Economic Evaluation of the Floor and Ceiling Price Policy for Maize in Ghana

Yaw Kyei and Kevin Parton

Ghana Food Distribution Corporation, Accra and Department of Health Studies, University of New England, Armidale, respectively.
Abstract

Output price support and price ceiling policies are used in many developing countries to stabilise prices for staple foodstuffs. This paper presents a method of evaluating price support and price ceiling policies as prevailed in the maize sub-sector in Ghana for the period 1974 to 1991. The paper evaluates the policy in the context of economic efficiency. It also indicates the likely distributional consequences of the policy. Significant considerations of non-efficiency nature which are not captured in the analytical framework are discussed in the formulation of policy suggestions.
Introduction

Ghana is an agricultural country with a population of about 15.5 million and an annual population growth rate of around 2.5 per cent. Maize is the leading staple food in the country and it constitutes over 40 per cent of domestic food sales. Maize and its various processed forms provide approximately 33 per cent of the caloric supply to the average Ghanaian.

In 1974, the government of Ghana introduced the Guaranteed Minimum Price (GMP) policy in the maize sub-sector to ensure improved income levels for maize farmers, stabilise domestic maize prices, keep consumer food prices at 'reasonable' prices, reduce the country's dependence on maize imports and maintain strategic food security.

For the period prior to 1991, the government pursued pricing and trade policies which were characterised by reliance on administered allocative mechanisms rather than on relative prices. Besides, the country's fiscal and monetary policies, combined with the increases in domestic maize prices, resulted in positive protection for producers and in a consistent expansion of maize output. Consequently, in 1985, domestic prices of maize were about 50 per cent above the world market prices.

As a condition of financial assistance from the IMF/World Bank, Ghana in 1983 agreed to a program of specific policy reforms designed to stabilise the country's macro-economic position and to promote structural adjustment as the basis for longer-term growth. Under the structural adjustment policy package, an increasing emphasis has been given to the liberalisation of the economy, correction of policy-induced distortions and minimisation of government intervention in economic activities. As pointed out by Husain and Faruque, the main thrust of the economic recovery program has been to reorient the economy to respond to signals of the free-market system where prices are set by supply and demand. Consequently, there has been a reduction in the extent of commodities covered by price fixing, price controls, price monitoring and enforcement by the various government and quasi-public agencies. Output and input pricing in agriculture has undergone a major shift towards reliance on competitive marketing. Import policy has also become more flexible with reduced tariff protection. As a consequence, encouragement has been given to the importing of a wide variety of agricultural products.

Significantly, the government since 1991 has attempted to de-regulate the maize sub-sector and has abolished the GMP scheme. This is in furtherance of the IMF/World Bank's general objective to 'pursue greater efficiency in the use of resources through greater reliance on economic incentives.' It is argued by the World Bank that such
liberalisation policies can help restore economic growth in Ghana through the elimination of critical bottlenecks in the country's resource allocation.

The purposes of this paper are basically two-fold. First, we seek to make quantitative estimates of benefits and costs of the GMP scheme by analysing the impact of the policy on producer and consumer surpluses, government budgetary burden and foreign exchange savings. Second, having assessed the narrow effects of the GMP policy on economic efficiency, we examine some of the policy's broader effects.

The paper is divided into six sections. Following this general introduction, Section 2 describes the GMP policy as it operated in Ghana. A description of the method of analysis is presented in Section 3. This is followed by an outline of the results of the efficiency analysis in Section 4. This section also covers the results of the sensitivity analysis. In Section 5, we examine some wider effects of the GMP policy. Section 6 is the concluding section.

The Guaranteed Minimum Price (GMP) Policy

The GMP policy can be described as a pre-specified floor price determined by the government and used to maintain a minimum market price for maize delivered to the government procurement agency, the Ghana Food Distribution Corporation (GFDC). The policy entailed a government support price (at the farmgate) and price ceilings (at the retail level). Under the GMP policy, the government fixed rural producer prices of maize below urban retail prices, but both exceeded the average world price. In this respect, Ghana's policies differed from those of many other developing countries, where both the urban retail and rural producer prices of the key staple were below the world price.

Marketing of maize in Ghana involved a large army of small-scale private traders (who handled about 94 per cent of the marketable surplus), and the GFDC, which is still the major government institution directly involved in domestic food marketing. There were three main streams of private traders: the itinerant traders, the market-based traders and the food contractors. Though GFDC constituted the single major participant in the maize industry under the GMP policy, it was not legally bound to purchase all the marketable surpluses nor could it. Private traders were also not legally obliged to comply with the government-determined prices and so they operated a free market system in their segments of the market. The government sector worked in parallel with the private trading sector and influenced the latter through competition. The government was able to defend the floor and ceiling prices through its domestic trading operation and by restricting imports.
Even though the government, through its procurement agency, GFDC, handled only about 6 per cent of the total national marketable output of maize, its support prices - both floor and ceiling prices - impacted significantly on the private market. The effect of the GMP policy on the government sector market and how it influenced the private sector market, is presented in Figure 1. Total supply and total demand curves are represented by S and D, respectively. Also shown is the curve $D_H$ which represents the demand by producers for on-farm consumption.

It has been drawn slightly sensitive to prices on the basis of evidence from Haessel\textsuperscript{10}. Total demand is shown by $D_HMD$, and it represents the combined demand for both maize producers and non-producers. The horizontal distance between $D_HMD$ and $D_HH$ measures the demand by non-farm households. Other assumptions made in constructing the model are as in Appendix 1.

Without the GMP policy and its associated trade restrictions the ruling price in Ghana would be $P_W$, the international price. The quantity of maize $Q_{Q1}$ would be produced domestically and $Q_{Q2}$ would be consumed, with imports ($Q_{Q3} Q_{Q2}$) filling the gap. Of the total consumption, $Q_{Q0}$ would be on-farm consumption.

The GMP policy had the effect of increasing both averaged producer and consumer prices to $P_S$ and $P_C$ respectively. At these prices the quantity of maize supplied ($Q_{Q4}$) would just fall short of the quantity demanded ($Q_{Q5}$), and a small quantity ($Q_{Q3} Q_{Q4}$) would be imported. At this higher effective producer price, a smaller quantity ($Q_{Q3}$) would be consumed on farms.

The GMP policy has been criticised because it placed a fiscal burden on the government and because it was badly targeted. Its practical implementation has raised both distributional and operational problems because of the inability of GFDC to purchase all the amounts offered by the farmers. This was due to inadequate financial resources, poor geographical coverage and peaks in the volume of purchases\textsuperscript{11}. The situation 'compelled' most small-scale rural farmers to rely on traditional market intermediaries for disposing of most of their produce even at prices lower than the guaranteed prices fixed by the government. The Ministry of Agriculture\textsuperscript{12} identified some of the major defects of the GMP policy as:

i. the announcement of prices after harvest rather than prior to sowing; and

ii. prices based on the cost of production, which assumes that all farmers apply recommended cultural practices.
Figure 1: Floor and ceiling price policy for maize in Ghana
Despite the criticisms of the GMP scheme, its discontinuation has attracted many protests and complaints from maize producers and consumers. Many of the farmers strongly favoured the scheme and have therefore criticised the current totally free market system. Their reaction seems to confirm arguments by Dantwala and Hayami, Subbarao and Otsuka that such procurement by government agencies leads to an increase in the average price received by farmers. It reduces the riskiness of their farm income, allows them to plan ahead with confidence, provides them with better guides for planning production, and therefore can have a positive impact on their well being.

**Efficiency Effects of Removal of the GMP Policy**

Using the theoretical framework developed by Ahmed, a partial equilibrium model was employed to estimate the benefits and costs associated with the GMP policy. As shown in Appendix 2, a number of simplifications and assumptions were made to modify and extend the model to suit the Ghanaian situation.

Referring to Figure 1, under the GMP policy, if $OQ_4$ is to be made available from domestic production, then average producer price must be increased from $P_w$ to $P_s$. If the government maintains the average consumer price at $P_c$, providing an average price of $P_s$ to farmers would involve various transfers. There would be losses to the government from its domestic trading operations, but a small gain as it imports a small quantity (12.92 kt) and re-sells it at a higher price. In its domestic trading, the guaranteed producer price was about 28,887 cedis/t ($US1.00=367 cedis$). The government purchased about 28.44kt and resold this at 22,154 cedis/t to defend the ceiling price to consumers. The cost of this operation was 191.49 million cedis. Conversely, GFDC in its importing of maize made gains of 47.17 million cedis as it imported at the world price of 18,500 cedis/t and re-sold domestically at 22,154 cedis/t. The net cost to the government was 144.32 million cedis (see Table 1).

There are more significant transfers of the GMP policy for producers and consumers. As shown in Figure 1, maize producers received an average price of $P_s(=22,651$ cedis/t) under the policy instead of $P_w(=18,503$ cedis/t) and as a consequence output is increased from 383 kt to 461 kt. The producer surplus gain involved is about 1,909 million cedis ($=P_s\Delta BP_w$). (This calculation includes the producer surplus effects from home consumption, the implicit price of which is the producer price.)
On the consumption side, a higher average price $P_c(=22,621$ cedis/t) is operable with the GMP policy than the price $P_w(=18,503$ cedis/t) without it. This is associated with a fall in consumption and a consumer surplus loss of about 2,252 million cedis ($=P_cCFP_w$).

These various transfers are shown in Table 1 which reveals the net social cost of the GMP policy to be 487 million cedis. Also important to a consideration of the impact of the policy is its foreign exchange saving effect. Without the policy, imports of maize would be 236.54 kt ($=Q_1Q_2$), and with it they were 12.93 kt ($=Q_4Q_5$). At a world price of 18,503 cedis/t this represents a foreign exchange saving of 4,137 million cedis.

The criteria used for the evaluation of the GMP policy are similar to those used by Barker and Hayami$^{16}$ and Ahmed$^{17}$. Numerical results of the analysis are provided in Table 1. This analysis is based on elasticity values estimated by Haessel$^{18}$ and Stryker$^{19}$.

| Table 1: Costs and benefits of GMP policy (million cedis per annum) |
|---------------------------------|-----------------|
| Criterion                        | Total maize industry |
| Net producer benefit             | +1,909           |
| Net consumer benefit             | -2,252           |
| Net government benefit           | -144             |
| Savings in foreign exchange      | +4,137           |
| Net social benefit               | -487             |

Parameter values:

- Price elasticity of maize demand ($m$) = -1.689.
- Price elasticity of maize supply ($m$) = 0.86.
- World price of maize ($P_w$) = 18 503.30 per tonne

With the GMP policy in place, distortions in the pattern of protection encouraged over-investment in maize production; reduction in consumption of the commodity and the transfer of surplus from the government, maize retailers and wholesalers to the producers.
From an efficiency point of view, the sector should produce those outputs for which it is internationally competitive\textsuperscript{20}. Like all price distortion policies, the GMP involved some efficiency losses. In totality, these are estimated at 487 million cedis per year.

Ellis\textsuperscript{21} has argued that it is unwise for the policy analyst to depend on a single elasticity when calculating policy outcomes since elasticity parameters are difficult to estimate with precision. Even though the present study covers only the period of the GMP policy, all three elasticity values (supply, market demand and home consumption demand) were estimated for periods before and during the policy. The results of sensitivity analysis designed to consider the appropriateness of the elasticity values demonstrate that the world price of maize ($P_w$) and price elasticity of home consumption of maize ($\mu_m$) have more pronounced effects on the policy results than the other two parameters. Future studies should therefore address any possible changes in the two parameters.

**Extension of the Analysis (Wider effects of the GMP policy)**

From a pure 'efficiency' point of view and going by Harberger's\textsuperscript{22} definition of 'traditional cost-benefit analysis', the GMP policy was not a good policy. This was because the economic costs attributable to the policy outweighed the economic benefits. However, other non-economic values of the policy are difficult to incorporate systematically into the analytical framework. Significant considerations of wider effects form the core of this section.

Despite the attractiveness of the policy change to remove the GMP in terms of economic efficiency and government cost objectives, policy-makers may question the wisdom of the policy in the light of the burden it places on poor farmers. Even though relative to large farmers they received a lower benefit from the GMP, they did generally receive some benefit. Most of the corporation's purchasing outlets are located in the semi-urban areas and thus favoured the large-scale and semi-urban farmers. Direct access to the consumer subsidy for maize was with purchased maize from the Corporation. The subsidy was untargeted as it was simply reflected in a lower selling price by the Corporation. The fact that most of the Corporation's sales outlets are located in the urban areas implies that beneficiaries of maize subsidies have been urban consumers. In some cases, purchases from the Corporation were even easier for the rich and influential urban consumers than for the poor ones who genuinely deserved such a subsidy. Some deficit farmers and the poor rural landless did not benefit from the government subsidy because they purchased at the farmgate price which was in turn raised by the government price support subsidy.
Thus, while consumers as a group lost from the GMP, some urban consumers may have benefited from the scheme.

With the abolition of the GMP policy and the opening of the maize industry to free trade, domestic price will eventually be the same as or close to the world price. Based on the values of elasticity of demand and supply of maize in Ghana, the government will have to import 236 540t of maize valued at about 4.137 billion cedis (US$ 11.25 million) in foreign exchange annually. The key question is whether the government can raise the foreign exchange required to support such imports.

Evaluation of the GMP policy was based on the assumption of an efficient capital marketing system. For the policy change to be beneficial to the small-scale maize farmer, policy decisions should be made to encourage the development of marketing infrastructure and perhaps increase farmers' stockholding capacity to enable them to receive attractive prices for their produce in the imperfectly competitive rural markets.

The analysis ignored some essential, but non-market tasks such as grading, grain-drying, grain-storage and farmers' education which were performed by the GFDC under the GMP policy. The provision of such important roles cannot be guaranteed by the private sector organisations.

Ghana is prone to transitory food insecurity. Maize is regarded as a key contributor to food security in the country and it seems likely that the economic recovery program will be deficient as a policy to ensure food security. Under the GMP policy, the government through GFDC operated a national food security reserves and buffer stock system. But with liberalisation and the fiscal austerity associated with the GMP policy change, the role of the public sector in food security is de-emphasised and market forces are relied upon to determine the course of the country's food security. Given the country's high international costs, long import lead time and limited regional trade prospects, a 'holdfort' stock arrangement in the form of strategic food reserves would have considerable merit. How does the state maintain the required emergency stock level? Does the private sector have the capacity, capability and requisite expertise to hold this stock? As argued by Pinstrup-Andersen23, in a country like Ghana where a strong competitive market is absent, household food security goals may not be fully achieved through private distribution. Private enterprises, which are profit driven, cannot be expected to play the role of market stabiliser or emergency stockpiler without recovering the full costs of doing so24.

The GMP policy decreased the variability of maize prices for both producers and consumers. The policy 'insulated' domestic producers and consumers from the world
commodity markets which are typically thin and unstable. With the abolition of the policy, any variations in the world price will be transmitted directly into domestic price formation. This is more serious for a developing country like Ghana which may not command the relevant skills and techniques to ameliorate the effects of the volatility of international prices.

Special attention should be given to problems arising in remote areas hitherto served by the GFIJC at prices not reflecting real transport costs. In the short run when such areas still remain inaccessible, farmers in such areas will require a special treatment from the government to remain in maize production.

Associated with the policy change is the phasing out of public sector involvement in the importation and distribution of agricultural inputs required for technology adoption. Supplies to the remote farming centres which are still not very accessible and where most of the small-scale farmers operate cannot be guaranteed by the private sector.

The private sector is the leading sector involved in the marketing of maize in the country. The government has the responsibility to provide a favourable economic and investment climate for the private sector before the full gains from liberalisation can be realised. But according to Boehner25 apart from the mining sector, private investment has been low enough to raise questions about the sustainability of Ghana's growth performance.

Conclusions

Several developing countries are using price support and price ceiling policies to stabilise prices for staple foodstuffs. Our study of the removal of the GMP policy in Ghana provides a microscopic look at the net social cost of the policy. The cost of the policy was estimated as 487 million cedis per annum and it formed 0.11 per cent of the gross national product. This should be considered against the background that public funds for economic development are scarce in a developing country like Ghana.

The results add to the evidence that distorted markets reduce market efficiency and market transparency. They confirm the evidence that the maize industry will be more efficient and will have beneficial effects on development if the distortions are removed. From a pure 'efficiency' point of view and considering only the economic values of the GMP policy, it was not a good policy because the economic costs attributable to the policy outweighed the economic benefits. An important aspect of this conclusion is that the government's import restrictions were far more distortionary than its domestic trading activities.
In addition, there are many important wider considerations of a non-efficiency nature which need to be considered. Distributional effects are important, as is the lack of efficient marketing infrastructure. Additionally, the analysis presented in this paper assumes that the marginal utility of money is the same among all maize consumers and producers and also the price changes do not affect intra group distribution of income. These could be strong assumptions, particularly if the income gap between the rural poor maize farmers and the urban consumers is considered. Another issue that, through simplification, this analysis ignores are the dynamic effects of removal of the GMP policy, more especially when the spillover and feedback effects on the general economy are considered.
Appendix 1

Model Assumptions

i. That producers and consumers are price takers.

ii. Linearity in demand and supply functions.

iii. There is no shift in the supply curve for maize since the study focuses on price support monopoly and ignores any likely impact of government subsidised inputs such as fertiliser, seeds, and credit.

iv. That cross elasticities of demand and supply in the food market are zero.

v. The government's administered support prices (both floor and ceiling prices) are assumed to be generally above and below the market-determined purchasing and retail prices respectively. This implies that the government's procurement agency, GFDC, operated within a narrower price band than the private trading sector.

vi. The government's support prices could influence market prices, but could not necessarily determine them.

vii. Maize farmers and maize consumers are treated as homogenous.

viii. The on-farm demand curve for maize farmers is assumed to be inelastic, although greater than zero.

ix. Maize farmers typically produce more than one product.

x. That output depends on current price and abstracts from dynamic considerations that result from production lags and storage.

xi. All farmers and consumers receive and pay the same support prices under the program.

xii. That both the private and government trading sectors are integrated and that marketing margins are the same for both markets.
Appendix 2

Parameters and Data Used for the Study

A. Quantities (thousand metric tonnes)

1. Domestic consumption of maize (Qc) 474.00
2. Domestic output of maize (Qo) 461.08
3. Household consumption of maize (at the market-determined price (J)) 230.54
4. Increased maize production (Qc - Qo) 12.92

B. Prices (Cedis per tonne)

5. Domestic retail price (private-sector market) 39 739.17
6. Domestic retail price (government-sector market) 38 866.67
7. International price of maize (Pw) 18 503.30
8. Domestic producer price (private-sector market) (PpI) 22 651.33
9. Domestic producer price (government-sector market) (Pc) 22 154.00

Note: Based on some assumptions, the values for both 8 and 9 were estimated from 5 and 6 respectively.

C. Elasticities

10. Price elasticity of demand for maize (α_m) -1.689
11. Price elasticity of maize supply (β_m) 0.86
12. Price elasticity of home consumption of maize (μ_m) - 2.0
References


