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Relationship between Agriculture Subsidy and Agricultural Production in Nepal.

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Abstract

This article aims to analyze the relationship between agriculture subsidy and agricultural production in Nepal using annual time series data from 2013/14 to 2022/2023 A.D. Agricultural production is taken as the dependent variable and agricultural subsidy as the independent variable and it is analyzed using Karl Pearson Correlation and Ordinary Least Square (OLS) regression. The article found a high positive correlation (r= 0.72) among variables. Also, there exists a significant and positive relationship between agricultural production and agricultural subsidy (p-value =0.01) (Coefficient= 0.15) at a 5% level of confidence interval. Likewise, the residuals are free from heteroskedasticity and serial correlation. The article concludes that while the government should maintain its subsidy program, efforts must be made to address and control the irregularities in its distribution.

Keywords: Agricultural production, subsidy, GDP, regression, irregularities

Introduction

Agriculture plays a crucial role in Nepal's economy. In the fiscal year 2023/2024, it contributed 24.09 % of the GDP, and 62% of the people were involved in agriculture for employment (Ministry of Finance, 2024). This is no encouraging statistic because its contribution to GDP is minimal compared to people involved in agriculture. To promote agricultural production and its contribution to the economy, the Nepal government provides subsidies for various inputs including seeds, fertilizers, machinery purchases, etc. The purpose of subsidies is to lower the production cost of farmers and increase their financial performance. In this context, the important question is whether agricultural subsidies are increasing agrarian production as expected or not. Macro and micro-level studies suggest that the result is mixed. The article by (Kyle et al., 2017) examined the equity and effectiveness of the fertilizer subsidy program in Nepal.

The study conducted a household sample survey for more than a thousand households. It found that fertilizer subsidies helped to increase the access to fertilizer among the people. However, the quantity of fertilizer needed is insufficient, farmers do not know the optimal amount of fertilizer to use, and politics regarding the subsidy are some other problems. Likewise (Bista et al., 2018) studied the existing programs and policies regarding input subsidy in Nepal, especially in seeds and fertilizers to review the timeline of subsidy programs, budget details, and progress with the help of both primary and secondary data. It also used simple decomposition analysis to assess the effect of area and yield on change in production of paddy, wheat, and maize during the period of FY 2065/66 to FY 2071/72. The study found that seed subsidy was impressive for wheat and paddy but progress in organic fertilizer subsidy is not in its pace. The subsidy was mainly targeted to small and marginal farmers. Also, (Upadhyay et al., 2019) analyzed the impact of fertilizer subsidies on paddy cultivation in Nepal using simple regression analysis and descriptive statistical methods. The study found that subsidies positively influenced productivity, profitability, food sufficiency, and production costs.

In the South Asian context, (Kaur & Sharma, 2012) examined the effectiveness of agricultural subsidies in India after independence using the descriptive method. The article pointed out that, the increasing rate of total subsidies (fertilizers, electricity, and irrigation) is higher than gross cropped area (GCA) during pre, first as well as second phases of liberalization periods. It suggested that subsidy should not be the weapon for vote bank politics. In Bhutan (Wang et al., 2019) while assessing the socioeconomic impacts of agricultural subsidies found that in almost all sectors ranging from agricultural machinery, seeds to jersey cow, etc. the non-poor population has greater access to the subsidies compared to the poor. Likewise, in the case of Bangladesh, (Wang et al., 2019) assessed the impact of fertilizer subsidies on farming efficiency. Data Envelopment Analysis (DEA) and Tobit model found that subsidy has a significant effect on small and marginal farmers but an insignificant effect on medium and larger farmers.

If we analyze the international experience from countries outside South Asia, some research has supported agriculture subsidies and some have opposed them. The research by (Vitalis, 2007) in New Zealand, (Tan et al., 2013) in China, (López et al., 2017) in Paraguay, and (Vozárová et al., 2020) in the case of the Slovak Republic, found that subsidies had no significant impact on agricultural production whereas (Dorward & Chirwa, 2011) in Malawi, (Ali et al., 2019) in Pakistan, (Safo K Allotey et al., 2019) in Ghana found that subsidy had a positive impact on agricultural production and suggested applying it more effectively so that it reaches the desired end. Likewise, (Vozarova & Kotulic, 2016) quantified the effect of subsidies on the production performance of Slovak agriculture. The Pearson

Correlation coefficient was used and found that there is a strong correlation between agricultural subsidy and gross agricultural production. Similarly,(Michael et al., 2018) examined the agricultural input subsidy as a growth enhancement scheme in Nigeria. It found that subsidized input was helpful to small-scale farmers but due to politicization the agro-dealers could not get funds on time and it caused a delay in the delivery of inputs and support services. Also, (Mebrahtu & Lee, 2019) analyzed the impact of agricultural package programs on farm productivity in Tigray-Ethiopia using panel data. The research used the fixed effect (FE) estimation model and propensity score matching (PSM) to estimate the result. The result showed that the agricultural package was beneficial for recipients.

Considering the mixed experiences of the several countries, it would be an insightful study to see the relationship between agricultural subsidy and agricultural production in the Nepalese context. Nepal's government has launched agricultural subsidy programs over several decades but whether the program has made an impact on the ground is a debatable issue. Several reports have aroused of rampant corruption and misuse of the resources allocated for the agricultural subsidy and the real farmers who should have been the beneficiaries of the subsidy were devoid of it. The subsidy program is mainly designed for marginal and small farmers but politically connected people and kith and kin of the office bearers took the undue advantage. Due to this government even stopped providing cash grants. The malpractice was so high that in 2018, the agriculture minister formed a committee to study the effectiveness of the use of agriculture subsidies. The committee found that 35 percent of the subsidy that was given to farmers was used as a commission to government officials (Nayapatrika Daily, 2019).

The research studies conducted in different countries have shown that subsidies have helped farmers and increased farm productivity to some extent but over-politicization and vote bank politics have hindered its optimum utilization and benefit the maximum farmers. In Nepal's case, most research has been conducted related to fertilizer subsidies but only limited work that studies the relationship between production and subsidy has been carried and this research tries to fulfill that gap.

Material and Methods

The secondary data from the period 2013/14 to 2022/2023 A.D. is taken. The annual report published in various years by the Office of the Auditor General of Nepal, the Economic Survey published by the Ministry of Finance, Nepal, and the Current Macroeconomic Situation published by Nepal Rastra Bank are used.

Similarly, this article uses Karl Pearson correlation and regression analysis to see the linear relationship between the variables. Due to the limited years of time series data, the long run and short dynamics of the data could not be checked. So, the OLS method of regression was chosen. Agricultural production is used as the dependent variable and the amount of subsidy is used as an independent variable.

Model specification:
Q = f (S) where,
Q = Agricultural Production
S = Amount of Agricultural Subsidy.
The Karl Pearson Correlation Coefficient is:

$$r = \frac{\left\{\sum\left(x_i - \overline{\{x\}}\right)\left(y_i - \overline{\{y\}}\right)\right\}}{\left\{\sqrt{\sum\left(x_i - \overline{\{x\}}\right)^2 \sum\left(y_i - \overline{\{y\}}\right)^2}\right\}}$$

where:

r = Pearson correlation coefficient
x_i = Individual value of the x-variable
$\bar{x}$ = Individual value of the y-variable
$\bar{y}$ = Mean of the x-variable
= Mean of the y-variable
$\sum$ = Sum over all data points

The Regression Equation is:

$Q = \alpha + \beta S + \varepsilon$

Where, α, and β are parameters and ε is the error term.

The research uses both descriptive and analytical approaches to interpret the findings. It also uses regression through OLS and tests the residual for heteroskedasticity and serial correlation. The normality and stability tests are also conducted to check whether the model is the best fit or not.

Hypothesis:

H_0 = There is no significant relationship between agricultural subsidy and agricultural production

H_1 = There is a significant relationship between agricultural subsidy and agricultural production.

Result and Discussion

The correlation coefficient was found to be r= 0.72, which is highly correlated. This implies production and subsidy move in the same positive direction.

The increase in subsidy will increase production and productivity should be rewarded with justifiable and necessary subsidy. Likewise, the regression analysis of the data shows that the dependent variable was explained 52% by an independent variable. The research found a positive and significant linear relationship between agricultural production and the amount of subsidy at a 5% level of significance (p-value =0.01) (Coefficient = 0.15). So, we reject the null hypothesis and accept the alternate hypothesis. This implies that subsidy has a systematic and major influence on agricultural production. This regression analysis along with correlation analysis suggests that an increase in subsidy will increase production. Also, the data were free from heteroskedasticity by using the Breusch- Gagan- Godfrey test (p-value = 0.43) and Serial Correlation using the LM test (p-value = 0.07). This result verifies different research conducted in Nepal and other various countries about the positive effect of subsidies on agricultural productivity (Agyemang et al., 2022) in Ghana, (Zheng et al., 2013) in China.

Table 1

Least Squares Regression Result

Dependent Variable: Agricultural Production				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Agricultural Subsidy	0.150527	0.050472	2.982369	0.0175
C	19908.66	886.6912	22.45275	0.0000
R-squared	0.526474	Mean dependent var		22256.13
Adjusted R-squared	0.467283	S.D. dependent var		1768.803
S.E. of regression	1291.005	Akaike info criterion		17.34109
F-statistic	8.894524	Durbin-Watson stat		0.665117
Prob(F-statistic)	0.017537			

Source. Author's Calculation

Table 2

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.672020	Prob. F (1,8)	0.4361
Obs*R-squared	0.774929	Prob. Chi-Square (1)	0.3787
Scaled explained SS	0.154863	Prob. Chi-Square (1)	0.6939

Source. Author's Calculation

Table 3

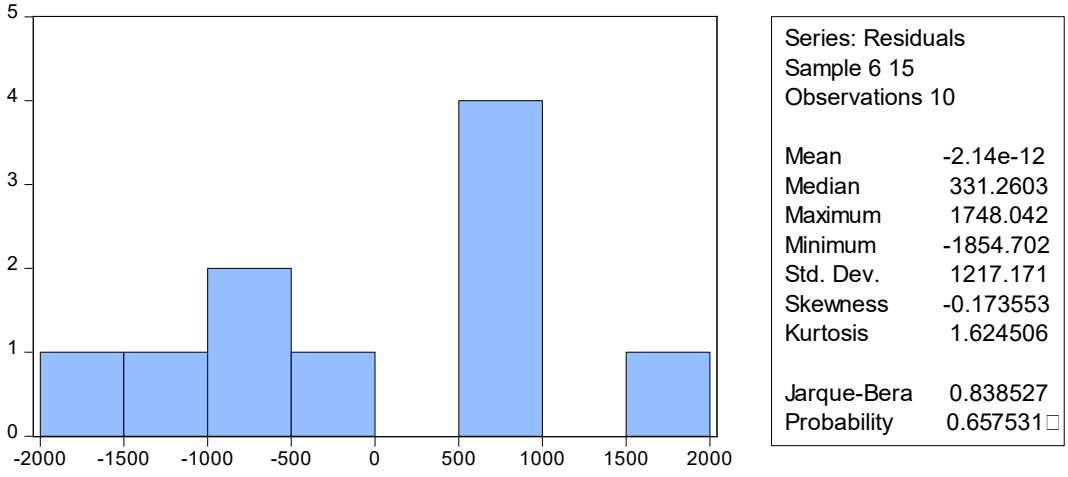
Breusch- Godfrey Serial Correlation LM Test

F-statistic	4.000588	Prob. F(2,6)	0.0787
Obs*R-squared	5.714646	Prob. Chi-Square (2)	0.0574

Source. Author's Calculation

Figure 1

Normality Test



It is seen from the above tables that data is free from heteroskedasticity, and serial correlation and the data are normally distributed.

Figure 2

CUSUM Test

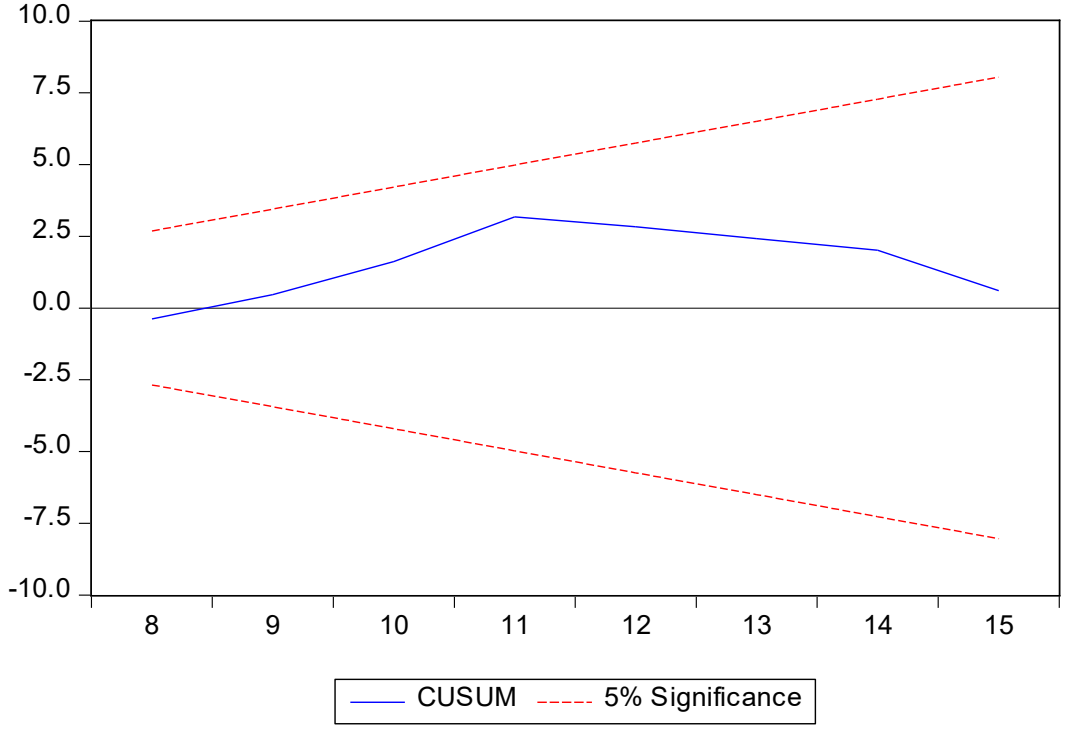
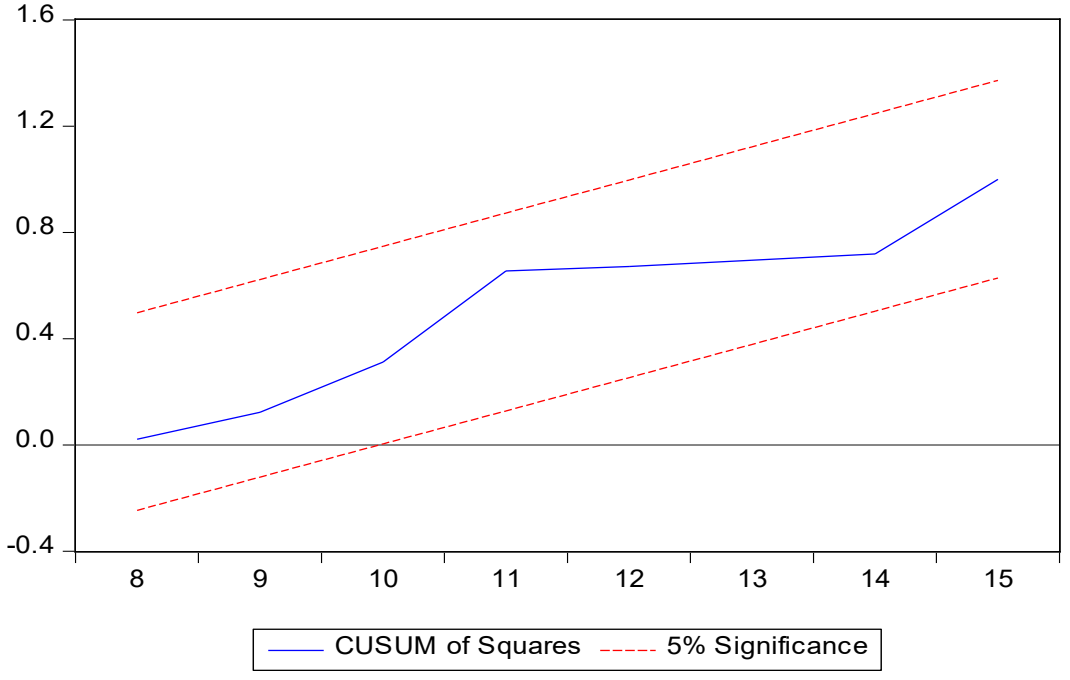


Figure 3

CUSUM of Square Test



Source. Author's Calculation

Figure 2 and Figure 3 show that the model is stable because the calculated line lies between two benchmark lines.

Conclusion

This study concludes that agricultural subsidy has a positive role in agricultural production in Nepal. The government should continue its subsidy program but time and often the rampant corruption and irregularities report regarding subsidy distribution surfaces in the media. The government should identify the real farmers and should give subsidy facilities directly through banking transactions or through trackable digital mediums which will control corruption. Not only large farmers but small farmers should also be beneficiaries of the government scheme. Subsidy not only protects the farmer but also protects the domestic market. This research suggests that the government should provide direct monetary benefits to the farmers rather than other non-monetary benefits because it will help farmers make decisions independently. The most important thing that should be noted is that, has all money that has been disbursed as subsidy is spent for what it is assigned for. The news report as cited in the introduction says that 35 percent of the subsidy

amount is taken by government officials as a commission. This report was prepared by government officials themselves. This means only 65 percent is spent on actual purpose and even within this 65 percent how much money goes to the hands of hardworking farmers nobody knows. So, there is a need for further study about how much money goes actually into the hands of the farmers and its impact on production. Despite all these shortcomings, subsidies have a significant role in production so the government should control the misuse of subsidies and increase the production.

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