

Betting the farm? Agricultural risks in Brazil



Few Brazilian farmers take out insurance on their crops despite being aware of the financial impact of weather and commodity price risks. Improving insurance penetration in Brazil would be beneficial for all stakeholders. To achieve this goal, Swiss Re proposes a set of measures ranging from awareness building to strengthening the capacity of local insurers and developing a robust agricultural insurance framework.

Betting the farm?

Agricultural risks in Brazil

Brazil is one of the world's most dynamic agricultural markets and accounts for one fifth of global food production. Due to the sheer size of the country, its agricultural sector is inevitably diverse in terms of geographical conditions, crops, farm sizes and hazards across the various regions. The main risks Brazilian farmers are exposed to include drought and excessive rainfall as well as volatile market prices for their inputs and the crops and livestock they produce. And yet, despite the obvious need for robust financial risk management, insurance penetration in Brazil is relatively low compared, for example, to OECD (Organisation for Economic Co-operation and Development) countries.

A survey among farmers in Brazil, commissioned by Swiss Re, shows that few farmers take out insurance on their crops even though they are aware of the financial impact of weather and commodity price risks. Various factors have contributed to this situation. Firstly, the diversity of the Brazilian agricultural sector requires a broad range of products to serve the specific needs of the farmers in the various regions. Secondly, structural issues are important too: individual farm production data lacks granularity, there is great dependency on subsidy schemes and credit, and there are issues regarding the availability and dissemination of agricultural insurance.

Potential solutions include building awareness among farmers, strengthening the capacity of local insurers and developing a robust agricultural insurance framework under the lead of the public sector. The development of a crop revenue coverage system for Brazil should also be considered.

We believe that the findings of this report are relevant not only to the stakeholders of the Brazilian agricultural sector, but also apply to other emerging agricultural powerhouses faced with a similar mix of issues.

Brazil, an agricultural powerhouse

Pressure on the global agricultural sector to boost production will continue to rise in view of the growing global population and the corresponding rise in demand for protein-rich foods. Brazil already is a top global player in several of the most important agribusiness sectors. The country's Gross Domestic Product (GDP) related to agricultural production was BRL 163.5 billion (roughly USD 86 billion) in 2008, or 7% of the Brazilian economy.¹ The overall agribusiness sector – production, processing and distribution – is estimated to account for as much as 25% of Brazil's GDP, and the importance of this market is expected to increase as we head into the next decade.

Brazil is one of only a few nations worldwide with large areas of unused arable land. While about 77 million hectares are currently cultivated, some 106 million – excluding rain forest and other conservation areas – are still unfarmed (see table 1). The country also has favourable weather conditions with a largely sub-tropical, humid climate that even allows two annual harvests in certain regions.

An increase in productivity calls for investments into inputs – such as seeds and fertilizers – and infrastructure – such as machinery, storage facilities and transportation. However, investments will only be made if promising returns can be expected. Ease of access to financial services and a solid financial risk management approach encourage such activities. A deeper understanding of the risk management approach of farmers is necessary in order to serve the market.

This report provides a brief overview of selected agricultural regions in Brazil and the main features of the farms surveyed. It summarizes the main results of the survey and examines particular features of the agricultural insurance framework in Brazil. The report concludes with a set of proposals to make agricultural insurance more attractive for farmers and help the agricultural sector in Brazil to achieve its full potential.

Table 1: Agricultural land in Brazil

	million hectares	% of total agricultural land	% of total land Brazil
Cultivated land (all crops)	77	21.6%	9%
Pastures	172	48.6%	20.3%
Available land	106	29.8%	12.4%
Arable land	355	100.0%	41.7%
Other land	496		58.3%
Total land area Brazil	851		100.0%

Source: Data from the Ministry of Agriculture, Livestock, and Supply (MAPA), see GAIN report BR8013, USDA Foreign Agricultural Service, 2008.

¹ See <http://www.ibge.gov.br/>.
As of August 31 2009, 1 US Dollar equalled 1.90 Brazilian Real (or 1 BRL = 0.526 USD)

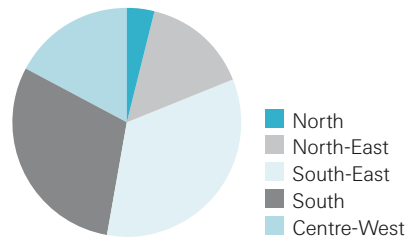
Agricultural production

To talk about agriculture in Brazil is to run the risk of generalising: this vast nation covers an area larger than the entire European Union and has various distinct agricultural regions with different crops, geographical characteristics and risk profiles. Traditionally, Brazilian agricultural activities were concentrated in the southern and south-eastern regions, but a combination of overcrowding and government incentives encouraged farmers from the 1960s onwards to move to other regions, including the central-west areas.

The south-eastern plains along Brazil's Atlantic coastline have traditionally been the source of much of the country's agricultural output and were cultivated for the production especially of sugar cane and coffee. Among others, the southeast comprises the states of Espírito Santo, Minas Gerais, and São Paulo. The region's farms are typically organized into cooperatives through which farmers buy inputs, sell production, ask for loans and receive technical advice. This region contributes 34% (BRL 49.5 billion) to Brazil's agricultural GDP.

The central-west region is largely flat with most of the agricultural activities in the states Mato Grosso, Mato Grosso do Sul, and Goiás. The main crops are soybean, maize and cotton. Farms are typically medium- to large-sized operations or corporate farms. Logistical issues, arising mainly from the distance of farms from major ports, and deficiencies in transport infrastructure are major problems for the region's farmers and result in comparatively high costs. The central-west region accounts for BRL 24.2 billion or 17% of the nation's agricultural GDP. Figure 1 shows the split of agricultural value production for all major regions.

Figure 1: Regional split of agricultural value production



Source: IBGE 2007²

Large farms take on risk

In March - April 2009, Swiss Re commissioned a field survey of Brazilian farms, split into 30 cooperatives, 220 large farms, and 20 corporate farms, mainly located in the south-eastern and central-western parts of Brazil (see figure 2).³ The study objectives were two-fold: to evaluate the farmers' risk perception and to collect information about how they currently manage these risks.⁴

The cooperatives surveyed represent on average about 4 600 members, each of which on average cultivates 113 hectares of land with four employees. They produce mainly maize, soybeans, wheat and coffee; but they also keep chicken, dairy cows, sows and beef cattle. The cooperatives support their members with respect to transportation, storage and processing of harvest and livestock. They also provide technical advice and access to financial services, including buying/selling of inputs/outputs, loans and insurance.

Figure 2: Focus of the survey



² The agricultural value produced in Brazil was BRL 145 billion in 2007.

³ The field survey was carried out by the Kleffmann Group in March-April 2009. Kleffmann Group was founded in 1990 and has conducted agricultural market research in more than 60 countries.

⁴ Whilst the number of farmers interviewed does not allow for statistically relevant conclusions, it still provides useful insights into the farmers' risk perception and related decision making, as well as pointing to some broader trends in terms of insurance penetration.

The large farms surveyed on average have about 30 employees and cultivate about 1 800 hectares of land. They produce soybeans, maize, coffee and sugar cane; about half of them also keep cattle. Most of these farms have their own infrastructure for transportation, storage and processing of raw material and livestock; the majority of them sell their products to traders (soybeans and maize) or directly to the processing industry (sugarcane and beef). However, about a quarter of them sell soybeans and maize to cooperatives and 70% sell coffee to cooperatives.

The corporate farms surveyed on average have 150 employees and cultivate 7 000 hectares of land. They produce mainly soybeans and maize; most of them also keep cattle. The corporate farms have their own infrastructure for transportation, storage and processing of raw material and livestock; most of them do not work together with cooperatives. About a third of them engage in contract farming.

Natural perils, high input costs and price volatility as major risks

Of the risks identified by the farmers, natural perils, high input costs and volatility in commodity (cooperatives and large farms) or currency (corporate farms) prices came to the fore. Farmers in all three of the categories ranked the top risks similarly (see figure 3). Each of these risks was perceived to have occurred regularly over the last decade: for example, major droughts were recorded in the summer seasons 2003/04, 2004/05 and 2008/09. Also, 2008 saw a significant spike in prices for inputs and agricultural commodities, followed by vast price drops during the last quarter. Whilst the farmers' individual estimates of the economic losses due to the materialisation of these risks ranged anywhere between 20 to 100 % of total production, the average estimated loss potential was in the range of roughly 20 to 40%. For those affected, this is clearly a major blow to their farm operations. In fact more than a third of the farmers said that there had been years where they suffered a net loss due to either a shortfall in production, high input costs or low commodity prices.

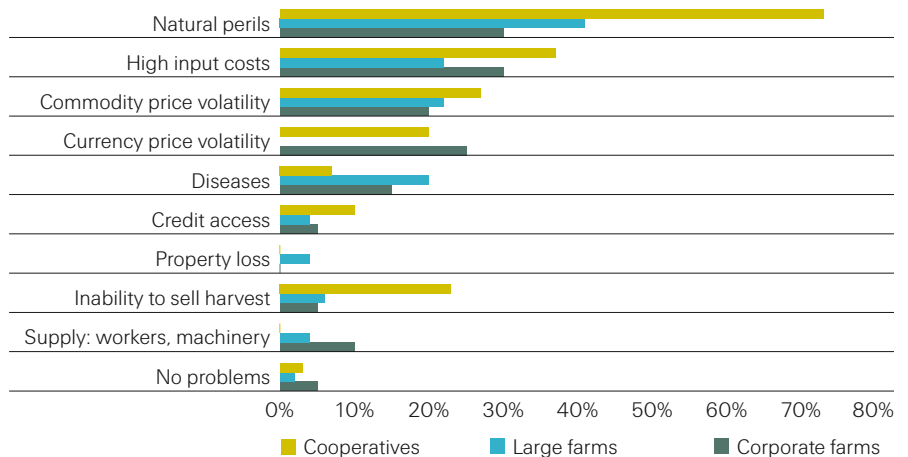


Limited risk management measures

Asked about their risk mitigation practices, farmers said they either bought insurance, diversified their crops or did nothing at all. Insurance purchasing by farmers varies broadly by operating model, farm size, and region: whilst the majority of the farmers organized in cooperatives had insurance, only 21% of the large farms and 15% of the corporate farms were covered by insurance. There are several reasons for the differences in insurance coverage. As smaller-sized farms organized in cooperatives are predominant in the south and south-eastern region, this explains partially the differences with respect to regional insurance penetration.

Moreover, smaller-sized farms are highly dependent on outside capital because lenders tend to demand crop insurance as a collateral. Other reasons for low penetration are the varying exposures to natural perils affecting agricultural production, but also the lack of insurance agents in some regions and hence limited access for farmers to insurance markets. Finally, regional differences in insurance penetration can also be explained because the production history per region represents an average of various types of farms and, for some crops, includes two growing seasons per year. Farms can differ significantly with respect to their productivity, and growing seasons differ with regard to yield. This leads to a lack of granularity of farm specific production data that in many cases would be necessary to develop more adequate insurance products. As a result, for those that typically have higher productivity than the regional average, insurance coverage is not attractive.

Figure 3: What are the largest risks?



However, even within a given region there are significant variations with respect to insurance penetration by state and by crop. For example in 2008 insurance penetration for soybeans in the state of Mato Grosso was 7% whilst it was 18% in Mato Gross do Sul. But when looking at maize, penetration is less than 1%. This can be explained by the different importance of individual crops to the farmers' total annual earnings. In these states soybeans are the major crop, thus receiving the bulk of credits and hence insurance coverage.

Roughly a quarter of those interviewed said they had some kind of insurance. On the whole, all three categories of farms purchased a broad range of insurance products including agricultural insurance, property insurance and accident insurance. For the large farms we were able to further distinguish the type of agricultural insurance purchased. The majority of these farmers purchased multi-peril crop insurance (MPCI) and used it as collateral

for a loan; roughly a quarter of them purchased stand-alone MPCI coverage or hail insurance.

There was a variety of reasons given for why farmers did not purchase insurance. A total of 40% of those large farms who answered the question said the main reason behind a lack of mitigation measures was a sense of fatalism: either the risks were considered acts of God, part of the risk of being an entrepreneur, impossible to counteract or simply too small to cover. Some 22% of the large farms mentioned a lack of awareness about insurance and its benefits or product design issues. The conclusion to be drawn from these results is that the task of increasing insurance penetration is two-fold: the lack of awareness about the benefits of insurance needs to be addressed and the perception that the insurance offering is not attractive also needs to be tackled. This last point is a hint that there is a need for products that are targeted at specific regions, crops and different sized farms.

Risks of the future

The most frequently cited future risks were climate change and extreme weather events. A significant number of farmers also identified financial market risks as posing a threat for future profits on their farms: these risks included input cost increases and commodity or currency price volatility foremost, but also other issues such as taxes, logistics and labour costs and the availability of credit. Among the mitigation measures that farmers mentioned for covering future risks, cooperatives suggest insurance protection as the first measure, while large and corporate farms vote for governmental support in the form of guaranteed prices and price protection measures first. Table 2 shows the most important answers in greater detail.

Table 2: Survey summary

Questions	Responses (multiple answers possible, results are percentages of the total number of answers given, for some questions different from total sample size)		
	Cooperatives	Large farms	Corporate farms
What are the largest financial risks?	(Risk)/Average loss in % of production: – natural perils (73%)/44% – input costs (37%)/20% – commodity prices (27%)/24%	(Risk)/Average loss in % of production: – natural perils (41%)/31% – input costs (22%)/31% – commodity prices (22%)/30%	(Risk)/Average loss in % of production: – natural perils (30%)/25% – input costs (30%)/16% – currency prices (25%)/26%
What are measures to prevent losses from these risks?	– insurance (57%) – none (20%) – diversify production (20%)	– none (43%) – insurance (21%) – improved crop protection (10%)	– none (40%) – insurance (10%) – diversify production (10%)
What insurance do you buy?	– agricultural insurance (40%) – accident insurance (43%) – property insurance (37%)	– MPCI (45%); thereof about ¾ in combination with a loan – hail insurance only (28%) – accident insurance (17%) – property insurance (8%)	– agricultural insurance (10%) – property insurance (5%) – accident insurance (5%)
Why didn't you take any measures to prevent losses?	– don't know (50%) – loss is too low (33%) – insurance not available (17%)	– entrepreneurial risk/act of God/not much to do (40%) – insurance is too complicated, expensive, not available, not known (22%) – loss is too small (5%)	– don't know (20%) – act of God (80%)
What are the largest future risks?	– climate change & extreme weather (90%) – input costs (87%) – commodity prices (70%)	– climate change & extreme weather (74%) – input costs (58%) – commodity prices (61%)	– climate change & extreme weather (70%) – availability of farm labour (55%) – input costs (60%)
What measures could help to prevent losses from future risks?	– insurance (57%) – diversify production (20%) – price guarantees (30%)	– price guarantees and other governmental protection (45%) – better agricultural insurance (17%) – better access to credit (6%)	– price guarantees and other governmental protection (30%) – better agricultural insurance (10%)

Agricultural policy and insurance

Brazil maintains a number of domestic support measures for agriculture including farm credits at preferential conditions, price support and stabilization mechanisms, agricultural insurance premium subsidies and a government run insurance fund covering insured losses from catastrophic events. This report focuses on farm credits, agricultural insurance and the interplay between these two.

The sources of credit under the current agricultural policy come from both government owned and private banks which are obliged to use 25% of their demand deposits for rural credits. Rural credits may be granted for production, investment and marketing at interest rates of 6.75% which is well below current market rates of 15 to 20%. As credits at preferential conditions are limited to BRL 600 000 per farmer, the large farms need to take out additional credits from the private market, for example from commercial banks and input suppliers.

Brazil pioneered MPCl coverage in South America, which was rolled out in an experimental, government controlled scheme in 1954. In 1973, under the Program of Guarantee of Agricultural Activities (PROAGRO), coverage was expanded to all regions and crops. By the early 1990s this program recorded high losses and was curtailed to provide sharply reduced coverage at substantially higher rates. Additionally, a small amount of agricultural insurance coverage was provided through private insurance companies which mainly focused on the south and south-eastern regions. As a result of these developments, the total amount of agricultural insurance premiums in 2001 was as little as BRL 81 million. It needed a catastrophic event to again catalyze the market development: in response to substantial government disaster relief payments triggered by two consecutive droughts (summer seasons 2003–04 and 2004–05), the government agreed to foster agricultural insurance through premium subsidies of up to 50%. Additionally, the government made it mandatory to have MPCl insurance for

all production credits. In 2008, the government has subsidized premiums with BRL 158 million, the majority of which was granted under the Rural Insurance program.⁵

Finally, agricultural insurance companies that offer insurance attached to loans must participate in an insurance fund that covers catastrophic losses. Coverage is provided in two layers with attachment points at 100 and 250% loss ratio. However, participation in this insurance fund is not attractive. For example, the premium for the coverage provided by the fund is 30% of the profits made in crop, livestock aquaculture and forestry. Hence, the premium structure provides little incentive for insurance companies to provide cost efficient services.

The limited availability of agricultural insurance has two main consequences. Firstly, in the absence of insurance, farmers frequently renegotiate their farm credits with the lenders and put pressure on the governments to extend deadlines for debt services or to abate part of the debts. Secondly, banks are extremely cautious to provide credit to farmers, as without insurance many of the farmers are not able to fulfil their debt service and pay back their loans. It is estimated that on the national level the unavailability of insurance has reduced credit by about 30%. It is estimated that the amount of unpaid agricultural debts is about BRL 130 billion, which is roughly the value of a whole annual harvest. The majority of the unpaid debt is carried by the national budget of Brazil. The remainder is shared among Bank of Brazil, private banks and input suppliers.⁶

The availability of more appealing agricultural insurance at subsidized premium rates – although governmental insurance subsidies have a limited budget of BRL 96 000 per farm already – would allow banks to increase their lending to farmers which in turn would boost the farmers' productivity.

Proposals for change

Based on the results of the survey and the impact analysis of some aspects of Brazil's agricultural policy on farmers, Swiss Re proposes the following changes to be implemented on the farm and the national level.

At the farm level, there is a need to increase the farmers' awareness about the benefits of insurance. Such an information campaign could be done by the direct insurance companies, the banks, and both governmental and non-governmental institutions.

Further, insurance products need to be structured such that they are more attractive to the farmers. For example, the agricultural insurance products that are currently offered to farmers are based on pre-agreed prices per tonne of production lost. Whilst these policies provide effective coverage against natural perils they do not address the farmers' risks related to volatile commodity market prices. Whilst the farmers interviewed ranked the impact of commodity prices among the top three risks they face, this can be especially problematic for farmers that have limited access to financial markets, either because they are not organized within a cooperative or because they are far away from markets.

A solution to these issues could take the form of a revenue insurance policy. Such policies already are sold under the US Federal Crop Insurance Program (FCIP) and cover the risk of a shortfall in the farmers' yield and a drop in commodity prices (see text box for the description of an example). To adopt a similar concept for Brazilian farmers, future contracts as traded at the Brazilian Mercantile and Futures Exchange (BM&F) could be used to define the price risk.

⁵ Source: Ministerio da Agricultura Pecuaria e Abastecimento. Programa de Subvenção ao Prêmio do Seguro Rural – PSR Execução 2008

⁶ Source: Guanziroli, C.E. and Basco, C.A., "Managing agricultural insurance in Brazil", in: COMUNIICA, fourth year, second phase, May-August 2008



By introducing products based on more granular yield statistics, satellite imagery or weather parameters, a series of issues could be addressed effectively, including the lack of granularity of farm specific production data and a slow and costly loss assessment process. Also, index based products could be designed to cover the risks of bi-annual crops, such as coffee trees, and products could be structured such that the payout compensates the farmer not only for pruning the trees but also for the reduced production related to the following year.

At the national level, there is a strong argument for the Brazilian government as well as provincial governments to enhance and restructure their support of the agricultural insurance market, for example by increasing both the total amount of premium subsidies and the limited subsidy per farmer. Whilst such support for the agricultural insurance market does not come free for the government, the costs of premium subsidies need to be balanced against the costs of the unpaid debt. Productivity gains and increased prosperity go hand in hand with

the farmers' improved access to credit if they are able to use their insurance policy as collateral. The premium structure of the government's catastrophe insurance fund should work as an incentive for insurance providers to offer cost efficient services. Furthermore, support for farmers should not only come through premium subsidies and catastrophe funds. Administrative fees could be reduced, and meteorological data that has to be bought from the private sector could be made more accessible.

Revenue Assurance

In the United States, insurance against poor crop yields has been available for many years. However, income from crop production can be low even when yields are not, but low crop prices are dominating the market place. Over the past decade, several types of insurance plans have been introduced that address this issue. These so-called crop revenue insurance programmes have become increasingly important and today make up 80% of total liabilities. The Revenue Assurance (RA), one of the most widely available crop revenue protections, is explained in more detail and some examples are given to illustrate how indemnity payments are triggered.

RA guarantees a pre-defined revenue, which is based on the individual producer's production history (APH) and Chicago Board of Trade futures market prices. The guaranteed revenue is determined by multiplying the base price (average of futures prices at time of planting) by the APH yield for the farm and by a pre-selected coverage level (65 to 85%). The actual revenue for insurance purposes is calculated by multiplying the actual yield on the farm by the harvest market price (average of futures prices at time of harvest). A farmer will be indemnified if the actual revenue falls below the guaranteed revenue.

Examples of RA indemnity payments¹

	Low yield/Low price	Low yield/Base price	Low yield/High price	Avg. yield/Low price	Avg. yield/Base price
Actual yield	100 bushel/acre	100 bushel/acre	100 bushel/acre	150 bushel/acre	150 bushel/acre
Harvest market price	USD 3.50	USD 4.00	USD 4.50	USD 3.50	USD 4.00
Guaranteed revenue	USD 450/acre	USD 450/acre	USD 450/acre	USD 450/acre	USD 450/acre
Actual revenue	USD 350/acre	USD 400/acre	USD 450/acre	USD 525/acre	USD 600/acre
Indemnity payment	USD 100/acre	USD 50/acre	0	0	0

¹ Based on APH yield of 150 bushels/acre, a base price of USD4.00/bushel and a 75% coverage level

Potential for growth

Brazil already is an agricultural powerhouse with the potential to significantly grow its production as we head into the next decade. To unlock its full growth potential, Brazil should invest into setting up a robust agricultural insurance market, as this will allow the farmers to have better access to credit and increase their productivity. To achieve this goal, all stakeholders of the agricultural sector need to work together.

The government could encourage the development of agricultural insurance markets through changes in its policy. Increasing agricultural insurance subsidies could prove to be more economical than extending deadlines for debt services or abating parts of the debts. Also, the government – together with the insurance industry – could help increase the farmers' awareness about the benefits of insurance

through information campaigns. The premium rates of the government's catastrophe insurance fund should be structured such that direct insurers benefit from a lean and cost-efficient set up. Considering the structural improvements that could be made, agricultural markets would benefit from better access to transportation.

Insurers and reinsurers could contribute by developing a broader range of products that address the farmers' individual needs. The government, academia and other parties can support the development of such products by improving data availability in general, increasing the granularity of statistics about the farmers' production, and generating proxy data such as rainfall indices or satellite imagery. It is also the task of the insurance industry to enhance its know-how and expertise – from risk assessment to loss adjustment – and invest into sales and marketing.

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