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Maize Price Trends in Ghana (2007-2011)

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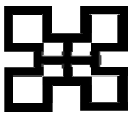

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Maize Price Trends in Ghana (2007-2011)[1]

Vincent Amanor-Boadu, PhD[2]

Maize (Zea mays, L.) is a principal human food and livestock feed in Ghana. Its production is essentially performed by smallholder farmers under traditional tillage and rain-fed conditions. Although production occurs in all of Ghana's ten administrative regions, more than 70% of maize output comes from five regions in three of the six agro-ecological zones. The five principal growing regions are Northern, Brong-Ahafo, Ashanti, Central and Eastern and the three agro-ecological zones are guinea savanna, forest savanna transition and semi-deciduous rainforest (Table 1). Forest savanna transition and the semi-deciduous agro-ecological zones have a bimodal rainfall distribution pattern, with the major season beginning in March and ending in July and the minor season beginning in September and ending in October/November. The guinea savanna agro-ecological zone has a uni-modal rainfall distribution that starts in May and ends in September.

Table 1: Distribution of Maize Production by Region and Agro-Ecological Zones (2006)

Region	Agro-Ecological Zone	Output (MT)	Area (Ha)	Yield (MT/Ha)
Brong-Ahafo	Forest savanna transition	363,595	191,691	1.90
Eastern	Semi-deciduous rainforest	209,542	133,844	1.57
Central	Semi-deciduous rainforest	166,847	102,648	1.63
Ashanti	Semi-deciduous rainforest	164,226	138,793	1.18
Northern	Guinea savanna	98,157	85,644	1.15
Western	Rainforest	73,210	51,102	1.43
Volta	Coastal savanna	48,286	35,330	1.37
Upper West	Sahel savanna	48,128	36,714	1.31
Upper East	Sahel savanna	14,712	14,355	1.02
Greater Accra	Coastal savanna	2,134	2,879	0.74

Source: Statistical Research and Information Directorate (SRID), 2006 and FAO.

Because of production's dependence on increasingly erratic rainfall conditions, total market conditions for maize tend to follow the direct impact of these rainfall conditions on production. The situation is exacerbated frequently by the poor or non-existent post-harvest management infrastructure and conditions in the country. The situation is such that even in periods of good moisture conditions, inefficient storage systems often result in price pressures arising from glut at harvest time and non-availability towards the end of the season.

[1] The Statistical Research and Information Directorate (SRID) of the Ghana Ministry of Food and Agriculture (MoFA) has been collecting commodity price data since the early 1970s. The most recent data are used in this report to assess the trends in maize prices with the view of providing some information to facilitate public policy development and strategic planning for businesses.

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Macroeconomic Environment

Ghana's economy has been steadier than most in the West African region, making Ghana the destination of choice for recent foreign direct investments (FDI). According to the World Bank (2011), the total FDI flowing into Ghana topped $2.53 billion in 2010 compared to $165.9 million in 2000, indicating the strong confidence foreign investors have in Ghana's economy.[3] On a per capita basis, Ghana's net FDI, at about $132 in 2010 (compared to about $7.56 in 2005) exceeded that of Middle Income Countries' at $113 ($71.14 in 2005) and that of its neighbor, Nigeria's at $48.90 ($40.28 in 2005).

The World Bank also reports that Ghana's new oil production and rebound in construction boosted economic growth to 14.4% per annum in 2011, a figure expected to decline to a respectable 7.5% in 2012 as oil production plateaus. These trends in the macroeconomic environment have contributed to Ghana's successes with its Millennial Development Goals. By 2006, Ghana had reduced the population living below the national poverty line from 51.7% to 28.5% and the undernourished population from 28% in 1991 to 5% in 2007.[4] The foregoing and other performance indicators have been attributed to Ghana's stable and growing democratic political environment. This macroeconomic environment frames the price trends that confront the various commodities, including agricultural commodities such as maize and cocoa and extractive commodities such as gold.

Maize Price Trends

Table 2 shows the summary statistics of the monthly wholesale prices over the covered duration. The table shows that Ghana's maize market did not escape the commodity price crisis that engulfed global commodity markets in the 2007 to 2010 period. The price range in the 2007/08 crop year, for example, was GH₵35.35 per 100kg compared to GH₵12.51 in the previous crop year and GH₵17.91 two crop years later. This turbulent year (2007/08) also posted the highest variability in market prices, with a standard deviation of GH₵11.76 and a coefficient of variation of 32.6%, the highest estimated in the last five crop years. Indeed, the variability in prices in all other crop years was in the single digit. Despite this low price variability within each crop year, what is observed is that the mean price over the crop year has been trending upwards.

Table 2: Summary Statistics of Monthly Maize Prices (2006/07-2011/12) per 100kg Bag

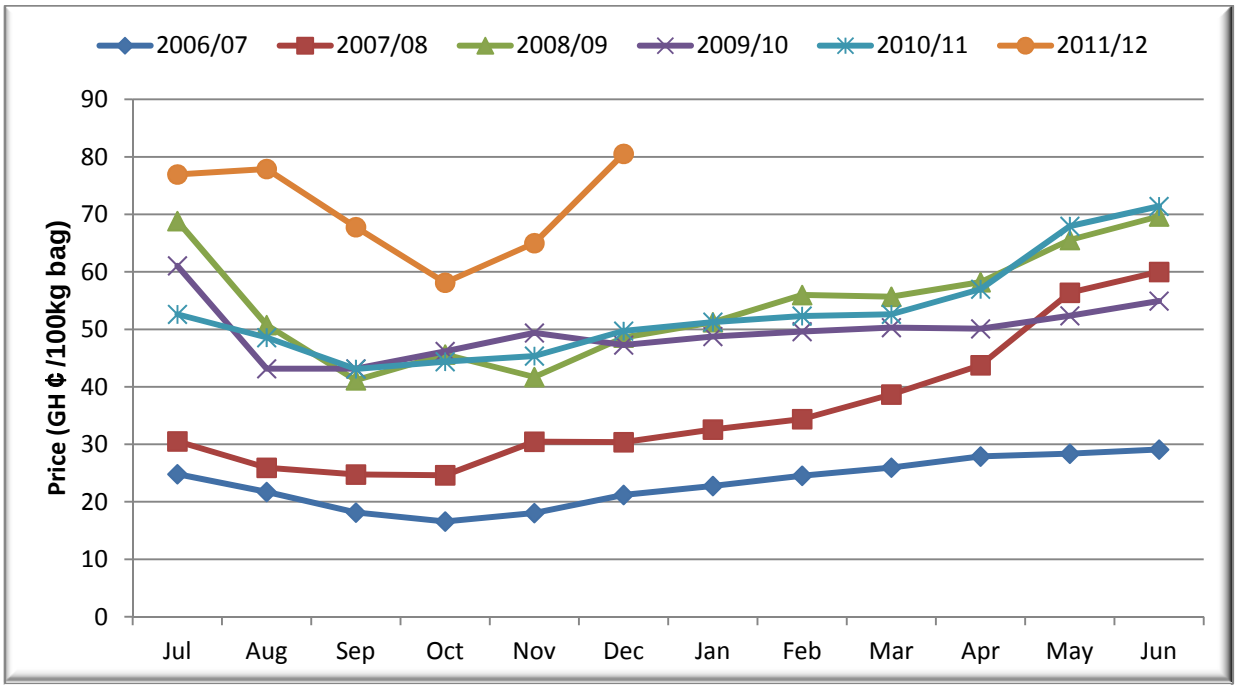
Crop Year	N (Months)	Range	Minimum	Maximum	Mean	Standard Deviation	Coefficient of Variation
2006/07	12	12.51	16.58	29.09	23.26	4.24	18.2%
2007/08	12	35.35	24.63	59.98	36.03	11.76	32.6%
2008/09	12	28.49	41.15	69.64	54.42	9.79	18.0%
2009/10	12	17.91	43.15	61.06	49.69	4.95	10.0%
2010/11	12	28.30	43.10	71.40	53.02	8.75	16.5%
2011/12	6	22.42	58.12	80.54	71.05	8.79	12.4%

[3] World Bank. *World Development Indicators*, March 2011.

[4] UNDP. Millennium Development Goals Indicators. Available at http://mdgs.un.org/unsd/mdg/Data.aspx.

Figure 1 shows the trends in the monthly wholesale price of maize from July 2006 arranged by crop year, starting in July to June. It shows that the last six maize crop years in Ghana form three distinct clusters based on their trend formats: the first two crop years, the second three, and the final crop year. The middle cluster exhibits more internal similarity than the first cluster, with their means within GH 5.00 of each other. The third cluster shows that prices in the 2011/12 crop year are significantly above the other two clusters' trend lines. It also exhibits a much steeper incline after the initial price decline than has been seen in previous years. It is impossible with the available data to determine the factors that are influencing these structural characteristics of the trends over the period under review.

Figure 1: Trend in Monthly Wholesale Maize Prices by Crop Year (2006/07-2011/12)

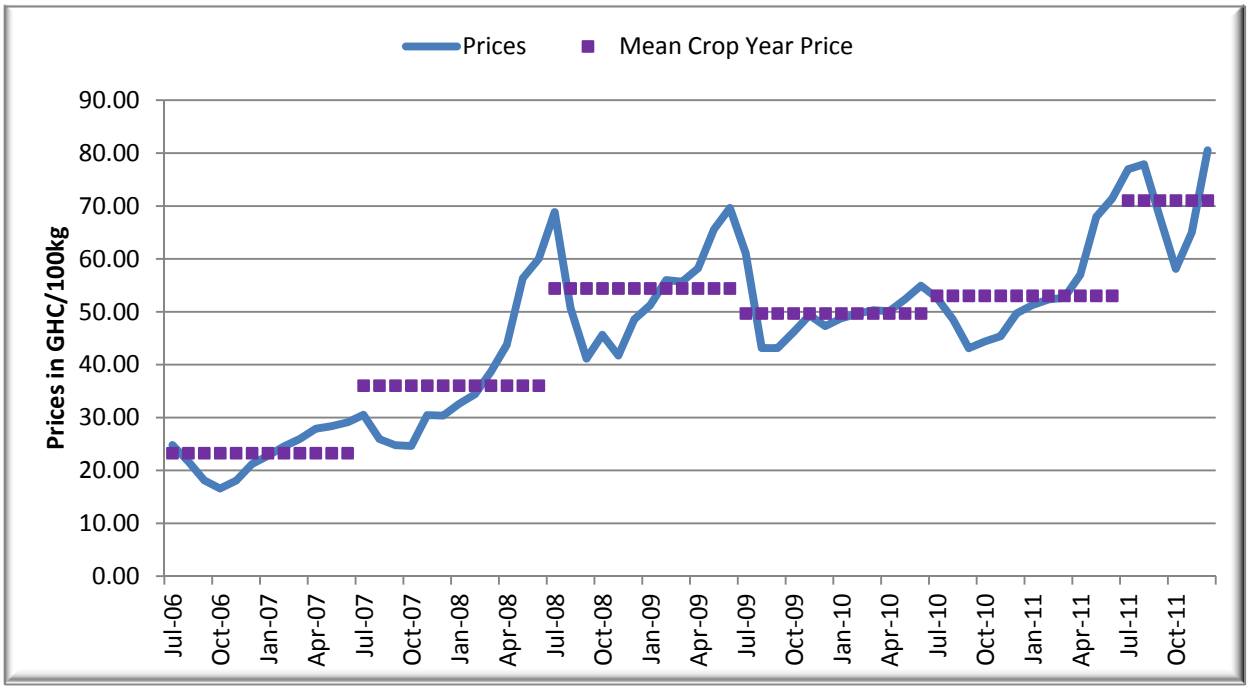


Source: Statistical Research and Information Directorate (SRID), MoFA – Ghana.

Figure 1 shows that prices generally decline rapidly in the four months after the new crop comes in July. For example, between July and October in each of the crop years under review, crop prices declined between 15% and 34%, with the lowest decline occurring in the 2010/11 crop year and the highest occurring in the 2008/09 crop year. That these declines occur at the beginning of the crop season is indicative of the dire need for effective storage systems in the country's maize sector. For if the policy objective is to manage producer incomes, then availability of storage facilities would allow them to control the release of their crop, and in so doing, control the price declines. The figure shows that once the excess output occurring at harvest has been taken off the market, prices begin to rise steadily throughout the rest of the crop year. The highest monthly average growth rate in prices was 12.1% in 2008/09 crop year and the lowest average monthly growth rate occurred in the 2009/10 crop year at 2.2%. The figure shows that a good minor crop in November and December could lead to some price depression, as seen in the 4.3% decline between November and December prices in 2009/10 crop year. If these price changes are indicative of the minor crop output situation, then the figure shows weak minor crop output in the last five crop years. Indeed, the price change

between November and December 2011/12 crop year was the highest at almost 24%, suggesting tighter supply relative to demand conditions. The figure also suggests accelerated monthly price changes from February through to the end of the crop year. The trend over the full six crop years is presented in Figure 2, summarizing the crop year trends presented in Figure 1, and also showing the upward shifts in the mean crop year price over time.

Figure 2: Overall Trend in Maize Prices and Average Crop Year Prices

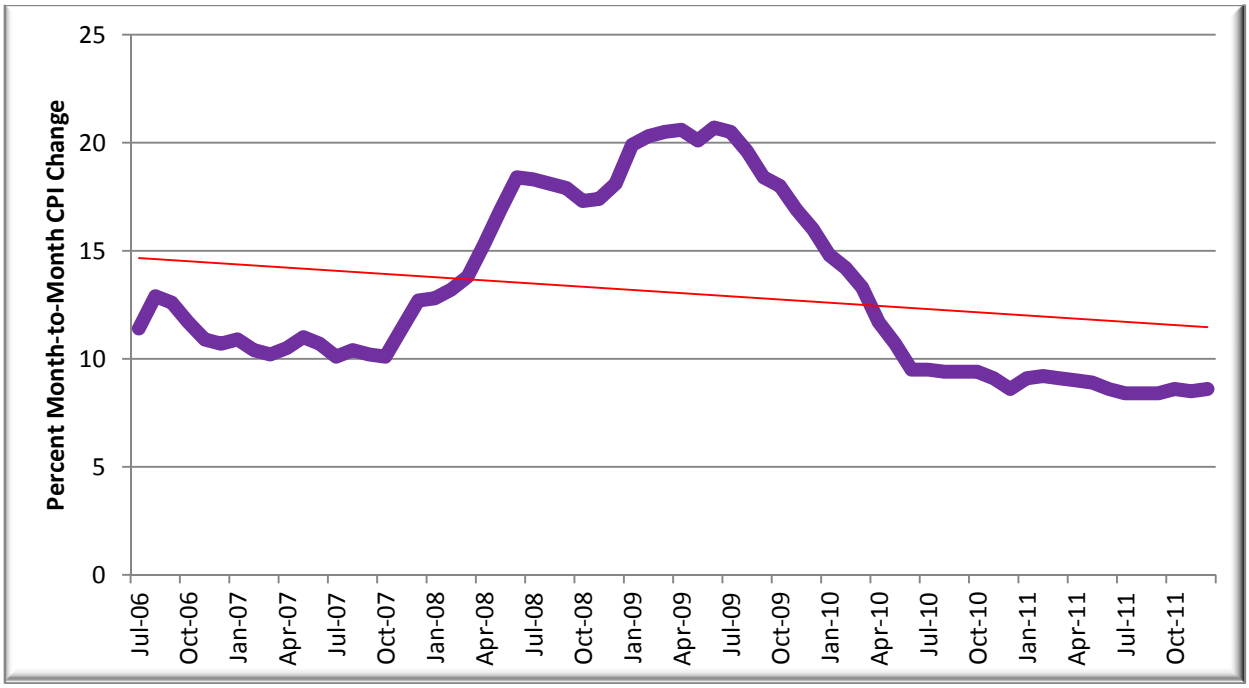


Source: Statistical Research and Information Directorate (SRID), MoFA – Ghana.

It is tempting to attribute this increasing average maize price over time to inflation. However, Ghana's month-to-month change in the consumer price index has been declining over the period of analysis, with the exception of the 2008/09 crop year (Figure 3). The correlation coefficient between maize prices and inflation was determined to be 0.13, and while this was positive, it was found not to be statistically significant even at the 10% level, thus negating the existence of any statistical relationship between these two variables over the period under consideration. To this end, it is plausible to attribute the observed trends in maize prices to supply and demand conditions throughout the year and changes in these conditions over time. USDA data (available through Index Mundi (http://www.indexmundi.com/agriculture) show that Ghana's 2011 production was about 1.5 million metric tonnes compared to 1.62 MMT in 2009 and 1.67 MT in 2010. Assuming that demand has remained strong because of the increasing growth in livestock production and human consumption, then the foregoing trend in supply would suggest that tight supply may be the reason for the observed price.[5]

[5] Ghana Agribusiness Report Q3 2012. Available at http://www.transworldnews.com/1063758/c1/ghana-agribusiness-report-q3-2012-new-market-research-report

Figure 3: Month-to-Month Change in the Consumer Price Index in Ghana (July 2006-December 2011)



Source: Ghana Statistical Services, Consumer Price Index (CPI). http://www.statsghana.gov.gh/cpi.html.

Observations for Policy and Strategic Action

That inflation cannot explain the trends in maize prices over the period under consideration triggers a search for other explanatory variables. Although it is observed anecdotally and theoretically that tight supply and growing demand conditions may explain the observed trends, there is no adequate data to ascertain and measure their impacts on price trends. For example, monthly supply conditions at various stages along the supply chain, trader expectations and behaviors and downstream users' capacity are all important influencing variables, yet such data are currently not collected by SRID.[6]

The impact of the price decline that occurs in the first three to four months after harvest has significant impact on producer incomes and probably insignificant effect on consumer food security situation. Thus, policy and business strategy focus may benefit from investing in effective storage and post-harvest management systems. Various studies have indicated that these strategies could significantly reduce the variability in prices and shift some of the benefits to the farm while reducing the impact on poor families that depend on maize as their staple.[7] The studies also show that these strategies could also improve protein consumption as animal

[6] Although SRID collects monthly price data on a number of commodities, it does not collect any related market information that could enhance these analyses. This was indicated to Dr. Kara Ross, Economics and Agribusiness Analyst, Kansas State University by Ms. Georgina Nkunu, SRID, Ministry of Food and Agriculture, Ghana in an email communication on April 17, 2012.

[7] Park, A. "Risk and Household Grain Management in Developing Countries," *The economic Journal*, 116(2006): 1088-1115.

feed prices are stabilized, the benefits of which get translated into stable animal protein prices, which contribute to improving national nutrition status, especially among the poor, mothers and infants.[8] As far back as 1989, Fama and French showed that storage infrastructure availability is an effective price risk management tool in all commodity markets.[9] However, a recent study by Gouel and Jean (2012) suggests that in poor open economy countries (such as Ghana), government interventions aimed at stabilizing prices of staple foods, which often include storage and trade measures, must be balanced appropriately if the expected results are to be achieved.[10] They find that an optimal storage policy on its own is detrimental to consumers because its stabilizing benefits leak into world markets, raising the average domestic price. However, an optimal combination of storage and trade policies provides a powerful stabilizing effect for domestic food prices.

Ghana's maize trade may do well to assess the foregoing trends and develop some long-term strategic insights into organizational behavior across the maize industry. Evaluating opportunities to reduce variability in prices within each year and across time could help reduce the transaction costs confronting all trade members along the supply chain. For example, procurement and transportation costs associated with atomistic procurement among small traders who scout for products in production areas are high and the development of some form of strategic alliances to minimize or eliminate some of these transaction costs could enhance total value created along the chain. This enhanced value creation could increase incomes for all chain participants, including smallholder producers who may not, under these conditions, have to sell the majority of their crop in the period immediately following harvest. This improvement in benefit distribution could contribute to investments in production, thereby expanding trade opportunities and creating higher net benefits to the maize trade. Organizing and operationalizing these strategic initiatives may benefit from public and/or public-private partnerships focused on the broader objectives of poverty alleviation and income enhancement among the most vulnerable in the country. It is important, however, in developing and implementing these initiatives, to ensure that they pose little or no adverse effect on the rest of the market, thereby avoiding the risk of creating new (and probably more stubborn) problems than the ones that the interventions sought to address.

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8 See, for example, Morton, A.S. "Potential Price Variability in the US Grain and Livestock Sector Scenarios: An Econometric Approach," *Dissertation Abstract International*, 43(1982): 1621-1622.

9 Fama, E.F. and K.R. French. "Commodity Futures Prices: Some Evidence on Forecast Power, Premiums, and the Theory of Storage." *The Journal of Business*, 60 (1987): 55-74.

10 Gouel C. and S. Jean. Optimal Food Price Stabilization in a Small Open Developing Country. Policy Research Working Paper Issue # 594, Washington D.C.: World Bank, 2012.