

“Modelling the Sustainability of the Canadian Crop Insurance Program: A Reserve Fund Process Under a Public–Private Partnership Model”

The Geneva Papers on Risk and Insurance : Issues and Practice. no.42 (Apr. 17)

## Modelling the Sustainability of the Canadian Crop Insurance Program: A Reserve Fund Process Under a Public–Private Partnership Model

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The objective of this paper is to model the multilayer risk-sharing structure of the crop insurance system in Canada and, in doing so, is the first paper to provide a quantitative assessment of the sustainability of the program. A reserve fund process is developed using actual crop insurance data from Manitoba to model the surplus of the crop insurance company. Based on simulation, a number of actuarial risk measures are calculated, including mean surplus, expected shortfall, value at risk and conditional tail expectation. The results point to a potential fault with the design of the current risk-sharing structure, where the federal–provincial reinsurance fund premium rate is designed to increase as the mean surplus of the insurer becomes less. This potentially penalises an insurance company that purchases reinsurance, even though reinsurance can reduce the risk exposure to the federal government by more than 58 per cent in some cases. *The Geneva Papers* (2017) 42, 226–246. doi:10.1057/s41288-017-0044-5

**Keywords:** risk management; crop insurance; reinsurance; premium computation; reserve fund process

Article submitted 24 September 2015; accepted 19 December 2016;  
published online 1 March 2017

### Introduction

Crops are susceptible to adverse weather including flood, drought, frost and hail. In the case of extreme weather, producers face the possibility of entire crop failure, which leads to difficulties in using private insurance only and makes public participation common. Crop insurance provides an effective way to protect farmers against these hazards, helping to stabilise their incomes in years when yields are lower than expected. Moreover, the security of insurance encourages producers to adopt more innovative agricultural practices, enhancing long-term productivity and output.