Stabilizing price incentives for staple grain producers in the context of broader agricultural policies

Debates and country experiences

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Stabilizing price incentives for staple grain producers in the context of broader agricultural policies: debates and country experiences

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Abstract

Price uncertainty is a major constraint to a sustained increase in staple food production. This paper reviews the trends and patterns of addressing this age-old problem over the course of the past several decades. Farmers in most developed countries and many Asian and Latin American countries have relied on a variety of public support programs as well as market-based marketing and price-risk management instruments to boost grain production. By contrast, inadequate support programs and weak market-based production services have led to stagnating production and increasing dependence on food imports in many poor African countries. State-led stabilization efforts that utilize and support private sector operations, complement market-based risk management instruments and address coordination failure and missing markets provide a better incentive to increase grain production. A more coordinated market stabilization effort is required in the future as a number of long-term structural factors such as climate change, water scarcity, high oil prices, soil degradation, biofuel production, and speculation in financial markets, point to a scenario of more volatile grain prices.

Key words: stabilization, price incentives, staple grains, producers

JEL classification: Q18, Q130, E64

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1. Introduction

Agricultural production is carried out in a risky environment. Farmers have to contend with price uncertainties and fluctuations on top of the uncertainty they face with regard to the quantity of production that will result from a given bundle of inputs and management decisions because of uncontrollable factors such as weather. Price and production uncertainties may reduce farmers' opportunity to access credit and drive them into low risk farming techniques and technologies.

Grain price volatility has remained a major concern despite considerable advances in communication, transportation and production technologies. Because grain production is closely associated with national food security and welfare of the farming population, managing price instability has been a major challenge and government authorities and experts have been debating grain price policies for years. Grain producers want prices to be stabilized at levels that guarantee adequate returns but interventions to achieve such objective are often costly to consumers and tax payers. The central question is whether or not policy action to maintain adequate price incentives is desirable. The debate has a long history and can be traced back at least to the British[1] Corn Laws[2] of the early nineteenth century. The Corn Laws were introduced to maintain remunerative grain prices for farmers: domestic markets were protected and food imports were allowed (and exports restricted) only when domestic prices were too high. The protectionist policy was challenged as consumers began to demand lower prices. Liberal trade policies later replaced the Corn Laws in the United Kingdom but the shift was not accompanied by effective tools to address falling and unstable prices. The incentive to produce staple grains in the United Kingdom suffered for the greater part of the late nineteenth and early twentieth century.. By the mid-twentieth century, various programmes to address price risks dominated the agricultural policy agenda in many developed countries. The pendulum stared to swing in the opposite direction in the 1970s and 1980s but not with so much energy.

This review discusses the trends and patterns of stabilizing prices to reduce price risks of producers in developed and developing countries. The focus is on the evolution of grain price policy, the approaches to stabilizing and supporting producer prices, and the outcomes obtained within a broader context of agricultural policies. The review concludes with lessons and implications for poor countries.

The paper starts by raising the question of whether grain prices need to be stabilized for producers in Section 2. Section 3 is devoted to reviewing the history of country experiences in managing basic food grain price risks while Section 4 provides the main conclusions of the paper.

2. Do prices need to be stabilized for grain producers?

The issue of whether producer prices need to be stabilized depends on the nature of price instability and the benefits derived from applying stabilization measures. This section

[1] Throughout this paper, the terms Britain and United Kingdom refer to the United Kingdom of Great Britain and Ireland prior to 1927 and the United Kingdom of Great Britain and Northern Ireland thereafter.
[2] Corn Laws, *The Columbia Encyclopaedia*, Sixth Edition, Columbia University Press, 2008. http://www.encyclopedia.com/topic/corn_laws.aspx

explores the factors behind grain price instability and the merits and demerits of stabilizing prices for producers.

2.1 Some factors behind grain price instability and long-term decline

It is generally perceived that nominal prices of agricultural commodities are more variable or volatile[3] than those of non-agricultural commodities. The volatility is often attributed to the special characteristics of agriculture: supply disturbances (e.g. climate and pests), inelastic supply and demand, and production decisions based on current prices (leading to cobweb effects; see below) and fluctuating food and agricultural policies. Price volatility that results from peaks and troughs in production is often made worse by a host of endogenous causes, including lack of adequate storage facilities, low stock levels, sudden jumps in input prices, underdeveloped market infrastructure and institutions, and limited export and import options. When stock levels are already tight, an otherwise minor shock can trigger major price increases (Gilbert and Morgan, 2010).[4]

High levels of production and low prices in the agricultural sector may also follow shortages and high prices in an unstable cobweb process if production decisions at planting time are based on the expectation that current prices will remain in place after harvest. If current prices are high, producers assume that this situation will continue and will accordingly take measures to expand production for the next season, resulting in high levels of production and price collapse (with the reverse taking place in the following season). The cycle of production and price instability is likely to repeat (Boussard, 1996; Boussard *et al*., 2006; Galtier, 2009), especially if farmers have limited information about the future.

Demand for basic food is price inelastic as staples are a necessity with few substitutes. Short-run supply response of food crops is also inelastic because of the long production cycle (from sowing to harvesting) and limited mobility in the short-run of factors of production to respond to price changes. This situation implies that producers and consumers cannot respond quickly enough to price changes; hence price spikes and collapse are more common in agricultural than in non-agricultural markets.

With regard to longer-term trends, from a certain level of income onwards, food expenditure as a proportion of income tends to decrease (Engel's Law) while advances in production and processing technologies allow the supply of basic food commodities to grow at a faster rate. The disparity between the slow growth of demand and expanding supply can lead to prolonged price collapse as reflected in the long-term decline of real prices of staple grains in the international markets (Heady and Fan, 2010; Alston *et al*., 2009). The decline could be more rapid if farmers respond to low prices by intensifying and increasing production further. This is sometimes referred to as 'technology treadmill' (Cochrane, 1958; Gardner, 2002). It would thus mean that, in the long term, farmers' incomes tend to decline and the benefit of technical change in agricultural development is captured as consumer surplus, rather than as producer surplus (Barrett *et al*., 2010; Anderson, 2009; Minten and Barrett, 2008).

[3] Prices that move up and down rapidly within a short period of time are generally referred to as volatile (see Balcombe (2010) and Jordaan, *et al*.,(2007) for details on the concept and measurement of price volatility).
[4] A significant increase in fuel and fertilizer prices and an associated rise in demand for biofuel feedstocks that also serve as food (e.g. corn, sugar and vegetable oils), export restrictions and bans, depreciation of the dollar, and speculation in the financial markets also contributed to the 2007/08 grain price increases (Gilbert and Morgan, 2009; Mittal, 2009; Abbott, 2009; Banse, *et al*., 2008; Heady and Fan, 2010).

2.2 The debate over food grain price stabilization

Despite the common tendency of instability in grain prices, there is no consensus over how best to address the problem. Using standard welfare analysis, some researchers have argued that food price stabilization has limited economic efficiency gains, has limited impact on the poor, and generates the most benefits for large-scale food producers (see, e.g., Myers, 2006 for a brief summary). Further, interventions to stabilize prices may involve government failure that could reduce welfare more than the cost of the market failure it seeks to overcome. This is mainly attributed to the high cost of information needed to effectively stabilize prices (Hayek, 1945). It is also thought that free movement of prices is needed to aggregate and transmit a signal concerning the scarcity of goods and any attempt to stabilize prices would therefore damage the quality of resource allocation. Finally, if the primary source of price instability is supply fluctuations, prices and quantity will vary inversely - thus, stabilizing food prices may exacerbate the instability of producers' income (Newbery and Stiglitz, 1981). According to a recent report by the World Bank (2005), governments should move away from stabilizing prices to stabilizing macroeconomic variables. Macroeconomic stability achieved through monetary, fiscal, trade and exchange rate policies, rather than food price stabilization schemes, are the most appropriate ways to ensure a stable economic environment within which investment is encouraged and economic growth can occur.

Arguments in favour of food price stabilization, on the other hand, reject the notion of limited efficiency gains and emphasize the negative impact of unstable prices on producers, consumers and macroeconomic stability (Timmer and Dawe, 2007; Poulton *et al*., 2006; Myers, 2006; Timmer, 1989). For net buyers of food in developing countries, price risks translate into both income and consumption risks with serious consequences on nutrition, health and education, especially in the absence of consumption smoothing opportunities. Unpredictable prices reduce the quantity and quality of investment by farmers, traders, processors and distributors. Food price shocks can cause major macroeconomic instability and serious development challenges. Since food carries a large weight in the consumer price index (CPI) of poor countries, a significant rise in staple grain prices translates into higher overall prices (inflation).[5] Price stabilization measures are reported to have a favourable impact on production and productivity and overall welfare. Timmer (2002) has shown that rice price stabilization added 0.5-1 percentage point of growth in GDP per year to the Indonesian economy in the 1970s. Less volatile production and prices would also mean less risks and transaction costs, thus promoting upstream and downstream investment in local food supply chains (Poulton *et al*., 2006; Gang and Mahajan, 2006; Dawe, 2001; Timmer, 1989).[6] Business people will find investment in storage or regional arbitrage attractive if prices are predictable and not too volatile and if production and imports forecasts are available (Cummings *et al*., 2006). In poor countries where markets for credit, insurance, input and output are underdeveloped, stable prices are possibly one of the most important incentives to invest in new technology (Pinckney, 1993; Gabre-Madhin *et al*., 2003).

In situations where there is agreement among experts on the importance of price stabilization, there tends to be disagreements over which instruments are most effective (Starr, 2002). Some take the view that it is the governments' failure to fully liberalize markets that causes price instability while others doubt the possibility of achieving stable prices in a fully

[5] Such concerns may not arise in richer countries where the share of food in the total household expenditure is low.

[6] Notice also that uncertain prices also create risks for banks that might lend to farmers. Often, they will raise interest rates to cover uncertain risks, or simply refuse to provide credit at all.

liberalized market. According to the former viewpoint, what is needed is a market-based approach with a stronger commitment by governments to minimize interventions in food markets, improve storage and other market infrastructure, enhance market information, remove tariffs, ensure macroeconomic stability, eliminate licensing requirements for regional trade, invest in an improved crop production forecasting system, and promote market-based risk management strategies (Jayne and Tschirely, 2009). Several market-based risk management instruments, including facilitation of private storage (warehouse receipt systems) and futures and options markets are reported to have considerable potential in addressing food price volatility (World Bank, 2005). As a result of the hedging and price discovery functions of futures market, overall agricultural marketing performance is expected to be more efficient.[7]

According to the critics of market-based price stabilization instruments, price volatility is an inherent feature of agricultural markets and market-based solutions have not been been fully effective because of market failures and/or missing markets. Access to futures markets is limited in developing countries where smallholders dominate production (and transactions costs as a proportion of price can be quite large) and supporting institutions and markets are missing. Even farmers in developed countries seldom use futures markets (Abbott, 2010). Problems such as moral hazard, adverse selection and basis risk also undermine crop insurance alternatives. Because of missing or incomplete credit and insurance markets and limited information, producers, processors and other players along the value chain are unable to make optimal decisions. When prices are volatile, it becomes very difficult to decode the information provided by markets, leading to coordination failure (Gerard, *et al*., 2011). Solutions to price instability needs to be sought in government interventions inclusive of buffer stocks and/or trade taxes or quantitative restrictions to regulate domestic prices. State interventions should be based on collaboration between public and private actions and policies should be rules-based, transparent, credible and relatively predictable so that interventions make outcomes better, not worse (Abbott, 2010; Gerard, *et al*., 2011).

One major problem of government-based price stabilization is the difficulty of picking the "right" price that reflects economic opportunity costs. Stabilization at price levels that are too high or too low can be costly to the economy (Anderson and Roumasset, 1996). By supporting or stabilizing prices well above market price levels, governments can encourage overproduction and discourage consumption (consumers buy less at higher prices). Public price stabilization schemes may also create disincentives to innovate in credit and insurance markets and to invest in food storage facilities (World Bank, 2005; Cummings *et al*., 2006).

In spite of the debates and the problems, stabilizing prices for producers is a common practice as demonstrated in the next section.

3. Price stabilization for grain producers: practice and performance

Agricultural production in developed countries has been aided by transformation in marketing, transportation, communication and, of course, technological advances. The expansion of railway transport and telegraphs, introduction of mechanized grain loading and unloading facilities, and the emergence of commodity exchanges in the nineteenth century boosted and facilitated long-distance grain trade in North America and Europe. The trade was

[7] Futures markets are used to hedge against price risks by improving the certainty of receiving or paying certain prices six months or one or more years in the future; the use of options markets guarantees a minimum or maximum price and still allows the possibility to benefit from price improvements.

further transformed when large (low-cost) ships, cold storage systems and containerizations were introduced in the twentieth century. More recently, internet technology, agribusiness and value chain transformation, and the supermarket revolution have further transformed food trade in developed countries, with increasing effects on developing countries as well. Though these developments have added value to products and changed the variety and quality of food consumed by the masses, they have not brought grain price stability to the markets.

3.1 Developed countries

Government interventions in agricultural markets have a long history in developed countries, for example the Corn Laws (i.e. grain trade policy) of the United Kingdom mentioned above. European countries (excluding the United Kingdom) began protecting their farmers in response to falling prices due to global overproduction and the arrival of railways and motor vessels that made imports from distant countries (e.g. the United States of America, Canada, Australia) cheaper. Sharp falls in grain prices in the 1880s-90s and in the 1920s-30s led most countries of Western Europe to introduce protective tariffs and various support programmes. Germany also developed an outstanding system of agricultural education and research, and implemented significant land reform measures. Growth in agricultural production and productivity stimulated agro-processing and Germany outpaced the United Kingdom as an industrial nation by the early twentieth century. Unlike Germany, the United Kingdom pursued an agricultural free trade policy between 1846 and 1930 and farmers had no protection against the fall in international prices, particularly in the 1880s–90s. Unable to compete with cheaper imports from North America and other parts of the world and faced with unpredictable prices, farmers reduced their investment in grain production. Agricultural productivity in the United Kingdom began to recover in the 1930s and 1940s when the government improved and stabilized price incentives through tariff protection, subsidies and price supports (Koning, 2007).

The European Union (EU) was formed in 1957 and one of its major policy actions was the establishment of the Common Agricultural Policy (CAP). The CAP went into effect in 1963 with the principles of creating a unified and stable market, reinforcing the protection of EU farmers against cheaper imports from the world market, increasing farm incomes through price support and productivity-enhancing measures, with all costs financed by a common treasury. Guaranteed prices are set at levels which ensure production is profitable in the EU countries. The effective operation of this price system has relied on significant border protection (tariffs) (European Commission, 2011; Swinnen, 2009). Aimed initially at increasing productivity and securing availability of food supplies (during the Cold War), the generous support and the new technologies led to a massive increase in food production, making the EU the second largest exporter of foodstuffs in the world (after the United States of America).

Mechanization and widespread use of chemical fertilizers significantly increased production at the end of the nineteenth and the beginning of the twentieth century in the United States of America. This, however, translated into lower prices and reduced incentives. Prices also became more volatile in the 1920s and 1930s (Boussard, 2006). Many farmers refrained from buying tractors and other machinery because investment in these technologies was risky given volatile and declining prices. Farm productivity stagnated and conditions on the farm worsened following the 1929 Crash, which considerably increased debt burden and drove many farmers into bankruptcy. In 1933, in response to excess production and declining

prices, New Deal Politicians created programmes to restrict production, support and control prices, and provided special credit schemes for United States farmers. The price support guaranteed farmers a "parity" price that roughly corresponded to prices during favourable market times. Farmers were no longer threatened by unstable prices, hence they responded by investing in productivity-enhancing technology which resulted in a 3.0% per annum increase in farm productivity between 1935 and 1975 (Clarke, 1988, 1992). United States farmers still receive various types of payments that are often inversely proportional to current market prices (OECD, 2010). A so-called target price (to determine level of income supplement) is set at a somewhat higher level than the market price, usually through political bargaining between farm organizations and the federal government.[8] The United States of America has thus achieved a sustained increase in production and productivity, a major factor behind the country's position as the world's biggest exporter of many agricultural products.

According to a recent OECD (2009), support to agriculture in developed countries has remained very high despite the promises to liberalize agriculture and reduce subsidies under the WTO trade negotiations. In 2008, support to producers, as measured by the Producer Support Estimate (PSE)[9], was estimated at 21% of aggregate gross receipts of OECD farm producers. Market price support (MPS) is still the dominant form of assistance provided to farmers in the OECD countries (OECD, 2010). However, the level of producer support in 2006-08 ranged widely between countries, from 1% in New Zealand to 62% in Norway.[10] Following its 1984 reform, New Zealand has sharply reduced its support to agriculture, leading to restructuring and adjustments that included limited expansion of cereal production but a substantial increase in fruit and vegetable production.[11,12] Moreover, private risk management efforts such as insurance and forward contracts have expanded as the government and farmer organizations supported knowledge and information systems to reduce information asymmetry (Melyukhina, 2011; Vitalis, 2007).

Price support measures have been implemented while encouraging private-sector participation in agribusinesses and commodity exchanges in OECD countries. Various support programmes have also been used to stimulate private investment along the food value chain. In addition to publishing timely United States and international crop supply, demand and price projections for major crops, the United States Department of Agriculture (USDA), for instance, monitors and provides information on government price and income supports, government stock-building activities, and government-subsidized crop insurance for the benefit of firms operating in the food and agricultural sector. Besides subsidizing premiums, governments in developed countries provide administrative and operating subsidies to

[8] Robert L. Thompson, *Agricultural Price Supports, The Concise Encyclopaedia of Economics*, http://www.econlib.org/library/Enc1/AgriculturalPriceSupports.html

[9] The Producer Support Estimate (PSE) is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income (OECD).

[10] The PSE for various OECD countries was estimated as 6% in Australia, 10% in the US, 13% in Mexico, 18% in Canada, 21% in Turkey, 27% in the European Union, 49% in Japan, 58% in Iceland, 60% in Switzerland and 61% in Korea (OECD, 2009).

[11] According to FAOSTAT, annual average cereal production increased by only 10% between 1970 and 1984 (before the reform) and between 1985 and 2010 (post-reform). By contrast, fruit and vegetable production increased by 200% and 138% over the same periods.

[12] New Zealand's competitiveness also stems in part from pre-liberalization investments (Koning, 2007) as well as producers' and processors' increased investment in new and different types of products and innovations. Since the mid-1990s, investment in knowledge has grown more rapidly than investment in machinery and equipment. A growing number of farmers have also moved into farm-related services such as agri-tour operations (Vitalis, 2007).

insurance companies and reinsurance of crop insurance policies (Dismukes *et al*., 2004). Farmers in OECD countries thus benefit from access to various services of private companies, in addition to public support programmes. Among the major services are forward contracts and vertical integration with highly developed agribusiness companies, and hedging in futures and options markets, insurance schemes and mutual funds (European Commission, 2001). The United States of America has a long tradition of relying on futures markets to set prices and provide price risk management services for many agricultural commodities.[13]

In short, the experiences of many developed countries show that the period before price support and stabilization is characterized by slow and variable growth in productivity and uncertain grain prices. Beginning after the Second World War, government measures have focused on ensuring remunerative prices and incomes for farmers and boosting agricultural production. For more than 50 years the supply of food commodities has grown faster than demand. Consequently, the real (deflated) prices of food commodities have steadily trended down, hence benefiting consumers (Boussard, 2006; Alston, *et al*., 2009). The price spikes of 1972/73 and 2007/08 appear to be exceptional cases.[14] Over time, however, the policy of support and stabilization has resulted in high levels of production, required high budgetary costs, distorted world markets, and caused perverse distributional effects (skewed towards large producers). Spending on agricultural support in OECD countries was estimated at US$253 billion (measured as producer support estimate, PSE) in 2009 (OECD, 2010). With few exceptions (e.g. New Zealand), the pace of reform to reduce the level of support and shift away from market price supports and payments based on output and input use towards budgetary payments that are linked less to production have also been slow to catch on, partly due to resistance from the farming community and food security concerns in many countries.

3.2 Asia

Although grain trade remained largely local in many parts of Asia, mainland Southeast Asia (especially Thailand, French Indochina[15] and Burma (now Myanmar) was able to expand rice production and dominate rice export to other parts of Asia (India, China, Hong Kong and Japan) until World War II (van der Eng, 2004). In the early twentieth century, national markets began to emerge, although price volatility and rising demand forced many Asian governments to use direct and indirect measures to regulate rice prices and trade. In the Philippines, prices were stabilized with a government-owned corporation buying paddy, milling it and distributing it. In China, duties were raised to discourage imports and thus support producers, while in French Indo-China taxes were raised to discourage exports and lower prices for consumers. Immediately after the Second World War, rice self-sufficiency became the primary concern of many Asian countries and only 5% of the total rice production reached international markets (Latham, 1988). The food supply and demand situation, however, came under pressure due to yield stagnation, exhaustion of uncultivated land and inadequate price incentives in the 1950s and 1960s while population growth soared

[13] In Europe, there have been considerable efforts to develop agricultural futures and option markets since 1988 but price and other support facilities have meant less volatility and hence less demand for futures and options markets.

[14] Many of the causes of the two world-wide crises are similar – production shortfall due to poor harvest, rapidly increasing demand, trade restrictions, and devaluations of the United States dollar. Other factors, including biofuel production, high fuel prices, and low level of stocks, contributed to the 2007/08 crisis (see Timmer, 2010).

[15] Now Cambodia, Laos, and Viet Nam.

to unprecedented rates (Koning, 2007; Kim and Lee, 2004). The Green Revolution was thus launched to boost production and ensure food security in several Asian countries.

The Green Revolution dramatically increased rice and wheat yields especially in areas with irrigation (Barrett *et al*., 2010; Minten and Barrett, 2008; Dawe, 2002; Gabre-Madhin *et al*., 2003). But the Revolution required support and stable prices for the success to be sustained (Evenson and Golin, 2003). Many countries stabilized grain prices at or above world price levels: India stabilized domestic prices well above world prices with the exception of a few years (when prices fell below international levels). The Philippines stabilized at levels above world prices, while Indonesia stabilized around the trend level of world prices. Pakistan, on the other hand, stabilized below world prices (Cummings *et al*., 2006; Dawe, 2007).[16] In India, the Agricultural Price Commission (set up in 1965 and renamed the Commission for Agricultural Costs and Prices in 1985) advises the Government on price policy that ensures adequate incentives to farmers.[17]

After going through strict state control of markets and prices for nearly three decades (under Mao), China's grain marketing system has been partially liberalized since the late 1970s. Initial reforms raised farm level prices and resulted, along with the emergency of household responsibility system and other institutional reforms (Lin, 1987), in a substantial increase in production. China maintains price stabilization and various income support policies, including minimum procurement prices for rice and wheat, and various input, machinery and fuel subsidies (Huang *et al*., 2004). Since 1990, China has used a system of state trading for certain strategic agricultural commodities to ensure stable prices by controlling trade, e.g. restricting exports during the 2007-08 food crisis (Fang, 2010). As a result of the grain floor price programme, the Chinese government was able to purchase and increase its strategic grain reserve significantly in recent years (Fang, 2010; Hansen *et al*., 2009).

Food price stabilization schemes in many Asian countries have been implemented along with policy support and increased investments designed to accelerate the pace of private-sector agribusiness development and agricultural commodity exchanges in order to ensure a more competitive and stable markets. In Indonesia, for example, the private sector was allowed to handle the bulk of the rice market while the government defended floor price (set to protect producers) with a relatively small amount of buffer stocks (Timmer, 2009). In the Philippines, the National Food Authority (NFA) handles a share of total domestic production similar to Indonesia **(**Cororaton and Corong, 2009**)** but accounts for a significantly larger share of rice imports. Thailand, a major exporter of rice, has a paddy pledging programme which, in recent years, has been used to procure rice from farmers at prices above market prices but allows the private sector to handle all domestic and export trade. Bangladesh, a net rice importer, also relies on private-sector trade but uses a variable rice tariff, the level adjusted depending on the size of the harvest, to stabilize prices. The Government of Viet Nam, a major rice exporter, allows the private sector and state trading companies to operate competitively (Dawe, 2010b; Ngan, 2010; Dawe, 2009; Dawe, 2007). The Chinese government has encouraged private entry into grain markets and made efforts to facilitate the flow of agricultural products by establishing nationally unified product standards, and by improving the inspection and quality/safety certification systems for agricultural products (Rozelle *et al*., 2002; The Trade Lawyers Advisory Group LLC, 2007). The role of

[16] Stable prices, productive technologies and input subsides enabled farmers to earn adequate return even when prices were below international prices.

[17] Commission for Agricultural Costs and Prices, Ministry of Agriculture, Govt. of India, http://cacp.dacnet.nic.in/ .

supermarkets and agribusinesses has also expanded rapidly in China (Reardon *et al*., 2005). Food and grain markets are increasingly served by competitive supermarkets and agribusiness firms in the Republic of Korea (OECD member). India has reformed its market intervention policies and improved the climate for private investment in agribusiness since the late 1990s (Landes, 2008).

Agricultural commodity exchanges generally play a minor role in Asia but many Asian countries have started promoting them mainly to allow trade in future contracts as one of the price risk management and price discovery instruments. China's first commodity exchange was established in 1990 and reorganized in 1995-98. The Agricultural Futures Exchange of Thailand trades white rice, in addition to natural rubber. India has one of the largest futures and forward trading in agricultural commodities among developing countries (UNCTAD and Swiss Futures and Options Association, 2006).[18] Farmers do not need to directly use commodity exchanges. They benefit indirectly when aggregators (e.g. cooperatives, purchasers and financiers) use commodity exchanges and contribute to price stability (UNCTAD, 2010; UNCTAD, 2007).

In general, recognizing the negative impact of low and/or variable prices on production, many Asian countries have supported and/or stabilized prices for producers since the 1960s. These efforts have contributed to the widespread adoption of Green Revolution technologies that boosted rice and wheat production, transforming the region from being food deficit to food surplus, and pulling millions of people from the brink of famine (Hazell, 2010). Although state run marketing institutions often require significant budgetary support, it is evidently a cost that many Asian governments have been happy to bear (Cummings and Gulati, 2009) as stable markets and price incentives, along with productive technologies, have enabled several Asian countries to achieve one of the fastest growth rates in cereal yield and production between 1961 and 2004 (World Bank, 2008). In the wake of the 2007/08 crisis, many Asian governments have expanded support to their farmers[19] (Demeke, *et al*., 2011).

3.3 Latin America and the Caribbean

Export commodities such as coffee (Brazil, Colombia and Costa Rica), sugar (Brazil and Cuba), bananas (Central America, Colombia and Ecuador), and grain and cattle production (Argentina, Chile and Uruguay) based on large-scale commercial production have dominated agriculture in Latin America since the nineteenth century. However, falling commodity prices preceding and following the Great Depression of the 1930s deeply affected the economies of Latin American countries that heavily relied on export of agricultural commodities to the United States of America and Europe. Many governments responded to the prolonged period of low prices with import substitution strategies and/or further expansion of export crops, the latter adversely affecting food production and triggering food and overall inflation (Sonnenfeld, 1992).

[18] In May 2008, India suspended futures trading in soy oil, rubber, potato and chickpea to tame galloping food prices, which was extended till Nov. 30. Earlier in 2007, India banned futures trade in rice, wheat, and two varieties of pulses for the same reason. (http://in.reuters.com/article/2008/12/03/india-commodity-idINBOM39173020081203)

[19] (FAO/GIEWS, Country policy monitoring: http://www.fao.org/giews/countrybrief/policy_index.jsp).

Within the framework an import substitution strategy, Mexico promoted Green Revolution technology packages as early as the 1940s, making it the birthplace of the Green Revolution. In the 1940s and 1950s, agricultural production in Mexico increased rapidly, thanks to the huge public investment in irrigation and high levels of government-controlled prices for basic foodstuffs which made the technologies profitable. By the end of the 1970s, however, the growth of production of basic foodstuffs slowed as the easy gains from new technology were fully exploited and less land went into growing corn and beans primarily due to government policy which kept prices for basic crops increasingly low and less profitable relative to unregulated crops (Barraclough and Utting, 1987). The risk and return to growing basic food crops deteriorated further in the early 1980s, when the country was beset by rising inflation and macroeconomic instability. Mexico responded by removing agricultural subsidies, withdrawing price support programmes for producers, and removing or reducing import barriers (1994), and accordingly allowing an influx of cheap (highly-subsidized) crops from the United States of America (The Oakland Institute, 2008). As government efforts to stabilize and improve price incentives for producers were largely inadequate and market-based price risk management options were non-existent in the 1980s and 1990s, food production, especially by small farmers, stagnated or declined in many Latin American countries (Byerlee *et al*., 2005; Rosenzweig-Pichardo, 2003). Food imports have also surged in many Caribbean countries with the removal of production subsidies, elimination of price stabilization schemes and liberalization of trading practices over the last two decades (Deep Ford and Rawlins, 2007; Ahmed, 2001).

Brazil and Argentina are among the few countries noted for their successful food and agriculture sectors in Latin America and the Caribbean. Total agricultural exports more than doubled between 1990 and 2005 in Brazil, making the country the world's third-largest agri-food exporter. Although the level of assistance to agriculture is low compared with the average in OECD countries, the Brazilian government has intervened in both the credit and agricultural domestic markets to support farmers. Producer support is provided mostly through preferential and subsidized credit to the sector, although farmers producing targeted commodities also benefit from regionally announced minimum guaranteed prices.[20] The highest level of support in Brazil is provided to staple crops that compete with imports (wheat, maize and rice) and cotton (OECD, 2005). Brazil also established a new Ministry of Agrarian Development (in addition to the Ministry of Agriculture) in 2000 in order to run programmes targeted to family farms and land reform (Viega, 2003). Increased foreign direct investment by multinational agribusiness companies, contract farming, improved transportation and marketing infrastructure, and commodity exchanges have provided valuable price discovery and price risk management services. The use of agricultural insurance schemes has expanded in recent years, although from a low base (Tueller, 2009). There are over 30 commodity exchanges trading largely in commodities for immediate or

[20] Brazil also takes the view that most of its support measures (including the credit programmes) would continue to be classified under the special and differential (S&D) treatment provisions of Article 6.2 of the Agreement on Agriculture, and hence excluded from the calculation of the aggregate measurement of support (AMS). See WTO document G/AG/R/52, 11 November 2008. The Special and differential (S&D) treatment for developing countries has taken two main forms: the granting of preferential access to developed country markets and exemption from disciplines applying to the protection of domestic industries under particular conditions. The AMS is the indicator on which the domestic support discipline for the Uruguay Round Agreement on Agriculture is based.

forward delivery. On the demand side, the huge export market[21] and domestic biofuel consumption have significantly improved the return on agricultural investment.

Argentina is the world's fourth-largest exporter of wheat, second-largest exporter of corn, largest exporter of soybean oil and sunflower oil and third-largest exporter of beef, soybeans and biodiesel. Argentina is also one of the few countries in the world that does not offer any subsidy or price support to its farmers. Indeed, many of its agricultural products are subject to export taxes and restrictions that reduce farm incentives. A number of factors have contributed to the success of the food and agriculture sector in Argentina: a large, flat level plain (the pampas) of more or less fertile land suitable for large-scale commercial cropping and livestock rearing;[22] and a rapidly expanding agribusiness sector that has greatly facilitated marketing, contract farming, and processing of output and improved access to inputs, machinery and equipment. Institutional transformations in the form of agriculture based on contracts (e.g. service contracts, land rental contracts, harvesting contracts, future markets contracts, insurance contracts, etc.) have stabilized the price and incentive environment for farmers (Chaddad, *et al*., 2009). Finally, commodity exchange systems in Argentina have helped the price discovery process and reduced price uncertainty for farmers and traders.[23]

Overall, many countries do not have a well-established government-based farm support programmes but agribusinesses and commercial farms have rapidly expanded in the region. While commercial production of many export crops has expanded, small farmers and peasants producing staple food crops are still among the poorest people in the region. Low profitability and inadequate support to small farmers have discouraged food production, resulting in increased dependence on imports in several countries. Many countries have responded to the 2007/08 food crisis with pronouncements to achieve food security and fight hunger through measures that include investing in family farms, stabilising food markets and creating food reserves (SELA, 2010). Countries such as Brazil, Ecuador (milk), Nicaragua and Colombia have introduced public purchase programmes to support and stabilize prices for small producers (FAO RLC, 2010).

3.4 Sub-Saharan Africa

During the colonial period, food production was largely neglected in Africa except in some limited cases where white farmers themselves were producing food crops (Smale and Jayne, 2003). After independence (since the 1960s), African countries intervened in the food sector but the objective changed to supporting consumers rather than producers. Countries such as Ethiopia, Guinea, Madagascar and Mozambique attempted to ensure low prices for consumers by banning or restricting private trade and instituting public food distribution systems (Kherallah, *et al*., 2002). Food production declined and market reforms were

[21] Brazil ranks number one in world production and exports of coffee, sugar, and frozen orange juice concentrate; number two in soybeans, tobacco, beef, and poultry; and number three or four in corn, pork, and cotton (USDA, Agricultural Economy and Policy Report – BRAZIL, February 2009. http://www.fas.usda.gov/country/Brazil/Brazil%20Agricultural%20Economy%20and%20Policy.pdf)

[22] The Argentine pampas is also one of the six major grain-producing agricultural areas of the world (North America, Western Europe, Ukraine-Russian Federation, China, and Australia are the others).

[23] The national exchange network of Argentina consists of 11 markets, which trade mostly in agricultural commodities, including one of the world's oldest commodity futures exchanges (the Bolsa de Cereales dating back to 1854) (FAO, 2004; UNCTAD, 2001)

introduced in late 1980s and early 1990s. Four countries, on the other hand, intervened to support producers and tried to initiate an Asian type of Green Revolution. These were Kenya during the period 1965-1980, Zambia in 1970-1989, Zimbabwe over the period 1980-89, and Malawi during 1983-93, all of which achieved impressive episodes of maize production growth. State marketing institutions offered attractive prices to producers and facilitated the disbursement of credit and subsidized inputs to smallholders (Mosley, 2002; Smale and Jayne, 2003). The intervention proved that farmers do respond to favourable incentives but the system relied exclusively on government marketing boards and the budgetary costs were too expensive to be sustained over a longer period. The success came to an end with the collapse of the boards and the absence of a strong private sector to supply inputs, extend credit or provide stable and attractive prices. The private sector lacked the policy support and incentives to render marketing and financial services (Smale and Jayne, 2003; Jayne *et al*., 2009).

Grain market policies in the post-liberalization period are generally characterized by lack of clarity about the respective roles of government and the private sector and inadequate incentives. Marketing parastatals in many eastern and southern African countries have continued to intervene in grain markets. Policy inconsistencies or reversals have also discouraged private-sector investment in value chain development and regional trade (Coulter and Poulton, 2001; FAO, 2003; Jayne *et al*., 2009). Investment in, and management of, storage activities, for instance, are costly and risky because of irregular government interventions, including the unpredictable release of public stock or government-sponsored imports and the arrival of food aid (Poulton *et al.*, 2006). Reduced access to credit at affordable rates, competition from low-cost food imports and non-emergency food aid, and the removal of input subsidies have discouraged the use of modern crop varieties and fertilizers in many cases (FAO, 2006). Owing to unfavourable market and price environment, grain yields stagnated as grain/fertilizer price ratios declined in some countries following market liberalization. In other cases, market liberalization is accompanied by sharp price fluctuations (Byerlee, *et al*., 2006; Galtier, 2009). A recent attempt by Sasakawa Global 2000 (SG2000 – an NGO) attempted to relaunch an African Green Revolution in the 1980s and 1990s failed largely because of marketing problems. Smallholders were able to achieve high yields but the programme soon ran into difficulties when the increased production led to a price collapse and adopting farmers started to default on their input loans (Adesina, 2009).[24]

South Africa's agriculture is different from that of the rest of Africa[25] but has some interesting features in terms of support schemes and price risk management. Its commercial farming sector has become a leading exporter of maize to African countries and among the worlds' leading exporters of wine, fresh fruits and sugar. This success has been achieved despite the country's poor land quality, highly variable climatic conditions and scarce water, and reduction of public support to commercial farms since 1994. South African commercial farmers benefited from efficient public agricultural research and extension services and marketing systems based on competitive agribusinesses and commodity exchange markets. The South African Futures Exchange (SAFEX) created the Agricultural Markets Division in 1995 in order to handle futures contracts for basic commodities such as maize, wheat and sunflower seeds (Adelegan, 2009). Farmers using futures contracts of SAFEX are able to hedge against price risks and produce staples such as maize, known for its highly volatile

[24] In Ethiopia, maize prices fell by over 80% in 2002, leading to disastrous consequences for farmers who had earlier adopted improved input packages (Adesina, 2009).

[25] In order to redress the inequitable land distribution, the South African government has plans to transfer 30% of the white-owned farms to the previously disadvantaged individuals (OECD, 2006).

prices in the continent (Geyser and Cutts, 2007; UNCTAD, 2007). The success of the commercial farmers, however, has not included small peasant farmers who have little or no access to agribusiness contracts, inputs or new technologies.

Summing up, pre and post-reform marketing policies in many sub-Saharan African countries have mostly focused on keeping prices low for the politically powerful urban consumers. Granting legal monopoly to parastatals to buy and sell grains before the reform, and pursuing inconsistent policies after the reform have given rise to a variable and risky incentive environment. Timmer's (2009) description that '... if public management of grain reserves is erratic, poorly funded, or captured by special interests, private expectations will be destabilized, making market instability even worse' is applicable to most parastatals in Africa. Weak markets and unstable prices have severely constrained the incentive to increase food production in the region. According to a recent FAO report (FAO, 2010b), '... food production per person almost tripled in East Asia, almost doubled in Asia, and that in South America grew by 70 percent'. In Africa food production per capita has barely improved at all.' Cereal yields in sub-Saharan Africa have stagnated at around 1 tonne per ha, compared to over 4 tonnes per ha in East Asia and the Pacific and over 3 tonnes per ha in Latin America and the Caribbean (World Bank, 2008).

4. Conclusions

Producers of staple grain find it difficult to operate under variable prices caused by supply or demand shocks, policy interventions, and imperfections in input, output, credit and insurance markets, among others. Even bumper harvests can cause hardship for some farmers if prices fall to very low levels. Although experts rarely agree on the rationale of, and the most effective instruments for stabilizing prices, past and present governments around the world are concerned that price risks undermine investment and technology adoption with negative implications for the welfare of farmers and national food availability.

With few exceptions, farmers in developed countries have access to a variety of public support programmes, trade protection schemes as well as market-based marketing and price-risk management instruments. As a result, grain productivity and production has increased consistently and real prices of grains have declined when viewed over a long-term period. A major criticism of the price policies in developed countries is the high cost of support and too much production. In Asia, agriculture and rural development has been facilitated through both government and market based programmes that have protected producers from low and variable prices, and national food security goals have been realized for the most part. In Latin America and the Caribbean, some countries with favourable natural resources have adopted government support programmes (including credit services) and/or pursued market-based approaches such as contract farming, agricultural insurance schemes and commodity exchanges. These countries have built a strong commercial farming sector and achieved a sustained production increase. Countries with no or inadequate support programmes and weak market-based production support services, on the other hand, have experienced stagnating staple grain producing smallholder sector and increasing dependence on volatile world grain markets. In sub-Saharan Africa, market stabilization efforts have not been effectively managed and food insecurity has remained a major challenge at both household and national levels. Many African governments attempted to support consumers without taking into account the negative impacts on producers and intervened in the market without considering the implications for private-sector operations along the food value chain.

Four major lessons can be drawn from this historical review of country experiences. First, state-led stabilization efforts that utilize and support private-sector operations, complement market-based risk management instruments and address coordination failure and missing markets provide a better incentive to increase staple grain production Managing price risks is an age-old problem which requires both the state and the market to work in tandem, with the latter assuming greater role over time.

Two, there are costs and preconditions associated with both government-led schemes and market-based price risk management tools. Government schemes distort prices and often involve large outlays of public money. Market-based tools, on the other hand, require considerable institutional capacity and competitive markets for factors of production and services (e.g. insurance). Most poor countries lack the resources and institutions to implement state-led or market-based support programmes. At the same time, they are faced with politically strong consumer groups whose demand for lower food prices cannot be ignored. Maintaining a favourable incentive environment for food producers is thus a huge challenge in poor countries. Failure to improve the incentive environment is among the major reasons behind the sluggish performance of food production in poor regions such as sub-Saharan Africa.

Third, the food policy challenge of developing countries became more urgent when food prices rose sharply in 2007/08. Very few governments viewed this, especially when combined with targeted safety net programmes, as an opportunity to increase production. Instead, many countries, especially in Africa, responded with ad-hoc measures such as restricting private-sector activities, banning exports and distributing subsidized public stock that lower domestic prices (Demeke *et al*., 2011). Producers in several countries were not allowed to gain from the recent high international prices, thereby limiting incentives for supply responses.

Finally, in looking to the future, a number of long-term structural factors such as water scarcity, climate change, high oil prices, soil degradation, biofuel production, and speculation in financial markets, point to a scenario of volatile grain prices. Climate change could result in increased frequency and severity of extreme weather, leading to greater fluctuations in food production, which in turn may trigger trade restrictions and increased volatility of international and domestic markets. Protecting producers against volatile markets will require more resources and better institutional capacity. Many poor countries cannot do much without the support of the international community. In this regard, it is encouraging to see that mitigating the volatility of food prices and other agricultural commodities is recognized as a major concern at a special meeting of the FAO in September 2010 as well as at the G20 Seoul Summit in November 2010. However, the initiatives need to include greater support to improve producers' incentive to address the root cause of the problem.

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