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Domestic Prices in Bangladesh**

**M. Golam Mortaza
Habibour Rahman**

June 2008

**Policy Analysis Unit (PAU)
Bangladesh Bank
Head Office, Dhaka, Bangladesh
(www.bangladeshbank.org.bd)
(www.bangladesh-bank.org)**



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M. Golam Mortaza
Research Economist
Policy Analysis Unit
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Transmission of International Commodity Prices to Domestic Prices in Bangladesh

M. Golam Mortaza
Habibour Rahman*

Abstract

In recent years, Bangladesh has experienced persistent price increases, especially of food items, in the domestic market in the backdrop of global increase in food prices. Such price developments in the international commodity markets have brought into forefront the effects of external price changes on domestic inflation, especially in the developing countries. This raises the issue of the existence and extent of import price pass-through to domestic prices. This paper analyzes the relationship between import and domestic prices in Bangladesh during 2000-2008. Using monthly data, the paper explores the relationship between domestic supply and pass-through elasticity and argues that commodities with higher share of domestic supply face a lower pass-through elasticity of import prices on domestic prices. The results suggest that it is important for policies in Bangladesh to correctly align the exchange rate and trade related policies in the short run to domestic realities coupled with the long run policy of increasing domestic production as the most effective strategy to ensure domestic price stability.

Key Words: International Prices, Domestic Prices, Elasticity, Bangladesh

JEL Classification: E31, E37, E63, F41.

* The authors are Research Economists, Policy Analysis Unit (PAU), Bangladesh Bank, Dhaka, Bangladesh. The author would like to thank Dr. Mustafa K. Mujeri, Chief Economist for his helpful suggestions and comments on earlier drafts of the paper. The views expressed in this paper are of the authors' own and do not necessarily reflect the views of the Bangladesh Bank.

Transmission of International Commodity Prices to Domestic Prices in Bangladesh

1. Introduction

Inflation in the developing world has been rising in recent years, mainly due to rising trend in food prices in the international market. For example, there was a 181 percent increase in global wheat prices over the 36 months leading up to February 2008, and an 83 percent increase in overall global food prices over the same period (World Bank 2008). Moreover, the price of rice in the international market rose by 165 percent between April 2007 and April 2008 (ADB 2008). There is a general consensus that the reasons for soaring food prices in the international market cover several factors including higher food demand in the emerging economies such as China and India that have led to reductions in food exports from these countries; rising oil prices and, more importantly, increased demand for bio-fuel raw materials such as wheat, soybean, maize, and palm oil which reduced the area of cropland for using food production for human consumption.¹ However, it is not the main reason that forces the policymakers in the developing economies to be diligent, but the implication of the impact of higher inflation on households, especially the poor in these countries. It becomes necessary for them to know how and to what extent the pass-through of rising global prices translates into rise in domestic price levels, if it exists. Bangladesh, as a net importer of food grains, is not out of the fear, in fact, it is facing higher food inflation in recent years and thus the policymakers are also concerned about the extent of global price transmission into domestic prices and its impact on the overall economy.

It is not only in the international market, but food prices have been soaring in the domestic market as well in Bangladesh. For example, during the period of April 2007 to April 2008, the price of rice increased by 61 percent to Tk. 32.10 per kilogram (kg) from Tk. 19.90 per kg, while the price of wheat increased by 56 percent to Tk. 30.60 per kg from Tk. 19.60 per kg (ADB 2008). Adverse price developments in the international market coupled with several unfavorable domestic macroeconomic changes such as short-term supply shocks due to adverse weather conditions, low prices of food commodities at the production stage leading to reduced production incentives, movements in the exchange rate, political and market uncertainty, strong domestic demand (resulting from economic growth and flow of remittances) and other economic and non-economic factors contributed to recent price increase in Bangladesh (Dawe 2008 and UNESCAP 2008). As a result, overall inflation in Bangladesh in May 2008 rose to 7.44 percent (point-to-point basis) with a dominant role of food inflation (9.62 percent). The immediate adverse effects of higher domestic food prices include, among others, reduced household income of the households in real terms and thus increase in poverty incidence, higher effective inflation for the poor households than average inflation due to higher share of total expenditure devoted to food by the poor households.² Thus higher food price at the international market not only increases the domestic price level, but it also negatively affects the welfare of the poor consumers and farmers in developing countries. In view of the importance of the issue, it is necessary for the policy makers to design appropriate domestic economic and trade policies that can mitigate the adverse

¹For evidence, see Mitchell 2008, Johnston 2007.

² See, for instance, Hensley and Lupton 2008; Mortaza and Hasnayan 2008.

effects of world price changes on the domestic economy based on credible knowledge on the ‘pass-through elasticity’ between imported and domestically produced goods.

This paper examines the extent to which increases in international food prices during the past few years have been transmitted to domestic prices in Bangladesh. In analyzing the historical data, evidence on price transmission for three important food commodities-- rice, wheat, and edible oil—have been taken. On the other hand, econometric analysis focuses on two staple foods-- rice and wheat-- which account for a larger share of the expenditures of the poor and edible oil, the consumption of which is based mainly on imports.³ The pass-through elasticity has been estimated using regression models of the above food items, followed by recent econometric techniques such as unit root tests and error correction models (ECM). Finally, the paper draws some policy implications from the empirical results.

This study provides the first numerical estimates on the empirical relationship between import prices and domestic prices as no earlier work on the issue exists in Bangladesh. The analysis uses commodity specific monthly data rather than annual data during a period of substantial policy reforms in order to understand both long-run and short-run relationships between import price and domestic inflation so that harmonized results can be provided for policy purposes. It is expected that the study will assist the policy makers in formulating sound policies for inflation control taking into consideration changes in import prices and global inflation.

The paper is organized as follows. Following the introduction of this section, section 2 provides the analytical basis of the present study and reviews the relevant literature both in the context of developed and developing countries. Section 3 provides a review of recent inflation in Bangladesh and its underlying dynamics, including relationships and analysis of international commodity prices and corresponding domestic prices and their interrelationships. The empirical models including analysis of variables and the estimation results are explained in section 4. Finally, section 5 provides the summary and policy implications.

2. Theory and Empirical Evidence

The way in which import prices of commodities affect final domestic prices is central to recent macroeconomic analysis as the issue is closely related with globalization and economic integration. In the wake of higher global food inflation, the degree and timing of pass-through is important, especially for developing countries, for forecasting inflation and formulating monetary policy in response to inflation shocks in the international market. The theoretical long-run impact of import prices on consumer prices is to assume that the consumption price elasticity with respect to import prices (the pass-through coefficient) is equal to the equilibrium proportion of consumption goods that are imported (Hampton 2001). As imports account approximately 36 percent of consumption goods in Bangladesh, it can be said that in the long run a 10 percent increase in import prices would lead to a 3.6 percent increase in consumer prices according to the above proposition.

³ For example, HIES 2005 data show that rice and wheat account for 20 percent of the household monthly consumption expenditure, while the corresponding figure is 33 percent for the poor in Bangladesh.

However, theoretically, the direct pass-through of import prices to domestic prices is nothing but the exchange rate pass-through which basically is an application of the law of one price. According to the law of one price, the price of a traded good will be the same in both domestic and foreign economies, when expressed at a common currency. This is commonly known as the *first-stage or direct pass-through* of import prices to domestic prices which can be defined as the elasticity of the domestic over-the-docks import prices with respect to the exchange rate.

Greater exchange rate volatility may make importers and exporters more cautious about price instability and may force them to adjust respective profit margins, and reduce measured pass-through.⁴ Specifically, for a small open economy which is a price taker in the world market, pass-through is expected to be complete; on the other hand, if the economy is not a price taker, then foreigners may adjust the foreign currency price of the import following the exchange rate change (Dwyer and Lam 1994).

On the other hand, the *second-stage or indirect pass-through* takes place when it is not only the prices of imported consumption goods that are affected by the import price shock, other prices are also affected by the same shock. In this case, a movement in import prices may lead to a change in overall consumer prices and the pass-through coefficient may not be equal to the import share of consumption. Theoretically, if second stage pass-through occurs, then the total pass-through from import price changes to consumption prices could be greater than the import share of consumption if wages are indexed to consumer prices.⁵ On the other hand, a movement in import prices may lead to a lower change in consumer prices if there is a relative price change of goods rather than a level shift in the overall consumer price index. It occurs when the higher price of imports may simply be offset by lower price of other goods as demand for those goods declines due to a lower proportional change in nominal income. This can be referred to as the income effect of import price shock. Moreover, if the consumption of imported consumption goods declines due to higher prices of those goods, then the import share of consumption may also decline and the resulting effect on the consumer prices may be smaller than the original share of consumption. This can be referred to as the substitution effect of import price shock.⁶

A number of research has been carried out on the extent to which international prices have a role on changes in domestic prices. A commodity-specific research carried out by Warr (2005), in searching for the relationship between two methods of modeling the relationship between the landed prices of imports and domestic prices in the context of rice imports into Indonesia, finds that the pass-through elasticity ranges between 0.27 and 0.37.⁷ This result has been considered important particularly in Indonesia as it is the world's largest importer of rice and policies with respect to this outcome have relevance in the context of Bangladesh as well.

⁴ See Wei and Parsley (1995) and Engel and Rogers (1998) for empirical evidence in this regard.

⁵ The second stage pass-through is more likely to take place in a situation when the central bank doesn't respond quickly to import price shocks to prevent inflationary impulse (Hampton 2001).

⁶ Firm-specific import price shock analysis reveals that since firms are not sure about the length of movement of import price shocks, they will usually alter their profit margin and absorb some of the import price shocks as it is costly for firms to adjust prices (due to menu costs).

⁷ The two methods are the 'pass-through elasticity' and the 'Armington' elasticity of substitution between imported and domestically produced goods.

Food prices have been considered as key components of the pass-through of international prices to domestic prices worldwide, as it has a significant impact on overall domestic prices, especially in developing countries, and thus on food consumption and production. Dawe (2008) analyzes the extent to which domestic prices of seven large Asian countries have increased since 2003 and concluded that these countries have been successful to stabilize domestic prices relative to the recent change in world prices through commodity specific policies rather than a general approach.⁸ This has been particularly true for rice and wheat and it has been found out that, on average, till the end of 2007, the increase in real domestic rice prices was only about one-third of the increase in real US dollar world market rice prices. The evidence also suggests that these countries have been able to transmit price changes between farmers and consumers rather efficiently, mainly due to the well integrated system of markets linking the producers and the consumers.

World Bank (2008) points out that the pass-through of rising global prices doesn't translate into an immediate and proportionate rise in domestic price levels, due to various factors such as a weakening dollar, domestic infrastructure and price stabilization policies. On the other hand, FAO (2008) indicates that large increases in food and fuel prices threaten macroeconomic stability and overall growth, especially of low-income, net-importing countries. However, it indicates that government policies designed to avoid large domestic price shocks and the depreciation of the US dollar against many currencies tend to reduce transmission of world market prices to domestic prices. In this regard, it sets the case of Bangladesh as a successful example in mitigating the effect of international price on domestic prices and indicates that Bangladesh uses variable rice tariffs to stabilize domestic prices. The resulting outcome of these measures has helped the country to have lower transmission elasticity of commodity prices.⁹

Focusing on a different approach, McCarthy (1999) examines the impact of exchange rates and import prices on the domestic producer price index (PPI) and consumer price index (CPI) in selected industrialized countries during the period 1976 to 1998.¹⁰ The results show that countries which had higher import shares, less volatile exchange rates, less volatile GDP, and were less competitive on a global scale were found to have inflation rates that had high associations with the exchange rates. The result also suggests that exchange rates and import prices actually contributed to disinflation during the period rather than contributing to inflation. The result has largely been attributed to global excess production of goods followed by the 1997-98 East Asian crisis, which contributed to a decline in the world prices of many goods imported by the industrialized countries.

In the developed country context, Hampton (2001) re-estimated short- and long-run import price pass-through coefficients for New Zealand consumer prices for the period of 1989Q1 to 2001Q2

⁸ The reference countries are Bangladesh, China, India, Indonesia, Philippines, Thailand, and Viet Nam.

⁹ In fact, Dawe (2008) mentions that, in Bangladesh, domestic policy has stabilized urea prices, and while in domestic currency terms urea prices declined by 25 percent during August/October 2003-August/October 2007, world market prices increased by 79 percent in real domestic currency terms.

¹⁰ More specifically, McCarthy (1999) looks for the pass-through of the exchange rate and import price changes to domestic producer and consumer inflation using a model of pricing along a distribution chain, with the aim to detect the responses of the PPI and CPI inflation to the exchange rate, import price with focus on demand and supply sides (i.e., output gap) and oil price shocks, in order to provide estimates of the effect of these variables on domestic inflation using a historical decomposition of the VAR model for the period 1996:01 to 1998:04.

and the result of the investigation confirms that the impact was not as large as expected – a 10 percent increase in import prices leads to 0.5 per cent increase in consumer prices within the first quarter, and to 1.5 percent increase over the long run. The above results suggest a change in the consumer prices is necessarily accompanied by a corresponding exchange rate depreciation/appreciation in New Zealand during the period. Moreover, Taylor (2000) provides a direct relationship between the pass-through of import prices to domestic prices and inflation rate at the international market during the 1990s. The evidence suggests that inflation is positively correlated with inflation persistence, implying that the low inflation itself around the world caused low pass-through to domestic inflation in US during 1990s.

Keeping the above issues and outcomes in view, this study focuses on the issue of the effect of changes in international commodity prices on domestic commodity prices, where three commodities, namely, rice, wheat, and edible oil have been used for investigation. In particular, the paper estimates pass-through elasticities of these commodities, both long and short-run. It is likely that the pass-through will be stronger for commodities which have larger import shares in total consumption.

3. Data Analysis

Current inflation situation

The Bangladesh economy experienced a moderate rate of inflation, 5.2 percent on average in the first half of 1990s, mainly contributed by higher prices in non-food items. However, in the second half of the 1990s, average inflation increased to 5.6 percent driven by higher food prices, though food inflation started to decline after FY98, the year of the devastating flood, along with similar movement of overall inflation. Since then, Bangladesh experienced a low rate of inflation, at an average rate of less than 2.5 percent during FY01-FY02; when a relatively low price of food at that time played the key role in overall price developments (Table 1). However, in the following two years, the inflation rate jumped to 5.1 percent, followed by an average of 7.0 percent during FY05-FY07. In May 2008, the 12-month average inflation rate rose to 9.87 percent, whereas point-to-point inflation reached 7.44 percent.

Table 1: Trend in Overall Inflation: FY01-FY08

Year	Moving Average (MA)			Point to Point (PtP)		
	General	Food	Non-food	General	Food	Non-food
FY01	1.94	1.38	3.04	1.66	0.87	3.14
FY02	2.76	1.63	4.61	3.58	1.94	6.14
FY03	4.38	3.46	5.66	5.03	5.22	4.68
FY04	5.83	6.93	4.37	5.64	6.64	4.26
FY05	6.49	7.90	4.33	7.35	8.73	5.32
FY06	7.16	7.76	6.40	7.54	8.81	5.73
FY07	7.20	8.11	5.90	9.20	9.82	8.34
FY08*	9.87	11.93	6.72	7.44	9.62	3.89

Note: * Until May 2008.

Source: BBS

One general characteristic of recent inflation is that food inflation is higher than non-food inflation along with increasing gap between food and non-food inflation. Though the role of food

inflation in overall inflation was insignificant during FY01-FY03, food inflation started to soar since FY04 which, in turn, led to rising overall inflation.¹¹

Rural urban inflation

In case of rural and urban areas, in general, rural inflation has been higher than urban inflation (Table 2). Both in rural and urban areas, food inflation dominates non-food inflation in contributing to overall inflation. However, food inflation in urban areas has been higher than that in rural areas, since FY04. Recent statistics show that, in May 2008, 12-month average food inflation has gone up to 11.6 percent in rural areas, while the rate was 12.8 percent in urban areas.

Table 2: Trends in Rural and Urban Inflation: FY01-FY08

Year	Rural			Urban		
	General	Food	Non-food	General	Food	Non-food
FY01	2.26	1.18	3.83	1.52	1.89	1.13
FY02	2.43	1.44	4.57	3.36	2.09	4.70
FY03	4.74	4.05	5.91	3.52	2.09	5.00
FY04	5.77	6.55	4.47	5.66	7.80	4.14
FY05	6.62	7.99	4.27	6.14	7.71	4.49
FY06	7.36	7.62	6.90	6.68	8.09	5.14
FY07	7.28	7.93	6.10	7.02	8.53	5.34
FY08*	9.90	11.57	6.84	9.80	12.77	6.41

Note: * Until May 2008.

Source: BBS

In case of non-food inflation, the rate has been higher in urban areas in most of the years, especially in recent times. In May 2008, 12-month average non-food inflation rate increased to 6.8 percent in the rural areas, while the rate was 6.4 percent in the urban areas.

Two main characteristics of recent inflation trends can be observed: *first*, inflation in Bangladesh varies directly with food prices, especially in urban areas (Table 1); *second*, overall inflation in rural areas is higher than the corresponding urban rate. While, in general, food inflation is higher in urban areas, non-food inflation tends to be higher in rural areas (Table 2). These suggest that the inflation intensity varies with location and type of consumption items. However, it is mostly the prices of food items that determine overall inflation and it is likely that some of the food items contribute more to overall food inflation. Thus a better look is necessary on the commodity specific inflation rates rather the overall inflation rates to observe the contribution of individual products on inflation.

Commodity specific food inflation

Table 3 shows the cumulative percentage changes in monthly consumer price indices of major food items during FY04-FY08.¹² Both in rural and urban areas, among the individual commodity

¹¹ See, for instance, Mortaza and Hasnayan (2008) for empirical evidence on the role of food inflation in overall inflation.

categories, the highest percentage changes are observed in rice, wheat, and oil and fats, especially in the recent period. Thus it is clear that, in recent years, overall food prices in Bangladesh was dominated by higher prices of rice, wheat, and edible oil.

Between rural and urban food inflation, the highest percentage change is observed in wheat prices in the rural areas followed by rice and oil prices in FY08. On the other hand, in urban areas, though the highest percentage change is observed in wheat, the second highest change is noticed in oil price, followed by rice price. The relatively higher change in wheat price may be attributed to international supply shortage of wheat and higher prices and shortage of rice in the domestic market, as rice is a close substitute for wheat.

Table 3: Cumulative Percentage Changes in Monthly Consumer Price Indexes of Major Food Items

Items and specifications	Rural				Urban			
	FY05	FY06	FY07	FY08*	FY05	FY06	FY07	FY08*
Food, Beverage and Tobacco	6.78	8.33	9.22	6.88	7.35	9.05	10.39	6.58
A. Food	6.32	8.44	9.42	6.95	6.88	8.81	10.79	6.58
(a) Cereals	13.80	2.88	12.34	30.82	17.73	0.69	13.18	30.63
(i) Rice	13.68	3.01	11.31	28.31	18.02	1.40	10.23	25.72
(ii) Other Cereals	15.05	2.22	20.33	47.60	16.76	-1.96	24.56	46.73
<i>Wheat</i>	20.47	1.30	23.61	52.44	17.80	-2.67	27.89	50.22
(b) Pulses	4.58	23.02	15.34	15.42	7.89	18.19	15.13	16.97
(c) Fish	7.24	11.23	7.55	-31.19	8.32	8.55	11.96	-23.11
(d) Meat and Eggs	6.90	16.58	17.05	3.45	2.87	19.26	15.39	4.27
(e) Vegetable	-12.58	23.42	14.87	-7.11	1.15	21.24	11.26	-4.76
(f) Fruits	5.43	-1.14	10.98	8.51	6.57	14.42	7.25	7.17
(g) Spices	-8.27	16.07	-0.19	4.14	-16.14	14.66	-5.33	13.61
(h) Oil & Fats	0.58	2.14	27.42	25.14	-0.99	5.35	27.53	32.29
(i) Milk & Milk Products	2.87	1.04	3.77	17.25	3.47	8.84	9.06	8.07
B. Beverage	42.98	0.80	0.00	0.40	22.88	17.11	0.00	5.52
C. Tobacco and Products	3.66	10.27	7.44	8.57	0.80	3.67	17.87	9.42

Note: * Until April 2008

Source: BBS

Among the three commodity groups, in FY08, cumulative percentage changes in rice and wheat prices are higher in the rural areas than those of urban areas. However, in the case of oil and fat, the change is opposite, i.e., price change is higher in urban areas than in rural areas. The higher demand for cereals such as rice and wheat in the rural areas and recent supply shortage of these items may partly explain such higher price changes in the rural areas. In the case of oil, higher demand possibly explains higher prices in urban areas. Thus it is clear that the reasons for higher food prices can mainly be attributed to higher prices of rice, wheat, and oil in the recent period. Not surprisingly, the two main cereals in Bangladesh that are imported throughout the year are rice and wheat and import payments for food items other than cereals are highest for edible oil. Therefore, higher domestic prices of these food items are likely to result from higher import dependency to meet domestic consumption.

¹² In constructing commodity group specific CPI, the definition of general CPI construction is applied. The cumulative percentage change is defined as the summation of monthly change of CPI over the previous month's CPI of specific commodity group.

Commodity imports, consumption expenditure and total imports

Imports as a share of total consumption expenditure in Bangladesh has been increasing in recent years. For example, while imports accounted for nearly 25 percent of total private consumption goods in FY03, the ratio increased significantly to 36 percent in FY07 (Table 4). Though there is increasing share of imports in total consumption expenditure in recent years, it is likely that the commodity-specific share of import to consumption expenditure is different for different commodities. The import-consumption expenditure ratio for three commodities, namely rice, wheat and edible oil, shows that rice imports account for a very low proportion of its total consumption expenditure, varying around 1-3 percent during FY03-FY07. However, the import-consumption expenditure ratio is high in the case of wheat, at around 34-51 percent, and the share is even higher in the case edible oil, at around 58-68 percent during the same period.

Table 4: Commodity Import, Consumption and Total Imports

	FY03	FY04	FY05	FY06	FY07
Commodity import-consumption expenditure ratio					
Total domestic import	24.62	25.87	28.81	31.65	36.29
Rice	2.69	1.71	2.99	1.29	1.76
Wheat	33.95	44.02	45.33	42.98	50.83
Edible Oil	58.03	68.43	62.08	65.27	59.33
Commodity import-total import ratio					
Rice	2.18	1.31	2.01	0.79	1.04
Wheat	2.05	2.63	2.37	2.03	2.34
Edible Oil	3.77	4.32	3.34	3.20	3.39

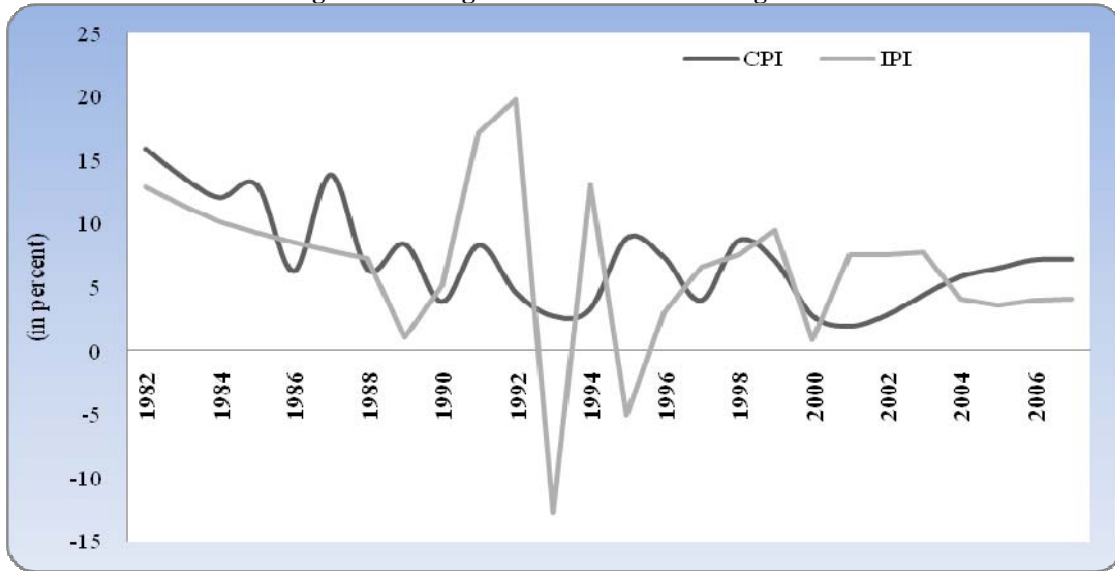
Source: BBS and Economic Trends, Bangladesh Bank.

Thus, similar to varying price changes of different commodities, import-consumption expenditure ratio in Bangladesh also varies depending upon the level of domestic consumption. It is evident in the case of these three goods that lower percentage change of prices is observed for goods which have a relatively lower import-consumption ratio. Accordingly, it is likely that the pass-through of international commodity prices to domestic prices will be lower for those goods which has lower import ratio in total consumption.

However, at the aggregate level, the channel through which the effect of international price changes is reflected in domestic inflation is the relationship between consumer price inflation (CPI) and import price index (IPI). If price at the international market rises, it will be reflected in IPI and thus will affect domestic CPI, through higher prices of consumer goods and/or higher input prices for consumer goods. Figure 1 depicts the relationship between CPI and IPI in Bangladesh during FY81-FY07 which clearly indicates a long-term relationship between them; although a short-term relationship is not evident.

However, it would be misleading to presume any relationship of commodity prices at the international and domestic market by simply looking at the relationship between CPI and IPI. Rather, it would be meaningful to observe commodity-specific price relationship at both markets and identify the relationship if exists.

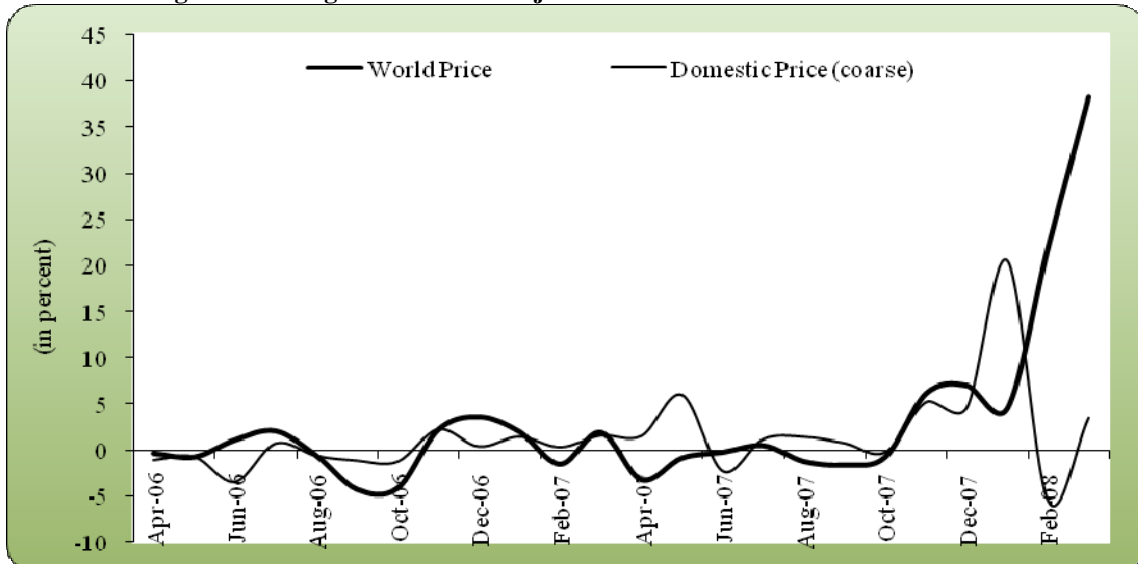
Figure 1: Changes in CPI and IPI in Bangladesh



Source: BBS

Figure 2 shows changes in world and domestic prices of rice during March 2006-March 2008. The price in the world rice market surged from an average of US\$378 per ton in December 2007 to US\$1015 per ton (in nominal terms) by the end of April 2008. Moreover, importers from developing countries found it difficult to import resulting from the unwillingness of traders to enter price negotiations due to supply shortage. At the domestic market, the average retail price of coarse rice increased by 18.8 percent (from Tk.26.30 per kg to Tk.31.30 per kg) during the period from December 2007 to March 2008. It is clear that price changes of rice in international and domestic markets follow similar pattern which provides some evidence that there is a direct link between world price and domestic price of rice.

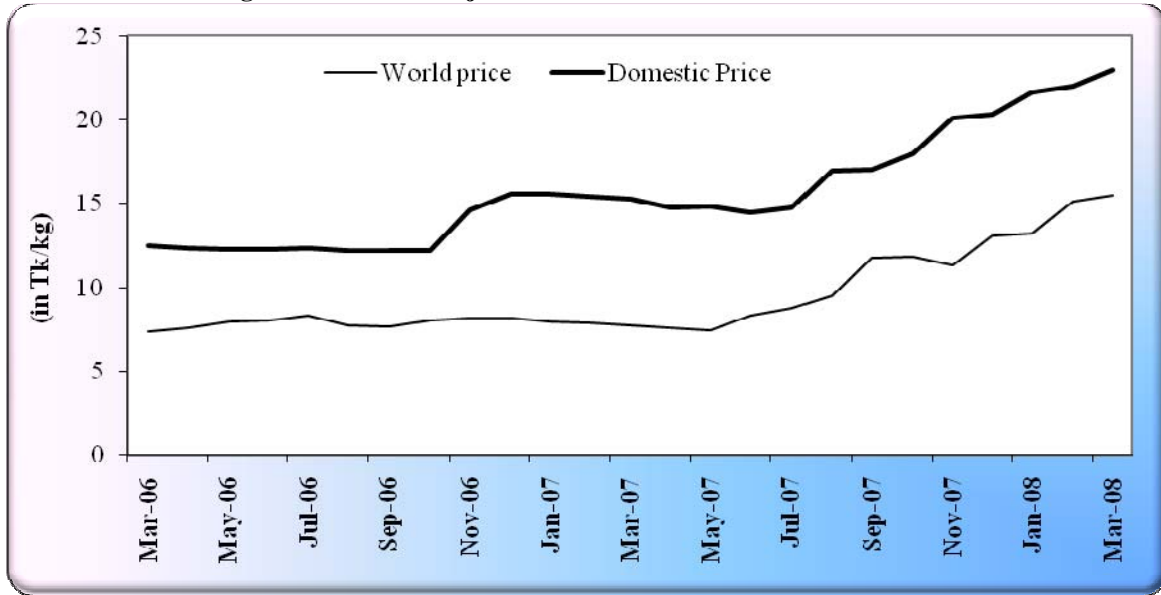
Figure 2: Changes in Inflation Adjusted World and Domestic Price of Rice



Source: IFS Database IMF and BBS

Figure 3 depicts the world and domestic wheat prices in real Taka terms during March 2006 to March 2008. This also confirms that domestic real price of wheat increased at a similar pace as world real price of wheat. Though the price of wheat in the domestic market started to increase since November 2006, the price was fairly stable at the international market at that time, but as the international wheat price climbed up suddenly in June 2007 the domestic wheat price increased likewise since August 2007.

Figure 3: Inflation Adjusted World and Domestic Price of Wheat

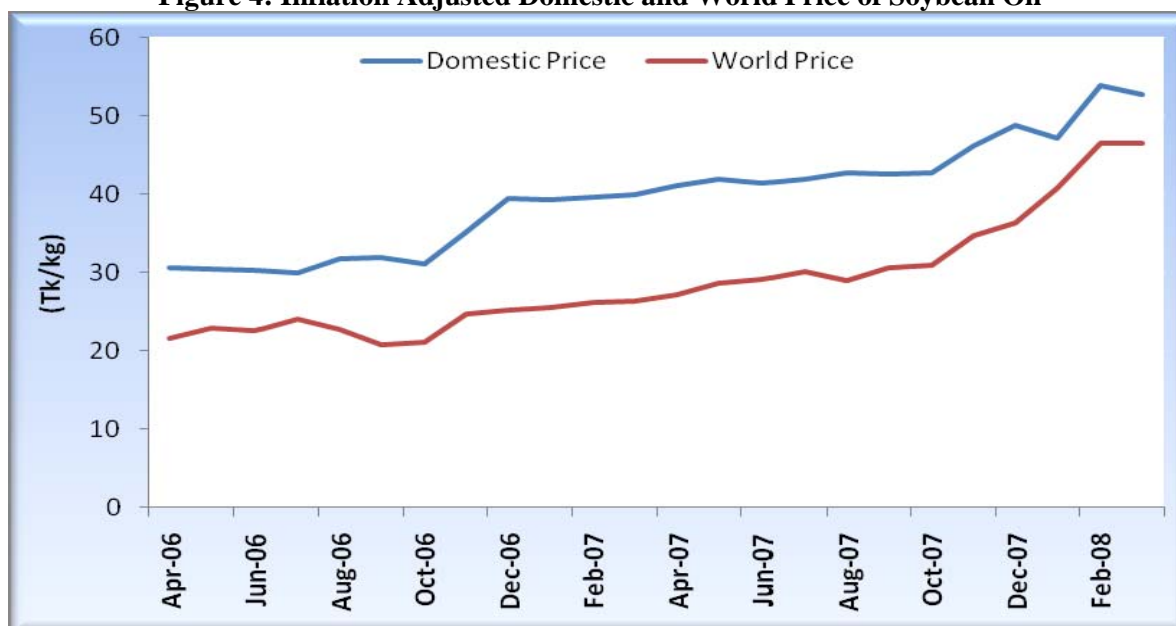


Source: IFS Database IMF and BBS

Moreover, the gap between domestic price and world price seems to have increased during the past few years indicating a higher pass-through of international wheat prices to domestic price. Thus the recent increase in domestic wheat price followed international wheat price very closely while shortages and higher prices of rice in the domestic market also played a role in setting higher domestic wheat prices.

In the case of soybean oil, real domestic price in Bangladesh has always been higher than its real world price indicating higher concentration of import based consumption. The gap between domestic price and the world price of soybean has, however, declined in recent years (Figure 4). In real Taka terms, while the gap between the prices in the domestic market and world market of soybean was Tk. 8.98 per kg, the gap reduced to Tk. 6.32 per kg indicating the impact of various government policies at the import level to mitigate the pressure of higher international price on domestic price.

Figure 4: Inflation Adjusted Domestic and World Price of Soybean Oil



Source: IFS Database IMF and BBS

Pass through to consumers

Table 5 provides results of the pass-through of international prices of rice, wheat, and edible oil to domestic consumers.¹³ A comparison of column (1) and column (2) shows that changes in column (2) are substantially lower than those in column (1), although changes are much high and positive. The reason for lower world prices of commodities in domestic currency is the exchange rate appreciation (against US\$) that the economy has experienced during the last two years. While during the period US\$ has depreciated against many currencies, the Bangladeshi consumers, in contrast, have benefited from the stability of the exchange rate.

It can also be seen that changes in column (3) are lower than the changes in column (2). This is the result of various commodity-based policies of the government, such as the rationalization of rice tariffs, to insulate domestic consumers from international price increases.¹⁴ It is not the case that the government of Bangladesh played the role of an interventionist, but used ad hoc changes in tariff rates to stabilize domestic prices.

¹³ In Table 5, there are two parts of estimation: In the upper part, cumulative price increase during the period of March 2006-March 2008 has been shown whereas in the lower part price increase in March 2008 over March 2006 is calculated. Column 1 shows price increase in real US\$ from March 2006 to March 2007, while column 2 shows increase in world price in real domestic currency terms during the same period. Column 3, on the other hand, shows change in real domestic price at the consumer level.

¹⁴ See, for instance, Dawe (2008) and FAO (2008).

Table 5: Pass-Through of World Prices to Consumers, M3:2006 to M3:2008

	World Price (US\$/MT) (1)	World Price (in Tk./MT) (2)	Domestic Price (in Tk./MT) (3)	Pass- through (%) (4) =(3)/(2)
Cumulative percentage changes in prices				
Rice	83.52	72.25	35.35	48.93
Wheat	93.31	80.85	65.14	80.57
Edible oil	91.72	81.02	55.71	68.76
Percentage changes in prices over the period				
Rice	111.39	88.32	38.63	43.74
Wheat	135.87	110.13	84.11	76.37
Edible oil	139.65	113.50	68.99	60.78

Source: IFS Database IMF and BBS

One of the characteristics of the above pass-through analysis is that during March 2006 to March 2008 the pass-through is less than 100 indicating incomplete pass-through of international prices into domestic markets. Among the three commodities, the pass-through varies significantly and higher pass-through is observed in the case of wheat, followed by edible oil and rice. In the case of wheat, shortage of global wheat production and domestic higher prices of rice might be the explanation, whereas higher price of edible oil at the international market can explain the higher price in the domestic market. The share of import of respective commodities corresponding to their consumption expenditure partly explains the different pass-through of international prices as well.

4. Estimating ‘Pass-Through’ Elasticity

Models and variables

In estimating the second stage elasticity of import prices to domestic consumer prices, the theoretical and empirical model used in the paper follows Warr (2005). Warr (2005) systematically builds a theoretical model to estimate the pass-through elasticity of rice in Indonesia, in which domestic price of rice has been considered as the dependent variable and the world price at the import stage and ‘other’ prices are considered as independent variables. In defining ‘other’ prices, domestic CPI has been used. In a similar fashion, following theoretical model will be used in this paper for estimation of pass-through elasticity for rice, wheat and edible oil in Bangladesh:

$$DP_i = E_0CPI + E_mWP_i \quad (1)$$

where, DP is the domestic price of the good; CPI is the consumer price index used as the index of ‘other’ prices; and WP is the world prices in domestic currency of the good. E_0 and E_m are the elasticities of the domestic price of the good with respect to ‘other’ prices and the import price, respectively.

Based on the above model, three empirical models are the following:

$$\text{Rice equation: } DP_r = \alpha + \beta_0 CPI + \beta_m WP_r + \mu \quad (2)$$

where, DP_r is the monthly domestic retail price of rice (coarse); CPI is the monthly consumer price index; WP_r is the monthly world price of rice and μ is the residual.¹⁵ Similarly,

$$\text{Wheat equation: } DP_w = \alpha + \beta_0 CPI + \beta_m WP_w + \mu \quad (3)^{16}$$

$$\text{Edible oil equation: } DP_s = \alpha + \beta_0 CPI + \beta_m WP_s + \mu \quad (4)$$

Estimation and Result Interpretation

The data that used in the estimation are monthly, covering the period January 2000 to March 2008, the period which shows an increasing trend of prices. Relevant data were collected from the Bangladesh Bureau of Statistics (BBS), various issues of *Economic Trends* published by the Statistics Department of the Bangladesh Bank (BB), and the International Financial Statistics (IFS) of the IMF. All time series variables are in the log form. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were performed on each variable and the results of the unit root tests are reported in Appendix Table A2. The results suggest that all the variables are integrated of order 1, i.e., (I(1)).

Two types of regression analyses were performed to identify the import price pass-through coefficient. *First*, estimates of possible long run relationship among the variables were obtained. The *long-run pass-through* typically refers to *total* change in consumption prices generated by a persistent or permanent import price shock of a commodity, once consumer prices have stopped adjusting to the initial import price shock (Hampton 2001). The estimated long-run elasticities are presented in Table 6 and the results suggest that the import price pass-through elasticity is 0.33 (rice), 0.31 (wheat) and 0.55 (edible oil). This implies that if import price in domestic currency increases by 10 percent, then, in the long-run, domestic price will increase by around 3.3 percent for rice, 3.1 percent for wheat, and 5.5 percent for edible oil.¹⁷

The Engle-Granger cointegration tests were also performed to test whether a long-run relationship exists among the variables and the test on residuals rejected the null hypothesis of no cointegration suggesting a long-run relationship among the variables (Table 6). In fact, this finding validates the above coefficient estimates to be stable in the long-run.

¹⁵ The data definitions are explained in Appendix Table A1.

¹⁶ Two more wheat equations are also considered to see the substitution effect of rice price on wheat price. In this context, one model is constructed by adding DP_r as another explanatory variable in equation (2) while the other model removes CPI from equation (2) and adds DP_r instead of CPI using the assumption that only rice price can affect the price of wheat.

¹⁷ Interestingly, when DP_r is included in wheat equation, the pass-through elasticity comes down to 0.17-0.18, suggesting a significant role of DP_r in explaining changes in price of wheat in Bangladesh.

From Table 6, it is observed that the pass-through elasticity of edible oil is significantly higher than the pass-through elasticities of rice and wheat. This result is not surprising as import-consumption ratio for rice is much lower compared with those for wheat and edible oil. However, in case of wheat, higher availability of rice - a substitute of wheat – played a significant role in having a lower pass-through elasticity of wheat. And, in the case of edible oil, consumption is almost entirely dependent on import and thus has a higher pass-through elasticity.

Table 6: Estimates of Long-Term Relationship (2000:1-2008:3)

I. Estimates of Rice Equation			
Dependent Variable: LDP_r			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-1.17	-2.06	0.04
LCPI	0.62	4.36	0.00
LWP_r	0.33	5.83	0.00
ADF Test for Residuals	-0.91	-7.98	0.00
II. Estimates of Wheat Equation			
Dependent Variable: LDP_w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-3.59	-4.60	0.00
LCPI	1.16	6.29	0.00
LWP_w	0.31	4.67	0.00
ADF Test for Residuals	-3.19	-8.32	0.00
III. Estimates of Edible Oil Equation			
Dependent Variable: LDP_s			
Independent Variables	Coefficient	t-Statistic	Prob.
C	0.27	0.55	0.58
LCPI	0.35	2.79	0.01
LWP_s	0.55	12.56	0.00
ADF Test for Residuals	-1.16	-11.51	0.00

Source: Authors' calculations

However, this test is not conclusive and it is necessary to determine the short-run adjustment process underlying the long-run relationship. This requires the estimation of a stable cointegrating relationship using the error correction model (ECM) to test the robustness of the earlier long-run relationship. The results of this test are presented in Table 7 and suggest that the estimated coefficients of the error-correction term are -0.12 (rice), -0.08 (wheat) and -0.27 (edible oil). These results imply that around 12 percent of disequilibrium in the long-run relationship is corrected in each month in the case of rice, whereas in the cases of wheat and edible oil, the corresponding figures are 8 percent and 27 percent respectively. All the estimated coefficients are statistically significant, supporting the earlier result that there is a long-run relationship among the variables.

Table 7: Estimates of Error Correction Model (2000:1-2008:3)

I. Estimates of Rice Equation			
Dependent Variable: DLDP _r			
Variables	Coefficient	t-Statistic	Prob.
C	0.002	0.523	0.60
DLDP _r (-1)	-0.125	-1.258	0.21
DLDP _r (-2)	0.299	2.601	0.01
DLCPI(-7)	0.757	2.131	0.03
DLWPr (-1)	0.193	2.227	0.03
DLWPr (-2)	-0.157	-1.657	0.10
EC term (-1)	-0.123	-2.001	0.04

II. Estimates of Wheat Equation			
Dependent Variable: DLDP _w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	0.005	1.222	0.22
DLDP _w (-3)	0.281	2.796	0.01
DLCPI(-1)	0.236	0.613	0.54
DLWP _w (-1)	0.140	2.467	0.02
EC term (-1)	-0.080	-2.164	0.03

III. Estimates of Edible Oil Equation			
Dependent Variable: DLDP _s			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-0.002	-0.476	0.63
DLDP _s (-7)	0.175	1.999	0.04
DLCPI(-5)	1.416	3.034	0.00
DLWPs	0.214	2.915	0.00
DLWPs (-1)	0.159	2.218	0.03
DLWPs (-4)	-0.155	-2.121	0.04
EC term (-1)	-0.272	-4.311	0.00

Source: authors' calculations

The estimated pass-through elasticity for rice in the short-run is 0.19, and the corresponding figures are 0.14 for wheat and 0.15 for edible oil. Thus over the entire period, the results suggest a pass-through elasticity of between 0.19 and 0.33 (rice), 0.14 and 0.31 (wheat) and 0.15 and 0.55 (edible oil). These results indicate that there is minimal effect of international prices of rice and wheat on their domestic prices; while, a relatively significant relationship is observed between international edible oil prices and its domestic prices. However, the 'pass-through elasticity' is less than unity indicating the effort of the government to insulate domestic inflation from the adverse impact of higher international prices.

5. Conclusion and Policy Implications

The study aimed at exploring the relationship between imported commodity prices and domestic consumer prices of selected goods in Bangladesh during 2000:01-2008:03. Understanding both the long-run and the short-run dynamics of import price shocks on consumer prices is crucial to policy making in a small open economy such as Bangladesh. Further, recent increase in international commodity prices has raised the issue of import price pass-through to consumer

prices as significant in framing effective policies to assist the domestic consumer, especially the poor, from the adverse effect of rising inflation.

Data analysis reveals that inflation in Bangladesh is dominated by food inflation and, in particular, prices of rice, wheat, and edible oil significantly affect overall food inflation. Interestingly, among all food items, import payments for these three items are highest. Though the import-consumption ratio of rice is very low, it is significantly higher for wheat and edible oil. However, since these are relatively high-weighted food items, even low import ratios of these commodities play a greater role in overall inflation in the country. Thus it is important for Bangladesh to maintain stable prices of these three food items at the import stage to mitigate their adverse effect on the domestic prices.

The empirical results suggest that pass-through elasticities lie between 0.19 and 0.33 for rice, 0.14 and 0.31 for wheat, and 0.15 and 0.55 for edible oil. These indicate lower pass-through elasticities for rice and wheat and a higher pass-through elasticity for edible oil. This is consistent with higher import-consumption ratio for edible oil, followed by wheat and rice. That is, the pass-through of international prices to domestic prices is likely to be higher for those goods that have higher import-consumption ratio. Thus, the government needs to follow commodity specific policies especially for those goods which have higher consumption weights in CPI and, at the same time, have higher import share in total consumption. In short, adopting commodity specific import policies rather than a common policy would be more effective in mitigating the problem of international price increase and its possible impact on the domestic economy.

The analysis also brings out several key points. With respect to addressing the adverse impact arising out of the relationship between international and domestic food prices, it is useful for Bangladesh to divide domestic policy interventions into two categories: (i) improving short-run trade policies to reduce domestic food prices; and (ii) stimulating agricultural investment and enhancing productivity to increase long-term food supply.

Reexamining trade related policies

First, it has been observed that the effect of higher international prices of three major food products (rice, wheat, and edible oil) on their domestic prices was partly neutralized by an exchange rate policy that maintained a relatively stable value of Taka vis-à-vis US\$ in Bangladesh. This suggests an active role of exchange rate policies in mitigating the pass-through problem at the import stage. The Bangladesh Bank, as the monetary authority, needs to adopt appropriate measures such that changes in the exchange rate contribute toward stability of domestic prices of imported food items. In this regard, a higher inflow of remittances may ensure more stability in the foreign exchange market and the issue needs specific focus.¹⁸

Second, commodity specific trade policies such as reduction of tariffs and taxes on food items have contributed to ensuring more stable domestic prices in Bangladesh relative to world prices

¹⁸ UNESCAP (2008) argues that rising demand for foreign workers resulting from higher oil incomes in some of the oil-rich countries in Western Asia could benefit LDCs such as Bangladesh through increasing remittances in these countries.

and keeping the pass-through elasticity at less than unity.¹⁹ Along with trade policies aimed at reducing price volatility, it is important to identify reliable sources of supply so that food imports are not constrained by export restrictions by the supplying country. Furthermore, such export restrictions might be taken up as important issue in future international trade negotiations under WTO.²⁰

Third, reducing import tariff on food commodities certainly is favorable to the domestic consumers and may help to ease domestic prices. However, this should be weighed against its adverse effect on domestic revenue earnings at the import stage. This could be substantial in specific cases, especially when the tariff is reduced on the large volume of imports. If it happens, then the tax authority should review the existing tax measures to help recover the revenue loss.

Increasing long-term supply

The results of this study highlight the importance of giving highest priority to increasing domestic production of important food commodities such as rice, since it is seen that the pass-through is lower for commodities that have higher share of domestic production in total consumption.²¹ In the case of wheat, since rice is a significant substitute and the nominal price of rice is lower than that of wheat at present, increasing rice production is likely to reduce the import of wheat resulting in lower pass-through to domestic prices.

Tariff reductions for agriculture commodity imports imply a loss of protection for domestic producers, who may face hefty supply of imported food commodities under a more liberalized regime. Moreover, recent higher prices of agricultural inputs such as fuel, seeds, fertilizer, wages of laborers and even, the rent of agricultural land may force them to reduce planting in the long-run. Thus complementary measures are required for domestic producers to hold them continuing agriculture production such as ensuring higher producer prices. The corresponding idea would be that the government can directly buy or stock food commodities from the producers at reasonable prices. Moreover, it is likely to serve a dual purpose: first, it can ensure increased flow of supply from domestic sources; and second, it can encourage the agricultural producers to continue with their efforts to increasing agricultural production in a sustained manner.

¹⁹ UNESCAP (2008) indicates that in Bangladesh, liberalizing trade in irrigation equipment and fertilizer markets in the early 1990s produced structural changes in agriculture sector and a significant increase in rice productivity. This resulted in a reduction of rice prices by 25 percent, benefiting the poor, who are the main consumers of rice (Klytchnikova and Diop (2006).

²⁰ For instance, see FAO (2008) on the issue.

²¹ There are some examples that the use of rice for different purposes is increasing recently compared with the past due to the price hike of wheat. For example, the poultry and fishery sector started to use rice as feed rather than wheat, creating extra demand on supply of rice with higher pressure on rice prices.

Appendix

Table A1: Data Series Details

The table summarizes the data series used in this analysis. All data are at a monthly frequency and the sample period is 2000:01 to 2008:03

Series Code	Series Name	Details
LCPI	Consumer price index	Log of consumer price index, on monthly basis
LDP _r	Domestic price of rice	Log of domestic prices of rice (coarse) in nominal terms, on monthly basis
LWP _r	World price of rice	Log of world price of rice (Bangkok, Thailand), on monthly basis
LDP _w	Domestic price of wheat	Log of domestic prices of wheat, on monthly basis
LWP _w	World price of wheat	Log of world price of wheat (US Gulf), on monthly basis
LDP _e	Domestic price of soybean oil	Log of domestic price of soybean oil (all origins: Dutch ports), on monthly basis
LWP _e	World price of soybean oil	Log of world price of soybean oil, on monthly basis

Table A2: Unit Root Tests with ADF and PP

Variables	ADF		PP		Decision
	Without trend	With trend	Without trend	With trend	
<i>LCPI</i>	0.71	-1.31	0.89	-0.78	I(1)
$\Delta LCPI$	-9.16	-9.22	-9.04	-9.51	I(0)
<i>LDP_r</i>	1.61	0.28	1.61	0.34	I(1)
ΔLDP_r	-11.02	-11.58	-11.02	-11.62	I(0)
<i>LWP_r</i>	2.10	0.26	2.21	0.87	I(1)
ΔLWP_r	-4.14	-5.16	-4.31	-4.33	I(0)
<i>LDP_w</i>	3.80	1.78	4.41	3.04	I(1)
ΔLDP_w	-4.20	-5.57	-10.07	-10.95	I(0)
<i>LWP_w</i>	2.15	-1.03	1.89	-0.42	I(1)
ΔLWP_w	-9.28	-9.72	-9.23	-9.78	I(0)
<i>LDP_s</i>	0.87	-0.85	0.87	-0.68	I(1)
ΔLDP_s	-11.17	-11.83	-11.18	-11.91	I(0)
<i>LWP_s</i>	0.91	-1.57	1.25	-0.98	I(1)
ΔLWP_s	-8.07	-8.54	-8.11	-8.44	I(0)

Notes: 1. Lag length of ADF tests have been decided on the basis of Akaike's Information Criterion (AIC); 2. Maximum Bandwidth for PP tests have been decided on the basis of Newey-West (1994); 3. All tests have been performed on the basis of 1-percent significance level using Econometric Views (EViews) 4 Package; 4. McKinnon (1996) Test critical values are: 1% level: -4.04, 5% level: -3.45, 10% level: -3.15

Table A3: Estimates of wheat equations (alternative models)

I. Estimates of Wheat Equation			
Case 1: Model with LDP _w			
Dependent Variable: LDP _w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-0.67	-1.03	0.30
LCPI	0.06	0.35	0.73
LWP _w	0.17	3.43	0.00
LDPr	1.03	9.34	0.00
ADF Test for Residuals	-0.95	-9.24	0.00
Case 2: Model without LCPI			
Dependent Variable: LDP _w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-0.45	-3.16	0.00
LDPr	1.05	12.79	0.00
LWP _w	0.18	4.09	0.00
ADF Test for Residuals	-0.95	-9.28	0.00

Table A4: Estimates of error correction model (Alternative wheat models)

Case 1: Model with LDP _w			
Dependent Variable: DLDP _w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	-0.007	-1.672	0.09
DLDP _w (-1)	0.137	1.332	0.19
DLDP _w (-3)	0.222	2.167	0.03
DLCPI(-2)	1.223	3.145	0.00
DLCPI(-4)	0.830	2.175	0.03
DLDP _r	0.392	3.379	0.00
DLDP _r (-8)	-0.221	-1.687	0.09
DLWP _w (-2)	0.101	1.790	0.07
DLWP _w (-9)	0.077	1.251	0.21
EC term(-1)	-0.111	-2.045	0.04
Case 2: Model without LCPI			
Dependent Variable: DLDP _w			
Independent Variables	Coefficient	t-Statistic	Prob.
C	0.000	0.252	0.80
DLDP _w (-1)	0.197	1.889	0.06
DLDP _w (-3)	0.185	1.788	0.07
DLDP _r	0.395	3.252	0.00
DLDP _r (-2)	0.185	1.682	0.09
DLDP _r (-8)	-0.224	-1.646	0.10
DLWP _w (-2)	0.126	2.209	0.02
EC term(-1)	-0.129	-2.405	0.01

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