

Assessing the Determinants of Crop Diversification at Farm Level: An Empirical Study

Abdulla Primov, Iroda Rustamova
 Tashkent State Agrarian University

Abstract

Since independence, the government of Uzbekistan has implemented the number of agricultural policies such as making some crucial structural reforms at the farms, comprising different institutions and enhancing diversity of agricultural production in order to stabilize the agricultural sector of the country. Therefore, crop diversity has an important role in sustainable agriculture. The main objective of this study is to analyse the status of crop diversification and its determinants in Uzbekistan. Using unique cross-sectional data from Samarkand region of Uzbekistan, we calculated the diversification index based on the Simpson Diversity Index method. Then we incorporated the diversity index into Tobit in order to examine the main determinants of diversification index.

Aim

The aim of the study is to identify the status of crop diversity

of the farmer's and its main determinants in Samarkand region.

Tasks

The study has utilized the cross-sectional data for the period 2020-2021 collected by using well-structured questionnaires through personal interview method in Samarkand region. The Simpson Diversity Index and Tobit regression model were used for empirical analysis.

Materials and methods

In this study, we opted for the Simpson Index of Diversification (SID) to calculate the crop diversity index of the sampled farms (Singh et al., 2005; Bobojonov et al., 2013). The Simpson Index (SI) is calculated using the following equation:

$$SID = 1 - \sum_{i=1}^n P_i^2 \quad (1)$$

$$P_i = \frac{A_i}{\sum_{i=1}^n A_i} \quad (2)$$

where,

A_i is the value or area of the i^{th} commodities and P_i is the proportionate value or area of the i^{th} commodities in the total value or area.

After measuring the extent of crop diversification index obtained from the SID, a Tobit regression model was used in order to analyze the main determinants of crop diversification. The model is specified as following equation:

$$y_i^* = \beta_0 + \beta_1 \text{Age}_i + \beta_2 \text{Offfarm}_i + \beta_3 \text{AccExt}_i + \beta_4 \text{PmAv}_i + \beta_5 \text{Gender}_i + \beta_6 \text{TrAv}_i + \beta_7 \text{FAsset}_i + \beta_8 \text{DepRatio}_i + \beta_9 \text{DisToMark}_i + v_i$$

$$y_i = \begin{cases} 0 & y_i^* < 0 \\ y_i^* & 0 \leq y_i^* \leq 1 \end{cases} \quad (3)$$

$$i = 1, 2, \dots, n,$$

Results

In terms of diversification, the result indicated that the average crop diversification index within the sample of farmers was 0.66 with a standard deviation of 0.17. The result implies that most of the farmers had a quiet high level of crop diversification intensity in different part of the Uzbekistan (Figure 2) whereas still around 11% of farmers have not practiced any types of crop diversification activities or cultivate only one or two state order crops cotton and wheat.

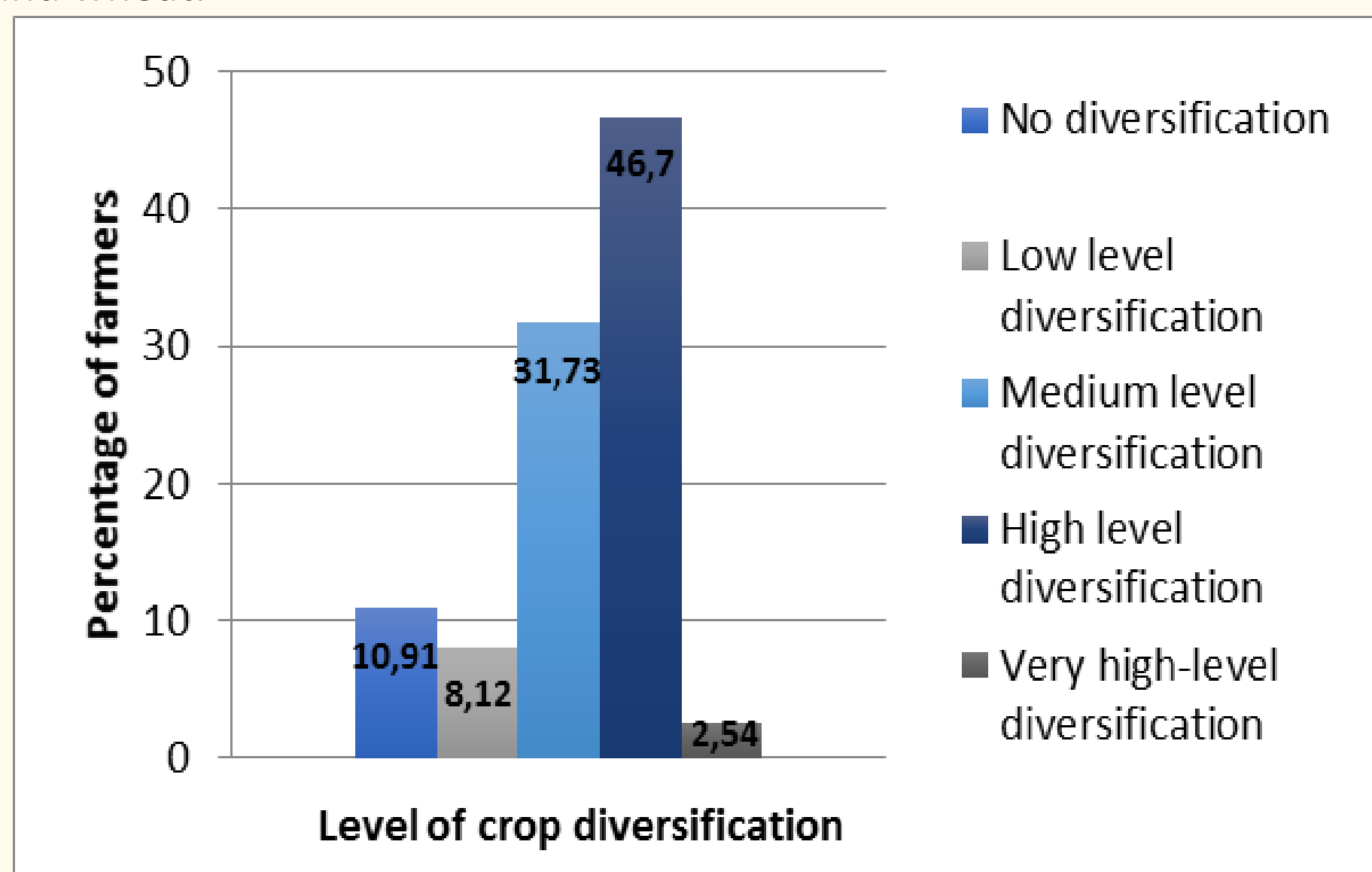


Fig. 1. Level of crop diversification of farmers

Source: Own estimation based on survey data

The Tobit model was employed to identify the main determinants of crop diversification of the farmers. The results of the Tobit regression model are presented in Table 1. The test for multicollinearity showed that there was no multicollinearity between any two or more explanatory variables in our study. In addition, all the explanatory variables were tested for heteroskedasticity using the Breuch-Pagan test and heteroskedasticity was not found among them.

Also, the chi-square of the Tobit model is quiet high meaning that the model fitted very well and statistically significant. The results of regression model suggested that the variables such as age, off-farm participation, extension service, pump and tractor availability were the major factors that positively and significantly affected by crop diversification.

Table 1

Result of Tobit regression on determinants of crop diversification

Variables	Markings	Coefficients	Standard error	t-statistics
Age of farmers	FAge	0.00281**	0.00106	2.64
Number of members in off-farm	Offfarm	0.85841**	0.30129	2.85
Access to extension service	AccExt	0.13213***	0.02794	4.73
Availability of pump	PmAv	0.06077*	0.02976	2.04
Gender of household head	Gender	0.50075	0.04856	1.05
Availability of tractor	TrAv	0.06378*	0.02639	2.42
Constant		0.61102	0.07666	0.80
Number of observations			302	
Psuedo R ²			0.4198	
LR chi ² (6)			61.12	
Log likelihood			-42.23	

Conclusion

1. Crop diversification is considered a key potential strategy for improving household food security. The study has examined the main determinants and extent of crop diversification at farm level across different districts of Samarkand region in Uzbekistan. The overall result in the five districts combined in this study reveals a mean Simpson Index within the sample of farmers was 0.66.
2. Furthermore, the result of Tobit regression model indicated that various farm specific factors such as age, access to extension service, number of members in off-farm, availability of water pump and availability of machinery are found as significant determinants of crop diversity whereas merely gender of household is not significant factor for crop diversification in the study regions. While cultivating several crop species helps the farmers to manage both price and production risks which attains more food options for the household and income through marketing the produce from the surpluses.

Acknowledgements

The forum is organized with the financial support of the European Union Programme ERASMUS+ project "New Master's Degree Curricula for Sustainable Bioeconomy in Uzbekistan (BioEcUz), No 619294-EPP-1-2020-1-LV-EPPKA2-CBHE-JP.

The European Commission's support for the production of this material does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.