Examining the External Determinants of Rice Price in Bangladesh

(Submitted: July 13, 2011; Accepted for Publication: December 4, 2011)

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Abstract

This paper tries to explore the relationship between the oil price and the rice price of Bangladesh from the 1960 to 2008. Along with this relationship we have also tried to analyze the impact of exchange rate, wage rate, and domestic production on rice price. Engle-Granger procedure and Vector Error Correction Model (VECM) are applied to identify the short-run and long-run relationship among the variables. Our results suggest that among the variables there is one cointegrating vector implying that there is a long-run relationship between oil price and the rice price. This result also suggest that the oil price, wage rate, and domestic production have a significant impact on determining the rice price and the model is free from specification biased.

Key words: Bio-fuel, Exchange rate, Oil, Engle Granger, Vector Error Correction Model

Introduction

In the last quarter of 2007, increases in the international price of rice started causing panic in the rice market. Market instability was aggravated by the export restrictions placed on rice by a number of countries (they claimed that the demand for rice has been increased in their home countries), leading to steep price hikes in the world market. Bangladesh managed to avoid shortages of rice during the food crisis but price increases were substantial. As Bangladesh is the world’s fourth largest producer of rice, why is the import of rice very often a matter of question? Why does the government of Bangladesh go for the procurement of rice? Why does it sell rice at a lower price in open market? Why should we care about the rice price?

The answer is quite simple. In Bangladesh, rice is the staple food and about fifty percent of all households are involved in rice production. So, any kind of volatility of rice price often exacerbates food consumption and creates food insecurity as it is to a large extent associated with rice consumption and production. One of the major results of high price of rice is high inflation rate as the consumption basket is mostly composed with food. This high rate of inflation makes the households poorer than earlier. So, one of the ways to restrain the rice price to a tolerable level is to supply rice at a reasonable price by government. A widely acceptable way to do this is rice procurement. High price of rice makes the people vulnerable and one of the major tasks of the government is to supply them at a reasonable price to ensure the social safety net. A rise in food prices pushes the millions of people into poverty. World Bank (2010) estimates that increase in food price pushes additional ten million people into extreme poverty. So, the price of rice is always a burning issue in Bangladesh.

On an average Bangladesh is nearly self-sufficient in rice. Increases in production have helped transform the food grain economy in Bangladesh by reducing dependence on food aid and government commercial imports. But geographical conditions make agricultural supply in Bangladesh especially sensitive to extreme weather events which greatly influence production levels from year to year. This became particularly obvious during 2007 when two monsoon floods (respectively in July and September) and Cyclone Sidr (in November) led to significant losses

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1 See FAO STAT 2011, www.fao.org
in the Aman and Aus rice crops. Losses were estimated at 1.8 million metric ton (MT) from the Aman crop alone. Between 1998-99 and 2007-08, the country imported an average of about 850,000 MT of rice per year, or less than 5 percent of total net availability (see figure 1).

In Bangladesh, a matter of particular relevance was that India, its primary source of rice imports, had set minimum prices for rice exports. Facing its own food-grain problems, India had raised its minimum rice export price from US$425/MT in October 2007 to US$505/MT in December 2007. In March 2008, the Indian government placed new restrictions on rice exports, allowing shipments of coarse varieties of rice at US$650/MT or above, and a week later it raised the minimum export price to US$1,000/MT.

![Figure 1: Domestic production, consumption, and import of rice (in'ooo tones) in Bangladesh. Source: Authors’ calculation from IRRI data](image)

Policy responses (export bans, price floors) of key rice-exporting countries including the People’s Republic of China (PRC), Pakistan, Vietnam, and India have increased price volatility and uncertainty in the international rice market. Export bans and price controls imposed by some countries (PRC, India, Vietnam, and Pakistan) have reduced supplies in the world rice markets and increased uncertainty about future rice supplies, contributing significantly to the surge in rice price especially since the end of 2007. Precautionary demand for food stocks in many countries is contributing to food grain price increases.

With a thinly trading international rice market, domestic rice prices in Bangladesh started increasing as well. The price of coarse rice in Bangladesh peaked at Tk36 (about US$0.55) per kg in April 2008, double the price of January 2007 and about 50 percent higher than in October 2007. Around the same time, the world market price of rice reached about US$850/MT or about Tk55/kg. It is worth noting that unlike in the food price crisis of 1974, when the price of rice in the world market reached US$540/MT and the domestic price in Bangladesh peaked at US$830/MT, this time the domestic price was kept well below the world market price. Even though domestic rice consumers paid significantly less than world market prices, the domestic retail price rose substantially. The domestic retail price of rice (in nominal terms) increased by about 50 percent during the period July 2007-July 2008. The fact was that the short-fall in the Amon crop was mostly offset by higher private sector imports. This has put upward pressure on the domestic price of rice.
Despite the export restrictions imposed in most rice-exporting countries, the private sector in Bangladesh managed to import about 1.7 million MT of rice during the period July 07–June 08 (not only from India but also from Myanmar). These imports, combined with a series of prudent measures that the government took to stimulate the 2008 boro crop contributed significantly to stabilize the domestic rice market. On the other hand, the fact that prices still increased substantially suggests that private stock demand also increased substantially—in the order of about 10 percent according to Dorosh (2009). The same author suggests that additional injections of about 1 million MT into the domestic market would have been sufficient to avoid any price increase at all.

But there are some additional factors that always create pressure on rice price. A rise in oil prices is expected to have a larger balance of payment effects. For many countries, a rise in oil prices significantly weakens the balance of payments. The combination of the affect of increase in both the oil price and the food price mostly aggravate the situation. World prices of crude oil and oil products in general have also increased in volatility during recent years. This contemporaneous increase in food and oil prices has reinforced in the effect of oil prices on food prices. Raising the oil price, limited supplies of fossil fuel and increased concerns about global warming have created a growing demand for renewable energy sources (Srinivasan, 2009). The production of these fuels is highly dependent on the availability of agricultural products. However, it is possible that bio-diesel production could in fact cushion consumers from the negative effects of increasing world oil prices, but could result in increasing food prices.

It is to be noted that energy-intensive farming is vulnerable to oil price shocks because prices paid by farmers for oil products or direct energy mirror the national energy markets. In addition, most agricultural producers purchase energy indirectly in other inputs, such as commercial nitrogen fertilizers, fuel and electricity costs for field operations, irrigation, and drying. Combined with fertilizer costs, these costs account for a significant proportion of the cost of production of many crops. Recent price increases are similar to the large energy price shocks of the mid-1970s and early 1980s, which stimulated economic research on energy use in the agricultural sector (Musser et al., 2006).

Rising energy prices and energy intensity of the agricultural sector have increased the cost of critical inputs like fertilizer, fuel, and power. World energy prices have increased rapidly in recent years, with per barrel oil prices rising by an average of about $10 per year between 2002 and 2007 in nominal terms and by slightly less in real terms (ADO 2008). Agriculture has become more energy intensive in the past decade. Both irrigation and fertilizers are critical inputs to the production of high-yielding varieties of food grains, and these are energy intensive. Energy prices rising sharply over the past year and to all-time highs in the past 6 months have fed into production cost, and hence, food grain prices. Increase in energy costs have translated into high input and labor costs. Despite large subsidies in Asian countries, domestic energy prices have increased 20–50% while fertilizer, irrigation, and transport costs have increased 30–50%. The hikes in fuel and energy prices are structural in nature because they reflect a long-term imbalance between rising incremental oil demand (estimated at 1.7 million barrels of oil equivalent a day
in 2008 over 2007) and stagnating production and supply (with non-OPEC [Organization of Petroleum Exporting Countries] production having peaked and OPEC unwilling for political reasons to expand output).

Figure 3: Relationship between crude oil price and milled rice price in Bangladesh
*Source: Authors’ calculation from IRRI data*

Gohin and Chantret (2010) investigate the long-run relationship between world prices of some food and energy products using a world computable general equilibrium model. They find a positive relationship due to the cost-push effect. Zhang et al. (2010) use time series prices on fuels and agricultural commodities to investigate the long-run co-integration of these prices. They find no direct long-run price relationships between fuel and agricultural commodity prices. Chen et al. (2010) investigate the relationships between the crude oil price and the global grain prices of corn, soybean, and wheat. The empirical results show that the change in each grain price is significantly influenced by the changes in crude oil price and other grain prices during the period extending from the 3rd week in 2005 to the 20th week in 2008, which implies that grain commodities are competing with the derived demand for bio-fuels using soybean or corn to produce ethanol or bio-diesel during the period of higher crude oil prices in these recent years. Conventional agriculture production systems in developed countries rely heavily on fossil energy (Cruse et al., 2010). Xiaodong and Hayes (2009) find evidence of volatility spillover among crude oil, corn and wheat markets, which could be largely explained by tightened interdependence between these markets induced by ethanol production. Abdel and Arshad (2008) show that there is a log-run causality from petroleum to cereal prices, and that vegetable oil prices are affected by petroleum prices. Tokgoz (2009) shows that the impact of energy prices on the European Union agricultural sector is increasing with the emergence of the bio-fuels sector, illustrating the importance of trade policy in responding to higher crude oil and grain prices.

The diversion of cereal use from food to produce alternative fuel (biofuel) is increasing as oil prices become higher. Bio-fuel demand has contributed to the food crisis in several ways. Since 2000, cereal use for food and feed increased by 4% and 7%, respectively, while cereal demand for industrial purposes like biofuels jumped by more than 25% (FAO 2007). Annually 100 million tons of food grains (corn) are being converted into bio-fuel. In the US, ethanol subsidies have increased the use of corn for bio-fuel production from 6% of total crop production to 23% in the past 3 years. Production of bio-fuel feedstock may also result in substitution of sugar, palm oil, and soybeans for wheat and rice crops. Thus, while part of the total food grain supply is being diverted away from use for human consumption, part of the incremental land used for bio-fuels and feed-stocks production is also being diverted from production of food grain for human consumption. This has tightened wheat, corn, and other grain supplies and contributed to the soaring food prices.

Land is also being diverted to urban/industrial uses and competition for scarce freshwater resources between agriculture and industry and residential uses also has adversely impacted the supply growth that is structural as societies undergo urbanization and industrialization. An ADB study shows that the water available for agriculture has already declined sharply over the past several decades, particularly in Asia. Water scarcity will be increasingly
challenging for the PRC and India, where irrigation water consumption as a share of total consumption is projected to decrease by 5–10% by 2050 compared with 2000.

It is generally argued that any devaluation of the currency creates an upward pressure on inflation. It has long been an interest for researchers to find the degree to which exchange rate movements are reflected in prices. The change in domestic prices that results from a change in the exchange rate is referred to as the exchange rate pass through. Jonathan McCarthy (1999) analyzed the impact of exchange rate and import prices on domestic Producer Price Index (PPI) and CPI in six industrialized OECD countries using data from 1976:1 to 1998:4. He used a recursive VAR framework in his analysis. From the impulse response function and variance decomposition he found that the exchange rate has a modest effect on domestic price over the post-Bretton Woods era. Another finding of his paper is that the pass through is stronger in countries with a large import share.

![Figure 4: Expected linkages between oil prices, exchange rate, and rice/corn prices](image)

Following the literatures, one can conceptually analyze the linkage between oil prices, exchange rate, and corn price or rice price in the above figure. The central question is how oil price along with exchange rate affect the rice prices. It is reasonable that oil prices directly affect the input prices and consequently affect the food prices. On the other side, oil prices also affect the bio-fuels, which indicate the use of corn to produce fuel for transport, also increase the price of corn or cereals. Exchange rate also affects the imports and those countries which uses the imported intermediate inputs to produce corn, are also affected by the depreciation of domestic currencies.

**Objective**

Historically, price stabilization of rice has been one of the main objectives of Bangladesh food policy; and since the 1970s, through technological change and increasing market integration, the country has considerably reduced price variability both within and between years. However, these alone cannot control the rice market substantially because of international integration and the effect of external shocks. Considering all of the issues, the study aims to investigate whether price of crude oil has any effect in determining the domestic price of milled rice in Bangladesh, and to offer policy suggestions to reduce the price vulnerability in the domestic rice market.

**Methodology**

**Data and Variable Description**

Domestic procurement and the Open Market Sale (OMS) have been the main instruments used against the rising price in different state of affairs in the rice industry in Bangladesh. Domestic supply of rice is added in the specification as sufficient production of rice at home shortens the gap between demand and supply which in turn
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lowers the domestic price of rice by market mechanism also by providing government the opportunity to intervene in the market when needed. We also use average wage in the agricultural farming as a determinant of rice price since labor is one the most essential factors of producing agricultural commodities like rice.

Rising energy prices and energy intensity of the agricultural sector have increased the cost of critical inputs like fertilizer, fuel, and power. Energy intensive farming is vulnerable to oil price shocks because prices paid by farmers for oil products or direct energy mirror the national energy markets. In addition, most agricultural producers purchase energy indirectly in other inputs, such as commercial nitrogen fertilizers, fuel and electricity costs for field operations, irrigation, and drying. Combined with fertilizer costs, these costs account for a significant proportion of the cost of production of many crops. For the present study, we used crude oil price as a proxy for energy price. Previous research has indicated that a depreciation of the dollar increases dollar-denominated commodity prices with an elasticity of between 0.5 and 1.0 (Gilbert, 1989). We used nominal exchange rate of Bangladesh Taka against US dollar to observe whether this assumption holds for Bangladesh as well which is a net importer of rice. Thus, the retail price of milled rice in Bangladesh is expected to follow the subsequent general functional form:

$$P_{rice} = f(Y_d, ExR, W, P_{oil})$$  \[1\]

where $P_{rice}$ is the retail price of milled rice; $Y_d$ is the domestic supply of milled rice, ExR is the official exchange rate, W is the average farm wage rates, and $P_{oil}$ is the price of crude oil in local currency term respectively. We use annual data for the above variables from 1960 to 2008 to assess the impact of oil price on rice price in Bangladesh. Other than oil price data, all relevant data are collected from IRRI, BBS.

Econometric Technique

We begin by focusing on the valid, non-spurious long-run equilibrium relationship (also called the cointegrating relationship) among the considered economic variables. If the time-series variables in a function such as Equation (1) are cointegrated, a stable long-run relationship can be estimated using standard ordinary least squares (OLS) techniques without obtaining spurious results (Engle and Granger, 1987).

However, an important preliminary to testing for the existence of a cointegrating relationship among the variables appearing in the regression equations is to examine the order of integration of each of the variables and to ascertain that all the series integrated are of the same order. Unit root tests applied to the original series and their first and higher order differences are a useful tool to determine the order of integration. Hence standard procedure of unit root testing by employing the Augmented Dickey Fuller (ADF) test is followed. However, since the ADF test is often criticized for low power, we complement this test with the Phillips-Perron (PP) test. As discussed by Schwert (1989) and echoed by Lin (1995), small-sample studies show that it is more appropriate to use the PP test when the process is generated by general ARIMA processes.

Two or more non-stationary series can be regressed only in the case when there exists a cointegrating relation between them (Hendry & Juselius, 2001). Engle and Granger (1987) have advanced a number of new techniques concerning the estimation and testing of cointegration and associated error correction models. Testing for cointegration involves an examination of the residuals from the cointegrating regression to satisfy the requirement that the residual from the regression is $I(0)$. We use the ADF test to examine the order of integration of the residual. To test the robustness of the cointegration results, the Johansen procedure is also applied.

Johansen (1988) and Johansen and Juselius (1990) developed a more robust procedure of testing for cointegration which constructs a test statistic, called the likelihood ratio (LR) test, to determine the number of cointegrating vectors in a cointegration regression. The Johansen (1988) approach is based on the maximum likelihood estimation procedure and tests for the number of cointegrating relations in the vector autoregressive representation. The Johansen approach allows simultaneous testing the existence of cointegrating relations and determining their number (rank). When the Johansen test results in rank 1, a cointegrating relation does exist.

If the variables are $I(1)$, this study proceeds to cointegration technique to test for long run relationships. Individually non stationary variables at level becomes stationary when combined together through linear combinations with other variables.

For empirical testing we express the long-run estimation of equation (1) as follows:
\[ \ln P_{rice} = \alpha_0 + \sum_{j=0}^{\rho} \alpha_j \ln P_{rice_{-j}} + \sum_{i=1}^{k} \sum_{j=0}^{\rho} \beta_{ij} X_{i,t-j} + \mu_t \]  

where \( i = 1, \ldots, k \) and \( j=0, \ldots, \rho \), and \( \mu_t \) is a random error and where \( \ln P_{rice} \) is the natural log of retail price of milled rice, \( X_t \) is a vector of explanatory variables expressed in natural log term and \( \mu_t \) is the white noise residual. Since all the variables are in logarithms the estimated coefficients in Equation (2) represents the long-term elasticity of milled rice price in Bangladesh with respect to the explanatory variables.

The presence of cointegration implies that it would be possible to model a time varying equilibrium. If the result suggests that there is one cointegrating vector in the model, we can proceed to the vector error-correction specification to observe the short run dynamics of the specification. The optimal lag length, \( \rho \) in the ECM, is decided by choosing the lag length that minimizes Schwartz criterion. The ECM of Equation (2) can be represented as

\[ \Delta \ln P_{rice} = \alpha_0 + \sum_{j=0}^{\rho} \alpha_j \Delta \ln P_{rice_{-j}} + \sum_{i=1}^{k} \sum_{j=0}^{\rho} \beta_{ij} \Delta X_{i,t-j} + \gamma \mu_{t-1} + \varepsilon_t \]  

where \( \Delta \) is the difference operator, \( \varepsilon_t \) is the white noise residual, and \( \mu_{t-1} \) is the lagged residual from the cointegrating regressions, and its coefficient represents the feedback mechanism and corrects for the departure of the real balances from their equilibrium values in the preceding period.

**Empirical Results**

Table 1 summarizes the results for unit root tests on levels and in first differences of the data. We found that all series are non-stationary at their level form since the null hypothesis of non-stationarity cannot be rejected at the 5% significance level. However, the null hypothesis is easily rejected at the 5% significance level after the first difference. Therefore, the variables are now I(1) variables. Given that the variables are I(1), this study proceeds to cointegration technique to test for long run relationships. Individually non stationary variables at level become stationary when combined together through linear combinations with other variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Augmented Dickey-Fuller</th>
<th>Phillips-Perron</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln P_{rice} )</td>
<td>-1.857 ***</td>
<td>-2.017 ***</td>
</tr>
<tr>
<td>( \ln \text{ExR} )</td>
<td>-0.654 ***</td>
<td>-0.652 ***</td>
</tr>
<tr>
<td>( \ln Y_d )</td>
<td>0.164</td>
<td>0.875 ***</td>
</tr>
<tr>
<td>( \ln P_{oil} )</td>
<td>-0.156 ***</td>
<td>-0.288 ***</td>
</tr>
<tr>
<td>( \ln W )</td>
<td>-1.255 ***</td>
<td>-1.208 ***</td>
</tr>
</tbody>
</table>

**Notes:** ***denote significant at 1% level

Testing for cointegration using Engle and Granger (1987) two step procedures involves an examination of the residuals from the cointegrating regression presented in table 2 to satisfy the requirement that the residual from the regression is I (0). The ADF test suggests that the residual is stationary and thus provides evidence of cointegration among the variables. To test the robustness of the cointegration results, the Johansen procedure (1988) is also applied.

<table>
<thead>
<tr>
<th>Maximum rank</th>
<th>LL</th>
<th>Eigen Value</th>
<th>Trace Statistic</th>
<th>5% Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>r=0</td>
<td>178.35</td>
<td>.</td>
<td>84.17</td>
<td>68.52</td>
</tr>
<tr>
<td>r≤1</td>
<td>201.88</td>
<td>0.624</td>
<td>37.11*</td>
<td>47.21</td>
</tr>
<tr>
<td>r≤2</td>
<td>212.60</td>
<td>0.360</td>
<td>15.66</td>
<td>29.68</td>
</tr>
<tr>
<td>r≤3</td>
<td>217.07</td>
<td>0.170</td>
<td>6.71</td>
<td>15.41</td>
</tr>
<tr>
<td>r≤4</td>
<td>219.41</td>
<td>0.092</td>
<td>2.04</td>
<td>3.76</td>
</tr>
</tbody>
</table>

**Notes:** * denotes rejection of the hypothesis at 5% significance level; trace statistic indicates 1 cointegrating equation(s) at 5% significance level.
The results of Johansn’s eigen value and trace tests for the model are presented in Table 2. Since there is growing evidence in favor of the robustness of the trace statistic (Cheung and Lai 1993, Kasa 1992), we accept the trace results that suggest there is at least one stationary relationship among the variables. Since the variables are cointegrated, a long run relationship among these variables does exist.

The estimated long-run model for the determinants of rice price in Bangladesh is reported in Table 3. All the regressors have taken the expected sign and are statistically significant at conventional level except the exchange rate. Our findings suggest that domestic factors like production of rice in Bangladesh and agricultural wage rate have substantial effect on the milled price of rice. A 1% increase in the domestic supply tends to reduce the domestic price by about .68% in local market. On the other hand, price of rice is very sensitive to the change in wage rate which is quite intuitive considering the labor intensive nature of the production technique. The coefficient of oil price is positive and statistically significant indicating that price of rice is influenced by the movement of oil price in the international market. The result is not surprising if we consider the fact that rice has become more energy intensive, especially electricity and fuel intensive, in the past decade. Both irrigation and fertilizers are critical inputs to the production of high-yielding varieties of rice which are energy intensive. The adjusted R$^2$ of the regression equation is reasonably high indicating that about 98 percent in the variation in the price of rice can be explained by the regressors included in the model.

### Table 3: Results of Cointegrating Regressions

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Ln Exchange rate (LnExR)</th>
<th>Ln Domestic production (LnYd)</th>
<th>Ln price of crude oil (LnPoi)</th>
<th>Ln Agricultural wage rate (LnW)</th>
<th>Constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of milled rice (LnPrice)</td>
<td>-0.415 (-1.55)</td>
<td>-0.679*** (-4.64)</td>
<td>0.084** (2.28)</td>
<td>1.300*** (5.85)</td>
<td>12.469*** (9.64)</td>
</tr>
</tbody>
</table>

Number of observation= 49                   Adj. R$^2$ = 0.98             F- Statistic= 671.76     DW-stat= 1.038

Unit root test for lag residuals           -4.184***

Note: t-values are in the parenthesis, *,**,*** denotes significance at 10% , 5% and 1% level respectively.

Once the cointegrating relations have been established, the next step is to estimate the error correction model. To capture the short run dynamics of the model, a VECM (vector error correction model) is applied based on the earlier OLS estimation of long run relationships. Error correction term $\mu_{t-1}$, from the cointegrating relation is included to capture the speed of adjustment to a disturbance in the long run equilibrium in the respective vector. The results are given in Table 4 where the error correction representation of the model is used taking the first difference of the all variables except wage rate for which we include two lags suggested by Schwert criterion and an equilibrium error correction term. The error correction term shows the speed at which the system converges to the equilibrium. If it is statistically significant it shows what the proportion of the disequilibrium in dependent variables in one period is corrected in the next period.

### Table 4: Results of Vector Error Correction Specification

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>DLnPoi</th>
<th>DLnYd</th>
<th>DLnW</th>
<th>Lag1D LnPoi</th>
<th>Lag2D LnPoi</th>
<th>DLnExR</th>
<th>$\mu_{t-1}$</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLnPrice</td>
<td>0.073 (0.753)</td>
<td>-1.096*** (-3.44)</td>
<td>0.824*** (3.917)</td>
<td>0.307* (1.870)</td>
<td>0.004 (0.033)</td>
<td>-0.563** (-2.18)</td>
<td>-0.317* (-1.798)</td>
<td>0.038 (1.323)</td>
</tr>
</tbody>
</table>

Adj. R$^2$ =0.54;            Prob(F-statistic)= 0.0000002
Durbin-Watson stat = 2.076   Ramsey RESET: 2.244   F(ARCH) = 0.042

Note: t-values are in the parenthesis, *,**,*** denotes significance at 10% , 5% and 1% level respectively.

One important feature of the short run dynamics is that the short-term coefficient of oil price is about 0.07, which is hardly distinguishable from the long-run coefficient of 0.08 suggesting that the magnitude of the response of domestic rice price to crude oil price in the short run does not vary much in the long run. There are several reasons for such behavior. First, the energy used in agricultural production is mostly oil-related. Moreover, Bangladesh's share of global rice production is too small to influence the international rice prices. Rather its own market price is largely influenced by the world price. Large rice producing countries like Vietnam, India which dominate world rice
production and export markets—use oil intensively in production. Second, oil prices affect the prices of fertilizers, as well as other chemicals used in crop production. Finally, oil prices also affect transport costs, such that the margin between domestic and export prices has added as much as 10.2% to the export prices of corn and wheat (Mitchell, 2008).

The error correction term is significantly negative, as required for cointegration, indicating that departures of the domestic rice price from its long-run equilibrium path are corrected through time at a high rate of about 31 percent per year. The overall explanatory power of the error-correction models is good. The equation passes a series of model misspecification tests. The residuals show no significant evidence of autocorrelation, non-normality or heteroskedasticity. In particular, the results of the Ramsey RESET specification tests indicate no specification bias.

As pointed by Laidler (1993: 175) and noted by Bahmani-Oskooee (2001), some of the problems of instability could stem from inadequate modelling of the short run dynamics characterizing departures from the long run relationship. Hence, it is expedient to incorporate the short run dynamics in testing for constancy of long run parameters. In view of this we applied the CUSUM and CUSUMSQ tests proposed by Brown, Dublin, and Evans (1975). The CUSUM test is based on cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines. Similar procedure is adopted to carry out the CUSUMSQ, which is based on the squared recursive residuals. Figure 5 show the plots of the CUSUM and CUSUM of squares tests for the above specification. In both cases, the CUSUM statistic stayed within the 5% critical lines indicating, among other things, the stability of all cointegrating coefficients.

Conclusion and Policy Suggestions

It has been stated earlier that, in spite of being the world’s fourth largest producer of rice, Bangladesh still is importing a large volume of rice for its increasing demand. So, increasing the production of rice continuously is the major solution for not only lessening the import but also for increasing our buffer stock and for maintaining the price level at an endurable level.

Bangladesh is adding about 2 million people to its population every year and will continue to do so for the foreseeable future. Although the current level of rice production at the national level is satisfactory, rice demand is projected to grow at 2-2.5 percent per year, based on population and income growth. Therefore, rice production needs to increase by a minimum of 330,000 MT/year. The country has very limited potential for net expansion of the area cultivated; in practice, the cultivable area has been falling by about 1 percent per year for more than a decade as land has been diverted to other uses including housing, industrialization, and infrastructure development. So, the problem is to use the available land efficiently. In order to do that, government could take part in an important role to increase the production by giving subsidy in input sector such as fertilizer, energy, oil, etc. Sufficient stock of oil should be maintained so that it can be provided to the farmer at subsidized price when necessary. Inventing HYV species of rice and diffusion of this invention by agriculture extension service could bring a positive growth rate in
Procurement price should be higher than the market price/cost of production. The middle man between rice producer and rice procurement officials should be removed. Supplying the farmers with improved quality of seeds holds large potential for quickly increasing rice production. To promote efficient use of water, reliable electricity supply for irrigation and proper agricultural water management and drainage practices need attention. Increasing the pace of rehabilitation of irrigation canals whose poor condition leads to large losses of water is also needed. Besides better access to market information, there are a number of ways in which farmers’ production risk may be reduced. Examples include enhancing disaster preparedness and post disaster rehabilitation of agricultural systems in disaster prone areas; and piloting insurance instruments such as weather based insurance.

References


