

Agricultural trade liberalisation and price volatility in Bangladesh and Tanzania: a comparative analysis



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ABSTRACT

This paper examines the impacts of agricultural trade liberalisation on the welfare of smallholder farmers in Bangladesh and Tanzania. Using secondary data for the pre and postliberalisation periods for two main agricultural crops from Bangladesh (rice) and Tanzania (maize) we analysed the correlation between domestic and international prices of rice and maize to investigate impacts of agricultural trade liberalisation on price stability/volatility and food security with a view to analysing the economic benefits of trade liberalisation for smallholder farmers. To understand price volatility, we used the Huchet-Bourdon (2011) method to estimate the coefficient of variation of the level of prices (CV) and the corrected coefficient of variation (CCV). We found that the values of both CV and CCV for consumer price in the postliberalisation period were quite large, suggesting greater volatility of consumer price of both crops. We further found that productivity growth did not necessarily lead to income gains for smallholder farmers in either country due to price volatility and the lack of market integration. This study illustrates the contradictory outcomes of agricultural trade liberalisation. We recommend complementary policy interventions to achieve enhanced welfare outcomes from agricultural trade liberalisation.

Keywords: Agricultural trade liberalisation, Bangladesh, Tanzania, price volatility

1 INTRODUCTION

Agricultural productivity is one of the most significant indicators of economic growth in developing countries because of multifunctional roles of agriculture in food production, food security, income and employment generation, poverty reduction, supply of industrial raw materials and contribution to gross domestic product (GDP) (Anderson 2004:22; World Bank 2008:25).

Agricultural productivity also has important implications for economic multiplier effects through the development of non-farm sectors, macroeconomic stability through maintaining stable food prices and environmental protection (Anderson 2004:22; World Bank 2008:25). Furthermore, trade in agricultural products contributes to national, regional and international trade dynamics. Thus one of the key arguments for agricultural trade liberalisation is that trade restrictions limit the potential benefits for farmers to access regional and international markets, and obtain the greatest benefit for their products. Hence agricultural trade liberalisation has been presented as a key instrument for poverty eradication in many African and South Asian countries.

The purpose of this paper is to examine the impact of agricultural trade liberalisation in two least developed countries, Bangladesh and Tanzania, to test if the welfare gains postulated in theoretical analyses may be obtained in practice to create long-term sustainable welfare outcomes for smallholder farmers.

This paper is organised into six main sections. Following this introduction, section two provides a brief critical review of the theoretical arguments on agricultural trade liberalisation, focusing on the different perspectives on its impacts on poverty reduction and welfare enhancement. Section three examines the phases of the development of trade policy in Tanzania and Bangladesh, and the links between policy changes, agricultural productivity, consumption, exports and food security. Section four presents the methodology and data analysis of production, consumption and prices for rice and maize in Bangladesh and Tanzania respectively in the pre and post trade liberalisation periods. In section five we analyse the empirical evidence of the extent to which commodity price volatility affects the income of smallholder farmer households and the potential impacts on poverty and food security. Section six provides a brief conclusion highlighting the policy implications of agricultural trade liberalisation.

We selected Tanzania and Bangladesh for this comparative analysis for three main reasons. First, both countries are least developed countries as classified by the United Nations Conference on Trade and Development (UNCTAD 2013) as they are the targets of the World Bank, International Monetary Fund (IMF) and World Trade Organisation for agricultural trade liberalisation as an instrument of poverty eradication (IMF 2001). Secondly, both are predominantly dependent on agriculture in terms of employment of labour (Tanzania 80%, Bangladesh 45%) and agriculture is a major contributor to foreign exchange earnings and GDP (60% and 50% respectively for Tanzania) (Tanzania Agriculture Trade Information Centre 2013); while 80 percent of Bangladesh's export products in 2007–2008 were from cotton and jute-based manufactured garments (Ministry of Finance 2009); and both countries depend on one main crop (Bangladesh on rice and Tanzania on maize) for food security and regional and international trade. Thirdly, both countries started agricultural trade liberalisation about the same time in the mid-1980s.

We selected maize and rice for analysis because maize accounts for about 32 percent of the total food production in Tanzania, and about 75 percent of all cereal consumption, also because about 85 percent of Tanzania's population depends on maize as an income-generating commodity. In the case of Bangladesh, rice is a staple food for more than 80 percent of the population.

2 AGRICULTURAL TRADE LIBERALISATION, POVERTY REDUCTION AND WELFARE ENHANCEMENT

We adopted Eicher, Mutti and Turnovsky's (2009:144) definition of agricultural trade liberalisation as the process of removing tariffs, regulations and other instruments and barriers perceived to obstruct the free flow of agricultural products and services between trading areas. Theoretically the benefits of agricultural trade liberalisation include raising the welfare of smallholder farmers through income growth and enhanced living standards, and more equitable income distribution. These benefits are arguably delivered through market access, expanding the demand for goods and services of domestic firms, enabling firms to reach larger markets, gains from economies of scale, and increased economic growth rates due to short run gains from resource reallocation (Stone & Shepherd 2011:5; Zhang 2008:175). Although difficult to measure (Rodriguez 2007:11), the dynamic gains from agricultural trade liberalisation shift the production possibility frontier outward through facilitating access of domestic products to foreign markets.

The poverty reduction and welfare enhancement effects of the agricultural trade liberalisation-driven growth paradigm is predicated on arguments that increased agricultural productivity will directly and indirectly impact on the price of food for net buyers, generate employment in both farm and non-farm sectors, and enhance income and earnings potential through higher wages (Mosley & Chiripanhura 2009:751; Popli 2010:803). Furthermore, growth linkage with the non-farm sector may be realised through industrialisation led through agricultural demand (Adeoti & Sinh 2009:6; Islam & Habib 2007:4; Williams & Smith 2008:8).

However, agricultural trade liberalisation may also translate into lower commodity prices for labour-intensive smallholder farmers, resulting in lower welfare gains for smallholder households. It could reduce the wages of unskilled workers, thereby widening the income gap between rich and poor households (Acharya 2011:60; Falvey, Greenaway & Silva 2010:230; Keleman 2010:13).

Poverty reduction is not simply a function of productivity growth, but also depends on public policies relating to inequalities and the extent to which economic growth is pro-poor. Bezemer and Headey (2008) suggest that to ensure that productivity growth, improved farm income, higher employment and food prices lead to pro-poor outcomes, agricultural productivity per unit of labour must increase at a faster rate than that of labour in order to raise employment and rural wages, and the total factor productivity (TFP) in agriculture must increase faster than food prices decrease for farm profitability to rise and for poor consumers to benefit from lower food prices. Therefore, the net effect of agricultural trade liberalisation on poverty reduction and the welfare of rural households depends on the direction of price changes and how they affect domestic factor prices. If the price changes are pro-poor then they will tend to reinforce positive growth effects of agricultural trade reform on the poor (Susila & Bourgeois 2008:75). This is the critical fulcrum that determines the net positive-negative impact of agricultural trade liberalisation on poverty reduction.

Many developing countries adopted agricultural trade liberalisation and market reform measures in the mid-1980s in response to the reemergence of a market-oriented development paradigm based on neoclassical orthodoxy (Gingrich & Garber 2010:2; Rahman 2008:11). The primary

focus was to introduce market forces into national agricultural trade by reducing government control of agricultural input and output markets and lowering tariff and non-tariff barriers. A critical review of these paradigms for Bangladesh and Tanzania indicates that the expected outcomes to improve agricultural productivity, boost rural incomes and reduce poverty are at best mixed. Some of the challenges include the fluctuations and disparities in domestic and international market prices for key agricultural tradable products and diminishing export opportunities, competition between domestic producers and imports, and the lack of investment in rural infrastructure to enhance the multiplier effects on agriculture and achieve pro-poor growth.

Using output data for two main agricultural crops – maize for Tanzania and rice for Bangladesh – we critically examined the contradictory outcomes of agricultural trade liberalisation on the welfare of smallholder farmers. We argue that as most rural agricultural producers are subsistence smallholder farmers they lose both as net sellers in high seasons and as net buyers in low season. Therefore, income gains from trade liberalisation accrued more to medium and large farmers and also to intermediary syndicates than to smallholder farmers, thereby increasing the income gap between rich and poor households in rural areas. For trade liberalisation to achieve the theoretical outcome of poverty reduction and enhanced welfare, smallholder farmers should be able to sell their products at the best possible price in a stable and predictable market. We suggest that the discussion on trade liberalisation must move beyond debates around productivity-driven growth paradigms. Poverty reduction and welfare enhancement for smallholder farmers depends not only on increased productivity, but also on the direction of price changes and how they affect domestic factor prices. We examine the specific case of trade policy in Tanzania and Bangladesh in the following section.

3 AGRICULTURAL TRADE LIBERALISATION IN TANZANIA AND BANGLADESH

Tanzania's trade policy may be divided into three phases, the first being the 1960s to mid-1980s when government policy was based on inward-looking state socialism which sought self-sufficiency in food production. From the mid-1980s to the mid-1990s state reforms based on IMF and World Bank prescriptions introduced the process of trade liberalisation in 1986 as part of the overall national economic recovery programme and the economic and social action plan (ESAP). This phase was characterised by structural adjustment programmes which removed export taxes on export crops; liberated the domestic food market; and opened up import markets for agricultural inputs, machinery and technology. Phase three began in about 1996 when the new government entered into a new agreement with the IMF on a three-year ESAP and relationships with other donors to move forward with the economic and social reform process. Agricultural trade liberalisation progressed through the 1990s and was fully in place by 2000. The government trade policy objective was to provide 'ways and means of ensuring a viable and steady path towards competitive export-led growth which will fulfil the goal of poverty eradication' (Economic and Social Research Foundation 2010:26). Although there is general agreement amongst economic analysts that 'so far Tanzania has not been able to derive significant benefits from trade liberalisation as well as from globalisation as a whole, due to inadequate

supply and delivery capacity with low technology levels, insufficient physical and human capital and underdeveloped infrastructure' (Economic and Social Research Foundation 2010:26).

Similar to Tanzania, the Bangladesh trade liberalisation policy may be divided into three phases, the first being 1972–1980 characterised by severe agricultural trade controls on exports and imports, including non-tariff barriers (NTBs) and heavy duties, a fixed exchange rate system, massive nationalisation, price control and the control of agricultural inputs and marketing. Phase two was in the period 1981–1990 when agricultural trade liberalisation started with some relaxation of NTBs and tariff barriers, and the beginning of denationalisation, deregulation, the removal of price controls and significant liberalisation of agricultural input and output markets. During phase three in 1991–2002, the liberalisation of agricultural trade and investment was fully implemented with large-scale reductions of NTBs and average tariffs, shifts from fixed to flexible exchange rate system, and extensive privatisation of agricultural input procurement and distribution systems.

Following agricultural trade liberalisation, Tanzania's annual growth rate of maize production fluctuated between a high of 48.7 percent in 2008 a low of -38.9 percent in 2009. The total annual production fluctuated between 5 440 710 metric tonnes in 2008 and 1 485 000 metric tonnes in 1994. This was reflected in the actual cultivated land committed to maize production, which also fluctuated between a high of 3 982 000 hectares in 2010 and a low of 957 500 hectares in 1999 (see table 2). In the period between 1990 and 2010, the consumption of maize constantly exceeded officially reported annual production. Ironically, even in years where consumption outstripped production, small quantities of maize were still reportedly exported, such as in 1990–1991 (production 2 430 000 metric tonnes: consumption 2 636 000 metric tonnes, export 14 000 metric tonnes), 2006–2007 (production 3 373,000 metric tonnes: consumption 3 450 000 metric tonnes, export 50 000 metric tonnes), and 2008–2009 (production 3 634 000 metric tonnes: consumption 3 750 000 metric tonnes, export 15 000 metric tonnes). In 2007–2008, despite the international food price crisis that year, Tanzania still reportedly exported 50 000 metric tonnes of maize even though there was only a 10 000 metric tonne surplus of production over consumption and the institution of a 'crisis-induced export ban on maize' (Ahmed, Diffenbaugh, Hertel & Martin 2012:2). In fact, there are clear policy inconsistencies around maize export. The government lifted a longstanding ban on maize export around the same time that the East Africa Community was established in 1999 (Ahmed et al 2012:2). However, in 2003 the Ministry of Agriculture and Food Security imposed an export ban on maize by withdrawing export permits already issued to traders and suspending the issuance of new permits. This ban was lifted for a month in 2006 and then reimposed, before being lifted again in late 2010 (Ahmed et al 2012:2).

The policy fluctuations are not surprising in a country where agricultural productivity is so low that in many cases even basic staple food crop production cannot meet households' needs and least of all contribute to national food security (Runyoro 2006). Even in the postliberalisation period one Tanzanian farmer produces food only to feed two people compared with European Union farmers' 130 people (Masalawala 2010:9). In a country where the average household size was five persons, this means that the average smallholder farmer did not produce enough food to feed their family throughout the year.

4 METHODOLOGY AND DATA ANALYSIS

We used productivity, consumption and the price of rice and maize to measure economic benefits of trade liberalisation for smallholder farmers in Bangladesh and Tanzania. We analysed productivity, consumption and price data for the pre and postliberalisation periods to examine the relationship between productivity, consumption and price. We used price growth/stability as the dummy forewarning potential for smallholder farmers. We examined the correlation between domestic and international prices of rice and maize for pre and postliberalisation periods in Bangladesh and Tanzania respectively to estimate impacts of agricultural trade liberalisation on price stability/volatility and food security. Data on preliberalisation maize prices in Tanzania between 1981–1985 and 1999 was calculated from table 3.1 of the World Bank Country Study (World Bank 2000:27) and between 2003 and 2012 from the Regional Agricultural Trade Intelligence Network (RATIN). We calculated maize price per metric tonne by converting the price from per kilogram by multiplying by 1 000 and converted maize price from local currency to US dollars for international comparison. We used the exchange rate from table 4 of the Bank of Tanzania (2011). Similarly, we estimated maize price between 2000 and 2002 from table 3.1 of the World Bank's (2000) country study by applying a simple moving average technique. The objective was to estimate the divergence between domestic and international trade prices in rice and maize for the case study countries.

The empirical evidence of the extent to which commodity price volatility affected the income of smallholder farmer households and their vulnerability to poverty and food insecurity was estimated using the coefficient of variation of the level of prices (CV) and corrected coefficient of variation (CCV) as measured by Huchet-Bourdon (2011).

$$CV = \frac{\text{Standard deviation } (\sigma)}{\text{Mean } (\mu)} \times 100 = \frac{\sqrt{\frac{\sum_{i=1}^n (X_i - \mu)^2}{n}}}{\frac{\sum_{i=1}^n X_i}{n}} \times 100$$

$$CCV = CV \sqrt{(1 - R^2)}$$

where R^2 – also known as the coefficient of determination – measures the goodness of fit that shows how well the estimated regression line fits the actual data (Gujarati 2011:13).

These calculations require a time series commodity price to estimate the income uncertainty that may emanate from price and production volatility under different scenarios of exposure to domestic and international market shocks for single-community smallholder farmers. Statistical analyses of price volatility over the pre and postliberalisation periods for rice in Bangladesh and maize in Tanzania provide an indicative assessment of how price volatility over the study periods impacts poverty reduction and welfare of smallholder producers. We defined price volatility as high deviation from the mean. We used the coefficient of variation because it does not depend on the unit of measurement, especially as we were working with two products from two countries, albeit over similar time periods. Our analysis focused on historical volatility based on recorded prices in both pre and postliberalisation periods. For this analysis we used local currency to reduce the effects of the exchange rate as smallholder farmers trade in local markets and exchange products in local currency rather than in US dollars.

We also applied the comparison of means statistical technique to analyse means and equality of variance in order to determine whether the observed changes in price were statistically significant.

5 RESULTS ANALYSIS AND EMPIRICAL EVIDENCE

5.1 Descriptive statistics of data

Tables 1 and 2 suggest that data for both case study countries were very similar in both the pre and postliberalisation periods. The values of standard deviations for all variables were larger in the postliberalisation period than in the preliberalisation period, suggesting that data was dispersed away from the mean. The distribution of data was asymmetric, a deviation from a normal distribution.

Table 1: Descriptive statistics for rice in Bangladesh for the period 1975–2013

| | Preliberalisation (1975–1985) | | | | Postliberalisation (1986–2013) | | | |
|---------------------|-------------------------------|----------|-------|-------|--------------------------------|----------|-------|--------|
| | Mean | Std | Skew | Kurto | Mean | Std | Skew | Kurto |
| Land (000 ha) | 10 142.11 | 359.01 | -1.11 | 1.33 | 11 035.98 | 1 193.78 | 1.41 | 0.847 |
| Production (000 t) | 12 799.50 | 1 640.20 | -0.60 | -0.36 | 23 554.20 | 6 430.47 | 0.39 | -1.250 |
| Yield (t/ha) | 1.26 | 0.13 | -0.33 | -0.49 | 2.12 | 0.42 | 0.35 | -0.590 |
| Consumption (000 t) | 13 193.57 | 1 046.48 | 0.08 | -1.21 | 24 059.00 | 6 001.86 | 0.25 | -1.470 |
| Irrigation (000 ha) | 1 134.93 | 303.01 | -0.29 | -1.12 | 3 393.41 | 979.92 | -0.16 | -1.193 |
| Fertiliser (000 t) | 602.45 | 253.74 | -0.04 | -1.02 | 2 454.06 | 707.45 | -0.29 | -0.849 |

Source: Calculated using data from *Handbook of agricultural statistics* (Ministry of Agriculture 2007); *Bangladesh economic review* (Ministry of Finance 2012, 2014)

Table 2: Descriptive statistics for maize in Tanzania for the period 1975–2013

| | Preliberalisation (1975–1995) | | | | Postliberalisation (1996–2013) | | | |
|---------------------|-------------------------------|--------|-------|-------|--------------------------------|----------|-------|-------|
| | Mean | Std | Skew | Kurto | Mean | Std | Skew | Kurto |
| Land (000 ha) | 1 511.48 | 282.08 | 0.38 | -1.44 | 2 567.01 | 1 086.68 | -0.19 | -1.70 |
| Production (000 t) | 2 011.89 | 477.62 | 0.67 | -0.02 | 3 586.99 | 1 167.12 | 0.20 | -0.59 |
| Yield (t/ha) | 1.33 | 0.21 | 2.68 | 9.19 | 1.57 | 0.83 | 1.38 | 0.79 |
| Consumption (000 t) | 1 925.95 | 618.74 | -0.44 | -0.75 | 2 435.56 | 162.40 | -0.09 | -0.88 |
| Irrigation (000 ha) | 125.71 | 29.40 | -1.41 | 1.08 | 181.32 | 15.21 | -0.67 | -1.50 |
| Fertiliser (000 t) | 65.67 | 23.50 | -0.17 | -1.22 | 101.27 | 64.31 | 0.72 | -0.76 |

Source: Calculated using data from Food and Agricultural Organization, Statistics Division (2014)

5.2 Rice and maize production

Maize production in Tanzania increased dramatically in the postliberalisation period, particularly in the second phase of liberalisation in the post-1996 period. However, there were also wide fluctuations in total production volumes, especially in the decade 2002–2011. There was also relatively constant alignment between productivity trends and trends in cultivated land area during the same period (figure 1), a clear indication that there were no changes in crop intensification and the application of modern technological inputs for production such as irrigation, fertilisers and high yielding seed varieties. Therefore, it would appear that the growth in maize production in the postliberalisation period was largely driven by the expansion of the cultivated area rather than input intensification. There was overall low use of improved maize varieties, chemical fertilisers and other production inputs by smallholder farmers in Tanzania (Erenstein, Kassie, Langyintuo & Mwangi, 2011:37, 51) and the fluctuations in productivity and total volume of production in the period 2002–2011 could be associated with weather variability (Rowhani, Lobell, Linderman & Ramankutty 2012:454).

The dramatic drop in yield per hectare during the period 2003–2011 (figure 6) indicates low productivity per capita due to the dominant position of smallholder farmers and low use of technological innovation in production inputs.

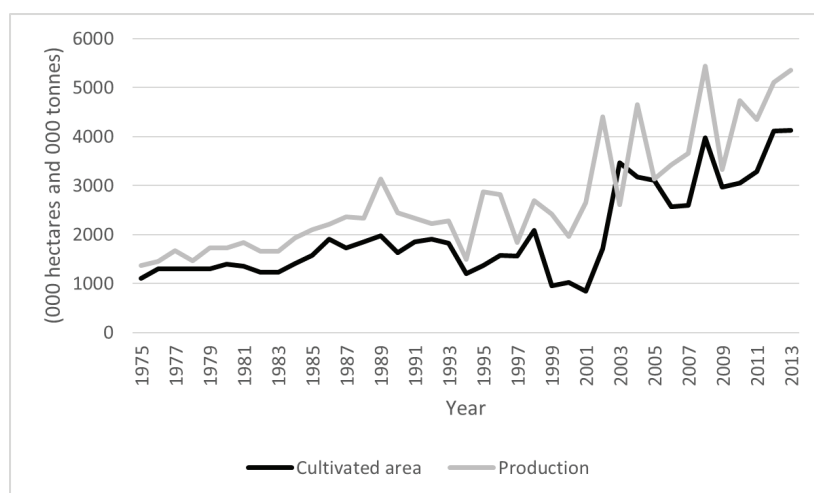


Figure 1: Maize production in Tanzania 1975–2013

Source: Calculated from Food and Agricultural Organization, Statistics Division (2014)

Conversely, in Bangladesh, rice production experienced rapid technological transformation in the postliberalisation period consisting primarily of a combination of the intensive use of irrigation equipment, fertilisers, and high-yielding variety (HYV) seeds. Technological transformation impacted cropping patterns of rice with dynamic shifts in rice cultivation from local varieties to HYVs, contributing to the higher volume of total rice production. Therefore, while total cultivated land for rice production remained constant in both pre and postliberalisation periods, total rice production rose gradually and the gap between total cultivated land and rice production

widened especially from the year 2000 and beyond (figure 2). This may be explained by the extensive adoption of technological inputs, a combination of irrigation equipment, HYV seeds, fertilisers and pesticides which also showed an upward trend in this period (figure 3).

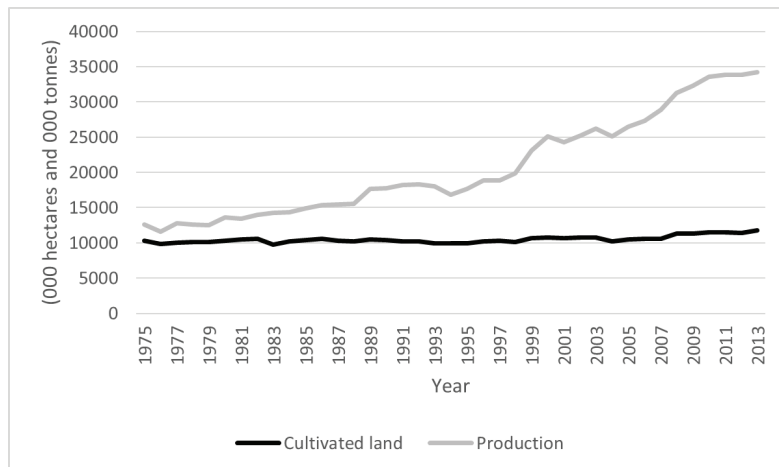


Figure 2: Rice production in Bangladesh 1975–2013

Source: Compiled and calculated from the *Handbook of agricultural statistics* (Ministry of Agriculture 2007); *Statistical yearbook of Bangladesh: 1986* (BBS 1986); *Bangladesh economic review* (Ministry of Finance 2012, 2014)

Thus rice yield per hectare and growth in production volumes closely aligned with the use of inputs for production technology (figures 2 and 3).

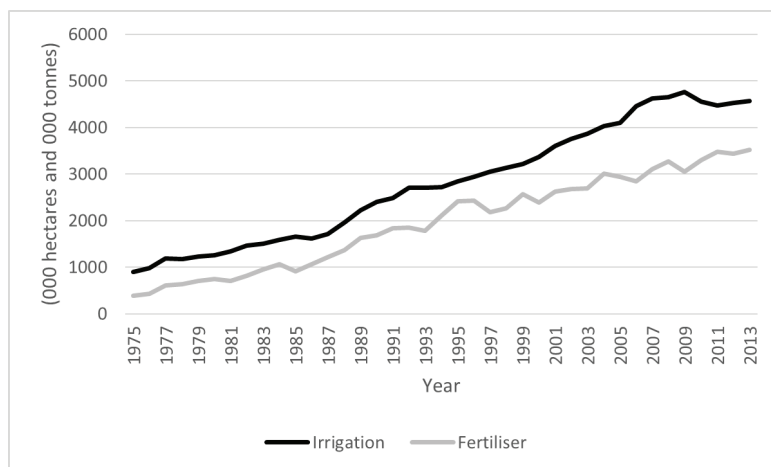


Figure 3: Bangladesh irrigated area and fertiliser use in rice production, 1975–2013

Source: Compiled and calculated from the *Handbook of agricultural statistics* (Ministry of Agriculture 2007); *Statistical yearbook of Bangladesh: 1986* (BBS 1986); *Bangladesh economic review* (Ministry of Finance 2012, 2014)

Figures 4 and 5 show that the production and consumption of maize and rice in Tanzania and Bangladesh respectively were relatively closely aligned in both the pre and postliberalisation periods.

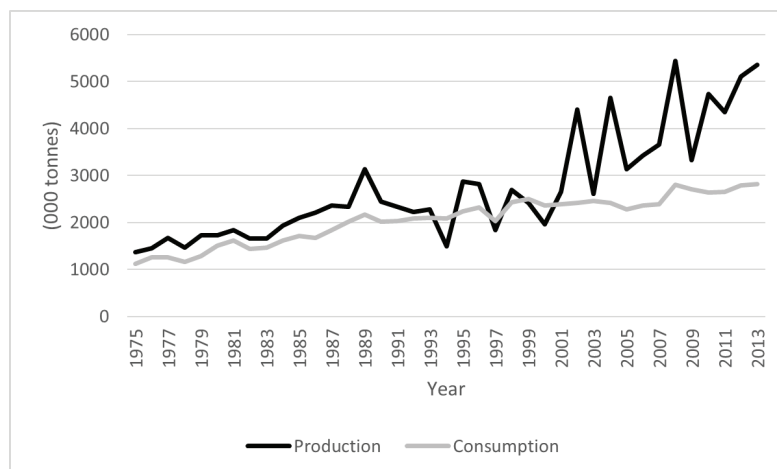


Figure 4: Maize production and consumption in Tanzania 1975–2013

Source: Calculated from Food and Agricultural Organization, Statistics Division (2014)

In the case of maize in Tanzania the cultivated area for maize production increased significantly from 1 905 000 hectares in 1986 to 3 050 700 hectares in 2010 although the average production per hectare declined. Maize production exceeded consumption in the decade 2001–2011, albeit fluctuating widely (figure 4), while rice consumption in Bangladesh slightly trended above production in the postliberalisation period until 2005 (figure 5). Surplus of production over consumption would normally signal that maize farmers in Tanzania moved beyond subsistence production and would utilise the excess maize output for trade, resulting in income gains for farmers and improvement in their welfare. This domestic surplus would also generate the opportunity for maize export to the international market and Tanzania as a net exporter would benefit from trade liberalisation if the international price of maize was favourable and stable. Therefore, price stability is an important variable in assessing the theoretical impact of trade liberalisation. We examined the movements of rice and maize prices in subsection 5.4.

5.3 Maize and rice yield

While there was evidence of an overall increase in the producing of rice in Bangladesh and maize in Tanzania, the average maize yield in Tanzania collapsed and went below the preliberalisation levels in the decade 2002–2011 (figure 6). This could be explained by the more extensive use of inputs and modern technology in rice production by Bangladesh's smallholder farmers compared with very low adoption or access to agricultural inputs and technology, particularly irrigation equipment and high yielding varieties, by Tanzania's smallholder maize farmers in the postliberalisation period. However, productivity growth did not necessarily lead to earnings gains for smallholder farmers in either Bangladesh or Tanzania, probably due to price volatility and lack of market integration.

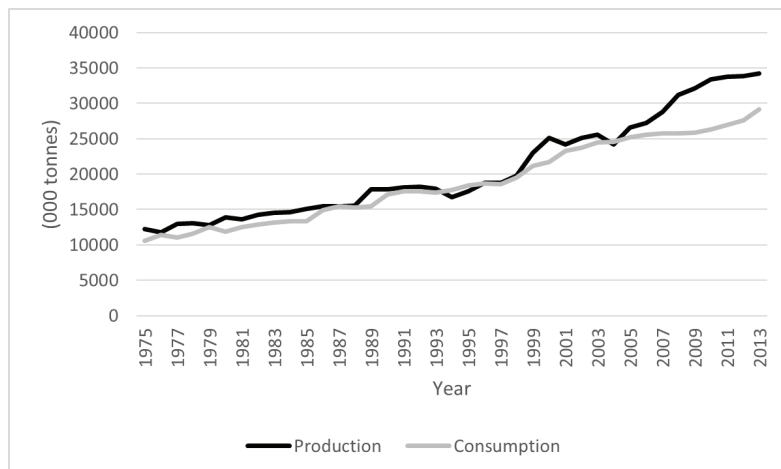


Figure 5: Rice production and consumption in Bangladesh, 1975–2013

Source: Compiled and calculated from the *Handbook of agricultural statistics* (Ministry of Agriculture 2007); *Statistical yearbook of Bangladesh: 1986* (BBS 1986); *Bangladesh economic review* (Ministry of Finance 2012, 2014)

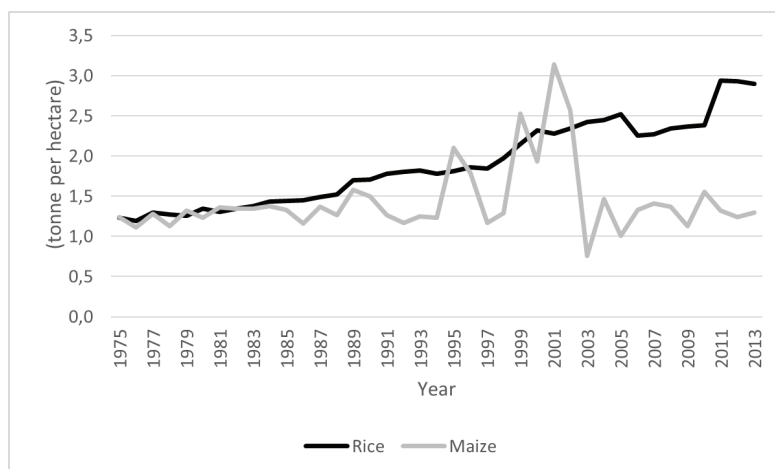


Figure 6: A comparison of yield of rice (Bangladesh) and maize (Tanzania), 1975–2013

Source: 1. Rice data compiled and calculated from the *Handbook of agricultural statistics* (Ministry of Agriculture 2007); *Statistical yearbook of Bangladesh: 1986* (BBS 1986); *Bangladesh economic review* (Ministry of Finance 2012, 2014)

2. Maize data compiled and calculated from Food and Agricultural Organization, Statistics Division (2014)

5.4 Maize and rice prices

There is clear evidence in both case study countries that there is no integration between domestic and international prices of rice and maize as shown in figures 7 and 8.

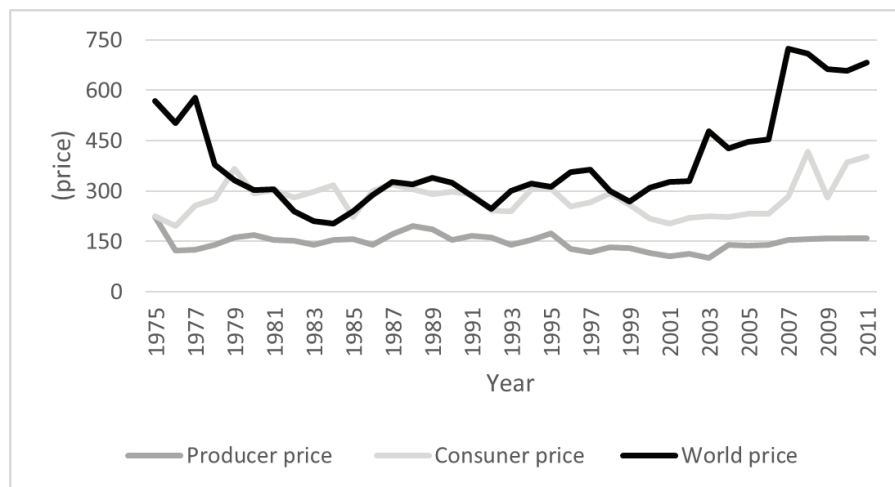


Figure 7: Rice Price in Bangladesh (in US\$/tonne), 1975–2011

Source: World rice statistics (IRRI 2014)

The producer price for rice in Bangladesh was relatively constant in both the preliberalisation and postliberalisation periods. However, there was upward trend in world price in the postliberalisation period, particularly from the year 2000 when the disparity between domestic and world prices widened considerably. This trend suggests that international prices had limited impact on domestic prices. Without effective market integration price volatility may in fact undermine trade efficiency. In the case of Bangladesh, the government ban on rice export sought to achieve both domestic food security and to stabilise domestic consumer price. While these policy objectives were achieved, they also impacted on producer prices which were consistently below both consumer and world prices of rice (figure 7). Thus, the theoretical benefit from trade liberalisation from high world prices of rice since 2000 did not flow to smallholder rice farmers in local markets dominated by rice syndicates and cartels. Syndicates and cartels benefit in two ways: they buy rice at low prices during the harvest (high) season and sell at high prices during lean seasons. Therefore, the net beneficiaries of rice trade liberalisation policy and imperfection in the rice market were rice traders and intermediaries of syndicates rather than smallholder farmers.

As in the case of Bangladesh, Tanzania also regulated the price of maize (although the policy fluctuated between strict price regulation and market-based pricing) and imposed maize export bans to pre-empt a shortage of maize in the domestic market. Export bans had two key negative impacts on the welfare of smallholder maize farmers. First, it limited smallholder farmers' earnings capacity from maize production in a regulated market, while benefiting consumers because of lower maize prices. Secondly, export bans encouraged illegal cross-border trade with

neighbouring food-deficit countries further penalising smallholder maize producers attempting to get a fair price on the open market, but benefited syndicates in cross-border smuggling, thereby denying the country tax benefits from regulated cross-border trade.

Unlike Bangladesh, domestic maize prices in Tanzania were consistently higher than world prices during the period 1981–2010 until some form of convergence in the period 2011–2012 (figure 8). This finding contradicts the theoretical argument by those opposed to trade liberalisation on the grounds that the comparative advantage of high-income country producers will dampen maize prices for local Tanzanian farmers because of cheap imports. In theory, where domestic prices have been consistently higher than world prices, this should provide positive gains both from production gains on domestic market prices and consumption gains from international import market prices. This further illustrates the theoretical ambiguity of the effects of agricultural trade liberalisation in least developed economies such as Tanzania. The theoretical question then arises, what is the justification for encouraging domestic production of maize because it would be cheaper for the country to import maize from the international market, if not for the fact that this would further depress the earning potential for smallholder maize farmers who depend on its production both for subsistence and income. Thus we conclude that the impact of trade liberalisation on the price of maize is, at best, mixed.

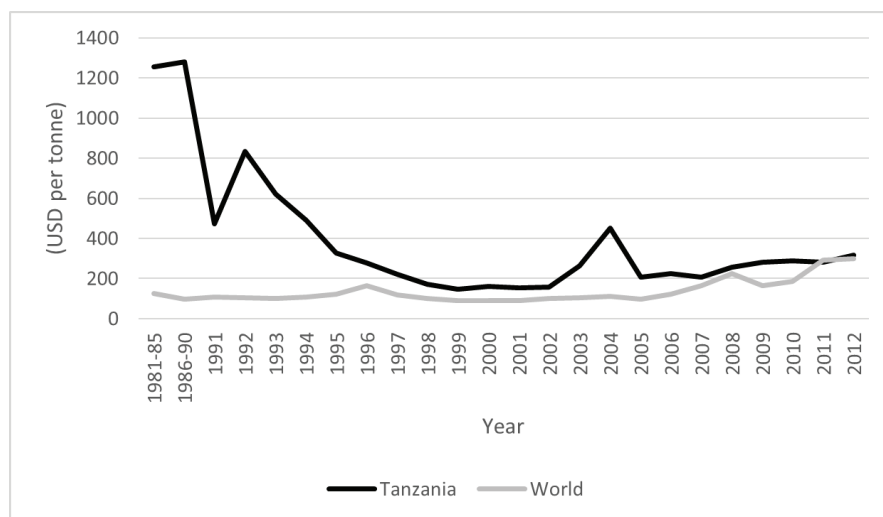


Figure 8: Maize price in Tanzania (in US\$/tonne): 1981–2012

Source: 1. World maize price from World Bank commodity price data (the pink sheet) 2. Tanzania maize price between 1981–1985 and 1999 calculated from table 3.1 of the World Bank (2000), between 2003 and 2012 calculated from RATIN (nd); and between 2000 and 2002 estimated.

5.5 Price volatility

Although the price volatility is clear from the graphs in figures 7 and 8, it is important to undertake some statistical tests of means and equality of variance to determine whether the observed changes are statistically significant.

The comparison of mean data suggests that there was a larger reduction in producer price than consumer price of rice in the postliberalisation period, suggesting that the welfare gains for smallholder rice farmers was not significant despite increased rice production in the postliberalisation period. The mean domestic maize price was significantly greater than the world price, suggesting welfare gains by maize producers, but a loss of welfare by maize consumers who in fact may be smallholder farmer households. This contradiction indicates inefficiency in the Tanzanian maize market and a more effective use of resources would be for the government to import maize from the international market at a cheaper world price and reallocate maize production resources to other more efficient economic activities.

The theoretical proposition that trade liberalisation increases exports and imports was not borne out in Tanzania. A close examination of the characteristics of the domestic market would help policymakers understand price movements. For example, what policy interventions would enable market integration given the complex nature of Tanzania's regional markets? How could the capacity of the private sector be enhanced to provide reliable information on national and subnational prices in order to ensure stability and equalisation in price across regions?

Table 3: Comparison of means

| | Rice price (USD/tonne)(Bangladesh) | | | | Maize price (USD/tonne) (Tanzania) | | | |
|----------------|------------------------------------|---------|--------------------------------|---------|------------------------------------|---------|--------------------------------|---------|
| | Preliberalisation (1975–1990) | | Postliberalisation (1991–2011) | | Preliberalisation (1981–1995) | | Postliberalisation (1996–2011) | |
| | Mean | Std dev | Mean | Std dev | Mean | Std dev | Mean | Std dev |
| Producer price | 158.92 | 25.92 | 138.96 | 21.05 | 521.39 | 404.70 | 249.69 | 81.42 |
| Consumer price | 284.10 | 41.95 | 268.74 | 55.51 | 609.23 | 86.35 | 273.00 | 70.21 |
| World price | 353.58 | 140.45 | 439.09 | 189.28 | 110.95 | 20.71 | 157.18 | 72.56 |

Source: 1. Bangladesh: calculated from data of World rice statistics (IRRI 2014)

2. Tanzania: calculated from World Bank commodity price data (the pink sheet); table 3.1 of the World Bank (2000); between 2003 and 2012 calculated from RATIN (nd)

We further calculated the CV in the preliberalisation and postliberalisation period for both countries to test price volatility. The results are shown in table 4.

Table 4: Coefficient of variation of the level of prices (CV) and corrected coefficient of variation (CCV) for rice in Bangladesh and Tanzania

| Rice (Bangladesh) | | | | | Maize (Tanzania) | | | |
|-------------------|----------------------------------|-------|-----------------------------------|-------|----------------------------------|-------|-----------------------------------|-------|
| | Preliberalisation (1975–1985) | | Postliberalisation (1986–2011) | | Preliberalisation (1981–1995) | | Postliberalisation (1996–2011) | |
| | CV | CCV | CV | CCV | CV | CCV | CV | CCV |
| Producer price | 16.15 | 7.19 | 15.15 | 7.94 | 77.62 | 35.32 | 32.61 | 16.74 |
| Consumer price | 16.91 | 8.57 | 20.65 | 11.95 | 18.26 | 10.15 | 25.85 | 12.87 |
| World price | 39.72 | 29.72 | 43.11 | 25.79 | 18.67 | 16.97 | 46.96 | 20.60 |

Source: 1. Bangladesh: calculated from data of world rice statistics (IRRI 2014)
 2. Tanzania: calculated from World Bank commodity price data (the pink sheet); table 3.1 of the World Bank (2000); between 2003 and 2012 calculated from RATIN (nd)

The larger the values of both CV and CCV are, the greater the price volatility. The values of CV and CCV for the producer price for both preliberalisation and postliberalisation periods for Bangladesh were similar, suggesting less volatility in the producer price of rice. However, the values of both CV and CCV for consumer price in the postliberalisation period were larger than that in the preliberalisation period, indicating a greater volatility of the consumer price of rice in the postliberalisation period. In the case of Tanzania, both the CV and CCV for producer price were more than twice as high in the preliberalisation as in the postliberalisation periods, suggesting extremely high volatility in producer price. This high volatility might be attributed to imperfections in the domestic maize market and less integration with the world maize market. Comparing the two countries, both CVs and CCVs for producer and consumer prices for Tanzania were much higher than for Bangladesh, suggesting even greater volatility. This price volatility has serious implications for smallholder farmers as they experience losses at two levels, namely low producer price and high consumer price because they sell their products at a low producer price immediately after the harvest to repay loans and meet household expenditure, and buy at high consumer price during the lean season to feed their families. Price volatility exposes poor consumers to high risks in the market because they are surplus producers during harvest season, but net-deficit producers and net-deficit sellers in unfavourable weather conditions.

The theoretical outcome of poverty reduction and enhanced welfare from trade liberalisation can only be achieved if smallholder farmers are able to sell their products at the best possible price in a stable and predictable market. Price volatility has important implications for how smallholder farmers allocate their resources and how they behave both as producers and sellers in high season and as consumers and buyers in low season. Price volatility also erodes market confidence and reduces food security for smallholder farmer households. Similarly, their purchasing power is significantly reduced by sharp seasonal price variations. This is especially significant for Tanzania's three million maize-producer households, who constitute approximately 85 percent of the total maize producers in Tanzania because they sell when the prices are low during the harvest season and buy when the prices are high during the lean season. Because their productivity is low and they do not have storage facilities, they are exposed to the worst of price volatility.

6 CONCLUSION

The theoretical proposition from literature suggests that agricultural trade liberalisation should positively impact the welfare of smallholder rice and maize farmers in Bangladesh and Tanzania respectively through increased productivity, exposure to new markets and income earnings potential through access to open regional and international markets. However, agricultural trade liberalisation in Bangladesh and Tanzania in both preliberalisation and postliberalisation periods was characterised by policy fluctuations that produced both positive and negative consequences on the welfare of smallholder farmers. In both countries export bans enabled self-sufficiency and food security in the staple food crops, rice and maize respectively. At the same time such bans invariably led to illegal cross-border trade. Export restrictions also acted as disincentives for rice and maize producers, and limited market expansion where export growth could lead to increase in price, making production more profitable. To be effective, agricultural trade liberalisation should not be limited only to commodity trade, in this case rice and maize trade. It must be accompanied by liberalisation in agricultural inputs and accompanying support for adoption of technological transformation, more effective use of agricultural inputs such as irrigation, fertiliser, pesticides and HYVs by smallholder farmers (Talukder & Chile 2014).

Other complementary policy interventions should include market competition, price integration and price stability so that smallholder farmers benefit both as producers and consumers, and careful analysis of private sector capacity and development of rural infrastructure must be integral parts of a policy framework in the non-trade areas. These policy interventions explain why the welfare status of smallholder rice farmers in Bangladesh was considerably higher than that of smallholder maize farmers in Tanzania, although smallholder rice farmers are still relatively less well-off than medium and large rice farmers (Talukder & Chile 2013). Thus while smallholder maize farmers might be self-sufficient in subsistence maize production, the policy outcome of trade liberalisation to enhance income through trade was not achieved for the estimated 85 percent of Tanzania's smallholder maize farmers who depend on it for income and employment.

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