

**Commonwealth Finance Ministers Meeting 2008**

**Food prices and agricultural production in emerging markets–  
New solutions from insurance**

**Information Paper by the Commonwealth Business Council\***

\*The CBC is grateful to Swiss Re for their contribution to the preparation of this paper

## Executive Summary

Food prices for wheat, maize, corn or soybeans have risen in the last year markedly, mainly as a result of a growing imbalance between supply and demand for agricultural products. Since 2000, prices for food have nearly doubled around the world. The supply side is not keeping up with the increase in demand. Direct investments into agriculture production are still remarkably low. In order to increase agricultural production and investment, reducing the volatility of agricultural production would assure stable returns for investors, allow farmers to retain their capital to invest in future production, and reduce the burden on governments to support farmers in the event of a natural disaster. This is an area where insurers can draw on their expertise to add value.

Once disasters strikes, many farmers turn to the government for help in the form of emergency funding, tax relief and other means. Often, development organisations and donors are becoming active, too. A pro-active approach would of course be more favourable to stabilize earnings volatility for farming communities. One way of achieving this is through insurance solutions and capital market instruments. In many countries governments provide subsidies for agriculture insurance programs - in some countries up to 50% to stabilize agriculture production and provide financial protection. Most subsidies are currently used in the crop sector under the form of multi peril crop insurance (MPCI). Government subsidized crop insurance programs almost always take the form of a Private Public Partnership (PPP) where government collaborates with the insurance sector.

Successful PPPs even go further and include risk transfer to the domestic as well as international reinsurance market for peak exposure. In national agriculture pools, risk is aggregated and shared among insurance companies while peak risks are secured by state-owned reinsurers in some markets. Insurance subsidies are attractive to governments because the WTO exempted subsidies for agricultural insurances from their free trade treaty in 1994 – if the agricultural insurance relieves the impact of natural disasters.

A strong PPP aims to reduce potential gaps between economic losses and insured losses in case of severe catastrophes in agriculture – often observed in emerging markets - and foster a well established risk management system. Adequate risk management is essential in the current market conditions. International reinsurers with a track record in agriculture reinsurance in emerging markets can provide know-how on technical aspects of agriculture schemes and can share valuable experience on newer risk management approaches that can complete crop insurance schemes.

Governments increasingly make use of newer risk management approaches to complement crop insurance schemes or to overcome difficulties of implementing insurance covers. In some occasions, governments leverage the use of capital market instruments to smooth and protect budgets at reduced opportunity costs. For this, partners outside the insurance sector are involved in the PPP concept so that governments can benefit from the same solutions as already used in the corporate business segment.

Examples include: **bancassurance programmes**, where crop insurance is tied to the farm credit and subsidized insurance policies are distributed and administered by bank agents; **index insurance covers** where indemnity is defined by parametric triggers based on official yield statistics or weather data; **Government Fund Protection** using the same financial instruments to provide stability to farming communities, governments can reduce volatility in spending in cases of agriculture disasters; **natural catastrophe models** that can ultimately be utilized for agriculture exposure to model flood and typhoon losses and to define an index based on modeled losses following a severe event- however there is more work required in this area.

## Recommendations:

- 1. Private Public Partnerships have worked well in established markets and Commonwealth Finance Ministers are urged to develop such private-public partnerships to help expand agricultural production.**
- 2. Provide Government support for subsidizing agriculture insurance and developing parametric and index solutions, particularly to assist small-scale farmers, as an efficient way to pro-actively manage disaster response that is relevant in the current food crisis.**

The CBC and its private sector partners stand ready to provide any information and assistance to help governments develop solutions in these areas.

## **Food Price Rises Bring Tension**

Food prices for wheat, maize, corn or soybeans have risen in the last year markedly, mainly as a result of a growing imbalance between supply and demand for agricultural products. Since 2000, prices for food have nearly doubled around the world. While some governments of producing countries have started to limit exports, some poorer net-importing nations like Bangladesh, Indonesia and a large number of African countries have felt the price effects the most. These developments have triggered demonstrations in 30 countries which escalated into riots in some instances. The World Bank estimates that recent increases in food prices will place 100 million people that escaped poverty right back into it. Even though the prices came down a bit in the last couple of weeks, the situation remains critical with an outlook of remaining high prices in the mid-term at least. As some economists point out, there is enough spare capacity to feed the world's population, provided that the farmers in both developing and developed countries are allowed to produce food according to the rules of supply and demand. So what went wrong?

### **High demand**

There are several reasons for the imbalance of supply and demand. Demand has increased in many fast-growing economies particularly in China and India. Economic prosperity also brings a rising demand for an enrichment of the average diet. The Chinese government, for example, expects that the demand for meat will rise by 10%, eggs by 26% and milk by an impressive 190% alone between 2000 and 2010<sup>1</sup>. The situation is similar in other countries like India. That has enormous consequences, because the production of 1 kg of beef needs 8 kg of wheat. At the same time, global grain storage levels are low. Furthermore, the growing demand for biofuel also impacts food prices as they use the same resources. Last but not least, financial speculators also contribute to rising food prices by shifting assets to the commodities markets.

### **Food supply is not keeping up**

The supply side is not keeping up with this increase in demand. Direct investments into agriculture production are still remarkably low. While the green revolution between 1960 and 1980 helped to double agricultural production in established markets (developed countries) thanks to an increase in crop yields through new seeds and advanced fertilizers following decades of intensive research, it did not reach all corners of the world. Since then investments in agricultural research have declined markedly and become increasingly privatized. While there is a trend for consolidation of farms in established markets, average farm sizes have declined in emerging economies (e.g. threefold in Bangladesh over the last 30 years), which makes efficient production even more difficult. Record high oil prices, fuel costs and nitrogen-based fertilizer have doubled recently, increasing production costs. Furthermore, the World Trade Organization (WTO) negotiations have put pressure on agriculture policy and farmers, as the Doha round discussions have called for less subsidies for agricultural production.

Voices for a second green revolution are getting louder but require considerable time, research and money to prepare new strains of higher yielding crop species and to improve fertilizer and agro chemicals. Even though intensifying research into agriculture is vital for governments, there are some quick wins possible. For example bringing the first green revolution to small scale farms in Asia and Africa as in these areas 40% of the food is produced involving 90% of all farmers.

Agricultural production is a risky proposition as natural perils in the form of droughts, floods or typhoons as well as pests and diseases frequently reduce harvests. The commodity markets have become increasingly volatile and sensitive to news from natural perils impacting expected harvests such as lower than expected harvests from droughts in Australia or the recent flood in the US mid- west.

So what can be done to increase agricultural production and investments in this sector? From the risk management perspective, there are various proposals for consideration. **Reducing the volatility of agricultural production would assure stable returns for investors, allow**

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<sup>1</sup> State Council. China Food and Nutrition Development Framework (2001-2010)

**farmers to retain their capital to invest in future production, and reduce the burden on governments to support farmers in the event of a natural disaster. This is an area where insurers can draw on their expertise to add value.**

### **Moving from ex-post to ex-ante event financing**

Natural disasters and climate related events can have a devastating impact on the agricultural sector. The potential impact of climate change adds additional volatility to production and government ad-hoc disaster budgets. Because of this, it is even more important to stabilize the agriculture sector and rethink disaster funding. Once disasters strikes, many farmers turn to the government for help in the form of emergency funding, tax relief and other means. Often, development organisations and donors are becoming active, too. A pro-active approach would of course be more favourable to stabilize earnings volatility for farming communities. One way of achieving this is through insurance solutions and capital market instruments.

In many countries governments provide subsidies for agriculture insurance programs - in some countries up to 50% to stabilize agriculture production and provide financial protection. Most subsidies are currently used in the crop sector under the form of multi peril crop insurance (MPCI). Farmers receive compensation by a pre-agreed price per tonnage if there is a drop in yields below a weighted historical average. A wide range of perils including drought, flood, frost, excessive moisture and sometimes diseases are covered. An extension of MPCI is Revenue Covers where fluctuations in commodity prices at planting compared to harvest are additionally covered. Income Covers is a further extension aiming to stabilize overall farm income.

MPCI schemes are large in Canada, USA, and India and are gaining increasing popularity in Brazil, parts of Europe and most recently in China. In some countries including South Africa and Australia, farmers do not receive subsidies and cope themselves. Subsidies obviously help to make crop insurance affordable. They are far less common in the specialized livestock sector, the forestry segment and the aquaculture industry.

As crop insurance comes with high costs for administration and loss adjustment, subsidies are necessary to make insurance covers affordable for farmers. Besides high costs, moral hazard and antiselection are key challenges to overcome in setting up a new insurance program. In emerging markets, the lack of an insurance mentality, small scale farming, large distances and limited insurance distribution channels are difficulties to overcome. Moreover, the lack of insurance loss statistics or proxies such as governmental production statistics, weather data or outputs from yield forecast models makes actuarially sound pricing a challenge. At an initial stage, the same insurance conditions are often applied throughout an entire province and all crop types independent of exposure and risk management practise, leading to non-sustainable results in a commercial sense. Trained loss adjustors are a necessity to a successful crop insurance scheme and it often takes a considerable time until loss adjustment procedures and manuals are implemented.

### **Working with partners**

Government subsidized crop insurance programs almost always take the form of a Private Public Partnership (PPP). The government usually sets up the legal framework and selects individual insurance companies to manage and deliver the insurance policies using their expertise in quantifying risk and transferring it. While some governments restrict their involvement in subsidizing, others assume a more active role and get involved in designing and adapting crop insurance policies, collecting production statistics, operating yield forecast models as well as providing guidance in setting terms and conditions of insurance (deductibles, rates). Under PPP, governments act as a lender of last resort for large agriculture catastrophes when insurance protection is exhausted and payments from ad-hoc disaster relief funds are necessary.

Successful PPPs even go further and include risk transfer to the domestic as well as international reinsurance market. In national agriculture pools, risk is aggregated and shared among insurance companies while peak risks are secured by state-owned reinsurers in some markets. Peak

exposure and catastrophe-type of losses are often transferred to international reinsurers that benefit from a globally diversified portfolio.

## **New solutions**

Governments increasingly make use of newer risk management approaches to complement crop insurance schemes or to overcome difficulties of implementing insurance covers. In some occasions, governments leverage the use of capital market instruments to smooth and protect budgets at reduced opportunity costs. For this, partners outside the insurance sector are involved into the PPP concept so that governments can benefit from the same solutions as already used in the corporate business segment.

As the farming sector in many developing countries represents a large portion of the economy (see sigma 1/2007 page 18) governments often have to intervene after such events that lower agriculture production levels. This puts a financial burden on the government, which often struggle to finance this unexpected burden.

### ***Bancassurance***

One example of such a partner outside the insurance sector could be the involvement of a bank. In a bancassurance program, crop insurance is tied to the farm credit and subsidized insurance policies are distributed and administered by bank agents. Where agriculture lending institutions are affiliated to the government, implementation can be better coordinated. And it makes credits for farmers more available. In many cases farmers hardly get money from banks to improve their production due to the lack of collateral. In the case of bancassurance the recoveries will come from the insurance policy.

While the green revolution made its way to Brazil, it also brought some downside in form of monoculture soybean plantation. These plantations are very vulnerable to drought. After two severe drought years in Southern Brazil, the government decided to subsidize MPCl covers in 2005 after high disaster relief payments. As it is usual practise to use future harvests as collateral for farm credit and input cost re-payment, farm loans and debts for input costs were not be paid back and many farmers were out of business. Key to the development was the decision of the country's largest rural lender, Banco do Brasil, to embed crop insurance into their loans for soybean and corn farmers in the South and make insurance compulsory. A clear win-win situation emerged: farmers have access to more loans, banks have insurance as a collateral of the loan in case of low harvest and while the government subsidizes this bancassurance scheme, it reduces potential disaster payments through risk transfer to the private sector. The insurance program is reinsured internationally through the state-owned reinsurer IRB and has rapidly expanded to include other Brazilian states and other crop types.

### ***Index Insurance***

In order to complement crop insurance, governments increasingly embrace capital market solutions in the form of index covers. One of these solutions is index insurances where indemnity is defined by parametric triggers based on official yield statistics or weather data. Index solutions induce basis risk, i.e., the non-perfect correlation between losses in agriculture production and the payout of the index program. In other words, a farmer in a community only receives payment if an entire area is severely affected and vice versa. Indexes work best if risk is aggregated. Index insurance also has lower administrative costs which makes it cheaper than crop insurance with the additional benefit of faster payments. Government support of the development of indexes is essential for this lower cost alternative for small holding farmers. Quicker payments can then be channelled through to the small-scale farmers.

Large-scale production indexes – also called Group Risk Plan (GRP) – are based on large scale production and yield statistics measured by governmental entities, and indemnify a larger farming community for deviations in yields compared to pre-agreed (historical) levels – similar to MPCl but on a larger scale. GRP is very common in North America and parts of Latin America and is gaining interest from grain boards and food processors to secure a stable supply of agriculture raw material at an agreed price or including protection for a certain price volatility.

In Weather insurance, defining a function of temperature and/or rainfall parameters measured at officially recognized weather stations, shortfalls of agriculture production can be compensated in function of deviations of the pre-agreed normal. This concept is widely used in the energy sector.

India's farming communities have used weather insurance to secure crop production from impacts of excessive rainfall and droughts and the government recently decided to subsidize weather index products. To date, more than 500,000 Indian farmers have taken weather insurance policies through schemes provided by state-owned Agriculture Insurance Company of India and private sector insurance companies including ICICI Lombard and Iffco Tokio. This is a good way to complement the state-run agriculture MPCl insurance program. The international reinsurance market is supporting these developments in providing guidance on pricing and providing reinsurance cover to local insurers.

In Mexico the Secretariat of Agriculture (SAGAPRA) compensates cattle farmers for losses from reduced biomass and additional costs for feed in severe drought years through a subsidized index insurance cover. To define a drought index, satellite images are used to calculate a Normalized Difference Vegetative Index (NDVI) reflecting chlorophyll levels of vegetation. If the current index falls below the guaranteed index in a given municipality, an indemnity is payable to cattle farmers. The state reinsurer Agroassemex runs the program which is internationally reinsured. Currently, some 750 municipalities in 19 Mexican states benefit from this cover. Similarly, the Agroassemex also runs a drought program for crops.

### ***Government Fund Protection***

Using the same financial instruments to provide stability to farming communities, governments can reduce volatility in spending in cases of agriculture disasters.

Wildfire activity increases particularly in drought years in Alberta, Canada, and suppression costs significantly exceed the budget. In order to manage and stabilize this budget the Forest Protection Division of Alberta's Ministry of Sustainable Resource Development bought a parametric cover through province-owned agriculture insurer AFSC, which is reinsured internationally. Given a good correlation between historical fire activity (ha burnt) and past suppression costs including aircraft fuels, equipment expenses and re-allocation of manpower, a pre-agreed indemnity per surface burnt above a pre-defined level is payable. The structure is highly cost effective, with moral hazard limited due to strict operational procedures in fire detection and suppression. Due to recorded fire fighting activity, moral hazard is limited. The Forest Protection Division provides weekly on-line updates on fire activity, hazard levels and uses remote sensing applications for monitoring.

In the context of losses for livestock from epidemic diseases, ie: avian flu or foot and mouth disease, government affiliated insurers and livestock associations could choose to cover aspects of business interruption and government obligations for payments to farmers whose animals are culled under government slaughter order.

### ***Catastrophe Models***

As already used for other lines of business (eg property and motor), sophisticated natural catastrophe models can ultimately be utilized for agriculture exposure to model flood and typhoon losses and to define an index based on modeled losses following a severe event. However there is quite a way to go. First insurance exposure information needs to be detailed (at least district level and per crop type) and more research is needed to define vulnerability functions (i.e.

relationship between modeled peril intensity and possible losses) for different growth phases and crop types. At one point provincial governments could benefit from recent advances in research of reinsurers with in-house catastrophe model development capabilities.

## **Conclusion**

High commodity prices and increasing demand for food crops have a high impact on societies and economies. Although yields are still increasing at low rates, arable land is decreasing and is clearly outpaced by increase in demand and the growing population. Food security issues and food prices will remain high on the agenda of governments as the demand gap will grow according to the predictions of the International Food Policy Research Institute.

The possible impact of climate change adds additional volatility to production and government ad-hoc disaster budgets. With that in mind it becomes even more important to stabilize the agriculture sector and rethink disaster funding. Pre-event funding has appealing advantages compared to ad-hoc payments after the disaster for governments and agriculture insurance is one way to support the producing sector. Subsidized crop insurance programs and index solutions are effective pro-active approaches to managing natural disasters in agriculture. At the same time insurance subsidies are very attractive to governments because the WTO exempted subsidies for agricultural insurances from their free trade treaty in 1994 – if the agricultural insurance relieves the impact of natural disasters.

A strong PPP aims to reduce potential gaps between economic losses and insured losses in case of severe catastrophes in agriculture – often observed in emerging markets - and foster a well established risk management system. An adequate risk management is essential in the current market conditions and outlook. International reinsurers with a track record in agriculture reinsurance in emerging markets can also provide know-how on technical aspects of agriculture schemes and can share valuable experience with newer risk management approaches that can complete crop insurance schemes.

## **Recommendations:**

- 1. Private Public Partnerships have worked well in established markets and Commonwealth Finance Ministers are urged to develop private-public partnerships to help expand agricultural production.**
- 2. Provide Government support for subsidizing agriculture insurance and developing parametric and index solutions, particularly to assist small scale farmers, as an efficient way to pro-actively manage disaster response that is relevant in the current food crisis.**

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