

## **CASE STUDY**

# **HEDGING MAIZE IMPORT PRICE RISKS IN MALAWI**

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### **PRICE RISKS IN MALAWI**

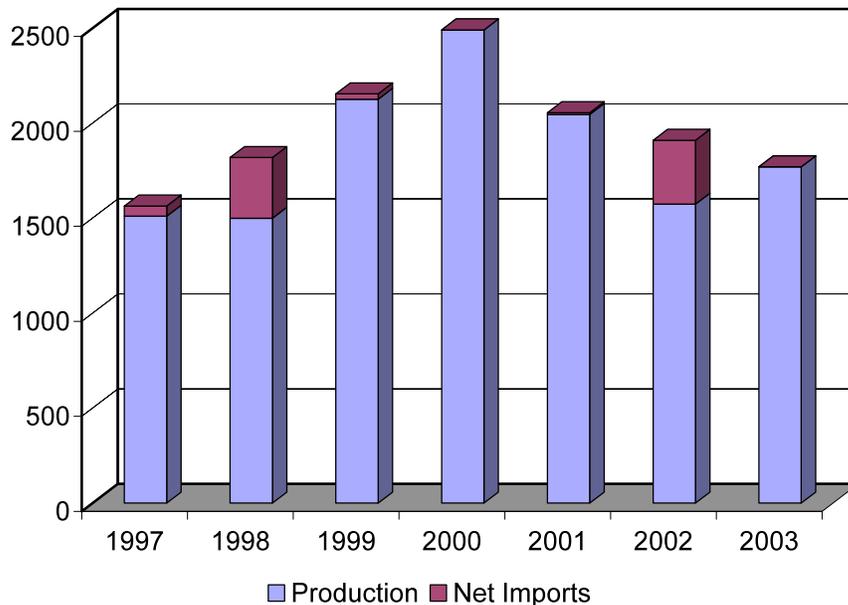
This case study describes the evolution of a program to hedge maize imports in Malawi using physical call options (i.e. options to buy physical maize and have it delivered to Malawi). The advantage of the physical call options over financial options in this application is that not only is price risk reduced but also the actual availability of maize product is ensured during times of domestic production shortage.

### **BACKGROUND**

Malawi is a small landlocked country of just over 11 million people in southeastern Africa. The country is very poor with annual gross national income per capita currently around USD 170. Malawi is food insecure with high infant mortality and much of the population experiencing periodic food shortages, malnutrition, and other health related problems (including high rates of HIV/AIDS infection).

The primary food crop grown in Malawi is maize. The main maize crop is planted in October and November and harvested in April and May. There is also a winter growing season with maize being planted in February and March and harvested in October and November. However, the winter crop is much smaller than the main summer crop due to limited suitable land. Adequate moisture is required at planting and good rainfall is critical during the December through February tasselling period. Almost all of the maize produced is rain-fed and therefore susceptible to drought and floods.

In good years Malawi is self-sufficient in maize or may have small amounts of excess maize for storage or export. In years with poor growing conditions, however, imports are required to support domestic consumption requirements. Figure 1 shows maize production and imports from 1997 through 2003 and indicates that substantial imports occurred during the poor harvest years of 1998 and 2002.



**Figure 1. Malawi Maize Production and Imports (Source, Dana, Gilbert, and Shim, Food Policy, 2006, pp. 357-371)**

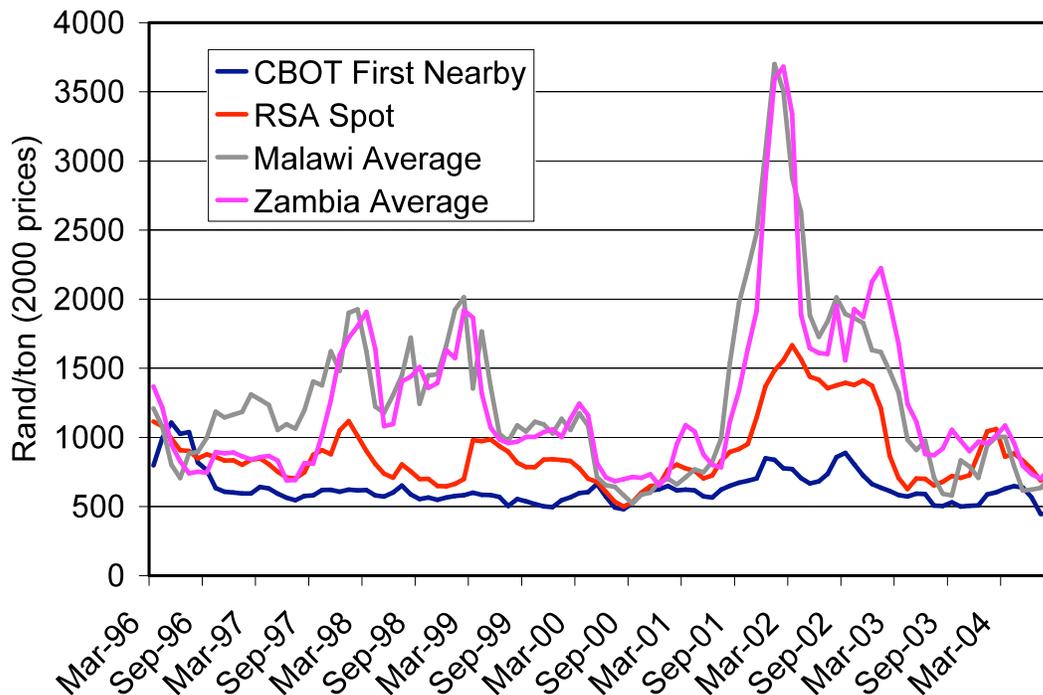
Maize imports in Malawi traditionally have been managed by the Government of Malawi (GOM) through its state trading board, the Agricultural Development and Marketing Corporation (ADMARC). Despite the ostensible liberalization of Malawian grain markets that occurred in 1987, there continues to be a pervasive view that the private sector is not developed enough or capable of handling Malawian maize import needs during times of shortage. Therefore, it is argued that domestic production shortfalls will lead to inadequate imports, very high domestic prices, and considerable domestic consumption shortages and hardship among consumers if imports are left to the private sector. For their part, private sector firms take the view that there is no incentive for them to engage actively in private sector imports if ADMARC is going to import on top of them, depress local prices, and cause them to experience trading losses. This leads to a situation where everyone expects the GOM to import in times of shortage, and so the Government is left with little choice but to act as expected.

In addition to maize, Malawi produces cash crops of tobacco, tea, and sugar that are exported and generate foreign exchange. Smallholder subsistence producers also grow beans, rice, cassava, and groundnuts. The agricultural sector is by far the largest sector of the Malawian economy and the major employer of labor.

### **RISKS ASSOCIATED WITH GOVERNMENT MAIZE IMPORTS**

There are two main types of risk facing the GOM when making maize import decisions. First, there is the risk of importing the wrong amount of maize, or not being able to obtain timely delivery of maize that has been purchased for import. Because these imports play such a critical role in the country's food security, it is imperative that adequate supplies be imported and available in a timely manner. Similarly, importing too much maize can also be costly because it will depress local prices and lead to trading losses for the Government. Second, there is the risk of having to pay very high prices for imported maize. Imports are only likely to be required in times of domestic production shortfalls. But when growing conditions are poor in Malawi they are also likely to be poor in the surrounding region, leading to high regional prices. Hence, it is likely that at the very time maize imports into Malawi are required, the price of such imports is likely to be quite high relative to normal maize price levels.

Figure 2 shows average maize prices across several maize trading centers in Malawi between March 1996 and March 2004. Also shown for purposes of comparison are average maize prices in Zambia, the Republic of South Africa (RSA), and the Chicago Board of Trade (CBOT) nearby futures contract for maize. The figure shows that the Malawian and Zambian prices move closely together and are more volatile than the RSA and CBOT prices. The Malawian price also moves closely with the RSA price, although the latter is typically lower and less volatile than the price in Malawi. This is as expected because RSA is the major surplus maize producer in the region and, as such, is the source for much of the maize imported into Malawi. Looking at the January-March periods in 1998 and 2002 (the hungry season in years of domestic production shortfalls) we see the run up in domestic prices in Malawi clearly visible, and this despite the GOM maize imports occurring during these periods. The RSA prices also increased significantly during these periods which increased the cost of imported maize.



**Figure 2. Monthly Average Maize Prices ((Source, Dana, Gilbert, and Shim, Food Policy, 2006, pp. 357-371)**

Dana, Gilbert and Shim (Food Policy, 2006, pp. 357-371) have shown via simulation experiments that a strategy of passively reacting to domestic production shortfalls in Malawi by the GOM either importing in times of shortage, holding inventories to cover short production years, or some combination of the two, can require considerable government outlays, and that these outlays can fluctuate unpredictably from year to year. This adds considerable risk to government cash flows and can preclude or postpone vital alternative investments in public services and infrastructure.

### **HEDGING MAIZE IMPORT RISKS**

The risk of wide fluctuations in GOM cash flows associated with maize import and/or storage suggests that hedging with futures and/or options may be a viable risk management strategy. In their study of hedging maize import price risks by the GOM, Dana, Gilbert and Shim (Food Policy, 2006, pp. 357-371) evaluate hedging strategies assuming that either the GOM takes out long futures positions (i.e. buys futures contracts), or that they buy call options, in both cases using financial contracts traded on the SAFEX market in RSA. They evaluate several strategies including: a) a non-discretionary purchase of futures contracts (i.e. routine hedging undertaken every year irrespective of current market conditions) to cover the 100,000 tons of imports that will be needed if a shortage arises; b) a discretionary purchase of futures contracts to cover the 100,000 tons of expected import need, but the futures are only bought if current market conditions suggest shortages are likely; and c) non-discretionary purchase of call options to cover

the 100,000 tons of maize that will need to be imported during shortage years. The main conclusion is that each of these strategies will reduce fluctuations in GOM cash flows considerably, with the greatest risk reduction coming from the non-discretionary futures hedge program.

In early 2005, the ministries of agriculture and finance in the GOM became aware of the strategies for hedging maize imports in Malawi developed by Dana, Gilbert, and Shim and expressed an interest in piloting an implementation program. It immediately became clear, however, that financial futures and/or options contracts would not be able to meet all of the needs of the GOM. Because of the critical food security role of the imports, the GOM not only needed to hedge the financial cost of the imports but they also needed assurance that the actual physical maize would be delivered to Malawi, so that it would be available for domestic consumption. This led to the development of a physical option strategy whereby the GOM would purchase a call option to take delivery of maize in Malawi, at a price agreed on by the contracting parties at the time the option is purchased, and with transport responsibilities lying with the contracting party (in this case a South African bank working with large regional grain traders). This physical option strategy has the advantage that not only does it put a ceiling on the purchase price, but it also ensures that the maize will actually be in Malawi available for consumption when the shortage arises.

The physical call option strategy implemented by the GOM is outlined in Box 1. By August of 2005 it had become clear that there was an impending maize shortage in Malawi. With technical assistance from the World Bank, the GOM solicited proposals for a physical call option contract and chose a proposal from Standard Bank in South Africa, which would be the contracting party. The option contract was signed in September of 2005. The proposal was for a call option on 60,000 metric tons of maize deliverable from November 2005 through February 2006 at a strike price equal to the September physical market price in RSA, plus a margin for the cost of shipping and transport to Malawi. The United Kingdom Department of International Development (DFID) agreed to pay the USD 25.5/mt option premium as an incentive for the GOM to pilot this new strategy for obtaining imports.

As maize shortages became more apparent in October and November, and regional maize prices began to rise, the GOM exercised the option. Delivery took place relatively smoothly during November 2005 through February 2006. Because the RSA maize price, and the cost of transportation to Malawi, both increased substantially between September and December of 2005, the GOM experienced considerable savings over what their costs would have been had they waited until December and contracted for immediate delivery. These savings were in the order of USD 50-90/mt excluding the option premium (USD 25-65/mt including an allowance for the premium). Furthermore, delivery took place relatively smoothly and the maize was available in storage in Malawi for timely distribution during the hungry season.

Of course, if regional maize supplies had remained plentiful, RSA maize prices had remained flat or fallen, and transportation rates had not increased, then the option would have little value and would probably have remained unexercised by the GOM. In that case the only cost would have been the option premium. Hence, the option acted as an insurance policy against maize shortages and high maize prices by ensuring the right, but not the obligation, to import maize, get it delivered in Malawi in a timely manner, and at a reasonable effective price. The cost of this insurance was the option premium.

### **Box 1. The Malawi Physical Call Option Program of 2005-2006**

September, 2005:	The GOM purchases an option to buy 60,000 metric tons of maize at a strike price equal to the current price of physical RSA maize in September, plus a margin for the cost of shipping and transport to Malawi. The option premium was USD 25.5/mt (USD 1.53 million for the 60,000 mt), which was paid by DFID.
October, 2005:	The GOM exercises the first tranch of the option for 30,000 metric tons.
November, 2005:	The GOM exercises the second tranch of the option for an additional 30,000 metric tones.
Nov, 2005-Feb 2006:	Deliveries take place while regional shortages are causing maize prices, and transportation rates, to rise substantially.
December, 2005:	By the end of December (when the GOM might have been trying to purchase physical maize for immediate import) cash prices for RSA maize had risen to approximately USD 60/mt higher than the strike price on the option. At the same time, shipping and transportation costs had also risen to approximately USD 30/mt higher than the transportation margin built into the option.
Outcome:	The cost of importing the maize under the option was in the range of USD 50-90/mt cheaper than the average cost would have been had the 60,000 mt been imported under cash contract during the month of December. Subtracting the USD 25.5 premium cost gives a costs saving of approximately USD 25-65/mt (although the actual savings to the GOM were greater as DFID paid the option premium). Furthermore, delivery took place relatively smoothly and the maize was available in storage in Malawi for timely distribution during the hungry season.

One final possible benefit of the hedging is the increased transparency that the options contract provided to the private sector. By committing to a contingent strategy the GOM eliminated some of the uncertainty regarding what their future actions were likely to be, thereby providing the private sector with increased transparency regarding their future actions.

### **EPILOGUE**

The success of the Malawi physical call option program of 2005-2006 has generated additional interest in these types of commodity price risk management strategies, both within Malawi and in neighboring countries that face similar problems (such as Zambia). Excellent growing conditions in Malawi during the 2006-2007 crop year, which became evident well in advance of harvest, meant that shortages were unlikely and the GOM decided not to buy calls on imports again. However, the 2007 harvest provided a surplus and it is possible that a strategy of buying put options (options to sell maize) may have been able to reduce some of the risk surrounding the disposition of this surplus maize. It is also clear that the GOM has a very discretionary attitude towards hedging—rather than

hedging routinely in every year they prefer to only hedge when they believe market conditions warrant it, and that they can lower costs by doing so. History has shown that such a discretionary approach to hedging can indeed lower average hedging costs but also leaves the hedger exposed to the risk that they will choose not to hedge during periods in which an unhedged position leads to very high costs (i.e., the lower average hedging cost means higher risk).