability of generating household income. The larger cultivation area the more production will be produced, hence the more income the family may generate. The more the family invests in the farm or the more labour days the family uses the more income the family can generate. Since data distribution of a number of variables is skewed, natural log form is applied where is applicable.

Table 2: *Determinants of Household Income*

Income (natural log)	Sample		Hoang Van Thu		Mong An		Quang Trung	
	Coef.[a]	S. E.[b]	Coef.[a]	S. E.[b]	Coef.[a]	S. E.[b]	Coef.[a]	S. E.[b]
Householder age (natural log)	0.1487*	0.0876	0.3903***	0.1417	-0.0226	0.1608	-0.0489	0.1587
Householder education (natural log)	0.1206**	0.0504	0.2614***	0.0834	0.0374	0.0867	0.0646	0.0931
Farm age (natural log)	0.0198	0.0508	0.2025**	0.0941	0.0478	0.1008	0.0256	0.0759
Householder experience (natural log)	0.0516	0.0478	0.2416**	0.0947	-0.0959	0.0881	0.0526	0.0700
Dependants (persons)	-0.0070	0.0166	0.0024	0.0268	-0.0244	0.0301	-0.0310	0.0334
Household poverty status (1=poor, 0=otherwise)	-0.0109	0.0502	0.1466	0.0991	-0.1625*	0.0829	-0.0035	0.0870
Regional poverty status (1=poor, 0=otherwise)	-0.0459	0.0389	omitted	omitted	-0.2599	0.2322	omitted	omitted
Cultivation method (1=single cropping, 0=intercropping)	-0.1332**	0.0535	-0.1401*	0.0833	-0.2917***	0.0998	-0.1378	0.0938
Source of trees (1=self-produced, 0=otherwise)	0.0420	0.0482	-0.0157	0.0809	0.0940	0.0994	-0.0204	0.0701
Information source (1=TV/radio/Internet, 0=otherwise)	-0.0104	0.0424	-0.0304	0.0767	0.0616	0.0800	-0.0312	0.0646
Cultivation area (natural log)	0.1020	0.0679	-0.0583	0.1171	0.2440**	0.1185	0.1834*	0.0949
Number of trees (natural log)	-0.0303	0.0549	0.0003**	0.0001	0.0000	0.0001	-0.0002**	0.0001
Investment (natural log)	0.0099	0.0365	-0.0209	0.0168	-0.0212	0.0186	-0.0028	0.0316
Labour days (natural log)	0.2014***	0.0362	0.0318***	0.0025	0.0620***	0.0028	0.0548***	0.0053
Constant	5.2758***	0.5507	5.6775***	0.6615	8.7208***	0.8240	8.3427***	0.7387

Note. [a]*Coefficient,* [b]*Standar Error.*

Source: Author's calculations from surveyed data.

4. Results and discussion

The impact of householder age is significant for the entire sample and Hoang Van Thu commune, but not for the remaining communes. For example, a one per cent increase in the householder age for sample and Hoang Van Thu commune is associated with an increase of approximately 15 and 39 per cent in household income, respectively. The significance level is at ten and one per cent, respectively.

Likewise, the impact of the householder education on household income is only significant for Hoang Van Thu Commune, but not for the whole sample and the other two communes. For example, a one per cent increase in the householder's schooling years leads to approximately 12 per cent increase in household income for the entire sample, the significance level is at five per cent and a one per cent increase in the householder's schooling years leads to approximately 26 per cent increase in household income for Hoang Van Thu commune, the significance level is at one per cent.

The effect of farm age is only significant for Hoang Van Thu commune, but insignificant for the entire sample and the remaining two communes. Particularly, a one per cent increase in the farm age is associated with an approximately 20 per cent increase in household income, significant at five per cent.

The impact of the householder experience (in growing Star Anise) on household income is only significant for Hoang Van Thu Commune, but not for the entire sample and the other two communes. Particularly, a one per cent increase in the householder experience is associated with an approximately 24 per cent increase in household income, significant at five per cent level.

The impact of household poverty status on household income is only significant for Mong An commune, but not for the entire sample and the other two communes. For example, compared to other households, income of a poor household is lower by approximately 15 per cent ($e^{-0.16}$-1), the significance level is at 10 per cent level.

It appears that the single cropping method is not as effective as the intercropping one. Particularly, the cultivation method significantly affect household income for the whole sample, Hoang Van Thu and Mong An communes, but not for Quang Trung commune. For example, income of a farm applies the single cropping is lower than that applies intercropping by approximately 14, 15 and 33 per cent for the entire sample, Hoang Van Thu and Mong An, respectively. The significance level is at five, one and ten per cent, respectively.

The density of the current Star Anise farms appears to be condensed, hence has a negative impact on household income. The results show that a one per cent increase in the number of trees in Hoang Van Thu and Quang Trung communes is associated with a decrease of approximately 0.3 and 0.2 per cent in household income. The significance level for both areas is at five per cent.

Labour days significantly affect household income for the whole sample and all the communes. For example, a one per cent increase in the labour days is associated with an increase of 20, 3, 6 and 6 per cent in household income. The significance level for the entire sample and all the study areas is at one per cent. This finding implies that household income heavily relies on labour.

5. Conclusion

The current study constructed a panel data set from repeatedly surveyed data of 300 households in three communes in Binh Gia district, Lang Son province during 2015 - 2017 and uses the Fixed-Effects method to examine the determinants of household income of Star Anise growers. The results show that the labour days significantly (at one per cent level) drive household income for the whole sample and the sub-samples. In addition, for the entire sample, the impact of the householder age, education and cultivation method on household income is significant at ten, five and five per cent level, respectively. The decomposition of the sample show that most of the selected factors significantly affects household income in Hoang Van Thu commune and a few impacts the other two communes. Further studies can apply mixed approaches, which may include qualitative methods, to be able to give policy recommendation to improve the growers' income.

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