Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.9, No.18, 2018

The Effect of the 'Subsidy on Fertilizer' on Food Prices in Bangladesh and Policy Options

Mohammad Altaf Ul Alam, PhD[1, 2]
1.Macroeconomic Wing, Finance Division, Ministry of Finance, Government of Bangladesh. Dhaka.
2.Views expressed in this article are the author's own and do not reflect the views of the Ministry of Finance, Government of Bangladesh

Abstract
The paper analyzes the effect of 'Subsidy on Fertilizer' on the food price indices of Bangladesh. Fertilizer price indices and food price indices are highly correlated all over the world. The regression analysis shows significant positive relation between fertilizer price indices and food price indices. Using the universal parameters (regression coefficients), simulation has been done using the fertilizer price indices with and without subsidy. Results show that without subsidy, food prices would have increased 2.2 times. Results also show that, without subsidy, food prices would have been volatile. The standard deviation of simulated food prices was higher without subsidy than with subsidy. Data shows that in Bangladesh as percentage of total budget and Budget Deficit, cost of subsidy is decreasing. The paper finally ended with some policy options and recommendations.
Keywords: Subsidy on Fertilizer, Food price volatility, Subsidy policy.

1.0 Introduction

Bangladesh is a developing country where agriculture sector contributed to around 15 percent of GDP in FY2015-16[1]. It is a densely populated country where in every square kilometer around 1116 people live. Although the country is small according to geographical area, aggregate demand for food in Bangladesh is much higher than many other countries due to the size of its population. Hence, food safety is a critical issue and if both production and import of food is not smooth, there is probability that famine and human disaster may occur. As land is scarce, agricultural production can only be increased by boosting productivity. It, in turn, can be increased by using inputs such as HYV seeds, fertilizer, irrigation etc.

In this paper, analysis is concentrated on the price of fertilizer. It is well-known that price of input affects the price of output. If the output or the commodity has inelastic demand such as agricultural commodities like food (crops and horticulture), then cost of production is an important factor for the commodity price to be determined. In other words, when demand curve is near vertical, then price of a commodity is determined by the movements of the supply curve. In this paper my focus is on the effects of fertilizer price on the price determination of food (crops and horticulture). Here fertilizer is the input and 'crops and horticulture' sector are output or commodity. In Bangladesh, price of fertilizer is an administered price for the last seventeen years. During this whole period, import cost was higher than its sale price. Figure 1 and 2 show the price differences before and after subsidy of four major fertilizer categories. These are Urea, TSP (triple super phosphate), MOP (muriate of potash) and DAP (diammoniam phosphate). Figures also show that there is volatility in import prices of fertilizer. However, the sale prices i.e. the prices after subsidy or administered prices are much less volatile. Now as the prices of fertilizer or the input price can affect the prices of agricultural commodities, here crops and horticulture, lower volatility of input prices would help to maintain lower volatility in agricultural commodity prices. Price stability of agricultural commodities is very important for Bangladesh as more that 20 percent of the population lives below poverty line income. Agriculture sector covers 43 percent of total employment. Here crops and horticulture sector (food) have inelastic demand. With a view to maintain the welfare of the people, Government of Bangladesh introduced fertilizer subsidy.

On the other hand, economists suggest that giving subsidy to any commodity/input creates price distortions. Donor agencies or UN organizations time and again suggest Bangladesh Government to remove all forms of subsidies including agriculture, fuel etc and encourage competitive price. They argue that giving a bulk amount of subsidy from government budget would increase budget deficit as well as fiscal burden of the government. However, there is not enough quantitative study/policy paper on this welfare enhancing policy of the government that identifies a research gap. In this backdrop, to find out the actual scenario, this paper investigates the following research questions, (1) how fertilizer price and food prices are related? (2) how fertilizer subsidy played a role to lower and stabilize food prices in Bangladesh? And (3) how much the subsidy programme is becoming a burden on the part of government?

In a nutshell, objective of the paper is to find out the importance of fertilizer subsidy and provide policy suggestion, whether, Bangladesh should continue or reduce existing subsidy programme. In this regard, this paper finds out what would have happened, if there were no subsidy on fertilizer i.e. particularly to estimate the

[1] FY means Fiscal Year, starts from 1st July and ends on 30 June.

magnitude of the increment of food prices. Another objective is to estimate the volatility of food prices – with and without subsidy. Lastly, objective of this paper is to quantify the burden of the government due to the existing subsidy policy. The scope of the research is large and will have implication for farmers as well as all the consumers of the country, as subsidy has effects on food prices.

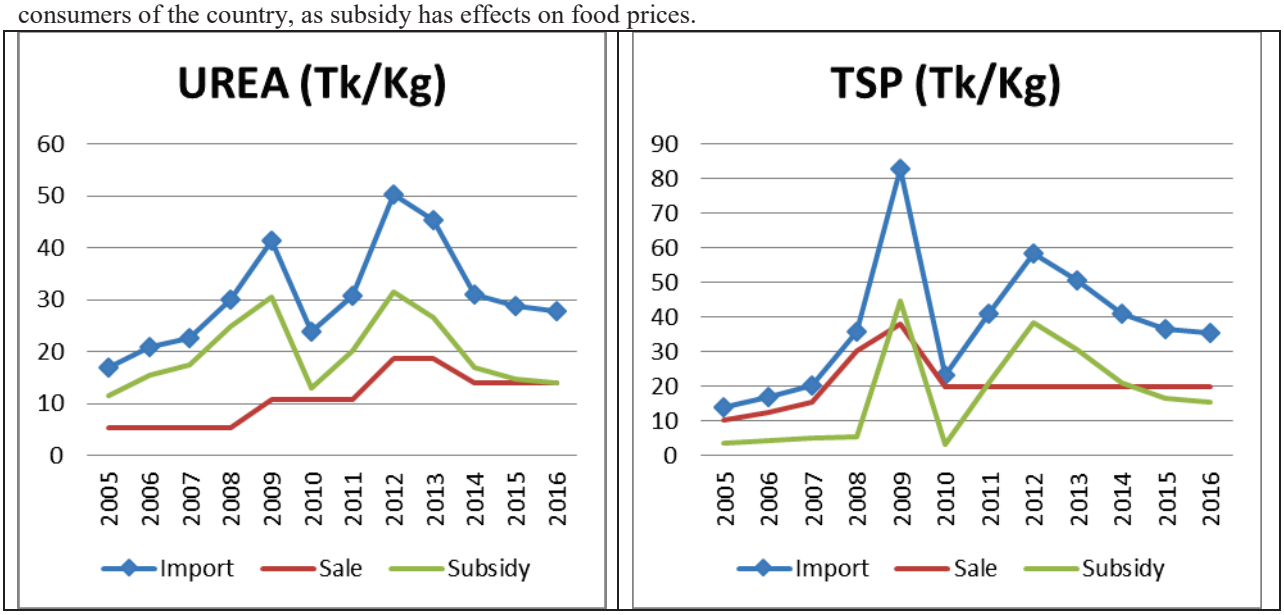

FIGURE 1: IMPORT PRICE, SALE PRICE AND SUBSIDY (TK/KG) OF UREA AND TSP
SOURCE: MINISTRY OF AGRICULTURE, VARIOUS REPORTS

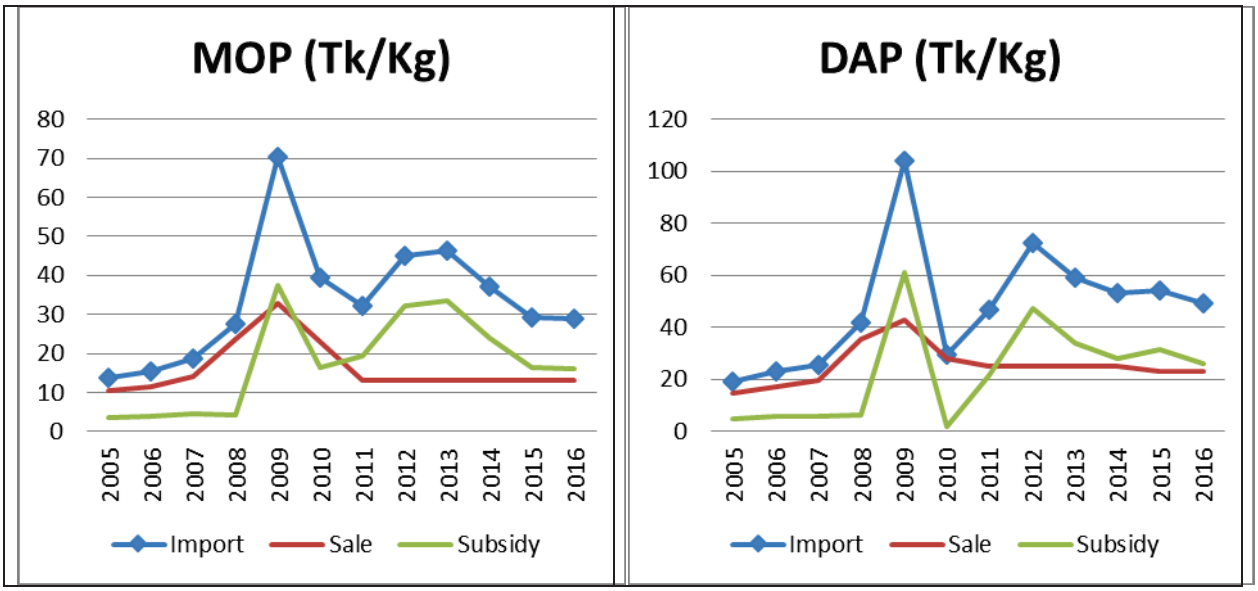

FIGURE 2: IMPORT PRICE, SALE PRICE AND SUBSIDY (TK/KG) OF MOP AND DAP
Source: Ministry of Agriculture, Various reports

In Bangladesh, fertilizer subsidy was reintroduced in FY2000-01. As data range is small (less than 30) econometrics analysis had some limitations. So a universal relationship between fertilizer price indices and food price indices was estimated and using those parameters simulation was done for Bangladesh. This is a limitation of the research as we do not have enough data. So obviously there are some areas for improvement.

In Section 2 and 3 literature review and methodology has been given. In Section 4 there is description regarding the fertilizer subsidy programme of Bangladesh including history. In Section 5 data processing and analysis has been given. There is concluding remarks and recommendations at the end.

2.0 Literature Review

Alesina and Rodrik (1994) showed empirically that inequality in land and income ownership is negatively correlated with subsequent economic growth. There are two major questions regarding the legitimacy of subsidy in a developing country. Is there a compelling economic argument or basis for the introduction and removal of

subsidies? Will the removal of subsidy necessarily improve economic performance? A detail discussion on subsidy with a theoretical background is explained in the paper. Theory says that subsidies are distortionary and reduce welfare in a perfectly competitive market. But in a less competitive market does it have the same demerits? More than fifty years ago Lipsey and Lancaster (1956) showed that in an economy characterized by many market imperfections, there is no guarantee that the removal of any such imperfection will improve social welfare. In brief, this is called the theory of second best. Let us explain the theory of second best in detail. Suppose there is a market imperfection, for example, there is only one firm or few firms in the market. The equilibrium quantity in this market will be below the perfectly competitive equilibrium quantity. As we know that in monopolistic market equilibrium price is higher than competitive price and quantity is lower than competitive quantity. So in an imperfect market, a subsidy, may reduce the price of the commodity and can ensure production near competitive equilibrium. This will increase social welfare. Net benefit must be calculated by deducting the cost of financing the subsidy either by distortionary taxes or by borrowing. The theory of second-best suggests that if there are irremovable distortions in some sectors of the economy, then economic performance and social welfare may be higher if free-market pricing principles are deliberately violated in other sectors of the economy (Amegashie 2006).

There is another argument in favour of subsidy. Subsidy can reduce income inequality by redistributing income from rich to poor if it is financed from direct taxes. Redistribution can enhance economic efficiency in certain situations. Income inequality has an adverse effect on growth (Alesina and Rodrik 1994). They also add that income inequality fuels social discontent and increases socio-political instability. Uncertainty in the economy creates disincentives to invest that constraint the economic growth.

There are other arguments in favour of subsidy in Keynesian theory. Subsidies can be used to boost expenditure or aggregate demand. So removal of subsidies might dampen economic activity. If subsidy is financed out of tax, removal of subsidy may reduce people's tax burden and thus stimulate the economy. But if government continues with the same amount of deficit then there will be no positive impact on the economy (Amegashie 2006).

Now, I explain the economics of subsidy with administered price. In the following figure (Figure 3) Pw is the world price of fertilizer and Pad is the administered price determined by the government. Figure shows that world price of fertilizer is higher than the subsidized price of the country. There is no import duty on fertilizer import. Government provides subsidy to the extent, it is required to maintain the administered price. Figure shows that administered price increased the demand for fertilizer from Qw to Qad which is smaller due to inelastic demand.

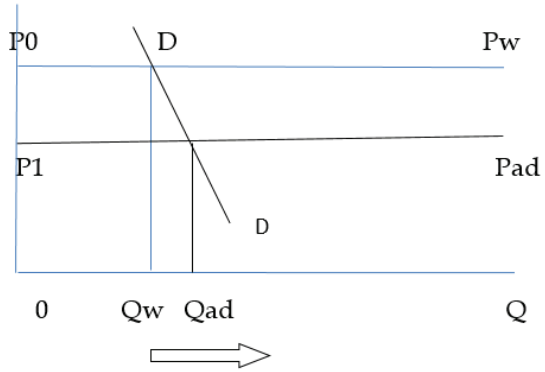

FIGURE 3: PRICE DETERMINATION WITH SUBSIDY

There are some literatures on fertilizer subsidy policy in Bangladesh. Stone (1987) suggested for removal of subsidy from Bangladesh. Zahir (2001) published an elaborate review of the evolution of fertilizer policy changes and policy reforms. He opined that gradual phasing out of the monopoly role, once played by BADC, benefited the farmers.

Latest review on Fertilizer Subsidy was in the paper by IFDC/FAI report[1] named 'Fertilizer Subsidy: Which Way Forward' (2017). It discussed in detail on fertilizer sector, fertilizer management, fertilizer subsidy programme, evolution of fertilizer policy and subsidy regime, overall policy impacts on fertilizer market distortions, fiscal burden etc. The report also discussed in detail on the subsidy programme of four countries (Bangladesh, China, India, Indonesia and Pakistan) and one region (sub-Saharan Africa). It alluded to the flaws of the existing subsidy programme of Bangladesh. The report suggested for substantial reduction in subsidies and diverting the resources to more productive investment in agriculture. It also advocated for nutrient based subsidies (which include all fertilizers opposed to urea only).

There are two basic forms of paying subsidy such as 'Fixed-price floating subsidy regime' and 'Fixed-

[1] IFDC - International Fertilizer Development Center, FAI – Fertilizer Association of India

subsidy floating price regime' (Sharma 2012). In the former there is a statutory price or administered price fixed by the government. Farmers buy fertilizer with this fixed price. In the later, amount of subsidy is fixed not the administered price.

3.0 Methodology

In the analysis various methods have been used. Price indices of fertilizer with and without subsidy were calculated by author. The author calculated Laspeyres, Passhe and Fisher Indices for fertilizer in Bangladesh. The formulas are as below:

- Laspeyres Index
  $P_L = \frac{\sum P_t Q_0}{\sum P_0 Q_0}$
- Passche Index
  $P_P = \frac{\sum P_t Q_1}{\sum P_0 Q_1}$
- Fisher Index $P_F = \sqrt{P_L * P_P}$

The author also did regression analysis for getting a universal relationship between price indices of fertilizer and price indices of agricultural commodities. Correlation coefficient between the two variables was also estimated. The formula for calculating correlation coefficient is

$$r = \frac{\sum XY - \frac{(\sum X)(\sum Y)}{N}}{\sqrt{((\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N}))}}$$

Here X and Y are two time series. 'r' is the correlation coefficient. The value of correlation coefficient is between -1 and +1. If the value is negative, it means that relation between the two variables is in opposite direction i.e. if the value of one variable increases, then the value of other variable decreases. For example, if the price of a commodity increases, the demand of the commodity decreases. If the value of coefficient is positive then if the value of one variable increases, then value of other variable also increases.

A brief review of the regression analysis is given here. Let X and Y are two variables, where X is independent variable and Y is dependent variable. The relationship can be explained by the following equation

$$Y_i = a + bX_i + \in, \quad i=1,2\ldots\ldots\ldots n$$

Here 'a' is constant, 'b' is regression coefficient and ε is stochastic error term. Using Ordinary Least Square (OLS) method the formula for calculating 'a' and 'b' are as below:

$$\hat{b} = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sum(X_i - \bar{X})^2}$$

And 'a' is calculated as follows,

$$\hat{a} = \bar{Y} - \hat{b}\bar{X}$$

Here $\hat{a}$ and $\hat{b}$ are estimated coefficients and $\bar{X}$ and $\bar{Y}$ are averages. However, along with the econometrics analysis, results are presented with graphs and tables. Estimating a universal relationship, between fertilizer prices and commodity prices, simulation for Bangladesh commodity prices has been done. Simulation shows how much commodity prices would have increased, if there had been no subsidy. Microsoft Excel, Eviews and STATA software were used for calculation.

4.0 Fertilizer Subsidy Programme in Bangladesh

The fertilizer subsidy programme in Bangladesh is linked with 'Green Revolution' in 1960s that encouraged improved agricultural input use (such as fertilizer, seed and irrigation). From the independence of Bangladesh, now rice production has increased threefold whereas population increased twofold, meaning that rice consumption had increased. Until 1992, fertilizer subsidy was given in different forms through BADC (Bangladesh Agricultural Development Corporation) although with some breaks in some years. The progress toward developing a competitive fertilizer market structure was hampered in 1994-95, when a severe crises of fertilizer emerged, all over the country, before *Boro* Season. After that, government again started controlling the fertilizer market. In 1997-98 government started to give subsidy for Urea fertilizer in the form of a trade gap

being provided to BCIC (Bangladesh Chemical Industries Corporation) for imported fertilizers. BCIC started importing Urea from 1996 to 1997 annually 500,000 to 700,000 Mt. Until FY 2003-04, government provided subsidy only for imported Urea. To ensure balanced nutrient government also started giving subsidy for imported TSP, MOP and DAP.

Always there was debate about the real beneficiaries of the subsidy programme. Some studies show that average price paid by large farmers is lower, and the price paid for urea fertilizer starts to decline as the farm size increases (Asaduzzaman and Islam 2008). The reason behind this finding is that, large farmers buy larger amount of fertilizer than the small farmers. Another study cites a joint IFDC/BARC[1] farm level survey to show that the small farmers do pay higher prices than medium and large farmers, but the difference is not large enough to suggest that the small farmers do not enjoy the benefit of subsidy at all (Osmani 1985).

Unbalanced use of fertilizer was a serious problem until 2004-05. For Urea, higher amount of subsidy was allocated compared to TSP, DAP, MOP. This led to unbalanced fertilizer use, which depressed yields and adversely affected soil fertility.

5.0 Data Processing and Analysis

5.1 Data Analysis

Food price indices and fertilizer price indices are highly correlated all over the world. To assess the impact without fertilizer subsidy, a regression analysis was done to estimate a universal relationship between food price indices and fertilizer price indices. In this paper, it is assumed that the relationship should also be true for Bangladesh. Figure 4 shows the long time series (1986-2016) of food and fertilizer price indices. Data are taken from World Bank: Commodity Prices – History and Projections. Correlation coefficient of the two series is 0.92 indicates very high correlation. A cointegration analysis proved a long-run relationship between the two series.

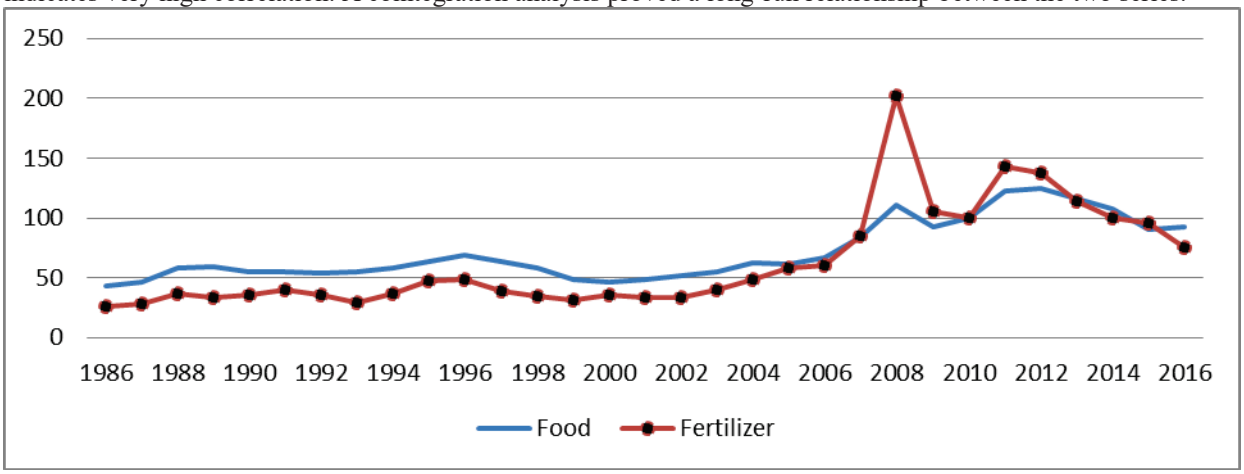

FIGURE 4: NOMINAL PRICE INDICES OF FERTILIZER AND FOOD

Source: World Bank (Commodity Price Indices)

A regression analysis was done using Eviews software taking log of both variables with base '*e*'. Fertilizer price indices are considered as independent variable and food price indices are considered as dependant variables. Results are shown in Table 1. The value of the coefficient of fertilizer is 0.532 and value of constant is 2.106. Both are significant at 5 percent level of significance as P-value = 0.0000.

Table 1: Regression Results, Food Prices = f (Fertilizer Price)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.106423	0.129376	16.28135	0.0000
LOG(FERTIZ)	0.532049	0.031835	16.71270	0.0000
R-squared	0.911855	Mean dependent var		4.249105
Adjusted R-squared	0.908591	S.D. dependent var		0.309168
S.E. of regression	0.093474	Akaike info criterion		-1.835798
Sum squared resid	0.235909	F-statistic		279.3144
Log likelihood	28.61907	Prob(F-statistic)		0.000000

Table 1 shows that the R-squared and Adjusted R-squared values are also high. After getting the universal

[1] BARC - Bangladesh Agricultural Research Council

relationship, Bangladesh fertilizer data were analyzed. There are four types of major category of fertilizers. These are Urea, TSP, MOP and DAP. For each category of fertilizer, available data are import price, sale price (administered price) and subsidy per kilogram of fertilizer. Two price indices were calculated – with subsidy (using sale price) and without subsidy (using import price). In each cases Laspeyres, Paasche and Fisher indices were calculated. However, for the simulation, Fisher indices were used. Price indices are shown in Table 2

TABLE 2: FERTILIZER PRICE INDICES (WITH AND WITHOUT SUBSIDY)

Year	Fertilizer Import Price Index			Subsidized Fertilizer Price Index		
	Laspeyres Index	Paasche Index	Fisher Index	Laspeyres Index	Paasche Index	Fisher Index
2005	100	100	100	54	54	54
2006	120.35	120.72	120.53	60.88038	60.39106	60.64
2007	136.78	137.22	137.00	69.67637	68.99957	69.34
2008	203.54	190.89	197.11	115.6114	93.13276	103.77
2009	404.12	318.76	358.91	159.7065	141.8995	150.54
2010	172.96	162.47	167.63	109.1705	109.3324	109.25
2011	222.70	210.10	216.31	94.68161	97.88194	96.27
2012	338.61	339.27	338.94	117.4313	113.5687	115.48
2013	304.53	303.77	304.15	117.4313	114.3218	115.87
2014	233.62	224.10	228.81	104.0659	109.3463	106.67
2015	212.05	210.57	211.31	102.6841	103.9914	103.34
2016	203.69	202.44	203.06	102.6841	101.7034	102.19

Source: Author's calculation, Data from Ministry of Agriculture

Next task is to simulate food price indices with subsidy and without subsidy, using the universal relationship that was estimated with regression analysis. Food price indices with and without subsidy are shown in Figure 5.

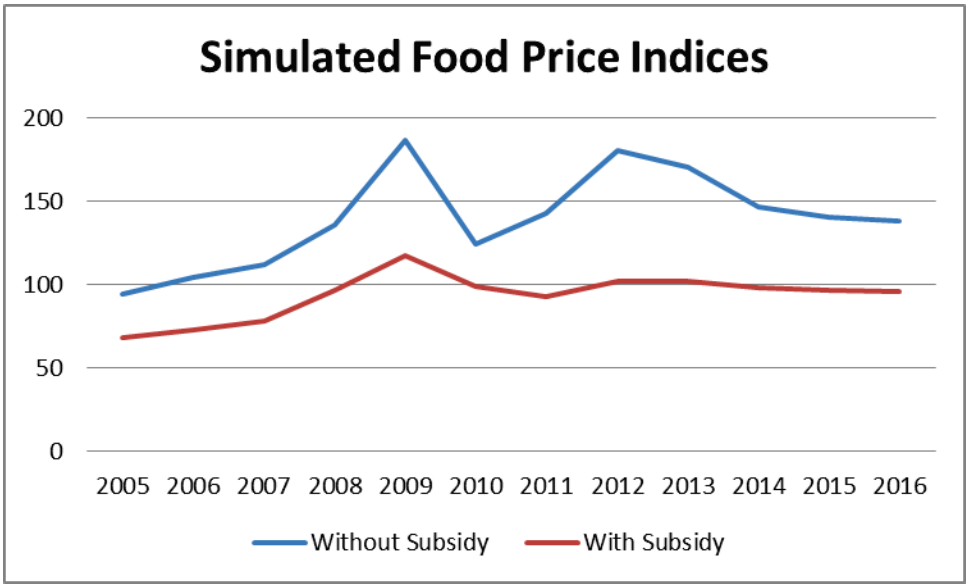

FIGURE 5: SIMULATED FOOD PRICE INDICES

Figure 5 shows that subsidy maintained smoothness in simulated food price indices. At all times food price indices with subsidy were below the food price indices without subsidy. Average price indices are 2.2 times higher without the provision of subsidy. This is a vivid example that subsidy kept the food prices lower.

5.2 Low Volatility

Another major contribution of administered price of fertilizer is maintaining lower volatility of the food prices. Low volatility or price stabilization is very important for farmer to decide about their investment in a particular crop/ vegetable. Considering the data range (2005-2016), standard deviation of the price indices of food with subsidy and without subsidy has been estimated. Table 3 shows the results.

TABLE 3: VOLATILITY OF FOOD PRICE INDICES (SIMULATED)

Category (Food Price Indices)	Standard Deviation
With Subsidy	11.81
Without Subsidy	19.95

Source: Author's calculation

Table 3 clearly shows that existence of subsidy ensured lower volatility of food prices in Bangladesh. This is a strong argument to continue fertilizer subsidy programme in order to keep the food prices lower in Bangladesh.

Needless to mention that, food price depends on many other variables such as new HYV (High Yielding Variety) crops/vegetables, irrigation facilities, rain fall etc. A long data series is not available for Bangladesh. For that reason a universal relationship was estimated and that relationship was used for Bangladesh to separate out only the effects of fertilizer.

5.3 Comparing with the Actual Price Indices of Bangladesh

In this sub-section a very small time series has been taken (2010-2016) from BBS data of crops and horticulture sub-sector. It shows that over this short period of time, price level has a downward trend. Figure 6 shows the trend. In the simulation, data show deflation in food price indices, if only cost of fertilizer is concerned. However, in reality, food prices depend on many variables, so in case of actual price indices, although there is inflation, the rate of inflation is decreasing. Data are given in Appendix 1.

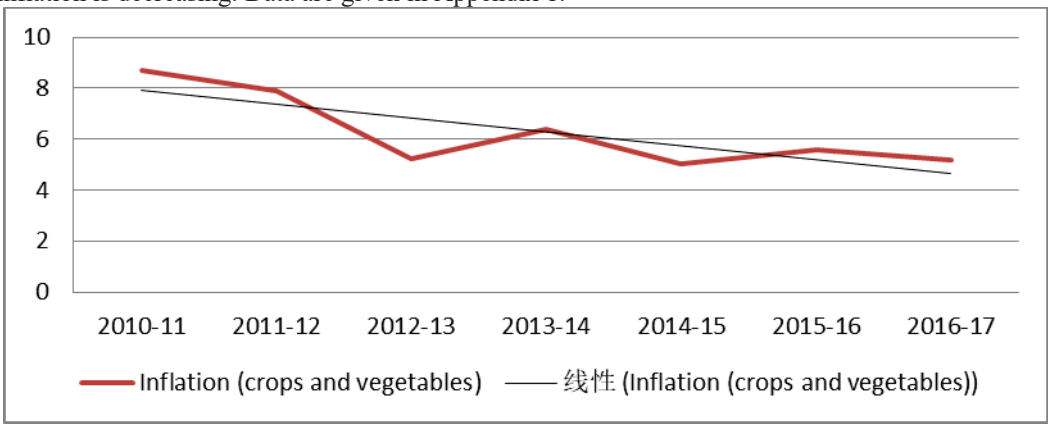

FIGURE 6: INFLATION (CROPS AND VEGETABLE SUB-SECTOR)

5.4 Fiscal Burden of the Government

Subsidy has implications on the government budget. For, Bangladesh how much it is a burden for the government? In this regard, Figure 7 shows the actual picture.

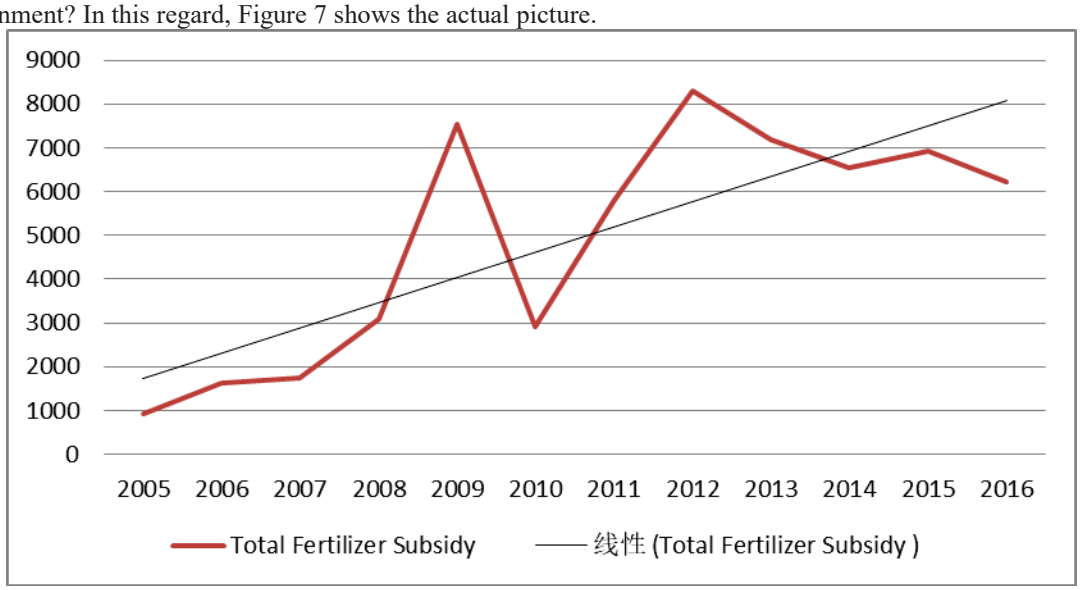

FIGURE 7: TOTAL FERTILIZER SUBSIDY (CRORE TAKA)

Source: Finance Division, MOF

Although the trend is increasing, after 2012, nominal amount of subsidy is decreasing. The amount is decreasing compared to total budget and budget deficit too.

TABLE 4: AGRICULTURE SUBSIDY (% OF TOTAL BUDGET AND BUDGET DEFICIT)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
% of Total Budget	2.74	3.41	8.46	2.88	4.54	5.44	4.12	3.48	3.39	2.61
% of Deficit	11.30	9.91	30.53	11.43	16.51	21.95	15.40	13.68	11.86	9.52

Source: Finance Division, Ministry of Finance

Table 4 and Figure 8 show that in recent years particularly after 2012, subsidy as percentage of total budget and budget deficit is gradually decreasing. There is a reason behind this slump. Fertilizer price is highly correlated with the fuel price as fertilizer industry needs fuel for production. For several years fuel price is lower in world market that reduced the fiscal burden of the government on fertilizer subsidy.

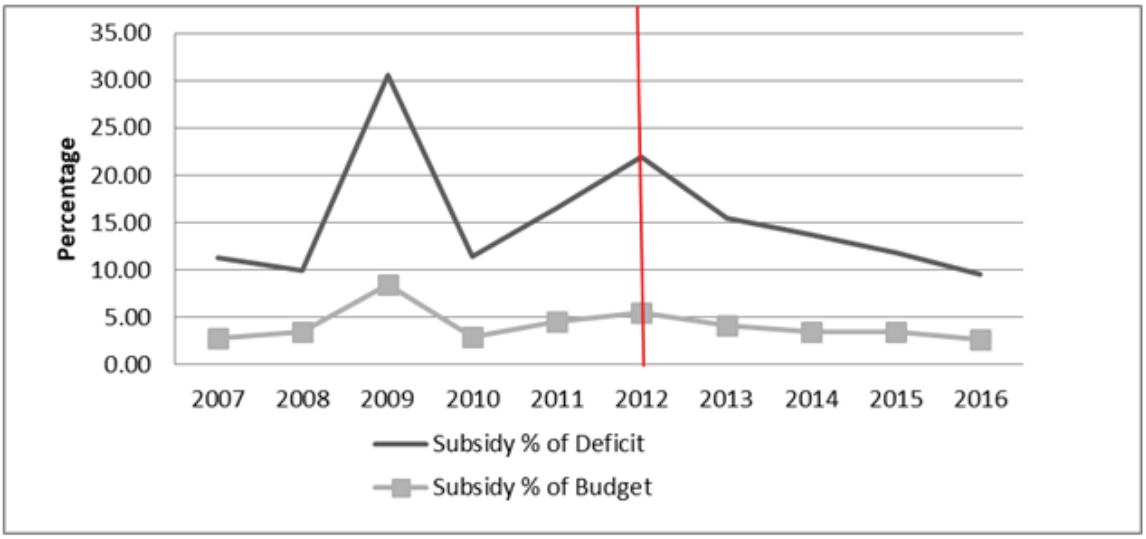

FIGURE 8: SUBSIDY AS % OF TOTAL BUDGET AND BUDGET DEFICIT

6.0 Findings, Conclusion and Recommendations

6.1 Findings

According to the data analysis results, paper has some very important findings. These are,

(1) Fertilizer price indices and food price indices are highly correlated all over the world. The regression analysis also shows significant positive relation between fertilizer price indices and food price indices.
(2) Using the universal parameters (regression coefficients), simulation has been done using the fertilizer price indices with and without subsidy for Bangladesh. Results show that without subsidy, food prices would have increased.
(3) Results also show that, without subsidy, food prices would have been volatile. The standard deviation of simulated food prices was higher without subsidy than with subsidy.
(4) Data shows that as percentage of Total budget and Budget Deficit, cost of subsidy is decreasing.

6.2 Policy Recommendations

In short, policy recommendation of this paper is in favour of continuing the present subsidy programme of Bangladesh Government. However, we can have some flexibility in subsidy pricing regime. Fertilizer subsidy is given in various ways in different countries. There are two basic forms of paying subsidy such as 'Fixed-price floating subsidy regime' and 'Fixed-subsidy floating price regime' and in Bangladesh 'Fixed-price floating subsidy regime is followed. Farmers buy fertilizer with this fixed price. But as the international price of fertilizer changes amount of subsidy paid by the government also changes. This method is not fiscal management friendly. There will be pressure on government budget if international price of fertilizer shot up. On the contrary, this method is convenient for the farmer as they do no face any pressure for the increase in fertilizer price in international market. It is true that some inflation adjustment is done every year to determine the administered price (nominal price is not fixed). 'Fixed-subsidy floating price regime' is better to ensure prudent fiscal management. This procedure is not congenial for the farmer as they have to face high price if there is a surge in international price of fertilizer.

There is another arena of discussion regarding fertilizer subsidy - whether subsidy should be given directly to the farmers or maintain the present system i.e. giving subsidy to the importing authority. In Bangladesh subsidy is given to BCIC (Bangladesh Chemical Industries Corporation) so farmers does not get it directly. There are some ways to give subsidy directly to the farmer. Direct transfer of subsidy to farmer for kerosene, LPG and fertilizer is proposed by a committee in India called UIDAI (Unique Identification Authority of India).

The committee proposed to implement it in a phased manner. In Bangladesh we can also think of implementing direct transfer of fertilizer subsidies to farmers (Sharma 2012). Note that some other issues need to be addressed before rolling out direct transfer of fertilizer subsidy policy. This can remove the fertilizer use other than the purpose of crop or vegetable production such as making of puffed rice ('*Muri*'). The efficiency of an input subsidy programme can be improved by targeting subsidy to specific types of farmers/regions e.g. who would otherwise use very little or no inputs as a result of poor access to institutional credit, high prices, information failures, etc. and will increase their input use substantially as a result of subsidy and secondly rationing through fixed quantity per household. The targeting of subsidies to different groups or regions is a better policy although there are hurdles to implement because of diversion, corruption and leakages from small and marginal farmers to large farmers. Rationing rather is a better option if fixed amount of fertilizer is given to farmers according to their land ownership. We can think of implementing these recommendations taking step-by-step policies from existing system to direct transfer in Bangladesh. Note that these policies also require access to credit for the farmers.

6.3 Conclusion

In this policy paper, it is evident that fertilizer import subsidy is very important for smoothing agricultural production in Bangladesh. The paper concludes with the following recommendations:

Short-Term Policies

Expenditure on fertilizer import subsidy is not yet alarming in Bangladesh. There is a decreasing trend on fertilizer import subsidy as percentage of total budget in the last four years. 'Fixed price floating subsidy regime' should be maintained up until Bangladesh has surplus in major crop production.

Medium and Long-Term Policies

1) In future subsidy related fiscal burden could increase. So in the medium-term it would be better to switch from 'Fixed price floating subsidy regime' to 'Fixed subsidy floating price regime'.
2) It is better to flourish domestic fertilizer industry if it is cost effective.
3) In the present system subsidy is given to importing authority. Distribution of subsidy should be more targeted to marginal and small farmers. In this respect, in the long-run government can think of giving subsidy directly to the farmers.

References

Alesina, A., and Rodrik, D., (1994), "Distributive Politics and Economic Growth", *The Quarterly Journal of Economics,* Vol. 109, No. 2, 465-490

Amegashie, J. A., (2006), "The Economics of Subsidies", *Crossroads,* Vol. 6, 7-15

Asaduzzaman, M., and Islam, N., (2008), Distribution of the Benefits of the Diesel Subsidy to Farmers and Its Effectiveness (Mimeo), Bangladesh Institute of Development Studies (BIDS), Dhaka.

Huang, J., Gulati, A., and Gregory, I., (2017), "Fertilizer Subsidies - Which Way Forward?", IFDC/FAI Report

Kaur, R., and Sharma, M., (2012), "Agricultural Subsidies in India Boon or Curse", *IOSR Journal of Humanities and Social Sciences,* Vol.2, Issues 4, 40-46

Osmani, S., (1985), "*Pricing and Distribution Policies for Agricultural Development in Bangladesh"*, BIDS, 13(3-4): 1-40

Sharma, V. P., (2012), "Dismantling Fertilizer Subsidies in India: Some Issues and Concerns for Farm Sector Growth", Indian Institute of Management, WP. No. 2012-09-01

Stone, B. ed., (1987). "*Fertilizer pricing policy in Bangladesh"*. Intl Food Policy Res Inst.

Zohir, S., (2001), "Impacts of Reforms in Agricultural Input Markets on Crop Sector Profitability in Bangladesh". Dhaka: SAPRI/BIDS.

Appendix 1

Year	Actual Price Indices (Crops and Vegetables	Inflation (deflator) of crops and vegetable sub-sector
2010	130.264	
2011	141.6044	8.705649
2012	152.7886	7.898217
2013	160.7691	5.223239
2014	171.0279	6.381093
2015	179.6604	5.047412
2016	189.6834	5.578833
2017	199.5	5.175266