Trade Liberalization, The 2008 Food Price Crisis and The Philippines and Bangladesh's Efforts in Improving Food Security

Bachelor Thesis for Obtaining the Degree

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Affidavit

I hereby affirm that this Bachelor's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

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ABSTRACT

The objective of this research is to explore the linkages between trade liberalization and food security, two ever relevant developmental concepts. More specifically it explores the reduction and elimination of import tariffs as a tool in increasing domestic food supply and improving availability of and people's access to rice as a staple crop. This paper aims at answering two research questions. Firstly, “How effective has the removal of import tariffs and quotas been in improving food security in the short-run?” and secondly, to less depth, “How well does conventional trade theory support the removal of import barriers in increasing supply?”. This research looks into the Ricardian and Heckscher-Ohlin trade theories with the aim of determining their validity in terms of the objective. It also makes a case of the 2008 food price crisis, where the highest price volatility was observed in rice, and the experiences of two of the world's largest rice importers, The Philippines and Bangladesh in the midst of the crisis. The responses of these countries to the crisis through trade policy, and the effectiveness of these policies in improving food security in the short term have been examined. This paper attempts to determine effectiveness of the policies qualitatively from reviewing reports from several institutional databases such as The Food and Agriculture Organization of the United Nations and The World Bank in the periods before, during and after the crisis. The paper employs a number of empirical tests, namely graphical, correlation and regression analysis using import, price and food security indices data collected mainly from the aforementioned databases in order to again determine effectiveness of the policy. The analysis suggests that removal of import tariffs has proven only partially effective in improving short-term food security. The analysis also suggests that the conventional theories hold true in their explanations of the workings of trade, despite their several limitations which the paper points out. This research ultimately serves to learn from the experiences of these countries in trade policy during the food crisis and affirm the role of this form of trade liberalization as a potential tool in mitigating impacts to food security in the event of a future crisis.

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List of Abbreviations

FAO	Food and Agricultural Organization
FIES	Family Income and Expenditure Survey
FSI	Food security Index
GATT	General Agreement on Tariffs and Trade
GHI	Global Hunger Index
HDI	Human Development Index
H-O	Heckscher-Ohlin theory of trade
ICTSD	International Centre for Trade and Sustainable Development
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
LFS	Labour Force Survey
LIFDC	Low Income Deficit Countries
MDG	Millenium Development Goal
MT	Metric Tonnes
NAEX	Net Agricultural Exporting
NAIM	Net Agricultural Importing
NAMA	Non-Agricultural Market Access
NFA	National Food Association
NFEX	Net Food Exporting
NFIM	Net Food Importing
SDG	Sustainable Development Goals
UN	High Level Task Force on the Global Food Security Crisis (HLTF
USDA	United States Department of Agriculture

USFSA	United States Food Sovereignty Alliance
WFP	World Food Programme
WFS	World Food Summit
WTO	World Trade Organization

1. Introduction

Increasing prices in global food markets coupled with an increasing price volatility in the last two decades have renewed concerns for world food security. Irregular spikes have been followed by crisis as was the case in 2008 and again in 2011 (UN, 2011). These periods of high prices and price volatility do not appear to be isolated events, but rather part of a greater shift in the longer-term trend of global markets for agricultural products (Tangermann, 2016). Developing countries that are net food importers and they're citizens are the most vulnerable to such situations. These nations are classified by the FAO as Low-Income Food-Deficit Countries (LIFDC). Due to their net food trade position any spike in food prices on the international market are most likely transmitted to them, just as blowback from any protectionist measures will also be transmitted. Although these price spikes are felt globally, it is the LIFDC, the poorest in the world that experience a much more significant decrease in real income. These people end up using a larger proportion of their income in buying essential food products.

Prices are only expected to continue rising in the international grain market as they face more pressure from changing diets, especially towards increased meat consumption; promotion of biofuels leading to increased demand for maize and vegetable oils; high speculation in the commodity futures market; an increasing number of net food importers and most importantly for this research shifting trade policies. The demand for food is projected to rise by at least 20 percent globally over the next 15 years, with the largest increases anticipated in Sub-Saharan Africa, South Asia and East Asia (Klytchnikova et.al, 2014). As of March 2008 the FAO has listed 37 countries under the threat of food insecurity that require external assistance. The staggering number of countries and an ever changing dynamic from the pressures previously mentioned are clear indications to the relevance of food security and the ways of achieving it, from the household to a global scale. At the national level despite significant increases in agricultural productivity and availability, availability of food has not been distributed evenly and as such caloric intake in several countries has not grown at the same rate. Food security has long been recognized as a universal human right (IFPRI, 2017)

To a large extent there seems to be a general consensus on the effects of trade policy on food security as evident through the heavy advocacy by the Food and Agricultural Organization and World Trade Organization (Farsund, Daugbjerg & Langhelle,2015). Despite overwhelming evidence based on trade models and past experience that shows this, policy makers have proven unable to take appropriate action during crisis and instead mostly take up protectionist policies to serve their own interests where a collective approach is required (Josling, 2014). Nations have shown through their responses to the 2008 food price crisis and to a lesser extent in 2011 how unprepared they are to deal with such issues and help those most affected. Recognition of a relationship between trade policy and food security can be traced back as far as the Kennedy Round of Negotiations of 1969 and the formulation of the General Agreement on Trade and Tariffs (GATT) (Simon, 2012). At this time policies for improved food security were focused more on production and increased food availability with much emphasis being put on the importance of food aid. It was not however until the WTO Doha Round of trade negotiations which began in 1995 that food security became a key issue (Simon, 2012).

According to the WTO 'one of the subjects under negotiation in the Doha Round is Non-agricultural market access (NAMA) with the aim "To reduce or as appropriate eliminate tariffs, including the reduction or elimination of high tariffs, tariff peaks and tariff escalation (higher tariffs protecting processing, lower tariffs on raw materials) as well as non-tariff barriers, in particular on products of export interest to developing countries".' (WTO Website). Views on the topic have evolved in line with improved understanding of the concept of food security. For example, access, a was not officially recognized as a dimension of food security until The Rome Summit of 1996 and little implementation taken until 2005.

This research will attempt at answering two questions. Firstly, **How effective has the removal of import tariffs and quotas been in improving food security in the short-run?.** Secondly, to less depth, **How well does conventional trade theory support the removal of import barriers in increasing supply?.** The validity of these theories in terms of the objective will be determined and their limitations reviewed. This is of importance as much discussions concerning the linkages between trade reform and food security stem from such theories, in particular through linking individual policies and impacts on domestic and world agricultural markets,

specifically in this case the rice market.These conventional trade theories, namely the Ricardian theory or theory of competitive advantage and the Heckscher-Ohlin or factor-proportions theory have been used extensively in predicting the potential gains from trade and have formed the basis for firm pro liberalization arguments.

This paper will start by reviewing literature related to trade liberalization,food security and their linkages, the 2007-2008 food crisis, and the trade theories. After, Food security will be explored. This will involve clearly defining the concept as well as it's relevant dimension, making a case for why the issue of food insecurity is of particular concern to developing countries, identified as LIFDCs, who are net food importers. It will look at how these countries have fared over the years and especially during periods of crisis as well as the underlying reasons for their vulnerability to food insecurity. In the last aspect, emphasis will be put on removal of import barriers, specifically tariffs as a policy option. This is in order to establish a foundation for the research and depict the continuous relevance of the topic.

Next, the 2007-2008 food price crisis will be analysed by firstly looking at the background of the crisis as well as creating a timeline of the events of the crisis. This will be followed by examination of the underlying causes of the crisis- short, medium and long run, as well as the consequences of the crisis at the global scale. This part ends with a look at the peculiar case of spikes in rice prices. Next, focus will be shifted the case studies of the Philippines and Bangladesh with respect to the crisis. This will begin by looking at the food security situation in each country to give a context to the crisis. The paper moves onto a look at the development of the crisis, some consequences and lastly the responses taken by these countries in coping with the crisis.

This is followed by an overall analysis, which begins with a summary of the import policy responses taken by the countries and their effectiveness based on the literature reviewed. Next, moving onto the quantitative analysis, a simple graphical analysis of import developments between 2000 and 2016 with focus on the crisis years will be conducted. After, a pearson's correlation test will be conducted between the annual rice imports of each country against two food security indicators, the average dietary energy supply and the depth of food deficit. This part

concludes with a multiple regression analysis carried out to analyse the relationship of rice imports on price and the crisis years.

The final part of this paper there will see an overall evaluation of various aspects of the paper including the methodology employed, the trade theories under scrutiny, and the empirical findings. Lastly, this research will conclude with a summary of the findings, providing final remarks on the topic and finally offering insights to addressing future concerns on trade reform and food security.

2. Methodology

2.1 Material

This research makes use of a vast range of sources. Most of the data and information comes from reports and databases of institutions such as the Food and Agriculture Organization (e.g AMIS - Agricultural Market Information System and GIEWS - Global Information and Early Warning System), World Food Programme, International Food Policy Research Institute, World Bank, and the World Trade Organization. Furthermore, this study will build on and draw conclusions mostly from the studies of Wiggins, Compton, Keats & Davies (2010); Jayasuriya, Mudbhary and Broca (2012); FAO (2008); Headey & Shenggen (2010); and Dorosh PA. & Rashid S., 2012. In examining the trade theories, this study draws heavily from FAO 2003; and Krugman, Obstfeld and Melitz, 2012.

2.2 Research Method

In conducting this research a mixed method research approach will be used. Both qualitative and quantitative data must be collected and analysed. This is so as to provide a more comprehensive response to the research questions as neither one of the approaches alone will be sufficient in doing so. Each method is an attempt to make up for the shortcomings of the other. For example, the quantitative data may be able to measure the effect of import tariff removal but cannot explain the rationale behind it. Likewise, the qualitative aspect makes use of several qualitative reports creating the potential for biased interpretations which a quantitative approach will not display. Also, a mixed method approach is simply ideal as the paper seeks to explain the causal relationship between reduced import tariffs and increased food security.

2.3 Qualitative Analysis

Qualitatively, research will involve analysing the extensive literature on the linkages between trade reform and food security, the global food price crisis and the role of the case study countries, as well as the conventional trade theories. This will begin by setting up and breaking down the trade theories as well as import tariffs. This is followed by a look at food security, vulnerability and food insecurity after which the

food crisis will be explored with a focus on rice. Lastly, the country cases will be examined by looking at food security, the crisis in each country and lastly a review of their trade policy response in terms of import tariffs.

2.4 Quantitative Analysis

The quantitative analysis will begin by looking at the developments of rice imports in the periods before during and after the crisis. This is simply to see the changes in the behaviour of these variables due to the crisis in each country. Graphs will be generated from rice import data for the years 2000-2016 followed by the analysis. Although the focus of the analysis is the crisis period 2007-2009, it is important to check for any trends, volatility and peaks, and a wider range of data is key for that.

In order to quantitatively analyze the relationship between trade and food security a simple correlation analysis will be conducted. Two indicators that relate to the food availability and access dimensions of food security will be used. These indicators are: Average dietary energy supply adequacy which relates to availability, and where 'Each country's or region's average supply of calories for food consumption is normalized by the average dietary energy requirement estimated for its population to provide an index of adequacy of the food supply in terms of calories'; (FAOSTAT), and the depth of the food deficit, which relates to access and 'indicates how many calories would be needed to lift the undernourished from their status, everything else being constant.'; (FAOSTAT). These will be plotted against yearly rice imports to check for a correlation. The expected outcome from these tests is that as imports increase there is an increase in the average dietary energy supply adequacy and a decrease in the depth of the food deficit.

The final part of the analysis will make use of a regression analysis. This will involve the analysis of the relationship of rice imports on price and the crisis years. A dummy variable will be used to represent the crisis years. This will mark the non-crisis years with the value 0, and the crisis years (2007-2009) with the value 1 to indicate the categorical effect being examined. Also, the logarithms of price and import variables will be used as they are a better representation of the linearity being tested. The expected outcome here is that as price decreases there is an increase in imports during the crisis years.

2.5 Country Selection:

As the focus of the research is LIFDCs, selecting the two case study countries for this study involved looking through 70 countries who were identified by the FAO as such. Selection began with the assumption that these countries would experience similar type of impacts from the crisis and also respond similarly. Basically, the Philippines and Bangladesh were selected from this extensive list of countries based on the following criteria:

- Net trade position - Both countries are major net food importers and net rice importers. This makes them to a large extent reliant on food imports to ensure sufficient supply. It is also important to note that both countries only recently became major net food importers, especially of rice over the last two decades. The Philippines and Bangladesh were the first and second largest rice importers in 2008 (Top 10 rice importers, exporters, 2009)
- Rice as a staple crop - Both are among the world's largest rice producers and consumers and are almost self-sufficient in that regard. They rely on rice imports to simply make up for a deficit in supply
- Impact of crisis - The food crisis affected The Philippines and Bangladesh in similar ways. Millions of people were pushed further into poverty and their main source of rice imports imposed severe trade restrictions.
- Response to crisis - Although each country employed a variety of options in response to the crisis, both made the initial use of trade reform by removing import tariffs and quotas.
- Population size and growth - both countries are highly populated with a population exceeding 100 million. Bangladesh (approx. 164 million) is the 8th most populous country in the world while the Philippines (approx. 106 million) is the 13th most populous. Both nations also exhibit similar positive rates of population growth- as of 2016 it was 1.6% percent in the Philippines and 1.1% in Bangladesh (CIA World Factbook).
- Scores and rankings on key indicators: Both countries score relatively low on key poverty and food security indicators i.e Food security index, HDI and GHI
- Contributing factors - In both countries, natural disasters from severe weather events have largely influenced their chronic poverty and food insecurity and had played a key role in worsening the food crisis. These

factors have been a major cause for transitory food insecurity in the past, and most likely in the future (Suansing, B., 2017)(WFP, 2007)

- Amount of import tariffs: Lastly, the countries were selected due to their difference in amount of tariffs. Whereas Bangladesh had a tariff of 5%, that of Philippines was 40% (World Bank, 2008). This is important so as to see the varying impact of the removal of a fairly small tariff to that of a large one.

3. Literature Review

Much of the literature examining the linkages between trade reform and food security have described the relationship as immensely complex due to the existence of multiple dimensions relating to each concept.

In Tangermann (2016), it is explained in the policy options paper that: 'As far as market access is concerned, a further reduction in tariffs will facilitate the integration of domestic markets with international trade and the transmission of price signals. It will thereby contribute to dampening the volatility of international markets that has caused so much concern in recent years'.

In his speech to the XIIIth Congress of the European Association of Agricultural Economists in Zurich in August 2011, then WTO Director-General Pascal Lamy addressed the important role of international trade and the reform of global trade rules in improving global food security. He says in his speech: "Trade policy — no doubt — has its place in this picture. But it cannot and does not, by itself, answer each and every challenge in agriculture. Not least because, at the end of the day, trade is no more than a simple transmission belt between supply and demand. It allows food-surplus countries to complement the countries in food-deficit. That transmission belt has to work smoothly, with as little friction as possible, but it is simply one element of a much more complex machine." (Lamy, 2011)

The UN High Level Task Force on the Global Food Security Crisis (HLTF) states in their 2008 Comprehensive Framework for Action how adjusting trade and tax policy can be used as a way of meeting the immediate food needs of vulnerable populations. As stated in their menu of action for food importing and food deficit countries: "Reduce import tariffs and other restrictions, as appropriate, on food commodities and agricultural inputs. While trade liberalization generally has a positive overall impact on an economy, governments should anticipate the impact on the domestic agricultural sector, including smallholder farmers, as well as government revenue losses and balance of payments effects". (HLF, 2008, p.31) This view is maintained in the updated Comprehensive Framework of Action of 2010 where the task force goes further to add: "When trade is being liberalized, including in negotiations for trade agreements, national authorities will first pay attention to protecting their citizens'

ability to enjoy their right to food, as well as the potential impact of such measures on the enjoyment of the right to food by people in other countries." (HLF, 2010, p.17)

The second sustainable development goals (SDG) of the 2030 Agenda for Sustainable Development is to end hunger, achieve food security and improved nutrition and promote sustainable agriculture (United Nations, 2015). In the UN publication, Transforming our world: the 2030 Agenda for Sustainable Development, it mentions one way of achieving this goal is to "Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round". (United Nations, 2015)

In the 2011 multi-agency report, Price Volatility in Food and Agricultural Markets: Policy Responses, it states that "International trade is therefore a potentially powerful engine to even out supply fluctuations across the globe, and as a result to reduce market volatility"[1]. This report goes further in saying that "trade is an essential component of any food security strategy' and that 'Policies that distort production and trade in agricultural commodities potentially impede the achievement of long run food security, by stimulating or conserving production in areas where it would not otherwise occur and by distorting, obscuring or impeding the transmission of price signals to competitive producers elsewhere' (Inter-Agency Report, 2011, p. 24).

The International Food Policy Research Institute's final report for 2008 makes a case for trade liberalization: "Widespread opening to trade, of the type observed since trade costs began to fall sharply in the 19th century, has lowered the average cost of food worldwide. In contrast, limiting trade—given the huge differences in land and resource endowments—would have resulted in extremely high prices in land-scarce countries, depressed food prices in land-abundant countries, and lower real incomes in both". On import tariffs it states: "A tax on imports, which stimulates production

[1] G20 leaders at their summit meeting in November 2010 requested FAO, IFAD, IMF, OECD, UNCTAD, WFP, the World Bank and the WTO (to) work with key stakeholders "to develop options for G20 consideration on how to better mitigate and manage the risks associated with the price volatility of food and other agriculture commodities, without distorting market behaviour, ultimately to protect the most vulnerable.

of import-competing goods, functions as an equivalent tax on exports, reducing exports in line with imports—it does not create the trade surplus frequently anticipated by proponents of protection (IFPRI/CGIAR, 2008)

In their 2011 paper: Rice trade policies and their implications for food security, Durand-Moratand and Wailes state that "Fixed and ad-valorem import tariffs are the preferred protectionist policy among developing nations." (Durand-Morat, A. & Wailes, E.J., 2011, p. 3)

It is noted by P. Konandreas in their paper on trade policy responses to price volatility in NFIDCs that "Lowering or eliminating import tariffs is the most common measure that governments take to cushion the impact on domestic prices of imported goods when world market prices rise. However, this option is severely limited when applied tariffs are already low as is generally the case in many poor countries and even their elimination is a small relief when import prices shoot up by several multiples of prevailing tariff levels." (Konandreas, P., 2012, p.2)

Although all the views presented so far have been in favour of open trade as a means of achieving food security, the notion does have its opponents. However this view has much less to do with food security, the global food system, or trade reform as a means of achieving food security. The arguments against rather focus largely on the general losses from trade.

On Trade Theory

Krugman et.al discusses the empirical backing for the ricardian trade theory. It traces the tests for the theory dating back to right after World War II. These tests mostly compared differences in labour and productivity between the US and Britain and uncovered that labor productivity was in Britain was lower than that in the US in almost sector. Thus, the US held an absolute advantage in that regards, but Britain was still exporting almost as much as the US. The only explanation for this was that despite having a much lower absolute advantage Britain still held a comparative advantage in some sectors, for which the US had a smaller productivity advantage.

This supports the basic prediction of the Ricardian theory. (Krugman, Obstfeld and Melitz, 2012)

Krugman et.al also discusses the empirical backing for the H-O model view that that trade is driven primarily by differences in resources between countries. It describes the tests as having shown very limited success mostly due to the theories simplified assumptions. However, there is still much evidence pointing to the predictions. This involves observing the patterns of exports between developed and developing countries by firstly comparing the "exports of labor-abundant, skills-scarce nations in the third world with the exports of skill-abundant, labor-scarce nations" (Krugman et.al, 2012). Observations showed that developing nations mostly accounted for low-skill-intensity exports such as clothing while developing nations exported mainly high-skill.intensity goods (Krugman et.al, 2012). Secondly, changes in patterns over time have proven to fit the theories predictions. An example is provides of exports to the US from Western Europe and four rapidly growing Asian economies. It shows that as the Asian economies increased their skilled labor supply, there was in turn an increased specialization in the production of skill-intensive goods (Krugman et.al, 2012).

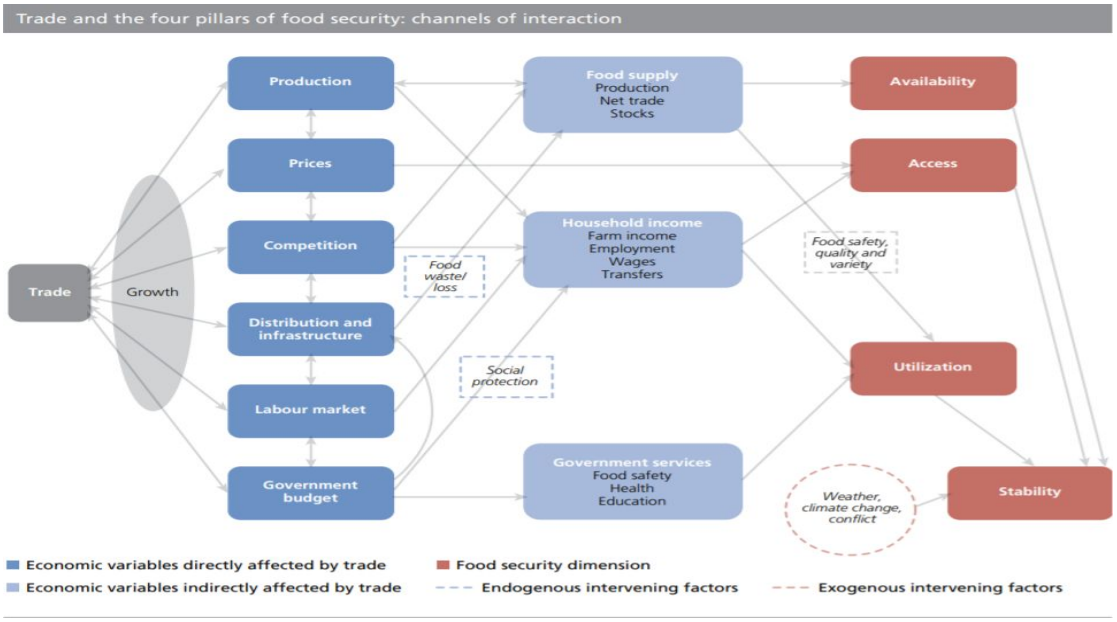
Trade linkages to food availability and food access.

The FAO, in its annual report on "The State of Agricultural Commodity Markets" for 2015-16 lays out a model depicting the linkages between trade and the four dimensions of food security (see figure 1 below).

A FAO policy brief from the same year provides a brief explanation of Figure 1: "In essence, trade, influenced by the economic context and sectoral composition of growth, directly affects key domestic variables like food production, prices, employment and government revenues. In the longer run, trade also affects competitiveness, infrastructure development, and the development of marketing channels and distribution networks, as it affects the incentives for public and private investments and new players' entry into markets. These direct effects translate into changes in food security indicators through three main intervening factors: total food supply, household income and government services." (Gadhok, 2016, p.1)

The aforementioned annual report also presents the possible short-, medium- and long-term effects of trade on the four dimensions of food security in Table 1 below.

Figure 1 - Trade and the four pillars of food security: channels of intersection



(Source: FAO, 2015)

Table 1 - Effects of trade on the four dimensions of food security

Possible short-, medium- and long-term effects of trade on the four dimensions of food security

	Possible positive effects	Possible negative effects
Availability	**Short term** • Trade boosts imports and increases both the quantity and the variety of food available. **Medium-to-long term** • The resulting specialization can lead to increased production of food through efficiency gains. • Greater competition from abroad may trigger improvements in productivity through greater investment, R&D, technology spillover.	**Medium-to-long term** • For net food-exporting countries, higher prices in international markets divert part of production previously available for domestic consumption to exports, potentially reducing domestic availability of staple foods. • For net food-importing countries, domestic producers who are unable to compete with imports are likely to curtail production, reducing domestic supplies and foregoing important multiplier effects of agricultural activities in rural economies.
Access	**Short term** • For net food-importing countries, food prices typically decrease when border protection is reduced. • Imported food and input prices are likely to decrease. **Medium-to-long term** • In the competitive sectors, incomes are likely to increase as the result of greater market access for exports. • The macroeconomic benefits of greater trade, such as export growth and inflow of foreign direct investment, support growth and higher employment, which in turn boost incomes.	**Short term** • For net food-exporting countries the domestic prices of exportable products may increase. **Medium-to-long term** • Employment and incomes in sensitive, import-competing, sectors may decline, with some producers transitioning out of agriculture. • Unequal distribution of gains may occur through enclave developments in export crops to the detriment of broad-based smallholder food crop production.
Utilization	**Short term** • Greater variety of available foods through imports may promote a more balanced diet and accommodate different preferences and tastes. **Medium-to-long term** • Food safety and quality may improve if exporters have more advanced national control systems in place or if international standards are applied more rigorously.	**Short term** • Greater reliance on imported foods is often associated with an increase in consumption of cheaper and more readily available foods that are high in calories and low in nutritional value. **Medium-to-long term** • Prioritization of commodity exports diverts land and resources from traditional and indigenous foods, which are often superior from a nutritional perspective.
Stability	**Short term** • Imports reduce the seasonal effect on food availability and prices to consumers. • Imports mitigate likelihood of shortages resulting from local production risks. **Medium-to-long term** • Shallow versus deep markets: global markets are less prone to policy- or weather-induced shocks.	**Short term** • Assuming obligations with regard to trade policies may reduce the policy space to deal with short-term market shocks. • Vulnerability to changes in trade policy by exporters, such as export bans. **Medium-to-long term** • Sectors at earlier stages of development may become more susceptible to price shocks and/or import surges.

Source: FAO.

On trade and food availability: "Through its impact on agricultural and food production, trade determines national food availability. Trade also affects how food supplies are distributed at the subnational level across domestic regions, between urban and rural markets, and at different points in time, affecting availability geographically and temporally. Trade can also affect the stability of availability". (FAO, 2015, p.27)

This report goes further to discuss how the type of impact on availability, negative or positive, depends on whether or not food imports displace or complement domestic production, with the later being the desirable outcome (FAO, 2015).

On trade and food access: "Access to food, which is primarily determined by the purchasing power of consumers, is affected by trade through the impact of trade on growth, incomes, prices and poverty levels. Broad employment and income opportunities, along with adequate food prices and low food inflation, facilitate economic access. Therefore, much depends on the level, inclusiveness and stability

of the growth rate generated by expanded trade. Government budgets for social protection and agricultural development can also play a role" (FOA, 2015, p. 30)

The role of prices in determining access to food is also discussed. Trade is an important determinant of domestic prices. Prices tend to be more volatile than incomes and unexpected changes in price can greatly influence household food security. (FAO 2016)

On determining the impact of short-term trade policy interventions on food security

"Many food-importing countries lowered import tariffs on food items, agricultural inputs and equipment. Import duties inflate domestic consumer prices relative to world prices, and reduce imports. The direct effect of the reduction or removal of an import duty on a given product is to lower the price of the imported good, thus contributing to reducing domestic consumer prices. However, in most net food-importing countries, tariffs on food products were already low and their reduction had a minimal impact on domestic prices. Reduced tariffs on inputs (machinery, seeds, fuel) lower the cost of production and provide an incentive for domestic production. Lower taxes, if not compensated for by higher revenue collected from greater amounts of imported goods, will have negative implications for government budgets." (FAO, 2015, p. 38)

4. Trade Theory

There are two underlying reasons why two countries would choose to engage in trade. The first reason being due to their differences in production capabilities. Each country will produce more of that which is able to or better at producing. In simple terms, they make an exchange, trading what they have for what they don't have. The second reason is so as to gain from economies of scale in production. By each country limiting their production to only a select range of good they are able to produce, they can produce each of these goods at a larger scale and with higher efficiency as opposed to producing everything themselves (Krugman et.al, 2012). Each country will opt to allocate more resources towards producing that which it is efficient at producing and trade it off for that which they are not. International trade comes down to the theory of comparative advantage. Various conventional or neoclassical trade models have been used to explain the workings of trade and especially the gains of trade. Of the theories, the most important have been the Ricardian and Heckscher-Ohlin trade theories.

4.1 The Ricardian Trade Theory

The Ricardian trade theory is built entirely on the concept of comparative advantage. According to this theory, trade is due solely to differences in labor productivity and opportunity cost between nations. Labor productivity in this theory is expressed as the unit labor requirement i.e the number of hours of labor needed to produce a good. Differences in labor productivity are due to several factors, and in the case of agriculture those may be geographical, such as climate, soil quality or simply location; or socio-economic, such as the amount of investment in human capital (Gutierrez, 2002). Krugman et.al (2012) presents a number of general assumptions of the Ricardian theory. Firstly, the existence of perfectly competitive markets, which implies conditions such as homogenous products, no barriers, several competitors, and perfect knowledge. The second assumption is that there is only one factor of production, labor which is free to move within countries but not between. Thirdly, that only two countries are involved with only the two goods being produced in each. Specialization in each country is determined by the relative prices of labour in each.

The Ricardian theory argues that by allocating labor to were it will have the highest productivity an economy will secure the best use of its resources (Krugman et.al 2012). A near real world example of ongoing trade is that between Bangladesh and India where garments and rice are being traded, and labour is the single immobile factor of production. Bangladesh imports rice from India and India garments from Bangladesh, sticking with the assumption that each country holds a comparative advantage in what they export.

Gains from Trade

Under the Ricardian model there are two approaches to seeing the gains from trade and specialization. The first is that trade can be treated as a method of indirect production (Krugman et.al, 2012). Bangladesh is capable of producing its own rice, but it would rather trade it for garments, which allows Bangladesh to indirectly produce rice by producing and exporting garments, something which it is more efficient in, in exchange for rice.

The second approach in showing the benefits from trade and specialization is by looking at how it expands each country's possibilities for consumption. That is to say that In the presence of trade, each country can enjoy a wider range of options as they are no longer limited to what they are capable of producing themselves (Krugman et.al, 2012).

Being the simplest trade model, the Ricardian model has several shortcomings (discussed in the evaluation section of this paper) as it holds a lot of general assumptions. Despite these shortcomings there is much empirical evidence in favor of its most basic prediction that countries export goods for which their productivity is relatively high, as shown previously in the literature review. (Krugman et.al, 2012)

4.2 The Heckscher-Ohlin Trade Theory

The Heckscher-Ohlin theory, also known as factor-proportions theory has been used more extensively in explaining international trade. This theory moves away from the Ricardian view of differences in labor productivity and focuses solely on the differences in resources as the main motivator for trade. Likewise, it builds on comparative advantage but argues that comparative advantage is influenced by the interaction between a nation's resources and the technology of production (Krugman et.al, 2012). The theory emphasizes the relationship between the proportions in which different factors of production are available in different countries and the proportions in which they are used in producing different goods, hence the name factor-proportions theory (Krugman et.al, 2012).

The Heckscher-Ohlin model in its simplest form involves two countries, two goods and two factors of production, the main addition being that the factors of production are now movable between sectors (Krugman et.al 2012). For example, ongoing trade between Bangladesh and India where garments and rice are being traded, with labour along with capital being the two mobile factors of production. Labour and capital are now movable between each sector, i.e the land used for farming can be used to build a textile plant, and conversely, the capital used to pay for a power loom can be used to pay for a tractor. Additionally under this model land and capital can substitute for each other when it comes to production (Krugman et.al, 2012).

Once trade is initiated each country will produce and export those goods which most efficiently use its most abundant resource. This is the basic prediction of the Heckscher-Ohlin theory (Krugman et.al, 2012). Under the assumptions and prediction of the model trade will have effects on a number of things, taking a situation where garment production is labor intensive and rice production is capital intensive and that Bangladesh has a higher labor to capital ratio than India. There will be a convergence of relative prices as the relative price of garments will rise in Bangladesh and fall in India, setting a new world relative price inbetween. This means that Bangladesh will export garments due to a rise in the relative price of cloth and India will export rice due to the rise in the relative prices of rice. Trade will also have effects on income distribution in the sense that owners of a country’s

abundant factors gain from trade and owners of a country's scarce factors lose (Krugman et.al, 2012). This means that Bangladesh garment producers gain, while Indian garment producers lose. Likewise, Indian rice farmers gain, while Bangladesh rice farmers stand to lose. Lastly, trade will lead to a complete equalisation of factor prices. When relative prices of rice and garments converge it will cause an equal convergence of relative prices of labor and capital in each country i.e wage and capital rate become the same in each (Krugman et.al 2012).

4.3 Import Tariffs

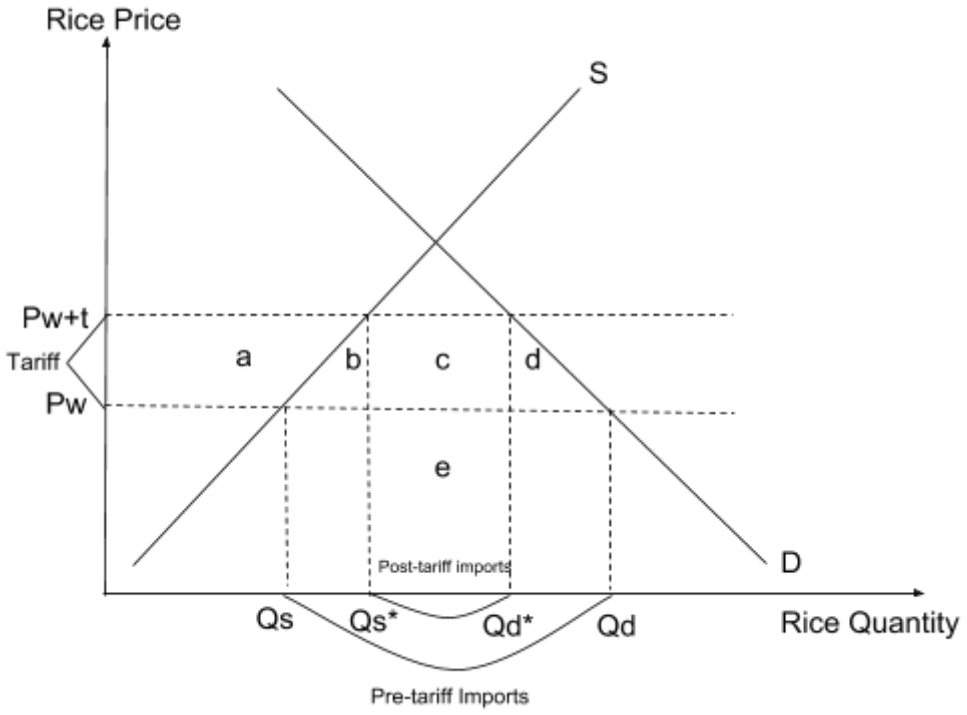
Import tariffs essentially have the effect of raising the cost of transporting goods from one country to another, thus raising the price received by domestic producers of that good. Tariffs have been used traditionally to raise government revenue and to protect its various domestic industries, and has been a suitable policy option for developing countries. The use of tariffs has dropped considerably in recent years as most nations have resorted to nontariff measures like import and export quotas. (Krugman et.al, 2012)

Figure 2 shows the effect of an import tariff on the quantity of a good supplied and demanded as well as the price. In the absence of a tariff, the price of rice would be the same in Bangladesh and India, both trading at the world price Pw. The quantity of rice demanded and supplied are represented as Qd and Qs respectively, where Bangladesh imports the difference (pre-tariff imports in figure 2) from India. As the tariff is introduced, producers will be less prepared to move rice from India to Bangladesh unless the price of rice in Bangladesh is higher than India by at least the amount of tariff t.

If there is no rice being traded there will be an excess demand for rice in Bangladesh and an excess supply of rice in India. This will make the price in Bangladesh to rise and that in India to fall until the price difference is the amount of tariff. At the increased price, Bangladesh producers will increase supply in spite of decreased demand from consumers. A drop in price in India will cause a drop in the quantity of rice demanded and an increase in the quantity supplied, creating a smaller supply for export. The amount of rice imported ultimately falls from QdQs, at free trade, to

Qd*Qs*, the new amount under the tariff. At this quantity, Bangladesh import demand is equal to Indian export supply.

Figure 2 - Effect of Import Tariff



Winners and losers are created as a result of the increases of the price of rice in Bangladesh and the decrease in India from the imposed tariff. Thus, rice producers in Bangladesh gain and those in India lose. The reverse can be said for consumers as those in Bangladesh lose from higher prices while consumers in India gain from the tariff. Another winner is the government of Bangladesh which raises revenue. The gains and losses due to the tariff are best depicted through changes in consumer and producer surplus which are encompassed in.

Consumer surplus is the difference between the price consumers pay for a good and the price that they would be willing to pay (Krugman et.al, 2012, Pp 198). As a result of the introduced tariff, Bangladesh rice consumers experience a loss in surplus due to the increase in price. Consumer surplus is represented in Figure 2 as the area

between Price and the demand curve. In the absence of the tariff, this is the area above the world price of rice Pw. Once a tariff is introduced and price increases this area reduces to the area above the new price Pw+t, marking a loss in the area a,b,c, d.

Producer surplus is the difference between the price producers sell their products and the price that they are willing to sell (Krugman et.al 2012). Bangladesh rice producers experience a gain in surplus due to the increased price of rice. Producer surplus is represented as the area between price and the supply curve. Before the tariff this is the area below Pw in Figure 2. Once the tariff is introduced, this increases to the area below Pw+t, gaining the area marked as (a).

In light of these concepts of consumer and producer welfare and the basis of the assumptions held by the neoclassical theories, the expected outcome from the removal of a tariff must then be a decrease in price, an increase in supply, and an increase consumer surplus.

5. Food Security

5.1 Defining Food Security

According to George-André Simon in Food Security: Definition, Four dimensions, and History, 'Gentilini identified about two hundred and five definitions of Food Security and Smith, Pointing and Maxwell counted about two hundred different definitions' (Simon, 2012, p. 4). The definition of food security has changed over time as knowledge has improved and more dimensions have been identified and incorporated. In 1996, the World Food Summit produced a generally accepted definition which states that "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life". (FAO, 1996).

This definition was amended by the FAO in 2002 to include social access and updated accordingly as: "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life". (FAO, 2002)

Food security as defined by the FAO is a situation 'when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.' (FAO, 2003)

For the purpose of this research, the above FAO definition of food security will be referred to, although various organizations, many of which serve as sources for this research hold their own definitions. It is important to look at these definitions so as to draw comparisons and also begin to create an idea on their stance regarding the subject.

The WFP defines food security as 'people having availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life' (WFP Website)

In the WTO definition for food security 'people are considered "food secure" when they have access to sufficient, safe, nutritious food to maintain a healthy and active life'. (WTO Website)

The United States Department of Agriculture defines food security as 'access by all people at all times to enough food for an active, healthy life.' (USDA ERS Website)

Other agencies such as the World Bank and the International Food Research Policy Institute accept and abide by the FAO definition set at the world food summit.

Figure 3 below, adopted from Clapp, J. (2014) provides a timeline of shifting attitudes towards the topic over the past century.

Figure 3 - Timeline of Shifting Attitudes towards Food Security

Nineteenth to early twentieth centuries: focus on food self-sufficiency as part of national security of states.

Mid-twentieth century: increasing attention to global implications of hunger
- League of Nations work on nutrition (1930s).
- "Freedom from want" (Franklin D. Roosevelt, 1941).
- Establishment of FAO (1945).
- Universal Declaration of Human Rights incorporates right to food (1948).
- Establishment of food aid programmes (1950s–60s).

1970s: the term "food security" is first introduced and has a global outlook.
- World Food Conference (1974) defines food security: "Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices."

1980s: focus of food security shifts from production to also incorporate access, and to include individuals.
- FAO definition (1983): "Ensuring that all people at all times have both physical and economic access to the basic food that they need."
- World Bank definition (1986): "Access of all people at all times to enough food for an active and healthy life."

1990s: growing attention to nutrition and cultural dimensions of food security, and the emergence of the concept of food sovereignty.
- World Food Summit (1996) definition: "Food security, at the individual, household, national, regional and global levels is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life."
- Emergence of the concept of food sovereignty (1996), defined most broadly as the right of nations and peoples to determine their own food systems.

2000s: Consolidation of the four pillars of food security and growing attention to the right to food, food sovereignty, and new dimensions of nutrition.
- The word "social" is added to the FAO definition of food security (2001): "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."
- Adoption by the FAO of the Right to Food Guidelines (2004).
- Four pillars of food security are outlined by the FAO (2006) to supplement and clarify the 2001 definition: availability, access, utilization, and stability.
- Nyéléni Declaration on Food Sovereignty (2007) gives prominence to the concept.
- Growing attention to the "triple burden" of malnutrition.

(source: Clapp, J., 2014)

Food security is classified into four dimensions: The first is availability. This has to do with supply aspect of food security and sufficiency. The WFP defines this as 'The amount of food that is present in a country or area through all forms of domestic production, imports, food stocks and food aid'. (WFP, 2009, p.170). The second is access, which implies people's ability to get the food they need. The definition refers to physical, social and economic access to food and focuses on income and utilization as being more concerned with food quality, food intake and how it is most efficiently used. The last dimension, stability, has to do with availability and access to food at all times, regardless of season or economic situation.

Transitory or short-term food insecurity refers to a temporary state of insecurity that is marked by a sudden drop in the ability to produce or access enough food to meet dietary need. It is caused by short-term disruptions to food access and availability as a result of year-to-year variations in food production, price fluctuations, natural disasters, unemployment, e.t.c. Policy makers must act hastily in minimizing transitory food security as its recurrence may result in long-term or chronic food insecurity Planning for and responding to transitory insecurity is a difficult task due to its quick onset and unpredictability. (FAO, 2008).

Food Sovereignty refers to the right of people to control the way in which their food is produced, traded and consumed rather than simply taking what they are giving, be it the type of products or the price of the products (Payne, Becheva, & ILEIA, 2007). The United States Food Sovereignty Alliance defines food sovereignty as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations". (USFSA Website)

Food sovereignty essentially differs from food security. Whereas food security places emphasis on peoples access to food, it ignores other aspects such as the source, quality, production conditions and even human rights. The food sovereignty movement views these aspects as essential components of the food system. (Payne, Becheva, & ILEIA, 2007)

In speaking extensively about food security it is only right to briefly discuss food insecurity, as vulnerability has more to do with the later than the former. FAO defines food insecurity as a situation where some people do not have access to sufficient quantities of safe and nutritious food and hence do not consume the food that they need to grow normally and conduct an active and healthy life. Food insecurity may be due to lack of food, lack of resources, improper use and changes over time (FAO, 2008)

According to the FAO 'Vulnerability to food insecurity refers to the full range of factors that place people at risk of becoming food-insecure. The degree of vulnerability of individuals, households or groups of people is determined by their exposure to the risk factors and their ability to cope with or withstand stressful situations.'(FAO, 2000)

Food security has entirely to do with the state of people's livelihood presently while vulnerability has more to do with the potential changes to this livelihood due to people's inability to cope with such situations that expose their vulnerability.

The WFP defines vulnerability as: "The vulnerability to food insecurity is made of all the factors that constitute a risk for people to become food insecure including factors that affect their capacity to face the difficulty they meet. In other words vulnerability to food insecurity relates to situations where there is a risk – in certain circumstances or following some events or shocks (drought, disease, civil disturbance, etc.) – that future food intake will be inadequate" (WFP, 2009, p. 172). Therefore assessing vulnerability is of great importance as it allows policy makers to not just address present food security but also come up with preventative measures.

Although the vulnerability to food security can be measured, the results will hold no complete accuracy. As is the case with the food security dimensions, there are no specific indicators for measuring vulnerability. (Simon, 2012)

Food Security and Poverty

Food Security and poverty go hand in hand and are closely linked to peoples access to food (FAO, 2008). As stated many times before, the poorest people are the ones

most susceptible to threats to their food security. It is estimated that the poorest end up spending 75 percent of their earnings on staple foods. Price volatility is a major factor influencing vulnerability to food insecurity. Poor people, who under normal market conditions may have been able to sufficiently feed themselves suddenly find themselves no longer able to do so due to rapid increases in prices (Martin, W. 2010). In both case study countries, there is a high prevalence of poverty, therefore any major changes to food supply will raise major concerns.

6. The 2007-2008 Global Food Price Crisis

6.1 Background

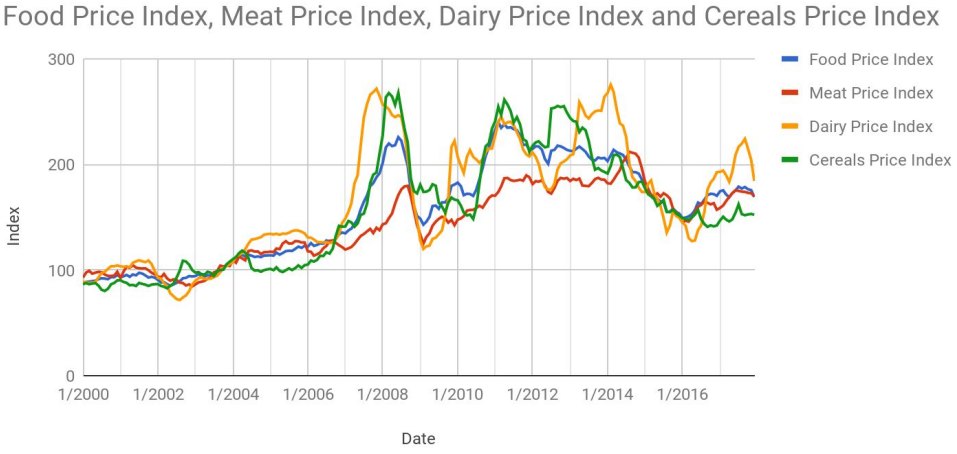
There have been food crisis in the past, but what separated that of 2008 with previous ones is the fact that it was felt globally and most major food and feed commodity markets were affected to various degrees (ALNAP. 2008). Another reason is that real prices had been falling for the previous two decades and price volatility had remained relatively low in line with this (Jayasuriya et.al 2012). There was also the major concern about the particular impact of the crisis on the poorest people in major food importers who all of a sudden were faced with a significant reduction in real income and purchasing power. The most affected areas were Asia, Sub-saharan Africa and Central America (IFPRI/CGIAR, 2008). The World Bank had estimated at the time that rising food prices had pushed some 44 million people in developing countries into poverty (World Bank, 2011). Governments and policy makers faced renewed challenges at an even greater scale. Although the crisis appeared to be years in the making, the onset was fast, leaving the world unprepared to properly handle the situation.

There had been a steady increase in food demand, along with population growth, rising income levels and shifting diets in the last three decades. Real food prices had dropped significantly ever since the Green Revolution that began in the late 1960's. This period was marked by record harvests and the building up of food stocks (HTLF, 2008). Real food prices continued to fall, reaching a record low by 2000. The general decline in prices came to an end after 2000 due to a major reduction in agricultural investment in the public and private sector. This lack of investment was especially detrimental to developing countries resulting in dwindling growth in agricultural output. Additionally, due to falling prices, several farmers growing food crops switched production to non-food crops or converted their farmland for non-agricultural purposes. Long periods of unsustainable use of land and resources have led to land degradation, soil erosion, nutrient depletion, water scarcity, desertification, and the disruption of biological cycles (HTLF, 2008).

From 2004, prices for most grains began to rise gradually and production increased, but at a much slower rate than demand, forcing several countries to utilise existing

stocks resulting in continued depletion of stocks (HTLF, 2008). The extreme weather events of 2005 in several key food supplying countries due to climate change and the associated risk, led to a 2.1% drop in world cereal production in 2006 (GIEWS, 2009). In 2005 the prices of staple cereal crops rice, wheat and corn began to rise after decades of low prices. Between January 2007 and the peak of the peak of the crisis in the second quarter of 2008, corn prices rose by 74%, rice prices by 224% and wheat prices by 124% (Keats, Wiggins, Compton & Vigneri, 2010). Prices fell subsequently but never regained pre-crisis levels. Figure 4 shows the FAO general food price indices along with various commodity group price indices. As can be seen, all but the meat price index showed dramatic growth from early 2007, peaking within the first half of 2008 before a similarly dramatic fall.

Figure 4 - FAO Food Price Indices 2000-2017



(source: FAO)

In a report by the Institute for Food and Development Policy, a summary of the price increases is provided: 'The World Bank reports that global food prices rose 83% over the last three years and the FAO cites a 45% increase in their world food price index during just the past nine months. The Economist's comparable index stands at its highest point since it was originally formulated in 1845. As of March 2008, average world wheat prices were 130% above their level a year earlier, soy prices were 87% higher, rice had climbed 74%, and maize was up 31%." (Holt-Giménez & Peabody, 2008, p.1)

6.2 Causes

There is much concurrence between existing literature (Headey, D. et.al. 2010; Wiggins et.al, 2010; Trostle R., 2008; Kearney, N., 2010; ECB, 2008) on the underlying reasons behind the 2007/2008 Global Food Price Crises. In this paper, the causes have been separated into short-term, mid-term and long-term causes. Between these causes, some factors seem to have played a much more significant role in inciting the crisis with each creating a cumulative effect. Figure 5 adopted from Heady et.al presents a timeline of the crisis, in terms of the various causes and when they started to present themselves.

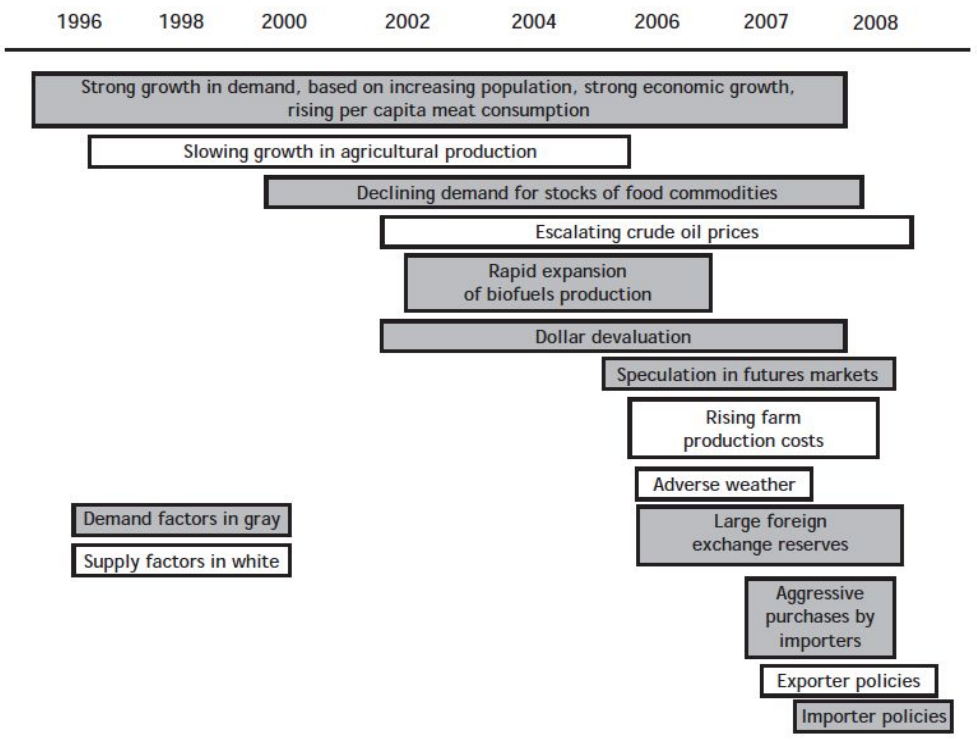
The long-term causes refers to those factors that initially set the trend for commodity markets at the time. These are, firstly the rapid economic growth and the rise in incomes in several emerging economies, particularly Asia that has led to increased meat consumption and therefore higher demand for crops as animal feed. Secondly, cereal production had experienced slowed growth since the 1980's despite increasing demand, with periods where cereal demand greatly exceeded production. (Headey & Shenggen, 2010)

The mid-term causes refers to those factors that appear to have played a role in the few years from the start of the century leading up to the 2008 price hike. There are several mid-term causes of the crisis. Among them are: the severe weather shocks, such as the droughts Australia and Ukraine faced between 2005 and 2007 that decreased wheat production and affected trade; biofuel production, backed by government policies promoting their use, had increased significantly at the time. A trend that is still being seen today. This spurred an increase in the demand for cereals, especially maize; depreciation in the value of the US Dollar; Higher oil prices led to an increase in the prices of diesel and fertilizers, greatly increasing the cost of production and transportation for producers; slower growth of cereal yields (and production), especially those of rice and wheat, during the past 20 years as a result of low investment over the previous three decades; increased investment in commodity futures markets fuelled speculation; and lastly depletion of stocks and reserves due to slowed growth in production. (Headey & Shenggen, 2010)

The short-term refers to those factors that came about at the start of the crisis and are mostly responses that may have worsened the situation. These are, export bans,

tariffs and other trade restrictions implemented by several major exporters. e.g India imposed a total export ban on non-basmati rice, and panic buying by several major rice importers e.g The Philippines encouraged producers to withhold supplies and traders to increase stocks. (Headey & Shenggen, 2010)

Figure 5 - 2008 Global Food Price Crises Timeline - Causes



(source: Headey & Shenggen, 2010)

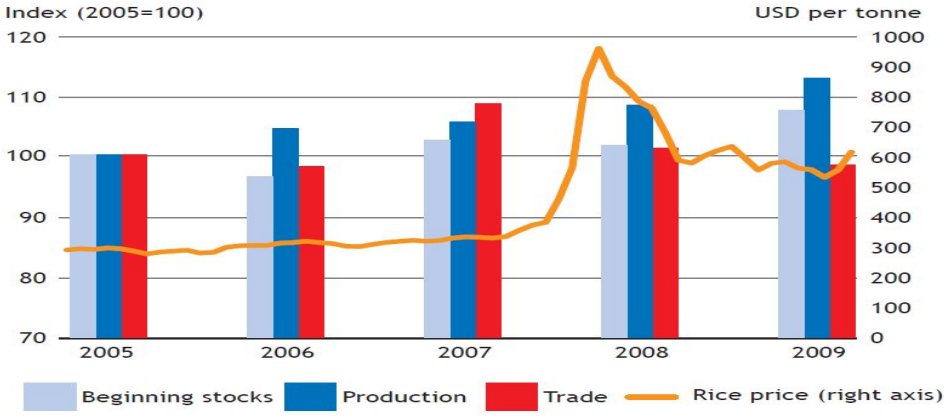
6.3 The Rice Crisis

There was special concern shown when it came to rising rice prices as they experienced extreme volatility and due to the status of rice as a staple for poorer populations in developing countries where rice can account for more than a quarter of calorie intake (Childs & Kiawu, 2009). Rice prices were relatively low at the beginning of the century but began showing a gradual increase from 2004. As the Global Food Price Crises began to set in by 2006 and most agricultural commodity prices began rising, the growth of rice prices was still comparatively slow. As the world prices of corn and wheat more than doubled between January 2006 to October 2007, rice prices showed only a 12 percent increase (Childs & Kiawu, 2009).

By October 2007 rice prices starting rising drastically. This saw a 10 percent increase within just two months and a 90 percent rise by October 2008.

The crisis in rise was unexpected as supply was constantly able to meet demand demand despite significant increases in demand (Baldwin & Childs, 2011). Conditions seemed to be in place to not have a rice crisis as there were available stocks, sufficient trade and general increases in rice production in the years preceding the crisis (see Figure 6 below). The rice market faced spillovers from other food commodity markets at the beginning of the crisis due food substitution displayed by consumers and producers alike. Despite these spillovers, rice prices were not expected to reach the levels that they did. (Baldwin & Childs, 2011)

Figure 6 - Rice Market Fundamentals



(source: FAO Economic and Social Development Department, 2011)

According to the FAO, the surge in global and domestic rice prices was not as a result of changes in demand and supply nor spillovers but rather due to government trade policies. Several major rice exporting countries imposed protectionist policies such as higher export tariffs, complete export bans, as well as raising minimum export prices. However, rice importers relaxed most measures such as import tariffs, quotas and taxes in order to encourage imports and stabilize their markets (Baldwin & Childs, 2011). They were also plans to accumulate reserves as a remedy to the crisis which contributed to increased demand. These measures further destabilised markets as they were undertaken without prior consultation with trading partners, fuelling more uncertainty. (Baldwin & Childs, 2011)

7. Country Cases

Food Security and poverty go hand in hand and are closely linked to peoples access to food. As stated many times before, the poorest people are the ones most susceptible to threats to their food security. It is estimated that the poorest people end up spending 75 percent of their earnings on staple foods. Price volatility is a major factor influencing vulnerability to food insecurity, and the poor, who under normal market conditions may have been able to sufficiently feed themselves suddenly find themselves no longer able to do so due to the rapid increases in prices (Martin, W. 2010). In both case study countries, there is a high prevalence of poverty, therefore any major changes to food supply will raise major concerns. Table 2 below shows the countries and their rankings in terms of indices relating to poverty and food security.

Table 2 - Poverty and Food Indicators: Case Country Rankings

Poverty and Food Security Indicators					
	HDI (out of 169)	GHI (out of 119)	Food Security Index (out of 113)	FSI - availability	FSI - affordability
Bangladesh	139	88	89	75	80
Philippines	116	68	79	80	77

It is important to note that both Bangladesh and The Philippines have made important strides in recent years towards eliminating poverty and improving food security. For example, the Philippines was successful at meeting the 2015 MDG target of halving poverty from what it was in 1990.

7.1 Bangladesh

7.1.1 Food Security and Poverty

In Bangladesh, a primary driver of food insecurity has been poverty along with seasonality and rising food prices, in spite of sufficient availability of food and markets that work properly (WFP website). It has relatively high rates of poverty and undernourishment which have been worsened by frequent natural disasters in the form of severe flooding, extreme cyclones, and less frequently, droughts. 30 to 50 percent of the country experiences extreme weather events yearly. In 2010, about 31.5 percent of Bangladeshis were living in poverty. Despite this being an improvement from 40 percent five years before, the rates were still very alarming with 17 percent of the population believed to be living far below the poverty line in extreme poverty (WFP website). Poverty in Bangladesh is as a result of "unemployment or underemployment, inadequate access to land for cultivation, social marginalisation and vulnerability to natural disasters" (WFP website). There are over than 40 million undernourished Bangladeshis who are food secure and 11 million who suffer from acute hunger which under the FAO definition are – not having access to adequate amounts of safe, nutritious food to sustain a healthy and productive life (FAO, 2012).

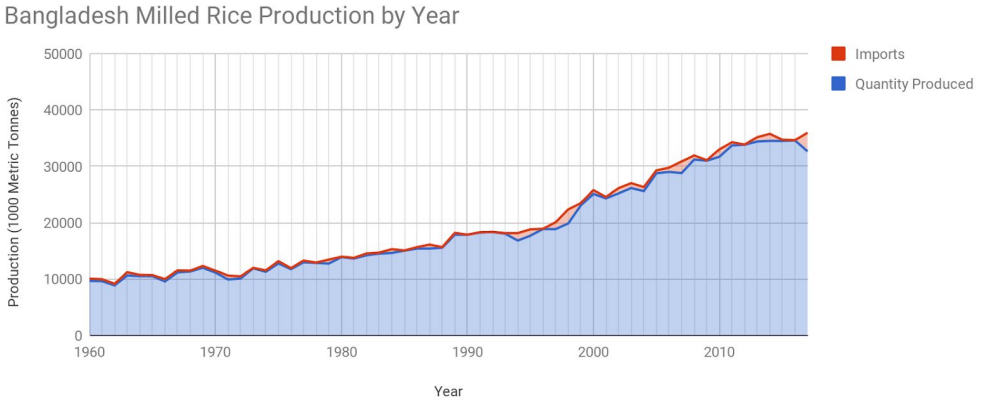
From the second half of the 1970's rice prices in Bangladesh more than doubled due to inflation and panic buying from fears of scarcity. This happened at a time when Bangladesh was recovering from the War of Independence[2], international rice prices had hiked, and the US was threatening to withhold its food aid, leaving Bangladesh unable to afford imports. Floods resulted in several farmers finding themselves unemployed and without means of income. This period saw Bangladesh experience one of its worst famines, with extremely high rice prices and reduced income. 1.5 million people are estimated to have died as a result of this (Wiggins et.al, 2012).

In response to this, the government took steps to ensure increased domestic production. It began open market operations in the grain market; a green revolution that vastly improved production by introducing more efficient farming methods; and the government introduced several safety nets. They managed to greatly increase

[2]War that gained Bangladesh its independence and the subsequent creation of the People's Republic of Bangladesh

production from under 14 million tonnes in 1980 to over 25 million tonnes in 2000 (see figure 7 below) (Wiggins et.al, 2012).

Figure 7 - Bangladesh Rice Production + Imports



(source: x)

In 2007, Bangladesh was already experiencing it's most severe monsoon season since 1991. Monsoon floods in late 2006 had caused significant damage to agricultural output. Cyclone Sidr struck in November 2007 and left Bangladesh in more devastation as much of the rice crop that was due for harvest in December was wiped out, along with stored crops, personal food stockpiles and livestock (Bangladesh Ministry of Food and Disaster Management, 2008, p. 19-20). The Bangladeshi government put estimates of rice lost to the 2007 floods between 600,000 to 850,000 MTs and the losses from Cyclone Sidr at about 800,000 to 1,300,000 MTs. This places the total rice losses from two events within a year at about 1,775,000 MTs (WFP, 2007). Millions of people found themselves unable to earn income as they're sources of livelihood were destroyed. This left approximately five million people in need of food assistance. (Bangladesh Ministry of Food and Disaster Management, 2008, p. 19-20*)*. As can be seen in Figure 4, rice production has generally displayed an upward trend over time with brief lapses. Although there was no negative growth in production during the period, growth was significantly slowed down.

7.1.2 The Crisis and Bangladesh

In the midst of the emergency in Bangladesh, the price crisis struck. This transformed the situation into a food supply and food price crisis, which left Bangladesh as a LIFDC with several problems and few impactful options. The situation was further exacerbated by early 2008 when its main supplier of rice imports, India, put in place a complete ban on all but basmati rice exports in order to secure its own stock. Dorosh P. and Rashid S. concluded in their 2012 study on price linkages between the Bangladesh and India rice markets that there was "a strong statistical comovement (co-integration) between Bangladesh domestic wholesale prices and import parity prices of subsidized BPL rice from India's public stocks" (Dorosh PA. & Rashid S., 2012). These restrictive measures by India exerted a lot of upwards pressure and led to the peaking of domestic rice prices, leaving Bangladesh scrambling for other sources.

The sudden spike in prices made it impossible for many households in bangladesh to meet their dietary needs. In the midst of the crisis, It is estimated that the hike in commodity prices, especially those of food may have driven over 4 million Bangladeshis back into poverty, which in relative terms is a 3 percent increase in the the poverty rate (World Bank, 2008).

Table 3, adopted from Wiggins et.al, 2012 presents a timeline of events relating to the food price crisis in Bangladesh

Table 3 - Timeline of Price Crisis in Bangladesh

Year	2007				2008			
Quarter	Jan/March	April/June	July/Sep	Oct/Dec	Jan/March	April/June	July/Sep	Oct/Dec
Events			Severe floods Spike in global fuel prices	Cyclone Sidr in November	India bans rice exports,others impose export tariffs	Boro harvest 17% up from past year		

7.1.3 Response to the crisis

In response to the spike in food prices, Bangladesh put in over 10 measures. The objectives of these measures as presented in Demeke et.al (2009) ranged between: Border and market measures to prevent or dampen food price rises, measures in order to increase short-term food availability, and measures to protect the most vulnerable population.

Table 4 below, taken from Wiggins et.al depicts the border and market measures undertaken by Bangladesh in response to the price spike.

Table 4 - Response to Crisis: Border and Market Measures

Measure	Bangladesh
BORDER MEASURES	
Export bans / restrictions	• Banned export of rice, soybean oil and palm oil
Import tariff reductions	• 5% duty on rice and wheat withdrawn
Public import facilitation	• Government encouragement to private importers—small importers were helped to open lines of credit. • A deal with the Indian government allowed GOB to secure ½ million tonnes of rice from India at below Indian rice export ceiling price.
Exercising risk hedging deals	*None recorded*
MARKET MEASURES	
Release of stocks	• Government released some of its national stocks through various public distribution channels; all targeted or self-targeting
Price controls by fiat	*None recorded on consumer side*
Untargeted staple food tax reduction	*None recorded*
Untargeted food subsidies	*None recorded* (though targeted food subsidies linked to procurement and safety net policies were reported, & targeted food distribution via WFP)
Restricting speculation/ private stockholding	• Strong anti-hoarding activity was recorded

(source: Wiggins et.al, 2012)

Of all the measures put in place, the one of importance for this research is the complete removal of the then 5% import tariff on rice as well as public import facilitation. The government actively promoted the private importation of food through open lines of credit for importers, and arranging public procurement through a bilateral trade deal with India which was supposed to see the import of 500,000 metric tonnes of rice. This resulted in the import of 2.05 million metric tons of rice and 1.40 million metric tons of wheat between 2007 and 2008, most of which came from the private sector (Wiggins et.al, 2012).

7.2 The Philippines

7.2.1 Food Security and Poverty

The Philippines, despite being a low-middle income country and one of the fastest growing economies in Asia, experiences a high level of inequality and vulnerability. Hunger and food insecurity are rampant in its rural areas, where food security is constantly under threat from natural disasters and conflict, and poverty rates tend to be much higher than the national average. According to the CIA World Factbook "Poverty afflicts more than a fifth of the total population but is as high as 75% in some areas of the southern Philippines. More than 60% of the poor reside in rural areas, where the incidence of poverty (about 30%) is more severe - a challenge to raising rural farm and non-farm incomes".

Despite having highly fertile farmland, frequent weather events such as typhoons that result in floods and landslides and have caused serious disruptions to food supply as crops are destroyed. The Philippines ranks No. 3 out of 171 countries on the 2017 World Risk Index and No. 5 out of 188 countries on the 2016 Global Climate Risk Index (In 2006 it was No.1)[3]. This, coupled with a lack of essential infrastructure (e.g farm-to-market roads), has led to widespread devastation among Filipino farmers (Suansing, B., 2017). In terms of access to food, the main hindrance for most poor Filipinos is lack of income as a result of unemployment. Some studies such as Nazal, M., & Domalaon, P. J. (2014) suggest that there is sufficient food

[3] GLOBAL CLIMATE RISK INDEX 2016 Briefing Paper and World Risk Report 2017

supply in the Philippines and the problem comes down to high food prices. Despite its status as a net food importer, food supply in the Philippines comes from predominantly domestic production. There was rapid positive growth in agricultural output In the Philippines starting from the early 2000s, which has diminished considerably in recent years. Whereas GDP has grown at a rate of 6 percent annually, agriculture has experienced an average growth of only 1.6 percent annually (Briones, R., Antonio, E., Habito, C., Porio, E., & Songco, D., 2017).

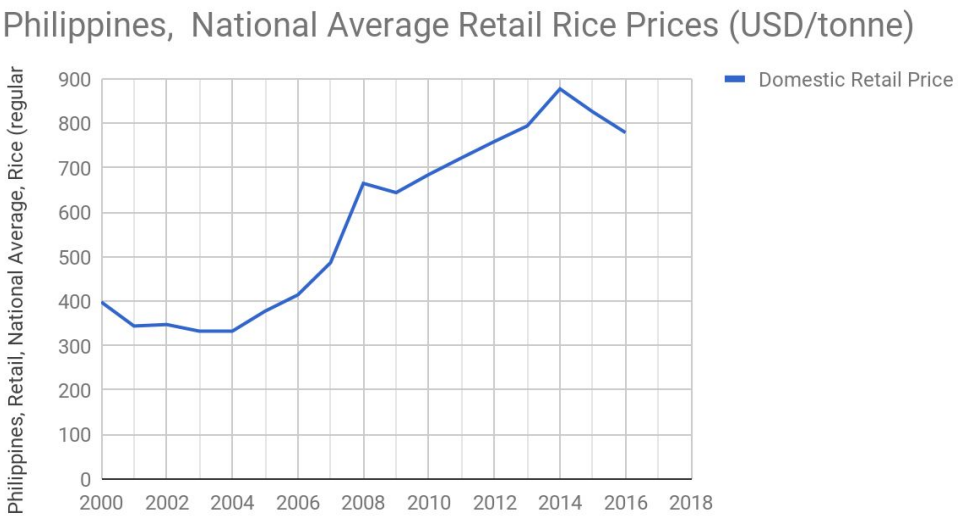
26.9 percent (approximately 12 million people) of the Filipino workforce is employed in the agricultural sector (CIA World Factbook). Briones et.al (2017) states that "Data from the merging of Family Income and Expenditure Survey (FIES) for 2012, and Labour Force Survey (LFS) for 2013 show that poverty is strongly correlated with rural areas and employment in agriculture. In 2012, poverty incidence in rural areas was at 35%. This is higher than the national poverty incidence of 24.8% or close to a quarter of the population, and went far beyond the 12.2% in urban areas. Of all the 24.8 million poor in 2012, 78% or 19.3 million are in the rural areas". The strong correlation between employment in agriculture and poverty is believed to be as a result of its economic structure. Although the agricultural sector employs 26.9 percent of the workforce, it accounts for only 9.4 percent of total GDP. Furthermore, there has been very slow growth (0.7 percent) in farm wages between 2002 and 2014 as well as significant drops in labour productivity as average output per worker went from 2.5% per year in 1997 – 2008 to 0.7% per year in 2009 – 2014. (Briones et.al, 2017)

7.2.2 The Crisis and the Philippines

Rice prices in the Philippines began to rise gradually from late 2006 and showed rapid increases from the last quarter of 2007. By the first quarter of 2008 prices had almost doubled, peaking in June 2008. The crisis came at a time when the Philippines was enjoying quite healthy economic growth. GDP growth averaging 5.4 percent from 2003-2006, reaching 7.2 percent in 2007, the highest growth it had seen in three decades before receding to 4.2% in 2008 (World Bank, 2008). This came mostly from the service sector with the government having done much less towards investing in agriculture. The Philippines was going through the global crisis

like most countries before the situation was escalated significantly largely due to government action and partly by shocks to the international market. After several major rice exporters imposed restrictions, the government took up large rice purchase tenders amid rising concerns about depleting stocks, hoarding by local traders, and impending social unrest. These rising demand pressures largely contributed to increases in the price of rice on the international market from 385 USD per metric ton in January 2008 to 567 USD in March almost reaching l,OOO USD per metric ton in April (World Bank, 2008). Figure 8 below shows average domestic retail prices in the Philippines. As can be seen prices started climbing substantial from about 2006, peaking in 2008.

Figure 8 - Philippines Average Annual Rice Price



(source: FAO GIEWS)

There were plans made to secure 1.5 million tonnes from Vietnam, it's main source of rice imports but this was never realised as Vietnam had already reached its yearly export quota and could no longer supply rice to the Philippines (Menelly, S. 2016). The total commitment by the Philippine government was to import 2.5 million tonnes in 2008 which should have been more than sufficient. Measures to reduce rice consumption at an individual level were also taken. For example, reduced portion sizes were being offered in some restaurants as stipulated by the government and saving leftover rice was encouraged (BBC, 2008). The import deal and measures are believed to have led to panic buying as the situation may have been blown out of proportion. Households began stockpiling and the government

alleges hoarding by traders who sought to profit from higher future prices. The Philippines is reported to have had one of the most serious cases of panic buying which directly contributed to a rise in prices in the international market. (BBC, 2008)

With regard to impacts, the price spikes resulted in serious changes in spending behaviour especially in the poor rural households. In a study conducted in the Philippines (Reyes et al. 2009) it was reported most households as having to slash spending on food by 34% and on healthcare by 23%, as well as increased rates of borrowing. There were reported increases in self-rated poverty which rose from 50 percent in March 2008 to 59 percent in June 2008; hunger incidence rose from 15.7 percent in March to 16.3 percent in June 2008; and unemployment rate from 7.4 percent in 2007 to 8 percent in April 2008. According to World Bank estimates "the 18 percent increase in all food items by July 2008 may have increased poverty by 3.6 percentage points, equivalent to about 3 million people (World Bank, 2008).

7.2.3 Response to the Crisis

In response to the crisis, the Philippine government implemented the Economic Resiliency Program, a heavily funded plan of action to alleviate the impacts of the rising prices. The measures included "scaling-up of quick-disbursing high-impact projects, particularly the Ginintuang Masaganang Ani (a rice production enhancement programme); increasing rice imports to ensure availability and accessibility of the staple food; and enjoining the support of private companies and citizens in cushioning the impact of the crisis." (Dawe, 2010)

The Philippine government drastically increased its rice imports as an attempt at stabilizing prices, increasing its domestic stockpile, and in order to make up for the domestic supply deficit, by importing a yearly average of about 2 million tonnes between 2006 and 2008 (Dawe, D. (edt). 2010). As a last resort in responding to the rising prices, the Philippines looked to Japan. Japan was holding in its reserves imported American rice which under WTO rules was not allowed to be sold outside the Japanese market (Menelly, 2016). An agreement was however reached in which 200,000 metric tonnes of rice was to be sent.

Moreover, the Philippine government made important temporary changes to its rice import policy. The National Food Association (NFA) moved to temporarily reduce the tariff on rice imports which was set at 40% as well as increasing import quotas for private rice imports. These measures were put in place from March 2008 and saw the rice import tariff lowered from 40% to 2 Pesos per kilo, and the import quota increased to 200,000 metric tonnes. The policy changes were undertaken in order to promote private imports and reduce the dependency on the NFA, but as world rice prices then were higher than domestic prices this did not immediately produce the expected outcome. By April, the government had resorted to temporary removing the import quota which had already been increased to 300,000 metric tonnes (World Bank, 2008). Consequently, as international prices began deflating, the Philippines imported a record amount of 2.43 million metric tonnes of rice in 2009

8.Analysis

8.1 Policy Response

In Bangladesh, border measures on imports were taken by the government as a response to the price crisis to dampen high domestic prices and increase supply. These were the removal of the import tariff on rice and import facilitation. These measures proved to be rather ineffective on their own, the reason being that it was very limited in its use of these policy options to begin with. Bangladesh already had a relatively low tariff of 5% in place, which meant that any reduction or removal was bound to have little effect on prices or imports. This is evident as Bangladesh took these measures right at the beginning of the crisis in 2007 but rice prices did not seem to be affected as they simply kept climbing to the record highs seen in mid 2008. Rather, Bangladesh found more success in its agricultural policies as at the peak of the crisis in mid 2008 it recorded record harvests of all types of rice. As reported by the USDA, rice harvests for most rice crops in Bangladesh averaged growth of 8% from the previous year. Although Bangladesh had initially largely sought imports in order to increase domestic supply, these record harvest naturally led to a lower import dependency. Thus, Bangladesh reduced its rice imports altogether from about 838 thousand tons imported between 2007 and 2008 to just 40 thousand tons between 2008 and 2009 (FAO STAT)

In the Philippines, these policy changes proved more effective in improving availability and access to rice. The reduction of its 40% rice import tariff coupled with heavy import facilitation through numerous rice tenders saw a successful reduction in domestic rice prices and an increase in imports. This however is not so clear cut as the measures originally taken by the Philippines are believed to have directly contributed to rising international prices which would be transmitted back home to begin with. The impact of the tariff reduction was also not felt immediately due to the fact that international rice prices had already surpassed domestic prices for rice in the Philippines when the changes were made. However, as international prices began to show signs of dropping, the changes went into full effect as 2.43 million metric tonnes of rice were imported in 2008 (FAO STAT).

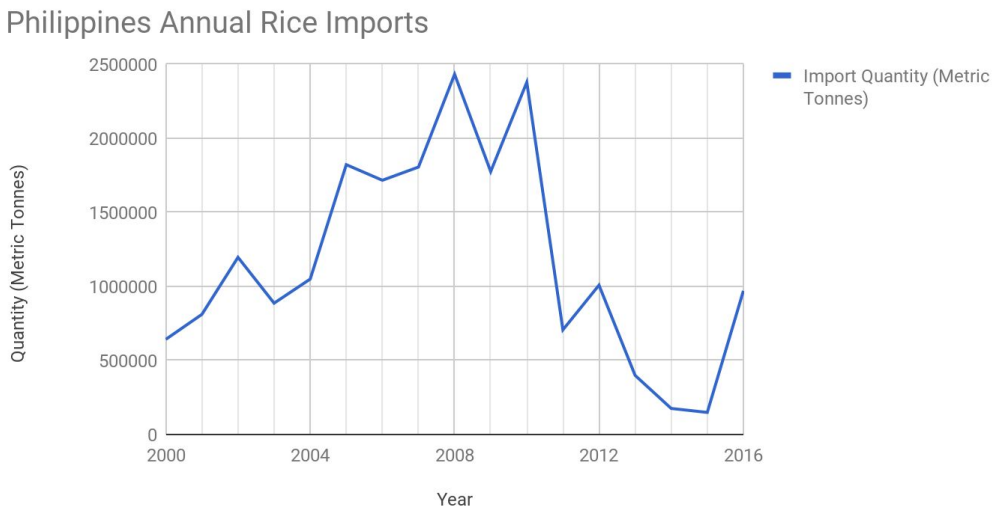
8.2 Rice Import Developments

So as to quantitatively analyse the various relationships between trade and food security, three separate approaches have been taken. The first is a simple graphical analysis of rice imports between 2000 and 2016 (See Appendix B).

Philippines

Figure 9 below is a graph of showing the amount of rice imported by the Philippines in metric tonnes annually, 2000 - 2016. As can be seen rice imports have shown an upward trend with sharp increases between 2000 and 2008. This trend may be attributed to the large post-harvest losses faced by the Philippines yearly (Childs, N., 2009). Rice imports peaked in 2008 at 2.43 million metric tonnes, a 34.7 percent increase from the year before. This is the most rice the Philippines has imported within this period and this coincides with the year in which the brunt of the crisis was felt and the import tariffs were removed. Imports dropped significantly in 2009 but increased almost as much in 2010 due to shortfalls in domestic production and further concerns over rising prices (Baldwin, & Childs, 2011). The two noticeable peaks have come in 2008 at the peak of the food price crisis and in 2010 as the Philippines sought to tackle an impending crisis.

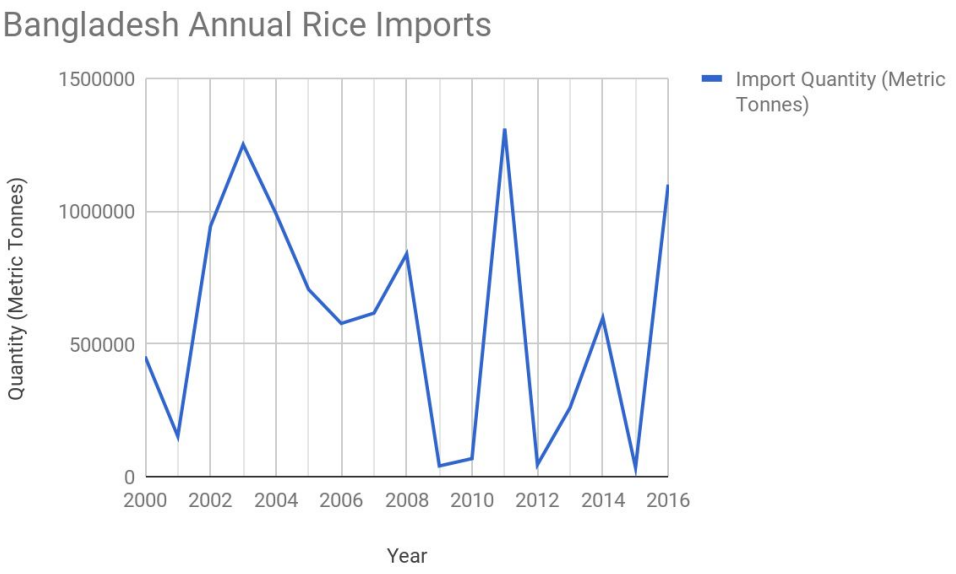
Figure 9 - Philippines Annual Rice Imports



Bangladesh

Figure 10 below shows the amount of rice imported by Bangladesh in metric tonnes annually between 2000 and 2016. As can be seen rice imports have shown much higher fluctuations in Bangladesh compared to the Philippines. Imports appear to be relatively low in 2006 with little growth in 2007. There is however a 36.2 percent increase of rice imports in 2008 with 838,710 metric tonnes imported compared to 615,840 tonnes in 2007. Therefore there was a substantial increase in rice imports in the 2008, the peak of the crisis and as new import policies took effect compared to the previous year. Rice imports fell sharply in 2009 to just 40,240 metric tonnes.

Figure 10 - Bangladesh Annual Rice Imports



8.3 Correlation Analysis

8.3.1 Philippines

Figure 10 below is a graph depicting the correlation between annual imports and the average dietary energy supply in the Philippines. It shows somewhat of a weak positive correlation between the variables, the relationship being that as rice imports increase so does the average dietary energy supply adequacy in the Philippines. A further analysis provides the results in Table 5. The correlation coefficient is 0.311, indicating a moderate positive correlation between the two variables. However, despite this strength of correlation the results are not statistically significant at a significance value of 0.120.

Figure 11 - Imports and average dietary energy supply adequacy: Philippines

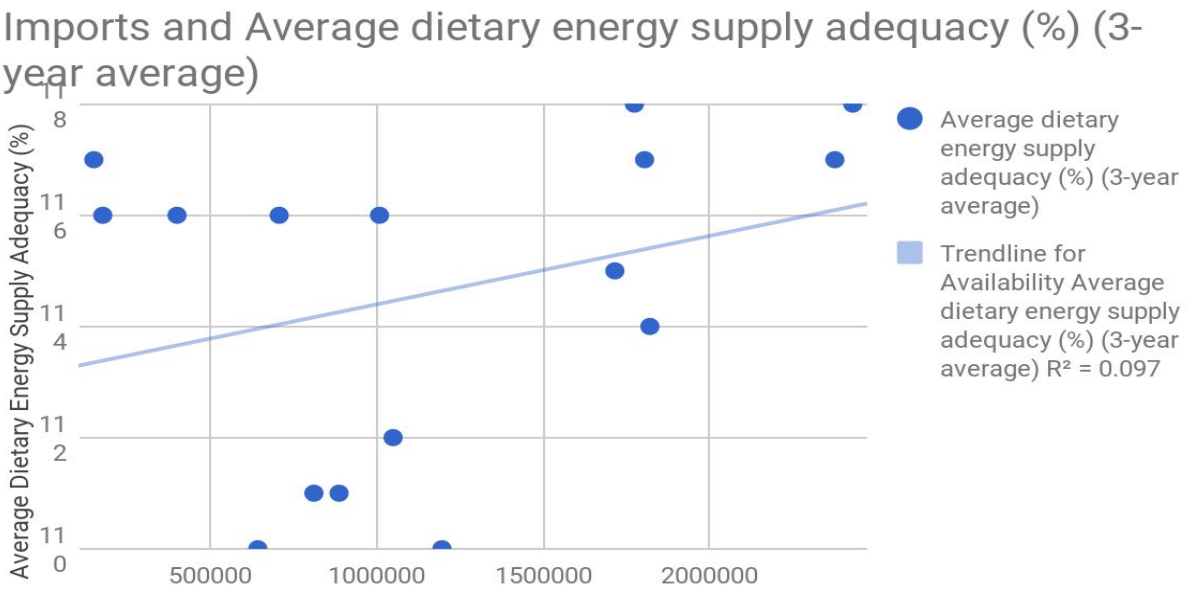


Table 5 - Imports/Average dietary energy supply adequacy:Philippines

Correlations			
		Imports	Averagedietaryenergy supplyadequacy
Imports	Pearson Correlation	1	.311
	Sig. (1-tailed)		.120
	N	16	16
Averagedietaryenergysupplyadequacy	Pearson Correlation	.311	1
	Sig. (1-tailed)	.120	
	N	16	16

Figure 12 depicts the correlation between annual imports and the depth of the food deficit in the Philippines. It would appear to be a moderately negative correlation between the variables, the relationship being that as rice imports increase the depth of the food deficit decreases. A further analysis provides the results in Table 6. The correlation coefficient is -0.329, indicating a moderate negative correlation between the two variables. However, despite this strength of correlation the results are not statistically significant at a significance value of 0.107.

Figure 12 - Imports and Depth of food deficit:Philippines

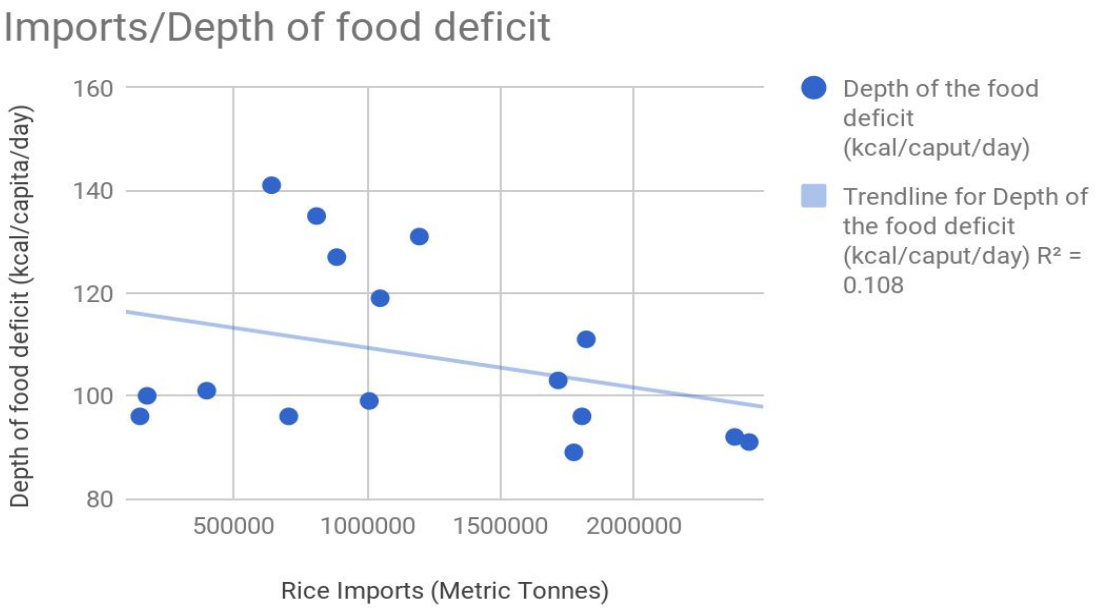


Table 6 - Imports/Depth of the food deficit: Philippines

Correlations

		Imports	Depthofthefooddeficitkcalcaputday
Imports	Pearson Correlation	1	-.329
	Sig. (1-tailed)		.107
	N	16	16
Depthofthefooddeficitkcalcaputday	Pearson Correlation	-.329	1
	Sig. (1-tailed)	.107	
	N	16	16

8.3.2 Bangladesh

Figure 13 depicts the correlation between annual rice imports and the depth of the food deficit in Bangladesh. It would appear to be a moderately positive correlation between the variables, the relationship being that as rice imports increase so does the average dietary energy adequacy. A further analysis provides the results in Table 7. The correlation coefficient is -0.176, indicating a moderate negative correlation between the two variables. However, despite this strength of correlation the results are not statistically significant at a significance value of 0.257.

Figure 13 - Bangladesh Imports and average dietary energy supply adequacy

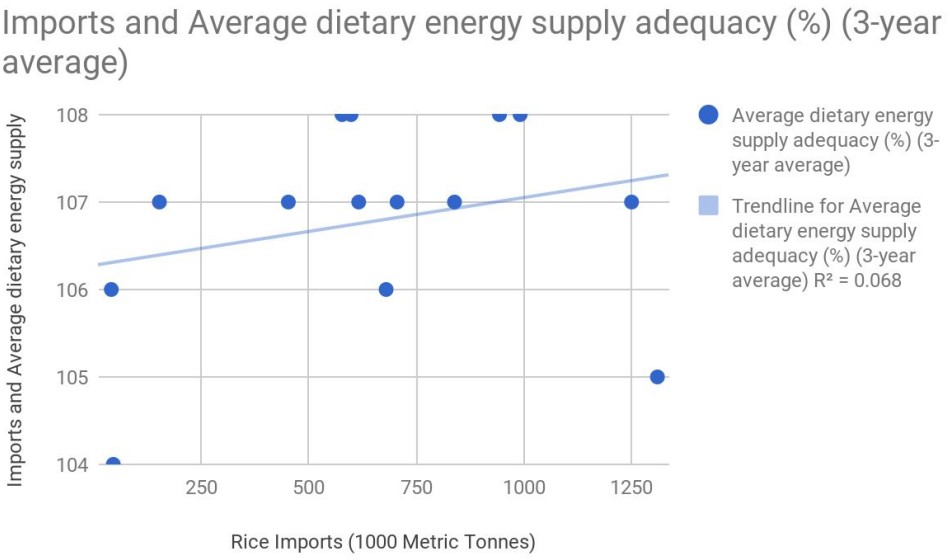


Table 7 - Import/Average dietary energy supply adequacy: Bangladesh

Correlations			
		Import	Averagedietaryenergysupply adequacy
Import	Pearson Correlation	1	-.176
	Sig. (1-tailed)		.257
	N	16	16
Averagedietaryenergysupplyadequacy3yearaverage	Pearson Correlation	-.176	1
	Sig. (1-tailed)	.257	
	N	16	16

Figure 14 depicts the correlation between annual imports and the depth of the food deficit. It would appear to be a moderately negative correlation between the variables, the relationship being that as rice imports increase the depth of the food deficit decreases in Bangladesh. A further analysis provides the results in Table 8. The correlation coefficient is 0.007, indicating a very weak positive correlation between the two variables. However, the results are not statistically significant at a significance value of 0.107.

Figure 14 - Bangladesh Imports and Depth of food deficit

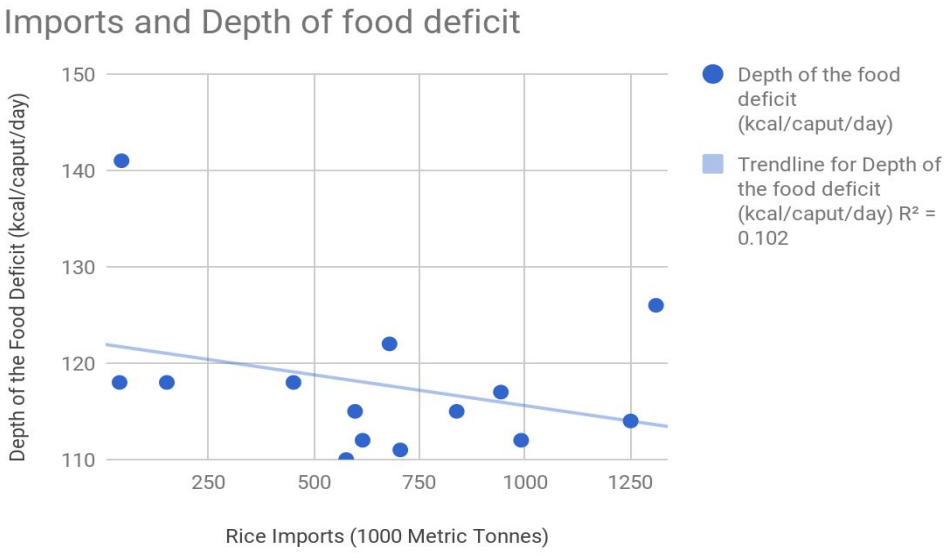


Table 8 - Import/Depth of food deficit: Bangladesh

Correlations			
		Import	Depthofthefooddeficitkcalcaputday
Import	Pearson Correlation	1	.007
	Sig. (1-tailed)		.490
	N	16	16
Depthofthefooddeficitkcalcaputday	Pearson Correlation	.007	1
	Sig. (1-tailed)	.490	
	N	16	16

8.4 Multiple Regression Analysis

Upon completion of the multiple regression analysis the following results were derived for the Philippines, as displayed in Table 9. The data shows that price holds a significance value of 4.4% and the year dummy holds a significance value of 3% indicating that both variables are statistically significant on imports. The price correlation coefficient indicates that for every unit increase in price, there is a -1.360 decrease in rice imports. The year dummy correlation coefficient shows that for every unit increase in the year dummy there is a 1.084 increase in rice imports.

Philippines

Table 9 - Regression Analysis Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.909	1.963		9.123	.000
	Yeardummy	1.084	.443	.519	2.445	.030
	PriceLog	-1.360	.610	-.473	-2.230	.044

a. Dependent Variable: ImportsLog

The data from the multiple regression analysis suggests that the initial assumption has been met, as both the year and price displayed statistical and substantive significance on rice imports. The statistical significance indicates that there is a dependency relationship of rice imports on the price and the year, where a movement in rice prices will result in a change in rice imports, and that in the crisis years there was also a change in rice imports in the Philippines. The correlation coefficient for price is a negative value which indicates that the inverse fulfills the assumption that as price increases there is a decrease in rice imports. The same can also be said about the year correlation coefficient which has a positive value, meeting the assumption that during the crisis years 2007-2009, there was an increase in rice prices.

9. Evaluation

9.1 Ricardian Trade Model

Although the Ricardian model has been used extensively to explain international trade, it does have a number of shortcomings due to its highly simplistic nature. In the real world, countries trade more than two goods between several trade partners, in the midst of imperfect markets, using a combination of resources. Firstly, the model assumes an extreme level of specialization which does not reflect production in reality. In reality there is the existence of multiple factors of production which reduces the inclination toward specialization and allows for the production of a wider range of goods

Secondly, the model assumes that the gains of trade are felt by the entire country and ignores the impacts that trade may have on income distribution on countries. In reality, these gains are felt to varying degrees with some groups benefitting more than others, and other groups losing altogether both the short and long term e.g import competing industries. International trade affects income distribution firstly as resources cannot move freely from one industry to another, and secondly due to differences in the factors of production demanded.

Thirdly, the model assumes that trade is a result of differences in the productivity of only one factor of production, labour, thereby ignoring other factors like capital and land. These neglected factors in reality may be just as important as labour. Lastly, due to the model's assumption of perfect competition, it neglects how economies of scale may be a reason for trade. There are other less apparent criticisms worthy of mentioning, such as the fact that the model does not take into consideration transport costs which are bound to affect terms of trade. The model also does not take into consideration the various protectionists policies employed by countries.

9.2 Heckscher-Ohlin Trade Model

Although the Heckscher-Ohlin model is an improvement on the Ricardian, it too holds several criticisms, some of which relate to those of the Ricardian as this is also a highly simplified model. This simplification makes it quite unrealistic for a number

of reasons. Firstly, due to its assumption that relative factor prices reflect relative factor abundance, the model puts too much focus on factor supply although factor demand also plays a very important role in determining these relative factor prices. If demand is to be taken into consideration the commodity price ratios may not equalise with the cost ratios. (Mundra, 2012)

The model is considered to be static in nature as it only takes into consideration fixed quantities of factors of production, given production functions, incomes and costs, not accepting any change. This does not reflect the real world. Also, the model is only a partial equilibrium analysis. Based off its assumption that differences in resources are the main reason for trade between countries, the model neglects several other factors such as transport costs and economies of scale, all which can have a significant effect on production costs and determination of the terms of trade. (Aahana, 2018)

This model holds the assumption that movements of the factors of production are are restricted only between the various sectors. This means that these factors cannot move between countries. This is however untrue as studies have shown that there are more movements of factors between countries than between regions in one countries as evident by international capital flows from developed countries to developing countries. Likewise, there is a large movement of labour from the developing to developed countries. (Aahana, 2018)

The model also assumes that the level of technology remains constant in each country. In the real world there are constant improvements in technology experienced by developing and developed countries alike. The last limitation relates to the models focus on factor intensity. It makes the assumption that production of a good being traded between two countries can only be capital intensive in one and labour intensive with the other, and vice-versa. There are other less apparent limitations for the model such as the case for by-products e.g seed cake for animal feed, which are often more sought by countries than the intended product.

9.3 Data and Tests Conducted

Two separate types of tests were used in checking various relationships, a correlation analysis and a regression analysis. The correlation analysis produced a mix of results, which all had one thing in common, a lack of statistical significance.

Two possible reasons have been pinned down for this. Firstly, the limited sample size used may have affected the statistical significance of the results. Secondly, whereas the relationship being tested was a bivariate one checking the effect of imports on a food security indicator, in reality the relationship is multivariate. At any given time food security is influenced by numerous other factors, all of which will have some influence on the results. For the regression analysis, results came out as expected. However, this is because an analysis was conducted for only the Philippines. No multiple regression analysis was carried out for Bangladesh due to its limited rice price data.

Overall, simple methods of analysis were used to try and explain complex relationships, creating inaccuracy. It would be quite a task in attempting to determine exactly how much any one policy may have helped, as each country made use of a wide variety of responses, with some holding more importance than others. Both countries made use of a vast combination of responses, sometimes interchangeably in an attempt to stem the price spikes.

10. Conclusion

The main aim of this paper was to to explore the linkages between trade liberalization and food security. More specifically it looked at the removal of import tariffs and quotas as well as facilitation of imports as a tool for increasing supply and improving food security in the midst of food price spikes. Focus was put on rice due to its status as a staple crop and its contribution to food security in several countries. This paper has made use of the 2007/2008 food price crisis as a prime example of alarming price spikes (where the highest price volatility was observed in rice), as well as examining the experiences of two of the world's largest rice importers, The Philippines and Bangladesh in the midst of the crisis. What served of most importance were the responses of these countries to the crisis by relaxing trade policies, and the effectiveness of this in improving food security in the short term.

Two research questions related to the objective were derived. These are:

1. How effective has the removal of import tariffs and quotas been in improving food security in the short-run?
2. How well does conventional trade theory support the removal import barriers in increasing supply?

In order to answer these research questions several methods of analysis were used which include a review of the literature and a quantitative analysis, from which key conclusions can be drawn.

Findings from the literature suggest firstly that Bangladesh and the Philippines both had rice import tariffs of 5% and 40% respectively, in place prior to the crisis. As the crisis pushed forward Bangladesh was the first of the two to take action by completely eliminating this import tariff. The Philippines enacted its policy a few months after, but unlike Bangladesh it only moved to significantly slash its tariff from an ad-valorem tariff to a relatively low specific tariff of 2 Pesos per kilo of rice, given the extremely high prices at the time.

In Bangladesh this import tariff reduction alone proved to have had a very little effect on prices, supply and food security which is due mostly to the fact that the

tariff was quite small to begin with and as such would had little impact relative to other policy options. Another reason for this is because

In the Philippines on the other hand, the removal of the import tariff is shown to have had a considerable effect on prices and supply, as well as food security. However this was not achieved without an ample impact on the international market which saw price increases as a result of the immense increase in demand for rice in the Philippines. Despite this, the Philippines ended up importing a record amount of rice, a lot of which went into building up stocks or else they would have been faced with excess supply.

Looking at the analysis of the rice import developments, it can be seen that both the Philippines and Bangladesh increased their rice imports significantly during the crisis. Although this does not explain any impacts this may have it paves the way in confirming the importance of imports as both countries used this at least with an attempt at relieving domestic supply woes. This saw the Philippines importing 2.43 million metric tonnes of rice in 2008, a 34.7 percent increase from the rice imports of 2007. Bangladesh also considerably increased its rice imports, bringing in 838,710 metric tonnes of rice imported compared to the 615,840 metric tonnes imported in 2007, indicating a 36.2% increase

A look at the correlation analysis will show that food security is quite dependent on rice imports in the Philippines but not as much in Bangladesh. The results for the Philippines showed that with regard to imports and the average dietary energy supply adequacy there was a moderate positive correlation, meaning that as rice imports increase so does the average dietary energy supply. The analysis on imports and depth of food deficit resulted in a moderate negative correlation, which translates as, with increasing rice imports there is a decrease in the depth of the food deficit.

The results for Bangladesh on the other hand showed a much less correlated relationship between imports and the food security indicators. In terms of imports and the average dietary energy supply, the results displayed a moderate negative correlation between the variables. This indicates that as rice imports increased, there was a decrease in the average dietary energy supply adequacy. Results for the test on imports and the depth of the food deficit on the other hand showed a very

weak positive correlation between the variables, indicating that as rice imports increase so does the depth of the food deficit.

It can be concluded then based of these results that the Philippines to a large extent produced the desired outcome of increased imports leading to an increase in average dietary energy supply adequacy but a decrease in the depth of the food deficit. Results from Bangladesh on the other hand failed to produce the desired outcome for either of the food security indicators. The results suggested rather the reverse of our outcome. Despite the outcomes for both countries, the results as a whole showed that imports had no statistical significance on the indicators and only substantive significance in the Philippines .

Lastly, the results from the multiple regression analysis of price and crisis years on rice imports for Philippines showed firstly that there was indeed a dependency relationship of imports on prices and the crisis years. The results suggest that during the crisis years 2007 to 2009 rice imports did increase. They also suggest that as rice prices decreased there was a similar increase in rice imports. These results strongly support the assumption that as a direct consequence of falling rice prices from the removal of import tariffs there was an increase in rice imports into the Philippines in the years of the crisis.

This research has succeeded in answering the first research question on the effectiveness of import tariff removal in improving food security in the short-run. The literature has shown that it was quite effective in the Philippines but had a more obscure and lesser impact in Bangladesh, attributing this to the differences in the size of the tariffs. Despite this, a look at the development of rice imports has shown that both countries significantly increased their imports during the crisis, thereby increasing supply but not necessarily food security as is the case with Bangladesh. Empirical tests conducted also seem to support this answer as they fulfilled the initial assumptions for the Philippines but failed to do so in Bangladesh.

To answer the second research question, it can be said that the conventional trade theories are well grounded with the regards to the changes in supply due to changes in prices. The literature showed that both the Philippines and Bangladesh sought to increase their domestic rice supply by removing the tariffs so as to increase imports as explained by the models. The test conducted also seem to support this because it

showed that the two countries did indeed reduce their import prices, which in turn reduced domestic prices and increased rice imports during the criss.

To conclude, the importance of food import tariffs to developing countries has declined significantly in recent years. Both Bangladesh and the Philippines produce most of the rice consumed domestically and they import only a small proportion of their total consumption. However, this small proportion is still essential to meeting a supply deficit which could mean hunger for millions as evident from the crisis. In the past a very viable protectionist option and source of revenue for them has been large import tariffs on rice, but today this is less effective and as such they opt for more non-tariff measures. Ultimately, the usefulness of the reduction or removal of import tariffs on food access and availability would appear to depend on the amount of tariff being removed. This has worked well for the Philippines due to its rather large tariff at the time compared to that of Bangladesh which had a rather low tariff in place.

10.1 Insights for the Future

Food prices are only expected show a continuous rise along with demand due to the same long term trends that led to the 2007-2008 crisis. This being the case it is right for countries to figure out more effective solutions to mitigate periods of high volatility and higher food prices. After the poor handling of the 2007-2008 food price crisis several agencies set out to establish frameworks for dealing with future crises. These frameworks tend to formulate a vast and complex mix of responses as opposed to the single policy option examined in this paper. Clearly, in order for countries to have any success at improving their food security during food price spikes the must look beyond import tariffs and even beyond trade policy.

In the short run, countries have temporarily removed or reduced their tariffs on important agricultural products just to put them back in place after once situations have improved. This has proven to cause high price volatility in international markets. Perhaps what will help LIFDCs more is the relaxation of export measures by their trade partners, of which they have little control over. The problem with this is that governments tend prioritize their citizens in ensuring food availability, making

them reluctant to make compromises for the food security of other countries. Perhaps, this is the same reasoning that makes them impose export tariffs in the first place. It would be mostly in the interest of the net food importing countries to advocate for trade liberalization in the WTO rules.

In the long run, Countries should generally move towards fully liberalizing trade. As stated before there has already been a huge decline in the use of import tariffs by developing countries. This however does not necessarily mean freer trade. They have simply adopted non-tariff barriers as they have been found to be more effective and less costly than tariffs in their protection. Tariffs appear to be turning into an obsolete import policy, and they could be phased out in the near future. Attempts are constantly being made to achieve trade liberalization through bilateral and multilateral trade agreements. Agreements such as the Agreement of Agriculture which have been crucial in the progression of trade liberalization. Other agreements such as the Doha Round of talks have sought to significantly reduce trade barriers, but are yet to be signed due to the complexity of talks and individual interests which make countries hesitant to partake.

At the household level, a concept such as the food sovereignty movement would suffice. The movement is a shift from relying on government and large corporations, to people having control over all aspects of their food. Although it differs from food security, it's main objective essentially to ensure food security for every individual Seeing as households become especially reliant on their governments at times of price crisis, in a situation where most people are responsible for their own food international markets will not matter as much. Perhaps, this is also a form liberalization, but at the household level.

Countries should learn from past mistakes and especially pay attention to the long term causes which were for quite some time overlooked. They should work more towards formulating preventative measures rather than seeking solutions only after they find themselves in a crisis. Ultimately, the key to maintaining food security and avoiding the impact of price spikes in the short and long term is to work towards self sufficiency in rice production. This will significantly reduce their dependency on rice imports and as such make their domestic rice markets less susceptible to price transmissions from international markets.

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Appendices

Appendix A

Bangladesh Annual Rice Domestic Production and Imports 1960-2017

Market Year	Production (1000MT)	Growth Rate	Imports
1960	9672	NA	408
1961	9618	-0.56 %	363
1962	8870	-7.78 %	274
1963	10624	19.77 %	574
1964	10503	-1.14 %	237
1965	10501	-0.02 %	194
1966	9575	-8.82 %	421
1967	11171	16.67 %	367
1968	11344	1.55 %	155
1969	12005	5.83 %	316
1970	11143	-7.18 %	347
1971	9932	-10.87 %	681
1972	10090	1.59 %	384
1973	11909	18.03 %	81
1974	11287	-5.22 %	262
1975	12762	13.07 %	390
1976	11753	-7.91 %	193
1977	12969	10.35 %	305
1978	12849	-0.93 %	60
1979	12740	-0.85 %	720
1980	13882	8.96 %	84
1981	13631	-1.81 %	144
1982	14216	4.29 %	317
1983	14500	2.00 %	180
1984	14620	0.83 %	690
1985	15040	2.87 %	39
1986	15406	2.43 %	261
1987	15413	0.05 %	691

1988	15550	0.89 %	120
1989	17860	14.86 %	324
1990	17852	-0.04 %	11
1991	18250	2.23 %	39
1992	18340	0.49 %	10
1993	18041	-1.63 %	100
1994	16833	-6.70 %	1300
1995	17687	5.07 %	1140
1996	18882	6.76 %	46
1997	18862	-0.11 %	1200
1998	19854	5.26 %	2500
1999	23066	16.18 %	400
2000	25086	8.76 %	672
2001	24310	-3.09 %	243
2002	25187	3.61 %	955
2003	26152	3.83 %	850
2004	25600	-2.11 %	725
2005	28758	12.34 %	514
2006	29000	0.84 %	769
2007	28800	-0.69 %	2047
2008	31200	8.33 %	732
2009	31000	-0.64 %	92
2010	31700	2.26 %	1308
2011	33700	6.31 %	563
2012	33820	0.36 %	35
2013	34390	1.69 %	780
2014	34500	0.32 %	1251
2015	34500	0.00 %	217
2016	34578	0.23 %	70
2017	32650	-5.58 %	3300

Philippines Annual Rice Imports and Domestic Retail Prices

Imports and Exports: PHILIPPINES Rice (milled) (AMIS Statistics Source: FAO-AMIS)			
Elements	Year	Import Quantity (Metric Tonnes)	Domestic Retail Price
Imports (NMY)	2000	642272	398.3333333
Imports (NMY)	2001	810903	344.1666667
Imports (NMY)	2002	1196159	347.5
Imports (NMY)	2003	886620	332.5
Imports (NMY)	2004	1049165	332.5
Imports (NMY)	2005	1821641	377.5
Imports (NMY)	2006	1716315	414.1666667
Imports (NMY)	2007	1805616	486.6666667
Imports (NMY)	2008	2432001	665
Imports (NMY)	2009	1775113	644.1666667
Imports (NMY)	2010	2378045	685
Imports (NMY)	2011	706471	722.5
Imports (NMY)	2012	1008273	759.1666667
Imports (NMY)	2013	399137	794.1666667
Imports (NMY)	2014	175800	877.5
Imports (NMY)	2015	149000	825.8333333
Imports (NMY)	2016	970000	779.1666667

Appendix B

Bangladesh Annual Rice Imports and Food Security Indicators

			Access		Availability		
Year	Imports	ImportsLog	Depth of the food deficit (kcal/caput/day)	DepthofFoodDefLog	Average dietary energy supply adequacy (%) (3-year average)	DietarySupplyLog	
2001	44.84	13.0217	141	4.94875989	104	4.644390899	
2002	1310.87	11.93249	126	4.836281907	105	4.65396035	
2003	679.6	13.7572	122	4.804021045	106	4.663439094	
2004	40.24	14.03922	118	4.770684624	106	4.663439094	
2005	838.71	13.80691	115	4.744932128	107	4.672828834	
2006	615.84	13.46615	112	4.718498871	107	4.672828834	
2007	577.06	13.2657	110	4.700480366	108	4.682131227	
2008	705.14	13.33074	111	4.709530201	107	4.672828834	
2009	991.44	13.63962	112	4.718498871	108	4.682131227	
2010	1250.71	10.60262	114	4.736198448	107	4.672828834	
2011	943.36	11.12667	117	4.762173935	108	4.682131227	
2012	152.13	14.0862	118	4.770684624	107	4.672828834	
2013	452.12	10.71086	118	4.770684624	107	4.672828834	
2014	598	12.46944	115	4.744932128	108	4.682131227	
2015	35	13.30135	112	4.718498871	108	4.682131227	
2016	1100	10.4631	107	4.672828834	109	4.691347882	
2017							

Philippines Annual RIce Imports and Food Security Indicators

			Access		Availability	
Year	Imports	ImportsLog	Depth of the food deficit (kcal/caput/day)	Depth of the food deficit (kcal/caput/day)	Average dietary energy supply adequacy (%) (3-year average)	DietaryAdequacyLog
2000	642272	13.37	141	141.00	110	4.700480366
2001	810903	13.61	135	135.00	111	4.709530201
2002	1196159	13.99	131	131.00	110	4.700480366
2003	886620	13.70	127	127.00	111	4.709530201
2004	1049165	13.86	119	119.00	112	4.718498871
2005	1821641	14.42	111	111.00	114	4.736198448
2006	1716315	14.36	103	103.00	115	4.744932128
2007	1805616	14.41	96	96.00	117	4.762173935
2008	2432001	14.70	91	91.00	118	4.770684624
2009	1775113	14.39	89	89.00	118	4.770684624
2010	2378045	14.68	92	92.00	117	4.762173935
2011	706471	13.47	96	96.00	116	4.753590191
2012	1008273	13.82	99	99.00	116	4.753590191
2013	399137	12.90	101	101.00	116	4.753590191
2014	175800	12.08	100	100.00	116	4.753590191
2015	149000	11.91	96	96.00	117	4.762173935
2016	970000					