

somewhat
different



Risk Mitigation and Insurance in Agriculture

From A Reinsurer's Perspective

Xiaoliang Liu, Underwriter, Agricultural Risks Department

Agricultural Business - A Global Mega-Trend

As world population & income rise, the race is on to meet changing nutritional needs

4. There is a need and a trend to invest, diversify and intensify agriculture production

- Capital is moving into agricultural sector in emerging markets
- Technical advancement needs high investment
- Countries worldwide are interested in gaining food self-sufficiency

3. The natural resources are scarce

- Land and water limitation
- Changing climate and increasing pollution

On the supply side, environmental pressures and increasing urbanisation are putting further strain on already limited resources.

1. World population will grow to 8.3 billion people in 2030

- Strongest population growth in Asia
- People increasingly live in urban centres
- Life expectancy is increasing

In 1985, meat consumption in China was 20 kg per person per year. Today, this figure has been increased to 63 kg. A further 30kg of meat per person expected to be added by 2030.

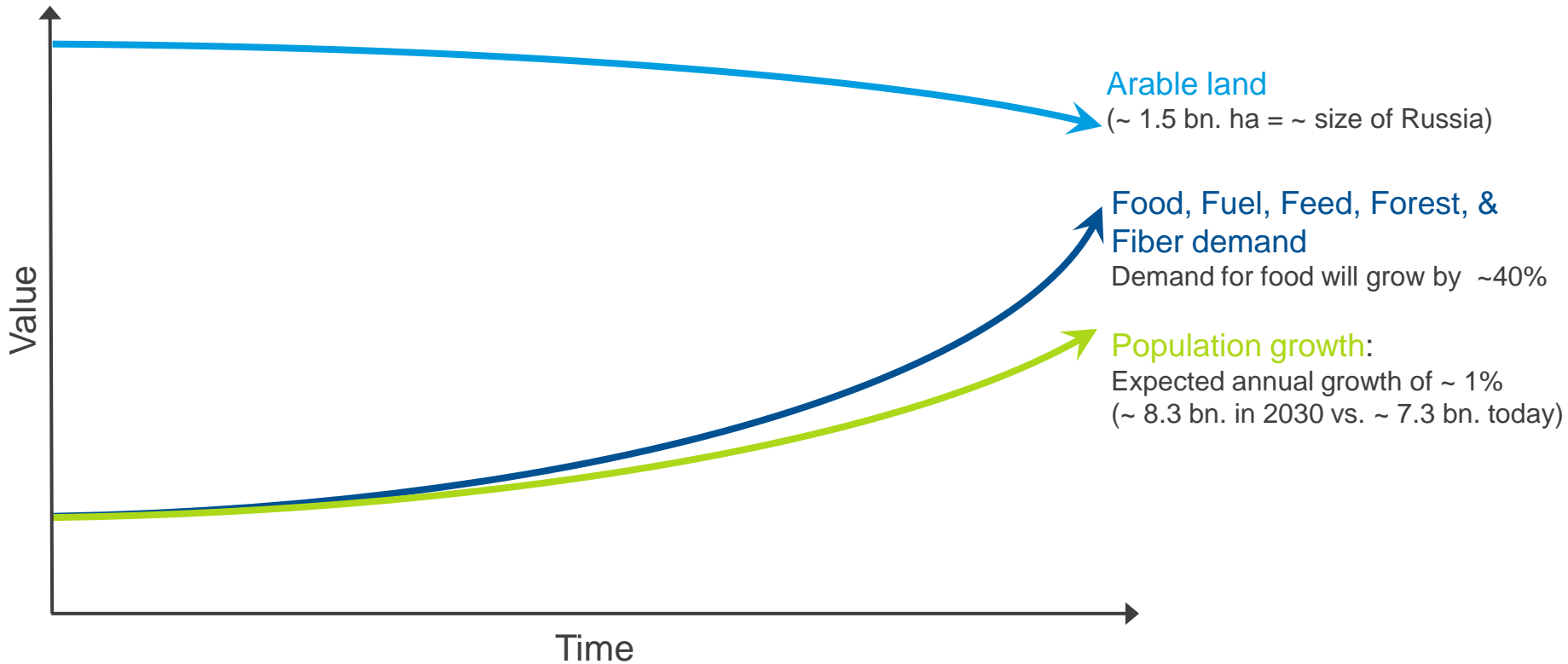
2. High economic growth is bringing large part of population out of poverty and leads to more consumption of calories

- And also the food consumption pattern is changing increasing the consumption of meat and healthy, high quality food (organic).

Global Food Supply is Facing Enormous Challenges

By 2030 demand for food will grow by 40%

Envisioned development of future demand vs. land



Source: Worldbank, FAO, Geohive

Key Goal: Improving the Productivity of the Agricultural Sector

Agricultural Risks

Risk Classification

| Type of Risk | Idiosyncratic | ←————→ | Systemic |
|------------------|-----------------------------|--------------------------|--|
| Natural Disaster | Hail | | Flood, Pest Infestation Drought |
| Diseases & Pests | | | Contagious Animal Disease |
| Price | | | Commodity, Inputs, Exchange Rates |
| Financial | | | Interest Rates |
| Operational | | Availability of Inputs | Evolution of Production Techniques (for example, biotechnology) |
| Environmental | | Pollution, Deforestation | |
| Policy | | | Public Subsidies, Agricultural Policy |
| Health | Illness, Injury, Disability | Epidemic Diseases | |
| Property | Fire, Theft | | Earthquake, Floods |

Mahul, O., and C.J. Stutley (2010). "Government Support to Agricultural Insurance." The World Bank. Washington, DC.

Risk Management Instruments

Classification of Risk Management

| Type of risk management | Examples |
|-------------------------|--|
| Technical | <ul style="list-style-type: none"> Low-Risk Production Irrigation Pest Prevention (Pesticides, Herbicides) Livestock Disease Prevention (Vaccination) On-Farm Diversification (Crop Rotation) Off-Farm Diversification |
| Financial | <ul style="list-style-type: none"> Financial Insurance Hedging Precautionary Savings Contingent Borrowing |

Mahul, O., and C.J. Stutley (2010). "Government Support to Agricultural Insurance." The World Bank. Washington, DC.

Agricultural Insurance

Most comprehensive tool for agricultural risk management

- ▶ Agricultural insurance complements other risk management instruments
 - Reducing the negative impacts of natural catastrophes
 - Preventing farmers from selling of household assets or savings
 - Stabilizing producer incomes
 - Facilitating farmers' access to credit
 - Improving farmers' ability of credit repayment
 - Encouraging farmers to move from current “low risk low return” to higher productivity practices

Agricultural insurance ensures long-term stability and growth of agriculture

Agricultural Insurance

Features of Agricultural Cover Types



Representatives

Single/Multi Peril

e.g. Hail, MPCl

Farm Yield/Revenue
e.g. MPCl (US)

Aggregated Outputs
e.g. Area yield Index

Source of Loss
e.g. Rainfall Index

Common Implications

- ▶ Certain indemnity payment
 - Indemnity payments are determined by individual loss adjustment on farm
- ▶ High transaction costs
- ▶ Affected by moral hazard and attract for adverse selection

- ▶ Uncertain indemnity payment
 - Pay outs are coupled to an objectively measured index and there is no need for loss adjustment on farm
- ▶ Low transaction costs
- ▶ Basis risk remains for the farmers

Agricultural Insurance

Insurance Products

Lines of Business and Scope of Cover

| | Risks | Cover | Rates | Deductibles |
|--------------------|---|---|-------------|---|
| Crops | Drought, frost, hail, flood, rain, others | Yield, quality, revenue | 1% - 30% | up to 50% |
| Forest | Fire, storm, snow weight | Yield, production costs | 0.2% - 2% | 1% of SI or 10% of loss with minimum monetary limit |
| Greenhouses | Fire, hail, storm, snow weight | Structure, crops, BI | 0.3% - 3.5% | 2% to 10% of SI per block |
| Livestock | All risk mortality, diseases | Animals, BI | 0.6% - 10% | 20% of claim to 10% of TSI |
| Bloodstock | All risk mortality, add. covers | Single animals, transport, medication costs | 1.5% - 15% | up to 20% |
| Aquaculture | All risk mortality, add. covers | Stock, equipment | 1.5% - 8% | 10% per unit to 20% of site |

Agricultural Insurance

Government Support

- ▶ Most of agricultural insurance programs are supported by governments; Private-Public-Partnership (PPP) is the one common feature.
- ▶ Premium subsidies are the most popular way of government support to agricultural insurance.
 - Insurers: technically sound commercial rates
 - Farmers: affordable agricultural insurance
 - Governments: replacing disaster relief, fulfilling government responsibilities

However

- Moral hazard
- Inefficiency
- Shifting government responsibilities to insurers (lack of risk layering)

Agricultural Insurance

Government Support (cont'd)

- ▶ Necessary areas of government support besides subsidies:
 - Establishment of legal and regulatory framework
 - Creation and enhancement of insurance infrastructure
 - Data and information: prompt, reliable (quality), accessible and transparent
 - Education and training
 - farmers & insurers
 - Technical support and advices on product developing and pricing
 - Reimbursement of administrative & operating costs
 - Reinsurance cover and capacity building

Case Study: USA Federal Crop Insurance Program

Some General Information

- ▶ The largest agricultural insurance market in the world with the premium volume of 9.8 billion USD in 2015.
- ▶ Two types of crop Insurance are available to farmers in the U.S.: Crop-Hail (roughly 8% of total “crop” premium) and Multiple Peril Crop Insurance (MPCI).
- ▶ Only MPCI policies are part of the Federal Crop Insurance Program and are subsidized by the government through the Federal Crop Insurance Corporation (FCIC). In 2015 FCIC provided 62% premium subsidies to farmers.
- ▶ The Federal Crop Insurance Program is administered by the Risk Management Agency (RMA), which develops and approves premium rates and subsidies, expense reimbursements and approves participation of private insurers in the program.

Case Study: USA Federal Crop Insurance Program

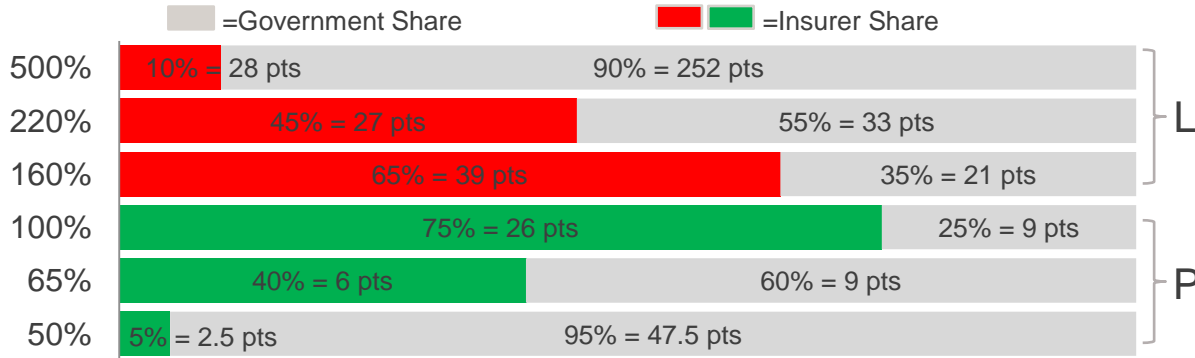
Some General Information

- ▶ The Federal Crop Insurance Program is a „take all comers market” with prices set by the government without any individual underwriting, this means, all insurance companies work with exact the same prices and products.
- ▶ Moreover, FCIC makes no rate distinctions between heterogeneous insured's. To compensate the lack of underwriting, the FCIC allows each insurer, on a per contract basis, to cede the contract (profit and loss) back to FCIC through either the commercial state fund or the residual fund (Assigned Risk Fund).
- ▶ Commercial state fund allows insurers to retain more risks and according to historical experience, the states are grouped into 3 groups
 - Group 1 cede less to FCIC: Illinois, Indiana, Iowa, Minnesota and Nebraska
 - Group 2&3 have the same risk sharing: all other states

Case Study: USA Federal Crop Insurance Program

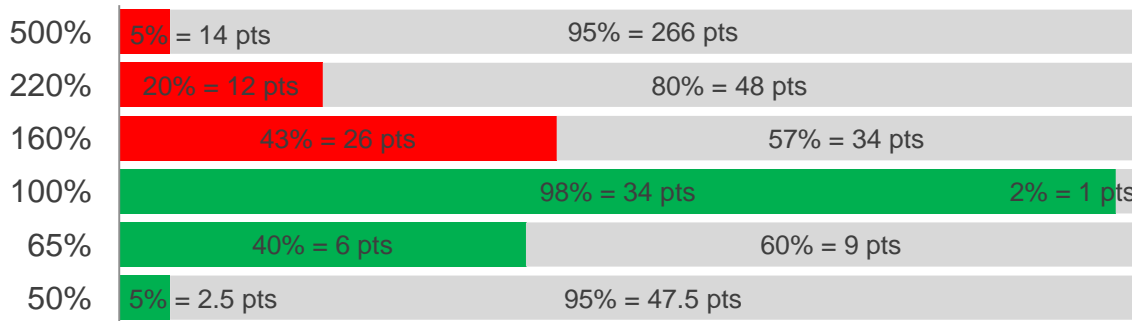
Federal Government Profit/Loss Sharing Scheme

State Group 1 Share in Profits/Losses



- ▶ Government retains all losses above a 500% loss ratio.
- ▶ At least 95% of the gains related to loss ratios below 50% under commercial state fund.
- ▶ The Group states 1 tend to be more profitable and allow the insurer to retain more risk and cede less to the FCIC.

State Group 2&3 Share in Profits/Losses

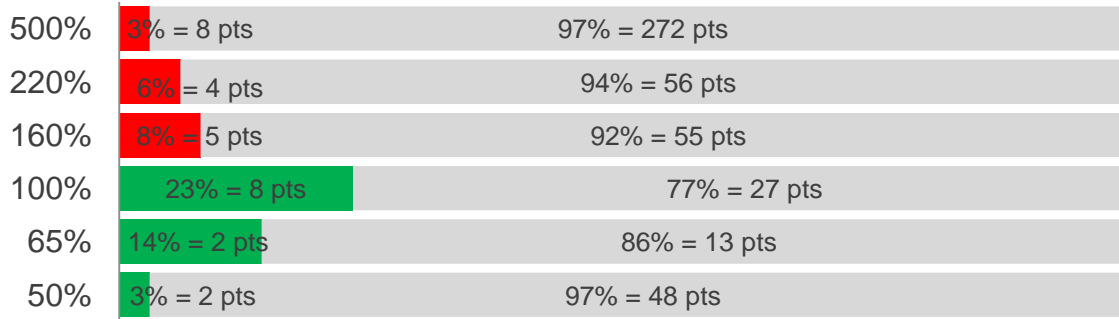


- ▶ State Group 2&3 currently have the same risk sharing arrangement.
- ▶ Group 2&3 have a higher opportunity to achieve a profit in good years.

Case Study: USA Federal Crop Insurance Program

Federal Government Profit/Loss Sharing Scheme

Residual Fund Share in Profits/Losses



- ▶ Government retains all losses above a 500% loss ratio
- ▶ At least 97% of the gains related to loss ratios below 50% under residual fund.
- ▶ Insurers retain a modest amount of the business.

Maximum Net Loss Ratio for Insurers

Loss Sharing

| Gross L/R |
|-----------|
| 100%-160% |
| 160%-220% |
| 220%-500% |
| 500% + |

Commercial State Fund

| Retention | | Retained Loss Ratio | |
|-----------|-----------|---------------------|-----------|
| Group 1 | Group 2&3 | Group 1 | Group 2&3 |
| 65,00% | 42,50% | 100%-139% | 100%-126% |
| 45,00% | 20,00% | 139%-166% | 126%-138% |
| 10,00% | 5,00% | 166%-194% | 138%-152% |
| 0,00% | 0,00% | 194% | 152% |

Residual Fund

| Retention | Retained L/R |
|-----------|--------------|
| 7,50% | 100%-105% |
| 6,00% | 105%-108% |
| 3,00% | 108%-117% |
| 0,00% | 117% |

- ▶ After Government profits/losses sharing, the FCIC retains a 6.5% QS of each participating insurer's net u/w results.
- ▶ Maximum net loss ratio for insurer
 - Group 1: 187.5%
 - Group 2&3: 145.5%
 - Residual Fund: 110.5%

Case Study: USA Federal Crop Insurance Program

2012 Drought

- ▶ In 2012 the U.S. agricultural sector was affected by the worst drought in a quarter century.
- ▶ The drought of 2012 greatly reduced the harvest potential of major crops such as corn and soybeans. Corn yields were significantly impacted while soybeans benefited from the late precipitation brought by Hurricane Isaac.
- ▶ According to the report from RMA, based on a gross premium figure of \$11.1 billion for the 2012 crop season, the industry faces a gross loss around \$17.4 billion, i.e. a 157% loss ratio for last year. Once the SRA protection to the industry is taken into consideration and the government retains a significant portion of the losses, the potential losses are reduced considerably to 117%.

Summary and Conclusion

- ▶ Global food supply is facing enormous challenges and improving the productivity of the agricultural sector is vital for the food security.
- ▶ Agricultural insurance complements other risk management instruments and ensures long-term stability and growth of agriculture.
- ▶ Underwrite agricultural insurance through Private Commercial Insurers wherever possible.
- ▶ Agricultural insurance premium subsidies is important; however, implement them in a smart way.

Agricultural Risks Department

One of Hannover Re's Specialty Lines

- ▶ Located at Hannover Re home office
- ▶ Responsible for all lines of agricultural business including crop production, livestock, bloodstock, forestry, greenhouse as well as aquaculture business.
- ▶ Over 15 years specialized agricultural underwriting and relationship management worldwide.
- ▶ Team of specialists comprises agronomists and a veterinarian and draws on backgrounds of reinsurance, international development assistance, agricultural and veterinarian engineering, economics and science.
- ▶ Combines longstanding underwriting experience with innovative know-how.
- ▶ The international staffs serve customers in a number of native languages, including

English, German, Spanish, Italian, Portuguese, French, Chinese, Polish, 

Agricultural Risks Department

Our Team



Andreas Bronk

General Manager
Agricultural Risks Worldwide

Tel: +49 511 5604-1745
Fax: +49 511 5604-3745
andreas.bronk@hannover-re.com



Luis Pulido

Senior Underwriter - Asia, North and
South America, Central America

Tel: +49 511 5604-1667
Fax: +49 511 5604-3667
luis.pulido@hannover-re.com



Dr. Sergiy Parkhomenko

Underwriter - Eastern European
Countries, North America, Turkey, Israel

Tel: +49 511 5604-1531
Fax: +49 511 5604-3531
sergiy.parkhomenko@hannover-re.com



Dr. Dina Dziuba

Underwriter - Australia, New
Zealand, Livestock and Bloodstock
Business WW

Tel: +49 511 5604-1488
Fax: +49 511 5604-3488
dina.dziuba@hannover-re.com



Dr. Leif Heimfarth

Underwriter - Index-based Insurance
schemes

Tel: +49 511 5604-1747
Fax: +49 511 5604-3747
leif.heimfarth@hannover-re.com



Xiaoliang Liu

Underwriter - Asia, Price and yield models

Tel: +49 511 5604-2621
Fax: +49 511 5604-4621
xiaoliang.liu@hannover-re.com

Agricultural Risks Department

Our Team



Joaquin Pilatti

Assistant Underwriter

Tel: +49 511 5604-1857

joaquin.pilatti@hannover-re.com



Dr. Imke Hering

Assistant Underwriter

Tel: +49 511 5604-2113

imke.hering@hannover-re.com



Elena-Codruta Duminica

Assistant Underwriter

Tel: +49 511 5604-2647

elena-codruta.duminica@hannover-re.com

Karl-Wiechert-Allee 50
30625 Hannover

<http://www.hannover-re.com>

Disclaimer

The information provided in this presentation does in no way whatsoever constitute legal, accounting, tax or other professional advice.

While Hannover Rück SE has endeavoured to include in this presentation information it believes to be reliable, complete and up-to-date, the company does not make any representation or warranty, express or implied, as to the accuracy, completeness or updated status of such information.

Therefore, in no case whatsoever will Hannover Rück SE and its affiliated companies or directors, officers or employees be liable to anyone for any decision made or action taken in conjunction with the information in this presentation or for any related damages.

© Hannover Rück SE. All rights reserved.

Hannover Re is the registered service mark of Hannover Rück SE.