

Determinants of Niger Seed Marketed Surplus Among Small Farm Households: The Case of Wama Hagalo Districts of East Wollega, Ethiopia

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Abstract

Though agriculture continues to dominate the national economy of Ethiopia, both in terms of overall agricultural production and productivity, the sector suffers from major structural problems. The majority of farmers in Ethiopia are smallholders, producing mostly for own consumption and generating only a small marketed surplus. This study tries to assess the major determinants of marketed surplus particularly Niger seed. To conduct the study, both primary and secondary data sources were used. A multi stage sampling technique were applied to collect primary data from 120 small farm households. The study employed both descriptive statistics and econometrics model in the analysis of the data. Ordinary Least Squares(OLS) method were applied to assess the determinants of Niger seed marketed surplus in the study area. Prior to OLS estimation, the explanatory variables were tested for Multicollinearity and Heteroscedasticity. The result of the regression analysis shows that age of the households, Tropical livestock holdings, and farm size of the households significantly affects Niger seed marketed surplus in the study area.

Keywords: Niger Seed, Marketed Surplus, Households, Wollega, Ethiopia

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1. Introduction

Agriculture continues to dominate the national economy of Ethiopia, accounting for 72.7 percent of employment and 36.7 percent of its overall GDP. More than 79 million people in Ethiopia relies on agriculture for their livelihoods. Besides gold, Ethiopia's top five exports are all agricultural products (ATA, 2017). In the second Growth and Transformation Plan of Ethiopia, national development priorities have been given to the development of agriculture as it remains the mainstay of the nation's accelerated economic development (NPC, 2017).

Though agriculture is at heart of Ethiopian economy, both in terms of overall agricultural production and productivity, the sector suffers from major structural problems. Despite an average investment close to 13 percent of the total national expenditure, Ethiopian agriculture remains low input, low-value and subsistence oriented, and is vulnerable to frequent climatic shocks (UNDP, 2016). The failure of rains in the sector causes devastating drought conditions. Significant pasture and water deficits severely affects livestock dependent households in lowlands – extremely low milk production, and plummeted prices for livestock (FAO, 2017). Ethiopian economy which has shown 9.3 percent of average annual growth during the 2013/14 to 2017/18 fiscal years has recorded 7.7 percent growth in 2017/18 fiscal year, slower than the growth rate registered in the previous year owing to growth deceleration in agriculture (NBE, 2018).

The majority of farmers in Ethiopia are smallholders, producing mostly for own consumption and generating only a small marketed surplus, portion of production which actually enters to the market (Alemayehu *et al.*, 2012). For instance, in the 2017/18 fiscal year, 67.72 percent of the cereal crops produced were used for household consumption. Nearly 11.5 percent and 17.08 percent were used for seed and sale, respectively. The remaining 3.7 per cent of the cereals produced was used for other purposes like wages and animal feed. The pattern of oilseeds utilization is distinctly different from that of cereals in Ethiopia, for example, 23.69 percent of the Niger seed produced in the fiscal year were used for household consumption. 10.38 and 2.45 percent were used for seed and other purposes such as wages in kind respectively. Meanwhile, 63.47 percent of Niger seed were sold by small farm households (CSA, 2017). Thus, the study tries to assess the major determinants of Niger seed marketed surplus among small farm households particularly at Wama Hagalo district of East Wollega zone of Oromia as Niger seed is the major oilseed in the study area.

2. Methodology

2.1. Description of the Study Area

Wama Hagalo is one of the woredas in East Wollega zone of Oromia Region of Ethiopia. The woreda is bounded by Bilo Boshe in the east, Wayu Tuka in the west, Sibu Sire in the north and Jimma zone to the south. *Mote* is the capital town of the woreda located at a distance of about 90 kilometers from the zonal capital, Nekemte. The

woreda is composed of 10 rural and 3 urban kebeles. According to the CSA (2013) projection, the total population of the woreda in 2017 is projected to 62,451, out of this 31,459 are male and 30,992 are female. The woreda has a total coverage of 62,104.24 hectares of land. In terms of land use pattern, 40,367.76 hectare is cultivable land, 10,122.99 hectares is grazing or pasture land, 5,278.86 hectare of land is covered with forest, and the remaining 6,334.63 hectares of land is for other uses. Agriculture is the primary income source of the households in the woreda. Maize, Sorghum, *Teff*, Niger, Barley, Broad Bean, and Millet are the major crops produced in the woreda.

2.2. Data and Data Source

The data for the study were gathered from primary and secondary sources. The primary data were collected through pre-tested semi-structured questionnaire. Secondary data were obtained from Central Statistical Agency (CSA), Governmental Organizations, and Woreda Offices, of Ethiopia.

2.3. Sampling Method and Sample Size

To collect primary data for the study, a multi stage sampling technique were adopted. First Wama Hagalo woreda was selected among the 17 woreda's of East Wollega zone since the woreda is well known in the production of Niger seed. In the second stage, 3 *kebeles* were selected from the 10 rural *kebeles* of the woreda. Finally, from the 3 selected *kebeles*, sample small farm households were selected randomly based on probability proportional to size sampling technique.

The study used the simplified Yamane's (1967) sample size determination formula in setting the appropriate sample size at 95 percent confidence level, 0.5 degree of variability, and 0.9 % level of precision(for having manageable sample size). The formula is as follow;

$$n = \frac{N}{1+N(e)^2} \quad n = \frac{3,843}{1+3,843(0.09)^2} \quad n = \frac{3,843}{1+3,843(0.0081)} \quad n = \frac{3,843}{1+31.13} \quad n = \frac{3,843}{32.13} = 120$$

Where,

n = the sample size

N= the total number of rural households in the selected *kebeles*.

e = the level of precision

Table 1: Distribution of Sample Small Farm Households in the 3 *kebeles*

Sample <i>Kebeles</i>	Total Small Farm Households	Sample Small Farm Households
Bata Kusaye	1,276	40
Meyisa Kombo	1,088	34
Bata Wayu	1,479	46
Total	3,843	120

Source: Own Computation

2.4. Methods of Data Analysis

The study employed both descriptive statistics and econometrics model in the analysis of the collected data. Descriptive statistics such as mean, ratio, percentages, and cross tabulations were used to describe the characteristics of small farm households in the study area. Ordinary Least Squares(OLS) regression model of Gujarati(2004) was applied to assess the determinants of Niger seed marketed surplus among small farm households.

Econometric model specification of supply function in matrix notation;

$$Y_i = X' \beta + U$$

Where: Y_i = Marketed Surplus of Niger Seed

X' = Vector of explanatory variables

β = Coefficient of the i^{th} explanatory variable

U = disturbance term

The dependent variable in the model, marketed surplus of Niger seed, is a continuous variable measured in quintal. It shows the supply of Niger seed to the market by the farm households. It is also transformed into logarithm for data formalization. The hypothesis and definition of the independent variables used in the model are summarized in table 2 below.

Table 2: Hypothesis and Definition of the Independent Variables

Variable	Description	Type	Hypothesis
Sex	Sex of Household Head	Dummy	+
Age	Age of Household Head	Continuous	+
Family Size	Family Size of the Household	Continuous	+
Dependency Ratio	Dependency Ratio of the Household	Continuous	-
Education	Education Status of Household Head	Dummy	+
Farm Size	Farm size owned by Households	Continuous	-
Distance from Market	Distance from a Local Market to home	Continuous	-
Frequency of DA	Frequency of DA in a Month	Continuous	+
Tropical Livestock Unit	Tropical livestock holdings of the Household	Continuous	+
Non/off Farm Income	Off/None Farm Income of the Household	Continuous	+
Access to Credit	Access to Credit by the Households	Dummy	+

3. Result and Discussion

3.1. Descriptive Statistics

The results of descriptive statistics show that out of the total 120 sample farm households, 115 are male headed and 5 are female headed households. The mean age of sample farm households were 44 years old. On an average, 7 people lives in a farm households house in the study area. The mean dependency ratio in the study area were 1.18. On average, the farm households in the study area holds 3.39 hectare of lands. The mean Tropical livestock holdings of the households in the study area were 6.62.

3.2. Ordinary Least Squares Estimation

Prior to OLS estimation, the explanatory variables were tested for Multicollinearity while the residuals were tested for Heteroscedasticity. The Variance Inflation Factor (VIF) technique were employed to detect multicollinearity, and Breusch- Pagen test for Heteroscedasticity. The VIF result in Apendix 1 shows the absence of series problem of multicollinearity. The result of Breusch-Pagen test ($\text{Prob} > \chi^2 = 0.08$) also reveals the non existance of problem of Heteroscedasticity.

The result of OLS in table 3 below shows that the age of the households, Tropical Livestock holdings, and Farm size of the households significantly affects Niger seed marketed surplus in the study area. The F-test value of $F(11, 108) = 5.00$, and R-square of value of 0.34 indicates the statistical significance of the regression model.

Table 3: OLS estimation Result

LMarketedSNS	Coef.	Std. Err.	t	P> t
Sex	0.3525	0.2721	1.30	0.198
Age	-0.0117	0.0047	-2.44	0.016
Family Size	-0.0108	0.0207	-0.53	0.600
Dependency Ratio	-0.0702	0.0628	-1.12	0.267
Education	0.1589	0.1267	1.25	0.213
Farm Size	0.1052	0.0356	2.95	0.004
Distance from Market	0.0060	0.0084	0.71	0.481
Frequency of DA	-0.0303	0.0465	-0.65	0.516
Tropical Livestock Unit	0.0494	0.0172	2.88	0.005
Non/off Farm Income	-0.4390	0.1373	-0.32	0.750
Access to Credit	-0.1626	0.1230	-1.32	0.189
Constant	0.2937	0.4092	0.72	0.474
Number of obs	= 120			
F(11, 108)	= 5.00			
Prob > F	= 0.000			
R-squared	= 0.3373			
Adj R-squared	= 0.2698			
Root MSE	= 0.5669			

Source: Own result

*** and ** indicate the level of significance at 1% and 5% probability level respectively.

4. Summary and Conclusion

Agriculture is at heart of Ethiopian economy however, both in terms of overall agricultural production and productivity, the sector suffers from major structural problems. Despite an average investment close to 13 percent of the total expenditure, Ethiopian agriculture remains low input, low-value and subsistence oriented, and is

vulnerable to frequent climatic shocks. Ethiopian farmers produce mostly for own consumption and generating only a small marketed surplus. Thus, this study tried to assess the major determinants of Niger seed marketed surplus among small farm households particularly at Wama Hagalo district of East Wollega zone of Oromia as Niger seed is the major oilseed in the study area.

The data for the study were gathered from both primary and secondary sources. The primary data were collected through pre-tested semi-structured questionnaire. Secondary data were obtained from Central Statistical Agency (CSA), Governmental Organizations, and Woreda Offices.

A multi stage sampling technique were applied to collect primary data from randemly selected 120 farm households in the study. The study employed both descriptive statistics and econometrics model in the analysis of the collected data. Descriptive statistics such as mean, ratio, percentages, and cross tabulations were used to describe the characteristics of small farm households in the study area. Ordinary Least Squares(OLS) regression model of were applied to assess the determinants of Niger seed marketed surplus among small farm households in the study area.

Prior to OLS estimation, the explanatory variables were tested for Multicollinearity while the residuals were tested for Heteroscedasticity. The result of OLS regression shows that the age of the households, Tropical Livestock holdings, and Farm size of the households significantly affects Niger seed marketed surplus in the study area.

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Appendix

Appendix 1: Multicollinearity Test Result

Variable	VIF	1/VIF
Age	1.73	0.577383
Tropical Livestock Unit	1.71	0.583096
Family Size	1.71	0.585390
Farm Size	1.56	0.639428
Access to Credit	1.37	0.731855
Education	1.36	0.732761
Dependency Ratio	1.31	0.763179
Frequency of DA	1.27	0.787029
Non/off Farm Income	1.23	0.814109
Distance from Market	1.20	0.832671
Sex	1.10	0.905245
Mean VIF	1.42	