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4

Impact of Indian Policies on Rice Price in Bangladesh

Selim Raihan
Towfiqul Islam Khan

CMI CHR. MICHELSEN INSTITUTE

CENTRE FOR POLICY DIALOGUE (CPD)
B A N G L A D E S H
a civil society think tank

IMPACT OF INDIAN POLICIES ON RICE PRICE IN BANGLADESH

CPD-CMI Working Paper 4

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Series Editors: *Professor Mustafizur Rahman*, Executive Director, CPD and *Dr Arne Wiig*, Senior Researcher and Coordinator, Poverty Dynamics, CMI

Abstract

Considering the experiences in 2007-2008 as a reference point, this paper estimates the macroeconomic and welfare impact of Indian rice export policies for Bangladesh using GTAP and CGE models. The study suggests that rice export ban by India had negative impacts on Bangladesh in terms of loss of welfare, decline in real GDP, decline in exports and imports, and rise in CPI. However, the margins of direct impacts were rather small. Also, majority of the households in the rural and urban areas experienced some fall in real consumption. This is a reflection of the fact that in recent years, Bangladesh has become less dependent on imported rice. However, the study also concludes that India, historically the primary source of imported rice for Bangladesh, can no longer be considered dependable.

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Acronyms

APC	Agricultural Prices Commission
BBS	Bangladesh Bureau of Statistics
BPL	Below Poverty Line
CDE	Constant Difference of Elasticity
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
CPI	Consumer Price Index
DAM	Department of Agricultural Marketing
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCI	Food Corporation of India
FOB	Free-on-Board
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GTAP (Model)	Global General Equilibrium (Model)
HIES	Household Income and Expenditure Survey
HYV	High-Yielding Variety
IT	Information Technology
MEP	Minimum Export Price
PEP	Partnership for Economic Policy
RMG	Readymade Garments
SAM	Social Accounting Matrix
USA	United States of America
USD	United States Dollar

1. INTRODUCTION

For Bangladesh, being the seventh most populated country in the world and having one of the highest concentrations of poverty, ensuring food security remains to be a critical challenge. The country has a population of about 152.5 million in 2011, of which about 31.5 per cent are living below the national poverty line. The share of undernourished people in Bangladesh is also the highest among the countries in South Asia. A number of impediments including high population density, volatility in price movements, the possible adverse impact of climate change and periodic natural disasters have undermined the goal of ensuring food security in Bangladesh (Rahman and Iqbal 2012). *The Global Hunger Index of 2011* identified Bangladesh as one of the countries belonging to the *alarming zone* being ranked 70th among 81 developing countries (IFPRI *et al*. 2011). Reutlinger (1985) conceptualised food security as "access by all people at all times to enough food needed for an active and healthy life. Its essential elements are the availability of food and the ability to acquire it." Thus keeping food prices at an affordable level for the low-income group is vital for ensuring food security and poverty alleviation.

Food security in Bangladesh is influenced mainly by the availability and price situation concerning rice. Indeed, rice is the single most important staple food for Bangladesh. Rice comprises about 97 per cent of the total foodgrains produced. Rice also accounts for 73 per cent of the calories consumed in Bangladesh compared to 33 per cent in India (Dorosh 2001). According to the latest Household Income and Expenditure Survey (HIES) of 2010, the poor households spend about 39 per cent of their total expenditure for rice (BBS 2011). Bangladesh has achieved commendable success in production of rice, and is currently the fourth largest producer of rice worldwide (after China, India and Indonesia). Nevertheless, the country is still a net importer of rice. The availability and affordability of rice are therefore also of particular concern from a food security point of view. In contrast, India, having excess supply of rice, is the second largest exporter of rice in the world. During 2000-2006, India supplied about 13 per cent of the total traded rice in the world. The geographical proximity between these two countries allowed India to become the natural rice supplier for Bangladesh. Moreover, prior to 2007-2008, Bangladesh imported rice from India at a subsidised price (Hossain and Deb 2003; Dorosh and Rashid 2012). Indeed, the imported rice from India was particularly important in adding to foodgrains supply and stabilising rice prices in Bangladesh following the devastating flood of 1998 which resulted in a shortfall of 2.2 million tonnes of rice production during the monsoon season (del Ninno *et al*. 2001). During 2005-2007, 97.2 per cent of total imported rice in Bangladesh originated from India (Rahman *et al*. 2008). In 2007 the Government of India imposed a ban on non-basmati rice exports in face of the global food price crisis which aggravated the soaring rice price situation in the international market further. In 2008 this ban was extended to export of basmati rice as well. Exports of top grade aromatic rice were later allowed from mid-October 2008, but at a very high minimum price. During the same period India imposed a ban on exports of wheat also. Similar measures were pursued by other foodgrains exporting countries.

It is generally thought that unstable export policies pursued by India, particularly with regard to rice, affect prices and availability of rice in Bangladesh, and have important consequences on the welfare of the people belonging to the low-income group of the country. However, it is also important to consider that during those years the import of rice

in Bangladesh constituted a very small fraction of the total available rice in the domestic market. Therefore, it is worth exploring whether the magnitudes of the negative impacts in Bangladesh due to banning of rice export by India were as large as were generally thought. However, there is currently a lack of available studies that can inform policies on the likely impact of the rice ban by India on the low-income group of people in Bangladesh. The recent experience of 2007-2008 can be a critical point of reference in this context. Against this backdrop, the objective of the present paper is to document the experiences in 2007-2008, and determine the consequences of Indian rice export policies for domestic rice price in Bangladesh. The paper also estimates the macroeconomic and welfare impact for Bangladesh of such trade policies persuaded by India.

The organisation of the paper is as follows: after the Introduction in Section 1, Section 2 presents the methodology of the study. Section 3 revisits the food price crisis in 2007-2008. Section 4 provides an overview of the rice policies of India and Bangladesh. Section 5 presents a review of the recent literature on the welfare impact of rice price rise in Bangladesh. Section 6 explores the impact of India's rice export ban on Bangladesh using the Computable General Equilibrium (CGE) models. Section 7 presents the results of the sensitivity analysis of the CGE exercises. Finally Section 8 concludes.

2. METHODOLOGY

The impact of rice export ban by India on prices is the first stepping-stone in calculating the first order welfare effect of a policy reform. The paper applies the general equilibrium model in the forms of both Global General Equilibrium Model (GTAP model) and a country CGE model of Bangladesh for this purpose. The GTAP model has frequently been applied to analysing the impacts of trade liberalisation on Bangladesh economy (see for instance, Annabi *et al*. 2006; Raihan and Razzaque 2008; Raihan 2011), but not on the impact of trade restrictions by one significant trading partner. The extent of increase in price of rice will depend on direct and indirect demand and supply elasticities. Also, the macro, sectoral and household level analysis can be conducted using these models. The country CGE model of Bangladesh has been used to analyse how various groups of households adapt to changing prices and as a result the impacts on their welfare.

2.1 The GTAP Model

The global CGE modelling framework of the GTAP (Hertel 1997) is a useful tool for the ex-ante analysis of the economic and trade consequences of multilateral or bilateral trade agreements. The GTAP model is a comparative static model, based on neoclassical theories. It is a linearised model, and uses a common global database for CGE analysis. The model assumes perfect competition in all markets, constant returns to scale in all production and trade activities, and profit maximising behaviour by firms and utility maximising behaviour by households. The model is solved using the GEMPACK software (Harrison and Pearson 1996).

In the GTAP model, each region has a single representative household, known as the regional household. The income of the regional household is generated through factor payments and tax revenues (including export and import taxes)/net of subsidies. The regional household allocates expenditure to private household expenditure, government

expenditure, and savings according to a Cobb-Douglas per capita utility function. Thus, each component of the final demand maintains a constant share of total regional income.

The private household buys commodity bundles to maximise utility, subject to its expenditure constraint. In the GTAP model the constrained optimising behaviour of the private household is represented by a Constant Difference of Elasticity (CDE) expenditure function. The private household spends its income on consumption of both domestic and imported commodities and pays taxes. The consumption bundles are Constant Elasticity of Substitution (CES) aggregates of domestic and imported goods, where the imported goods are also CES aggregates of imports from different regions. Taxes paid by the private household include commodity taxes for domestically produced and imported goods and the income tax/net of subsidies.

The government also spends its income on domestic and imported commodities, and it collects taxes. Taxes consist of commodity taxes for domestically produced and imported commodities. Like the private households, government consumption is a CES composite of domestically produced and imported goods.

The GTAP model considers the demand for investment in a particular region as savings. In a multi-country setting, the model is closed by assuming that regional savings are homogenous and contribute to a global pool of savings. This global savings is then allocated among regions for investment in response to changes in the expected rates of return in different regions. If all other markets in the multi-regional model are in equilibrium, if all firms earn zero profits, and if all households are on their budget constraint, such a treatment of savings and investment will lead to a situation in which global investment must equal global savings, and Walras' Law will be satisfied.

In the GTAP model producers receive payments for selling consumption goods and intermediate inputs both in the domestic market and to the rest of the world. Under the zero profit assumption employed in the model, these revenues must be precisely exhausted by spending on domestic intermediate inputs, imported intermediate inputs, factor income, and taxes paid to the regional household (taxes on both domestic and imported intermediate inputs and production taxes/net of subsidies).

The GTAP model postulates a nested production technology, with the assumption that every industry produces a single output, and constant returns to scale prevail in all markets. Industries have a Leontief production technology to produce their outputs. Industries maximise profits by choosing two broad categories of inputs – namely, a composite of factors (value added) and a composite of intermediate inputs. The factor composite is a CES function of labour, capital, land and natural resources. The intermediate composite is a Leontief function of material inputs, which are in turn, a CES composite of domestically produced goods and imports. Imports come from all regions.

The GTAP model employs the Armington assumption, which makes it possible to distinguish imports by their origin, and explains intra-industry trade of similar products. Following the Armington approach, the import shares of different regions depend on relative prices and the substitution elasticity between domestic and imported commodities.

Version 8 of the GTAP database uses 2007 as the base year. GTAP data on regions and commodities are aggregated to meet the objectives of the present study.

2.2 The Bangladesh CGE Model

The Bangladesh CGE model is built using the Partnership for Economic Policy (PEP) standard static model. In the Bangladesh CGE model, a representative firm in each industry maximises profits subject to its production technology. The sectoral output follows a Leontief production function. Each industry's value added consists of composite labour and composite capital, following a CES specification. Different categories of labour are combined following a CES technology with imperfect substitutability between different types of labour. Composite capital is a CES combination of the different categories of capital. It is assumed that intermediate inputs are perfectly complementary, and are combined following a Leontief production function.

Household incomes come from labour income, capital income and transfers received from other agents. Subtracting direct taxes yields household's disposable income. Household savings are a linear function of disposable income, which allows for the marginal propensity to save being different from the average propensity.

Corporate income consists of its share of capital income and of transfers received from other agents. Deducting business income taxes from total income yields the disposable income of each type of business. Likewise, business savings are the residual that remains after subtracting transfers to other agents from disposable income.

The government draws its income from household and business income taxes, taxes on products and on imports, and other taxes on production. Income taxes are described as a linear function of total income, whether it be for households or for businesses. The current government budget surplus or deficit (positive or negative savings) is the difference between its revenue and its expenditures. The latter consists of transfers to agents and current expenditures on goods and services.

The rest of the world receives payments for the value of imports, part of the income of capital, and transfers from domestic agents. Foreign spending in the domestic economy consists of the value of exports, and transfers to domestic agents. The difference between foreign receipts and spending is the amount of rest of the world savings, which are equal in absolute value to the current account balance, but of opposite sign.

The demand for goods and services, whether domestically produced or imported, consists of household consumption demand, investment demand, demand by government, and demand as transport or trade margins. It is assumed that households have Stone-Geary utility functions (from which derives the Linear Expenditure System). Investment demand includes both gross fixed capital formation (GFCF) and changes in inventories.

Producers' supply behaviour is represented by nested Constant Elasticity of Transformation (CET) functions: on the upper level, aggregate output is allocated to individual products; on the lower level, the supply of each product is distributed between the domestic market and

exports. The model departs from the 'pure' form of the small-country hypothesis. A local producer can increase his share of the world market only by offering a price that is advantageous relative to the (exogenous) world price. The ease with which his share can be increased depends on the degree of substitutability of the proposed product to competing products; in other words, it depends on the price elasticity of export demand. Commodities demanded on the domestic market are composite goods, combinations of locally produced goods and imports. The imperfect substitutability between the two is represented by a CES aggregator function. Naturally, for goods with no competition from imports, the demand for the composite commodity is the demand for the domestically produced goods.

The system requires that there is equilibrium between the supply and demand of each commodity on the domestic market. Also there are equilibriums in the factor markets. Total investment expenditure must be equal to the sum of agents' savings. The sum of supplies of every commodity by local producers must be equal to domestic demand for that commodity produced locally. And finally, supply to the export market of each good must be matched by demand.

This study uses the latest available Social Accounting Matrix (SAM) of Bangladesh, which is for the year 2007. The 2007 SAM identifies economic relationships through four categories of accounts: (i) production activity and commodity accounts for 41 sectors; (ii) four factors of productions with two different types each for labour and capital; (iii) current account transactions between four main institutional agents – household members and unincorporated capital, corporations, government, and the rest of the world; and (iv) one consolidated capital account to capture the flows of savings and investment. The disaggregation of activities, commodities, factors and institutions in the 41-sector SAM are shown in Table 1.

Table 1: Disaggregation and Description of Bangladesh SAM Accounts

Set	Description of Elements
Production activities and commodities (41 sectors)	
Agriculture (6 sectors)	Cereal crops; commercial crops; livestock rearing; poultry rearing; fishing; forestry
Manufacturing (22 sectors)	Rice milling; grain milling; food products; leather industry; yarn industry; cloth industry; woven readymade garments (RMG); knit RMG; toiletries; cigarette and bidi industry; furniture industry; paper, printing and publishing industry; pharmaceuticals; fertiliser industry; petroleum; chemical industry; glass industry; earth-ware industry; cement; metal industry; miscellaneous industry; mining and quarrying
Services (13 sectors)	Construction; electricity and water generation; gas extraction and distribution; wholesale and retail trade; transport; health service; education service; public administration and defence; bank, insurance and real estate; hotel and restaurant; communication; information technology (IT) and e-commerce; other services
Factors of production (4 types)	
Labour (2 types)	Labour unskilled; labour skilled
Capital (2 types)	Capital; land

(Table 1 contd.)

(Table 1 contd.)

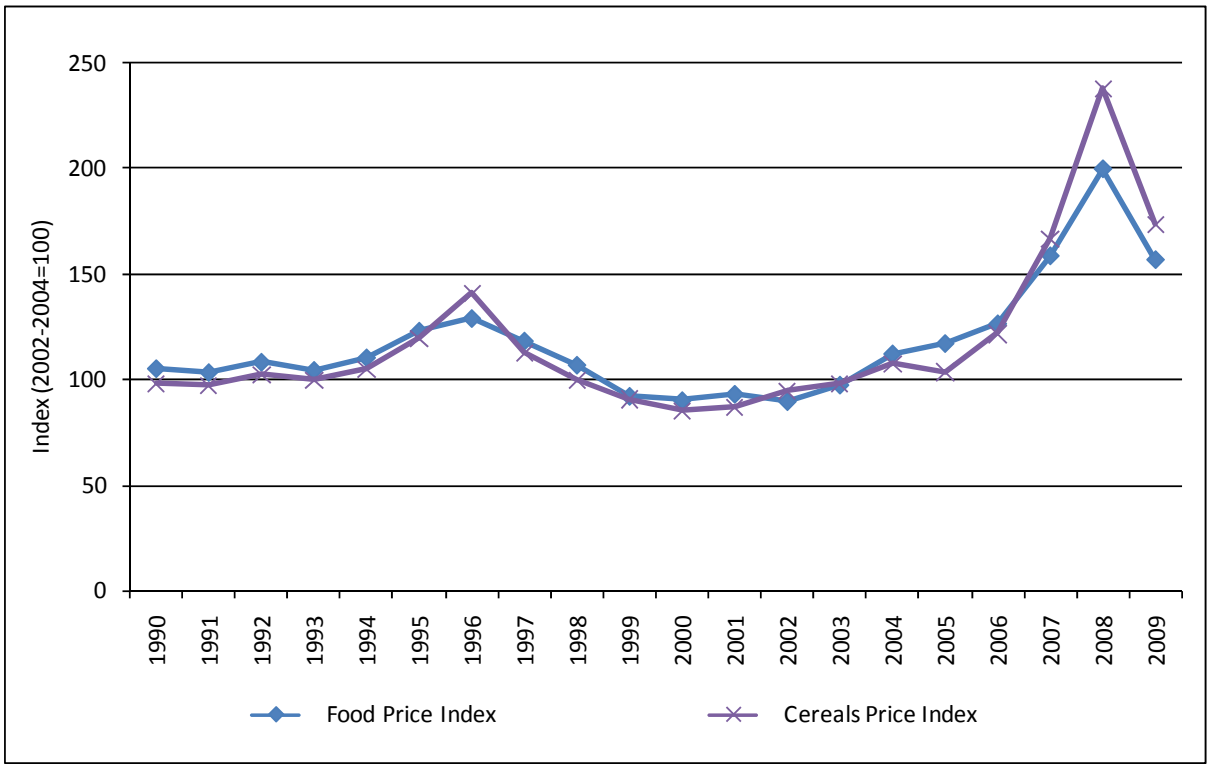
Set	Description of Elements
Current account transactions (4 agents)	
Households (7)	Rural: landless; agricultural marginal; agricultural small; agricultural large; non-farm Urban: households with low educated heads; households with highly educated heads
Others (3)	Government; corporations; rest of the world
Capital institution (1)	
Consolidated capital account (1)	

Source: Bangladesh Social Accounting Matrix, 2007.

3. REVISITING THE FOOD PRICE CRISIS IN 2007-2008

Soaring foodgrains prices in 2007-2008 caused serious concern around the world, particularly for the low-income group, who spend a significant portion of their income for food consumption. World foodgrains prices were fairly stable during 1990s. Indeed, it declined during the second half of 1990s (Figure 1). Since 2000, foodgrains prices were increasing with a sharp rise in 2007. In 2007 and 2008 cereals price index increased by 37.2 per cent and 42.5 per cent respectively. The prices started to decline in 2009 in face of the global financial and economic crisis.

Figure 1: FAO Annual Food Price Index and Cereals Price Index: 1990-2009

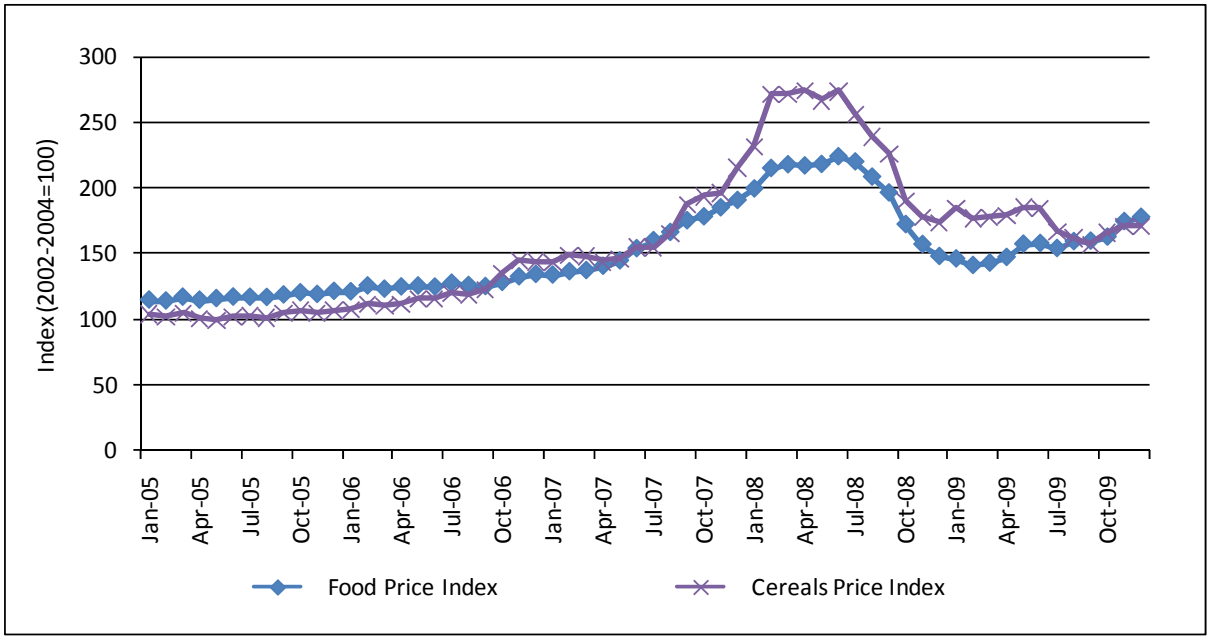


Source: Based on the data from Food and Agriculture Organization of the United Nations (FAO).

The monthly trend of foodgrains price index between January 2005 and December 2009 suggests that the upturn in prices was particularly significant from mid-2007. It continued to

rise until mid-2008 (Figure 2). Between July 2007 and June 2008, cereals price index increased by 76.2 per cent. Rice being one of the three major cereals in the world (along with wheat and maize) contributed significantly.

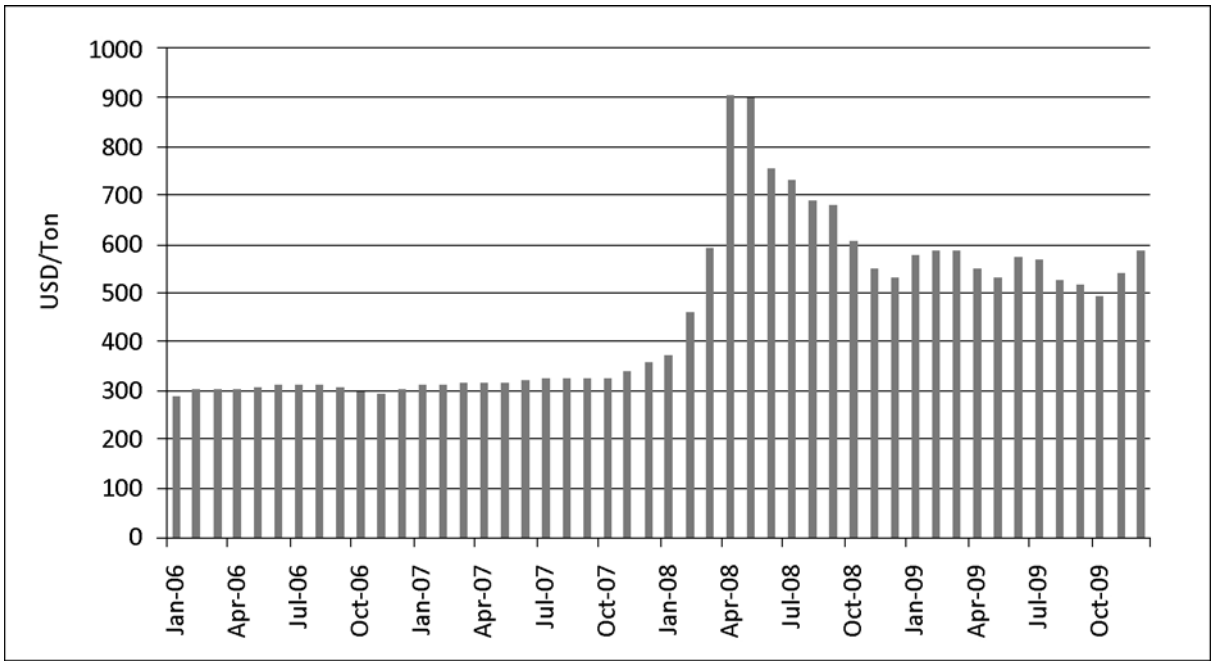
Figure 2: FAO Monthly Food Price Index and Cereals Price Index: 2005-2009



Source: Based on the data from Food and Agriculture Organization of the United Nations (FAO).

The international price of rice started to increase since mid-2007. In April 2008, international price of rice increased by about 53 per cent in a single month (Figure 3). The price started to ease again since mid-2008, but did not come down to the pre-crisis level.

Figure 3: International Price of Rice: 2006-2009



Source: World Bank Commodity Markets data.

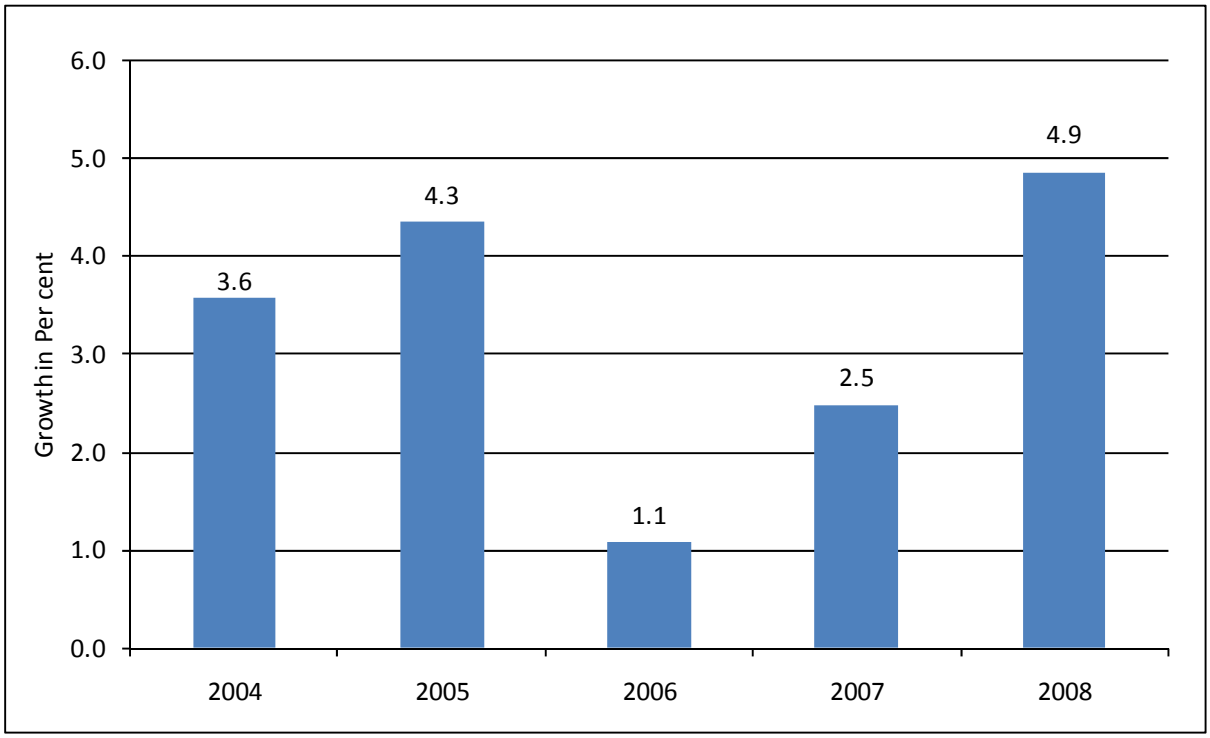
The price rise in the international market forced the countries around the world to take aggressive policy measures, which in turn further aggravated the situation. Sharma (2011) documented that out of 105 countries covered under the study, 33 countries or 31 per cent of the sample resorted to one or multiple export restrictive measures. FAO (2008a) also found that roughly one-quarter of the countries imposed some form of export restrictions during the food crisis of 2007-2008.

In October 2007, India banned exports of non-basmati rice. A few weeks later the ban was lifted, and was replaced by a minimum export price (MEP) of USD 425 per ton on 25 October 2007. MEP was subsequently increased to USD 505 per ton within two months. In reality, the MEP ensured an export ban as this price was higher than Thailand's free-on-board (FOB) price. MEP was again raised to USD 650 per ton on 19 March 2008. On 28 March 2008 India announced an MEP of USD 1,000 per ton for non-basmati rice and USD 1,200 per ton for basmati rice. Finally, India once again imposed a ban on rice exports on 1 April 2008. It needs to be noted that the global rice trade is relatively small with only 7 per cent of total global production is traded. Hence the policies of the second largest exporter, India, could influence world market prices (Deb *et al*. 2009). Jha and Srinivasan (1999) earlier estimated that a one million ton change in rice exports by India can result in a 4.7 per cent change in the international price of rice. Indeed, global rice trade also declined by 12.6 per cent in 2008. Headey (2011) argued that India was almost solely responsible for the decline in global rice exports in 2007-2008.

Moreover, other countries, including Bangladesh, Vietnam, Cambodia, Nepal, Madagascar, Brazil and Egypt followed India's lead in banning rice exports. Thailand imposed export ban in July 2008. A number of countries including Russia and Pakistan imposed or raised export duty on foodgrains. Ahmed (2010) argued that impositions of export restrictions and bans by India and China on rice, and by Argentina, Kazakhstan, Pakistan and Russia on wheat restricted global supply of foodgrains and created supply shortages. Actions by the Philippines, the largest importer of rice, further aggravated the problem. The government of the Philippines arranged large tenders to obtain needed rice imports against this background of shrinking traded supplies which created panic in the global rice market. Moreover rice importing countries tried to secure foodgrain availability by rush buying from the available rice exporters at a time when their traditional sources imposed restriction (Dollive 2008). Slayton (2009) argued that rice prices were directly influenced by restrictions and speculative buying by countries like the Philippines. Indeed, the global rice market lost respective trusts and led to the worse outcomes in the form of 'self-reinforcing price spiral' (Brahmbhatt and Christiaensen 2008). It needs to be considered that global rice production did not face any disruption during this period. In 2007, global production of rice increased by 2.5 per cent and while in 2008 rice production increased by 4.9 per cent (Figure 4).

Price of rice in the domestic market of Bangladesh was increasing since 2000. However, from July 2000 to January 2003, the increases in rice prices were relatively lower. During February 2003 and June 2007, rice prices increased at a faster pace. In July 2007, rice prices started to increase rapidly. The retail price of coarse rice reached the record high level of Tk. 34.6 per kg in April 2008 (Figure 5).

Figure 4: Growth in Global Rice Production: 2004-2008



Source: Based on the data from Food and Agriculture Organization of the United Nations (FAO).

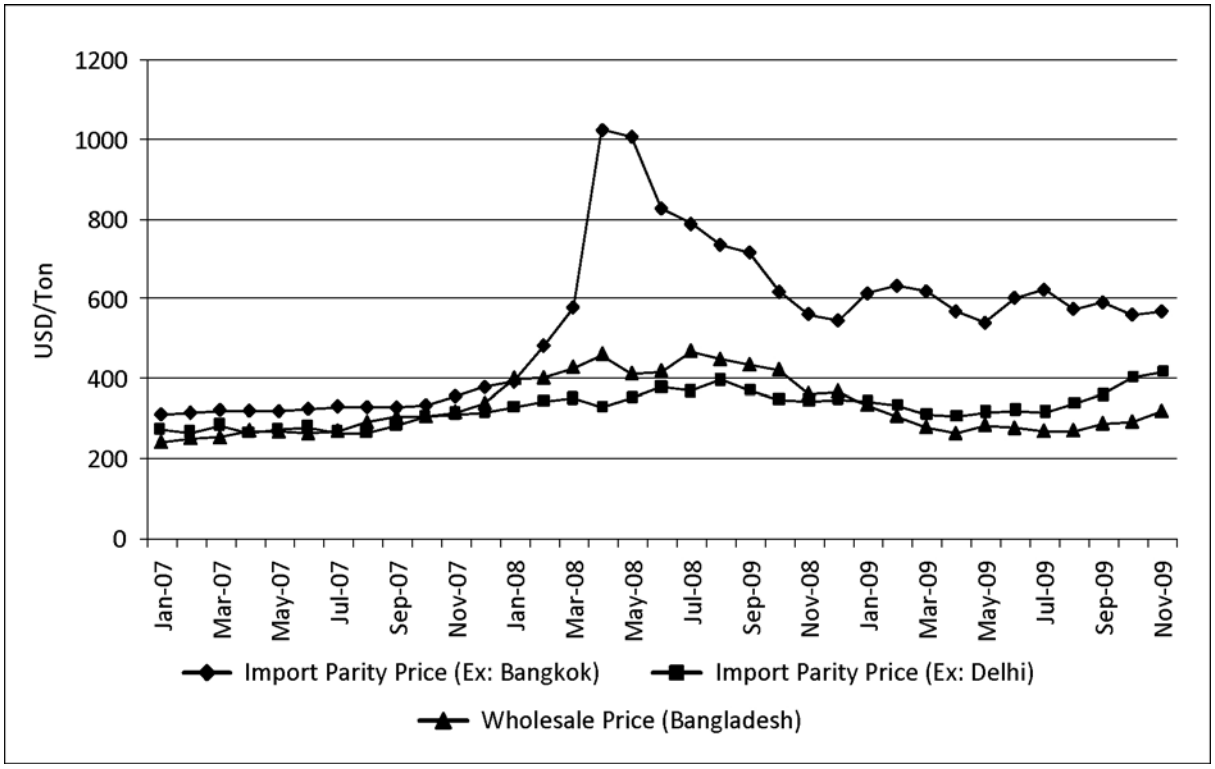
Figure 5: Monthly Wholesale and Retail Prices of Coarse Rice: 2007-2009

Source: Monthly Statistical Bulletin, Bangladesh Bureau of Statistics (BBS) and Department of Agricultural Marketing (DAM).

A comparison of rice prices in Bangladesh with import parity price of Thailand since 2007 suggested that domestic rice price in Bangladesh was always lower (Figure 6). In 2008, price of rice from Thailand remained well above the domestic price of Bangladesh. In contrast during this period, the price of rice in India was below Bangladesh's price, but remained

irrelevant due to export ban. Thus, it is clear that even if Bangladesh was able to import from the international market during that period, it would have to be at a higher cost than respective domestic price.

Figure 6: Comparison of Export Parity Prices and Domestic Wholesale Price of Rice in Bangladesh: 2007-2009



Source: Department of Agricultural Marketing (DAM), Bangladesh; Thailand Rice Exporters Association, Thailand; and Ministry of Consumer Affairs, Food and Public Distribution, Government of India.

In 2007-2008, Bangladesh faced two consecutive floods and a devastating cyclone which caused significant damage to the production of rice. As a consequence, the food deficit in this particular period was more acute than what would have been generally experienced. It was naturally expected that the imported rice from India would help bridge the deficit in Bangladesh, as was the case after the floods in 1998 and 2004 (Rahman *et al*. 2008). However, it was not so. Moreover, as mentioned earlier, policies pursued by India, to some extent, influenced the rising international rice prices. Prices of rice increased in Bangladesh as a consequence. Rahman *et al*. (2008) also argued that the domestic price of rice in Bangladesh increased sharply with the announcement of MEP by India.

4. RICE POLICY OF INDIA AND BANGLADESH

India was a rice importing country during the 1960s. The green revolution, based on high-yielding varieties (HYVs) of wheat and rice and the use of fertilisers and irrigation, was started during mid-1960s in India. Consequently, by early 1980s India achieved self-sufficiency in foodgrains production (Janaiah *et al.* 2006). The Food Corporation of India (FCI) and the Agricultural Prices Commission (APC) were also set up during mid-1960s to provide incentives to farmers by providing minimum support prices, and to ensure food

security for the both urban and rural poor. India was successful in adopting new technologies which contributed to the high growth in rice production (Acharya 2001). Agricultural research, extension, inputs delivery, credit, marketing, price support and spread of technology were prioritised by the subsequent policymakers (Rao 1996). The Government of India also provided substantial amount subsidies for agricultural inputs. According to Chand and Pandey (2008), subsidies for fertiliser almost doubled in real terms, between 1990 and 2005. Trade liberalisation measures started in India in the late 1980s, but foodgrains exports were restricted through licensing. By early 2000s, India had a huge buffer stock which forced the country to export both rice and wheat at a subsidised rate equivalent to half of the economic cost (Chand and Kumar 2006). Nevertheless, India regularly maintained a large buffer stock. Chand (2003) estimated that in the late 1980s, the Indian government procured 10-15 per cent of total rice output in the country and 15-22 per cent of total wheat production.

Bangladesh agricultural and trade policies for rice had undergone numerous changes during the past decades. Bangladesh achieved a major milestone at the end of the 1990s by approaching the critical point of demand-supply balance with regard to rice (Deb 2002; Hossain and Deb 2009). There is no denying that Bangladesh has achieved an impressive success in terms of rice production. On an average, during the last decade, production of rice experienced a growth of about 4 per cent per annum. The growth in rice production was attributed mainly to adoption of HYVs of rice. At present, almost three-fourths of the cultivated rice varieties are high-yield. Indeed, currently the farmers from the deep-flooded areas of depressed basins and the salinity-affected coastal areas only grow low-yield traditional rice varieties. Since independence, almost 90 per cent of the growth in rice production attributed to increases in yield. The dry season-irrigated Boro rice alone contributed to over 80 per cent of the increased production which now accounts for over 55 per cent of the total rice production in Bangladesh (Hossain *et al*. 2006). However, to meet demand and replenish the food stock, Bangladesh needs to import foodgrains, in varying amounts. On average, over 8 per cent of the total foodgrains supply in the domestic market of Bangladesh has been secured from imports during the recent decade. In FY2007-08, the share of imports in available foodgrains (rice and wheat) was only 9.7 per cent (Table 2). To facilitate the import of rice, tariff rates in Bangladesh on these items were brought down quite radically over the last two decades; from 31.25 per cent in FY1991-92 to 13.5 per cent in FY2001-02. The import duty on rice import was zero during 2007-2008.

Table 2: Share of Foodgrain Sources

(in Per cent)

Year	Domestic Production	Imports	Food Aid
FY2000	92.2	4.6	3.2
FY2001	94.6	3.8	1.7
FY2002	93.5	4.7	1.8
FY2003	89.3	9.9	0.8
FY2004	90.8	8.3	0.9
FY2005	88.6	10.4	1.0
FY2006	91.4	7.9	0.7
FY2007	92.1	7.6	0.3
FY2008	89.6	9.7	0.8
FY2009	91.4	8.2	0.4

Source: Authors' calculation based on the Bangladesh Bureau of Statistics (BBS) data.

At the aggregate level, foodgrain availability has improved in Bangladesh over the years. The growth rate of overall foodgrain production has been generally higher than the population growth rate of Bangladesh since 1971-72 (Begum and D'Haese 2010). Food availability on a per capita basis has increased from 453 gm/day in 1991-92 to 666 gm/day in 2010-11, an increase of 47 per cent over the period (Rahman and Iqbal 2012). According to the estimates by this study, Bangladesh enjoyed being a net food surplus country since 2000.

Deb *et al*. (2009) argued that India was the preferred source of rice imports for Bangladesh for a number of reasons: "(a) it is quicker and cheaper to bring rice from India; (b) it is possible for importers to bring in small quantities of rice by road; and (c) India exports parboiled rice, which is preferred by most Bangladeshis." Hence, Bangladesh's rice market is influenced by Indian policies. During 2001-2003, the Government of India exported rice at a highly subsidised price, known as Below Poverty Line (BPL) price (Dorosh and Rashid 2012; Hossain and Deb 2003). Indeed, India's wholesale prices of rice rose in the early 2000s and made private sector exports to Bangladesh (sourced from Indian open markets) unprofitable (Dorosh and Rashid 2012). As mentioned earlier, during this period, India accumulated a large public stock of rice and wheat, reaching to 65 million tonnes in the summer of 2001, due to a series of good harvests and relatively high procurement prices (Rashid *et al*. 2007). In order to reduce some of these stocks, the Government of India implemented a programme in 2002-2003 to subsidise exports of rice. At that time, the FCI provided rice stocks to private exporters at the subsidised rate of USD 127 per ton (milled rice) compared to an economic cost of USD 253 (Deb *et al*. 2009). This stock of rice was dumped on the Bangladeshi market and rice imports by Bangladesh increased significantly. These exports of 31 million tonnes of rice and wheat at subsidised prices from 2000 to 2004 helped FCI to reduce its stock to 21.7 million tonnes in 2005. This stock remained at approximately this level until 2007 (del Ninno *et al*. 2007). Dorosh and Rashid (2012) showed that Bangladesh domestic prices were close to the import parity based on BPL prices as opposed to import parity based on India's wholesale market prices. In March 2003, the Government of India imposed a ban on the export of rice to Bangladesh, for domestic reasons. In October 2003, the ban was lifted but the price of rice sold by the FCI to the exporters was increased. Until 2006-2007, Bangladesh continued to import Indian subsidised rice, and prices in the domestic market also remained largely in line with import parity based on BPL price. Indeed, this helped Bangladesh to maintain a higher degree of price stability in rice market (Dorosh and Rashid 2012). Regrettably, the stability was disrupted as India banned rice export in view of rise in international prices and relatively low public stock of wheat (Slayton 2009; Dorosh 2008; Dorosh 2009). Deb *et al*. (2009) argued that rice trading policy of India is largely influenced by their domestic policies and cannot be termed dependable. A more recent study also found that monthly rice prices for India and Bangladesh held a significant correlation, implying that these prices tend to move closely together (World Bank 2011).

5. WELFARE IMPACT OF RICE PRICE RISE: REVIEW OF LITERATURE

The price hike during 2007-2008 adversely affected the real income and poverty situation in low-income countries around the world. The world rice market turmoil of 2007-2008 also led to substantial surges in domestic rice prices in many countries around the world, and the poor people faced substantial adverse impacts (Dawe and Slayton 2010). Zezza *et al*. (2008) found that in the short-term, poorer households and households with limited asset

endowments and access to agricultural inputs were the most affected during the price shock of 2007-2008. In Asia 1.2 billion poor people who spend about 60 per cent of their income on food became vulnerable (ADB 2008). James *et al*. (2008) reported that an increase in food prices in the Philippines by 10 per cent, 20 per cent and 30 per cent can push an additional 2.72 million, 5.65 million and 8.85 million people respectively below the poverty line. The study also found that in Pakistan, a 10 per cent increase in food prices would result in an additional 7.05 million poor people. In the cases of 20 per cent and 30 per cent increase in food prices, the increment in the number of poor people in Pakistan would be 14.67 million and 21.96 million respectively. Ivanic and Martin (2008) estimated the impact of increases in food prices on poverty in nine low-income countries (Bolivia, Cambodia, Madagascar, Malawi, Nicaragua, Pakistan, Peru, Vietnam and Zambia) over the period from 2005 to 2007. The study concluded that both the extent in terms of headcount ratio and severity in poverty in terms of the poverty gap increased as a result of increases in global food prices. According to the estimates of the study, national poverty rates in these nine countries registered an increase of 4.5 percentage points. Based on these results, Ivanic and Martin (2008) further argued that 105 million additional people moved below poverty line in the low-income countries which was equivalent to seven years of poverty reduction. FAO (2008b) estimated that, the number of undernourished people in 2007 increased by 75 million, over and above 848 million undernourished, attributed to higher food prices, of whom 907 million live in the developing countries. Estimates from Wodon and Zaman (2008) suggested that in West and Central Africa poverty rate increased by 4.4 per cent as a result of increase in the price of cereals.

A review of the available literature on the impacts of the 2007-2008 price increase in Bangladesh indicates that the poverty and food insecurity situations worsened. There were differences with regard to the extent, nevertheless, all studies found a deteriorated situation in 2007 and 2008 in Bangladesh. Rahman *et al*. (2008) estimated the income erosion arising from rice price hike. According to their estimates, the poor faced a 63 per cent erosion of total income (expenditure) during the food price crisis due to increase in domestic price of rice. Bayes and Hossain (2008) carried out a survey in 62 villages in 57 districts to examine the poverty situation in rural Bangladesh in face of the price hike of essentials including rice. Based on the survey results, the study estimated that the poverty rate in Bangladesh increased by 3.6 percentage points, to 46.9 per cent in 2007 from 43.3 per cent in 2004. The survey further reported that 37 per cent among the landless households and 37 per cent of the land-owning households found a deterioration in their economic situation in 2007-2008 compared to the previous year. The study, however, did not report the extent of decrease in income or deterioration in the economic situation of the sample households. As regards the factors responsible for the decrease in income, 71 per cent of the landless households mentioned unfavourable prices as the reason. Indeed, average rice equivalent agricultural wage in Bangladesh declined to about 4.6 kg per day in July-December 2007, which was about 5.9 kg rice in 2006-07 (Deb 2011).

Raihan *et al*. (2008) updated the data on household income and poverty lines and estimated the poverty for the years 2006, 2007 and 2008. According to the study, headcount poverty declined from 40 per cent in FY2004-05 to 39.38 per cent in FY2005-06, but increased by 2.14 percentage points in FY2006-07 (to 41.52 per cent), and increased further by 4.34 per cent in FY2007-08. As a result, in the middle of 2008 the poverty headcount ratio stood at

45.86 per cent. It implies around 6.5 percentage points increase in poverty rate occurred due to food price hike in 2007-2008. World Bank (2008) used the poverty elasticity of growth and argued that between 2005 and March 2008, the rate of poverty in Bangladesh was expected to reduce by 5 percentage points as a result of economic growth. However, due food price shocks coupled with natural disasters, poverty alleviated by only 2 percentage points. This implies about four million people failed to come out of poverty. Thus, according to the World Bank (2008) estimate, about 38 per cent of the population of Bangladesh was living below the poverty line in 2008. The study further argued that the price of rice alone eroded nearly 20 per cent of the income of poor households.

World Bank (2010) revealed that in South Asia most households, including those situated in rural areas, were net buyers of food, and likely to suffer welfare losses from increases in food prices. According to the estimates, around 70-80 per cent of rural households in the region were net buyers of the main grain/staple foodgrain. For example, in Bangladesh and Nepal respectively, about 80 per cent and 70 per cent of households are net buyers of rice; while in Pakistan 77 per cent of households are net buyers of wheat. Hossain and Bayes (2009) found that only about 4 per cent of rural households had a net surplus of foodgrains in Bangladesh. According to simulations carried out by World Bank (2010), a 50 per cent increase in the price of rice could raise the national poverty rate in Bangladesh by about 6 percentage points; whilst a 40 per cent increase in the wheat price in Pakistan could cause a 2 percentage point increase in their national poverty. Simulation result for Nepal suggested that a 20 per cent increase in food prices could lead only 0.5 percentage points increase in poverty rate. Vishwanath and Serajuddin (2010) estimated increases in poverty headcount ration across four South Asian countries. According to their estimates, poverty rate increased by 4.6 percentage points in Bangladesh due to increase in price of essentials. The increase in poverty rate for Sri Lanka was even higher, 5.2 percentage points. The increase in poverty rates in Pakistan and Nepal were 3.2 percentage points and 1.6 percentage points respectively.

According to FAO/WFP (2008), as a result of rising food prices, the number of food-insecure people in Bangladesh increased by 7.5 million. Consequently, the total food insecure population in Bangladesh reached to 65.3 million in 2008. The study also revealed that 45 per cent of Bangladesh's total population was food-insecure, i.e. consumed less than 2122 kcal per day. At the same time nearly 23.9 per cent people in the country was severely food-insecure, i.e. consumed less than 1805 kcal per day. The study further reported that 92 per cent of the new food-insecure are amongst the more severely food-insecure.

6. IMPACT OF INDIA'S RICE EXPORT BAN ON BANGLADESH: SIMULATION EXERCISES USING THE CGE MODELS

In the GTAP framework, this study runs a simulation where the import of rice from India to Bangladesh is made zero (in line with the scenario of banning of export of rice from India to Bangladesh). Table 3 shows the welfare effects of such a scenario. It appears that Bangladesh would incur a welfare loss due to such ban. Also, there would be a welfare loss for India.

Table 3: Welfare Effects of the Rice Export Ban by India (Equivalent Variation in Million USD)

Country/Region	Welfare
Bangladesh	-119.38
India	-65.76
Nepal	0.35
Pakistan	15.13
Sri Lanka	1.06
Rest of South Asia	0.12
USA	-9.09
EU_25	-4.15
Rest of the World	0.72

Source: GTAP Simulation Results.
Note: USA: United States of America; EU: European Union.

The GTAP simulation results also show that such export ban would lead to rise in import price of rice by 158.02 per cent in Bangladesh (Table 4). However, since import constitutes a very low share in domestic supply of rice, such a scenario would result in domestic market price of rice to be increased by 2.28 per cent.

Table 4: Impact on Rice Prices (Per cent Change from Base)

Commodity	Import Price	Market Price
Rice	158.02	2.28

Source: GTAP Simulation Results.

The GTAP simulation result is linked to the Bangladesh CGE model by introducing a shock on the import price of rice by 158.02 per cent. The macroeconomic impacts of the simulation in the Bangladesh CGE model are reported in Table 5. Real gross domestic product (GDP), total exports and total imports would fall, whereas Consumer Price Index (CPI) would rise, real GDP would fall by 0.01 per cent. Total exports and import would fall by 0.34 per cent and 0.18 per cent respectively. Finally, CPI would increase by 0.29 per cent.

Table 5: Impacts on Macro Variables (Per cent Change from Base)

Component	Per cent Change
Real GDP	-0.01
Total Export	-0.34
Total Import	-0.18
Consumer Price Index (CPI)	0.29

Source: Simulation using the Bangladesh CGE Model.

The sectoral impacts of the CGE simulation are reported in Table 6. The rise in import price of rice by 158.02 per cent would lead to reduction in import of rice by 59.49 per cent. It will, however, have some very small positive effects on domestic rice production. In general, such a scenario would lead to overall negative effects on the economy.

Table 6: Impacts on Sectoral Production, Export and Import (Per cent Change from Base)

Sector	O	E	M
Cereal crops	0.47	-0.09	1.08
Commercial crops	-0.24	-0.52	0.41
Livestock rearing	-0.01	-0.28	0.46
Poultry rearing	-0.02	-0.30	0.47
Fishing	-0.04	-0.27	0.43
Forestry	0.04	-0.09	1.08
Agriculture	0.10	-0.32	-4.60
Rice milling	0.60	0.05	-59.49
Grain milling	0.00	-0.28	0.47
Food process	-0.04	-0.23	0.29
Leather industry	-0.10	-0.25	0.36
Jute and yarn	-0.60	-0.54	-0.24
Cloth milling	-0.16	-0.26	0.17
RMG	-0.36	-0.36	0.15
Knitting	-0.34	-0.37	0.47
Toiletries	-0.14	-0.19	0.10
Cigarette industry	0.03	-0.15	0.36
Furniture industry	-0.17	-0.25	0.21
Paper, printing and publishing industry	-0.19	-0.26	0.12
Pharmaceuticals	0.01	-0.14	0.29
Fertiliser industry	-0.18	-0.28	0.31
Petroleum	-0.11	-0.14	0.06
Chemical industry	-0.24	-0.28	0.06
Glass industry	-0.07	-0.22	0.29
Earth-ware and clay industry	0.01	-0.18	0.36
Cement	0.06	-0.15	0.41
Metal	-0.04	-0.20	0.31
Miscellaneous industry	-0.16	-0.27	0.26
Mining and quarrying	0.03	-0.18	0.40
Industry	0.02	-0.35	0.18
Construction	0.08	-	-
Electricity and water generation	0.02	-	-
Gas extraction and distribution	-0.01	-	-
Wholesale and retail trade	-0.01	-	-
Transport	-0.06	-0.22	0.28
Health service	-0.03	-	-
Education service	-0.07	-	-
Public administration and defence	-0.21	-0.29	0.14
Bank insurance and real estate	-0.04	-0.20	0.29
Hotel and restaurant	-0.02	-	-
Communication	-0.06	-0.21	0.28
IT and e-commerce	-0.11	-0.24	0.31
Other services	-0.01	-0.21	0.35
Services	-0.01	-0.34	-0.13
Total	0.02	-0.34	-0.20

Note: O = Production; E = Export; M = Import; '-' = Not applicable.
Source: Simulation using the Bangladesh CGE Model.

The impacts on households' real consumption are reported in Table 7. Except rural large farmers, all household categories would experience fall in real consumption. The largest per cent fall in real consumption would be incurred by the rural non-farm households, followed by rural landless and marginal farmers.

Table 7: Effect on Real Consumption (Per cent Change from the Base Year)

Household	Real Consumption
Rural landless	-0.05
Rural marginal farmer	-0.05
Rural small farmer	-0.03
Rural large farmer	0.01
Rural non-farm	-0.06
Urban low educated	-0.01
Urban high educated	-0.04

Source: Simulation using the Bangladesh CGE Model.

7. SENSITIVITY ANALYSIS

The results of the sensitivity analysis of the GTAP simulation are presented in Tables 8-12. In the sensitivity analysis two additional simulations are conducted considering the Armington CES elasticity for domestic/imported allocation to be increased and decreased by 50 per cent. This analysis suggests that the direction of the results remain unchanged, though the magnitude of the results changed depending on the values of the elasticities. Table 8 suggests that the welfare loss of Bangladesh would be in the range of USD 73 million and USD 166 million. The welfare loss of India would be in the range of USD 50 million and USD 81 million. Table 9 suggests that the import price of rice in Bangladesh would increase in the range of 90 per cent and 226 per cent. The resultant market price of rice would have an increase in the range of 1.92 per cent and 2.64 per cent. Table 10 shows that the impacts on major macro indicators are consistent across different elasticity values. Table 11 indicates that the fall in import of rice in Bangladesh would be in the range of 34 per cent and 85 per cent. Table 12 also suggests that at the household level the impacts are consistent across different elasticity values.

Table 8: Results of Sensitivity Analysis: Welfare Effects of the Rice Export Ban by India (Equivalent Variation in Million USD)

Country/Region	50% Increase in Original Elasticity Value	Original Elasticity Value	50% Reduction in Original Elasticity Value
Bangladesh	-73.12	-119.38	-165.64
India	-50.25	-65.76	-81.27
Nepal	0.46	0.35	0.24
Pakistan	23.85	15.13	6.41
Sri Lanka	1.41	1.06	0.71
Rest of South Asia	0.16	0.12	0.08
USA	-4.18	-9.09	-14.00
EU_25	1.83	-4.15	-10.13
Rest of the World	1.74	0.72	-0.30

Source: GTAP Simulation and Sensitivity Analysis.

Table 9: Results of Sensitivity Analysis: Impact on Rice Prices (Per cent Change from Base)

Commodity	50% Increase in Original Elasticity Value		Original Elasticity Value		50% Reduction in Original Elasticity Value	
	Import Price	Market Price	Import Price	Market Price	Import Price	Market Price
Rice	89.68	1.92	158.02	2.28	226.36	2.64

Source: GTAP Simulation and Sensitivity Analysis.

Table 10: Results of Sensitivity Analysis: Impacts on Macro Variables (Per cent Change from Base)

Component	50% Increase in Original Elasticity Value	Original Elasticity Value	50% Reduction in Original Elasticity Value
Real GDP	-0.01	-0.01	-0.01
Total Export	-0.19	-0.34	-0.49
Total Import	-0.10	-0.18	-0.26
Consumer Price Index (CPI)	0.16	0.29	0.42

Source: Simulation using the Bangladesh CGE Model and Sensitivity Analysis.

Table 11: Results of Sensitivity Analysis: Impacts on Sectoral Production, Export and Import (Per cent Change from Base)

Sector	50% Increase in Original Elasticity Value			Original Elasticity Value			50% Reduction in Original Elasticity Value		
	O	E	M	O	E	M	O	E	M
Cereal crops	0.27	-0.05	0.61	0.47	-0.09	1.08	0.67	-0.13	1.55
Commercial crops	-0.14	-0.30	0.23	-0.24	-0.52	0.41	-0.34	-0.74	0.59
Livestock rearing	-0.01	-0.16	0.26	-0.01	-0.28	0.46	-0.01	-0.40	0.66
Poultry rearing	-0.01	-0.17	0.27	-0.02	-0.30	0.47	-0.03	-0.43	0.67
Fishing	-0.02	-0.15	0.24	-0.04	-0.27	0.43	-0.06	-0.39	0.62
Forestry	0.02	-0.05	0.61	0.04	-0.09	1.08	0.06	-0.13	1.55
Agriculture	0.06	-0.18	-2.61	0.10	-0.32	-4.60	0.14	-0.46	-6.59
Rice milling	0.34	0.03	-33.76	0.60	0.05	-59.49	0.86	0.07	-85.22
Grain milling	0.00	-0.16	0.27	0.00	-0.28	0.47	0.00	-0.40	0.67
Food process	-0.02	-0.13	0.16	-0.04	-0.23	0.29	-0.06	-0.33	0.42
Leather industry	-0.06	-0.14	0.20	-0.10	-0.25	0.36	-0.14	-0.36	0.52
Jute and yarn	-0.34	-0.31	-0.14	-0.60	-0.54	-0.24	-0.86	-0.77	-0.34
Cloth milling	-0.09	-0.15	0.10	-0.16	-0.26	0.17	-0.23	-0.37	0.24
RMG	-0.20	-0.20	0.09	-0.36	-0.36	0.15	-0.52	-0.52	0.21
Knitting	-0.19	-0.21	0.27	-0.34	-0.37	0.47	-0.49	-0.53	0.67
Toiletries	-0.08	-0.11	0.06	-0.14	-0.19	0.10	-0.20	-0.27	0.14
Cigarette industry	0.02	-0.09	0.20	0.03	-0.15	0.36	0.04	-0.21	0.52
Furniture industry	-0.10	-0.14	0.12	-0.17	-0.25	0.21	-0.24	-0.36	0.30
Paper, printing and publishing industry	-0.11	-0.15	0.07	-0.19	-0.26	0.12	-0.27	-0.37	0.17
Pharmaceuticals	0.01	-0.08	0.16	0.01	-0.14	0.29	0.01	-0.20	0.42
Fertiliser industry	-0.10	-0.16	0.18	-0.18	-0.28	0.31	-0.26	-0.40	0.44
Petroleum	-0.06	-0.08	0.03	-0.11	-0.14	0.06	-0.16	-0.20	0.09
Chemical industry	-0.14	-0.16	0.03	-0.24	-0.28	0.06	-0.34	-0.40	0.09
Glass industry	-0.04	-0.12	0.16	-0.07	-0.22	0.29	-0.10	-0.32	0.42
Earth-ware and clay industry	0.01	-0.10	0.20	0.01	-0.18	0.36	0.01	-0.26	0.52
Cement	0.03	-0.09	0.23	0.06	-0.15	0.41	0.09	-0.21	0.59
Metal	-0.02	-0.11	0.18	-0.04	-0.20	0.31	-0.06	-0.29	0.44
Miscellaneous industry	-0.09	-0.15	0.15	-0.16	-0.27	0.26	-0.23	-0.39	0.37
Mining and quarrying	0.02	-0.10	0.23	0.03	-0.18	0.40	0.04	-0.26	0.57
Industry	0.01	-0.20	0.10	0.02	-0.35	0.18	0.03	-0.50	0.26
Construction	0.05	-	-	0.08	-	-	0.11	-	-
Electricity and water generation	0.01	-	-	0.02	-	-	0.03	-	-
Gas extraction and distribution	-0.01	-	-	-0.01	-	-	-0.01	-	-
Wholesale and retail trade	-0.01	-	-	-0.01	-	-	-0.01	-	-
Transport	-0.03	-0.12	0.16	-0.06	-0.22	0.28	-0.09	-0.32	0.40
Health service	-0.02	-	-	-0.03	-	-	-0.04	-	-
Education service	-0.04	-	-	-0.07	-	-	-0.10	-	-

(Table 11 contd.)

(Table 11 contd.)

Sector	50% Increase in Original Elasticity Value			Original Elasticity Value			50% Reduction in Original Elasticity Value		
	O	E	M	O	E	M	O	E	M
Public administration and defence	-0.12	-0.16	0.08	-0.21	-0.29	0.14	-0.30	-0.42	0.20
Bank insurance and real estate	-0.02	-0.11	0.16	-0.04	-0.20	0.29	-0.06	-0.29	0.42
Hotel and restaurant	-0.01	-	-	-0.02	-	-	-0.03	-	-
Communication	-0.03	-0.12	0.16	-0.06	-0.21	0.28	-0.09	-0.30	0.40
IT and e-commerce	-0.06	-0.14	0.18	-0.11	-0.24	0.31	-0.16	-0.34	0.44
Other services	-0.01	-0.12	0.20	-0.01	-0.21	0.35	-0.01	-0.30	0.50
Services	-0.01	-0.19	-0.07	-0.01	-0.34	-0.13	-0.01	-0.49	-0.19
Total	0.01	-0.19	-0.11	0.02	-0.34	-0.20	0.03	-0.49	-0.29

Note: O = Production; E = Export; M = Import; '-' = Not applicable.
Source: Simulation using the Bangladesh CGE Model and Sensitivity Analysis.

Table 12: Results of Sensitivity Analysis: Effect on Real Consumption (Per cent Change from the Base Year)

Household	50% Increase in Original Elasticity Value	Original Elasticity Value	50% Reduction in Original Elasticity Value
Rural landless	-0.03	-0.05	-0.07
Rural marginal farmer	-0.03	-0.05	-0.07
Rural small farmer	-0.02	-0.03	-0.04
Rural large farmer	0.01	0.01	0.01
Rural non-farm	-0.03	-0.06	-0.09
Urban low educated	-0.01	-0.01	-0.01
Urban high educated	-0.02	-0.04	-0.06

Source: Simulation using the Bangladesh CGE Model and Sensitivity Analysis.

8. CONCLUSION

The present study has explored the impact of Indian rice export policies (during 2007-2008) on domestic rice price in Bangladesh. Using the general equilibrium modelling framework, the study suggests that there were negative impacts on Bangladesh in terms of loss of welfare, decline in real GDP, decline in exports and imports, and rise in the CPI. However, the margins of direct impacts were rather small. Also, majority of the households in the rural and urban areas experienced some fall in real consumption. This is a reflection of the fact that in recent years, Bangladesh has become less dependent on import of rice, and therefore, such actions taken by India had little direct effect in determining the domestic price in Bangladesh.

The study also finds that India, historically the primary source of imported rice for Bangladesh, can no longer be considered dependable. The imported rice from India significantly helped Bangladesh to counter the production and price shocks in past, particularly during 1998 and 2004. Regrettably, it did not happen in 2007 and 2008. Indeed, the pledged rice export from India under the government-to-government initiative was not realised.

Nevertheless, Bangladesh experienced significant rises in food prices, especially of rice, during 2007 and 2008. There are several explanations for the food price hike during that period. Some of them were domestic, and some were related to the effects generated at the global level. CPD (2012) has identified four broad sources of increased commodity prices – cost-push, demand-pull, structural and future expectation. Raihan (2013) also identified several domestic factors which contributed to the rice price hike. Bangladesh had been one of the high-growth performing economies over the last ten years. The high growth rate of per capita GDP contributed to a demand-pull inflation. Bangladesh was experiencing a steady rise in remittance inflow until the mid-2000s. In 2006-07, the growth of remittances was 24.5 per cent. Such inflow had also contributed to some demand-pull inflation in Bangladesh. Furthermore, the Bangladesh government increased administered prices of petroleum products in April 2007 in order to make domestic prices of fuel closer to the international market prices. Though fuel constitutes a very small share in the basket of commodities used for calculation of the CPI, rise in fuel prices had some spillover effects on the prices of commodities by rising cost through two major channels: higher cost for irrigation, which raised the cost of rice production; and higher cost of transportation from farm-gate to market, which again raised the price of rice. It is also argued that though there were no concrete evidences of established syndicates in the markets of essential commodities taking advantage of the weak consumer protection laws, there were some short-term alliances among the suppliers of these goods to influence over supply and prices in order to make windfall gains. This might have some impact on the rising price of rice. Anecdotal evidence suggests that some business people had been cautious in pursuing general business practices when there was anti-corruption drive during the Caretaker Government regime of 2007 and 2008. Furthermore, some of the informal marketplaces, both in rural and urban areas, were disrupted because of significant legal measures deployed at that time. Such actions resulted in disruption in the 'established' supply chains, which exacerbated the inflationary trend. More importantly, there was a declining trend of growth in agriculture over time, especially of the crops sector in Bangladesh. This resulted in less production relative to the domestic demand. The slower growth in agriculture, and particularly for the crops sector, was due to failures in the timely supply of fertiliser, seed and pesticide to the farmers, increased cost of irrigation because of rise in diesel price, and the decline in the availability of cultivable land because of population growth and rehabilitation. As was mentioned, severe natural calamities during July-August 2007 also exacerbated the situation. Additionally, it is also important to recall that following India's lead, when a number of countries were imposing ban on foodgrains exports, a future price increase was also expected by the market players. Combining all these factors along with the Indian rice policy contributed to the significant rise in the domestic retail price of rice during 2007-2008.

From the policy perspective the present paper puts forward two recommendations – *first*, India should no longer be considered as the only reliable source of rice supplier for Bangladesh during global crisis period, and that Bangladesh should think about diversifying her rice import sources; and *second*, policymakers of Bangladesh will need to address domestic factors which undermine the national food security by raising commodity prices abnormally in the domestic market.

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