View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Research Papers in Economics

Farm Income Stabilization and Risk Management: Some Lessons from AgriStability Program in Canada

Shingo Kimura and Jesús Antón[1]

Trade and Agricultural Directorate

Organization for Economic Co-operation and Development, France

shingo.kimura@oecd.org jesus.anton@oecd.org

Paper prepared for presentation at the EAAE 2011 Congress
Change and Uncertainty
Challenges for Agriculture,
Food and Natural Resources

August 30 to September 2, 2011
ETH Zurich, Zurich, Switzerland

Copyright 2011 by [Shingo Kimura and Jesús Antón]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

[1] The views expressed in this article are those of the authors and not those of the OECD or its member countries.

Abstract

This paper analyzes the effectiveness and efficiency of farm income stabilization program such as AgiStability in Canada. This program intends to mitigate farm income fluctuations, which is seemingly more neutral to the farming decision than the payments that are countercyclical with price or revenue, or that are commodity specific. However reduction of income variability generate responses in farmers' risk management strategies, and most often generate crowding out effects of other strategies such as insurance or diversification. Stochastic analysis of risks and payments is combined with a micro economic model of endogenous risk management decision under uncertainty to explore the interactions between them. The part of the program that is triggered with small margin reductions of 15-30% (frequent normal risk) is found to have the strongest crowding out effects; the most catastrophic part of the payments (when margins are negative) is paid too late for being an effective disaster assistance; the middle range part of the program enters in competition with AgriInsurance, the subsidized insurance program. In all, this program is a socially more acceptable form of supporting farmers, rather than an efficient risk management tool.

1. Introduction

Optimum risk management strategy for the farmers depends on the risk environment that they are exposed to as well as risk market instruments and government policies in place. Existing literature finds a wide range of evidence. If the yield risk is higher other sources of risks, farmers are more interested in protecting yield risk, for example, through crop yield insurance. Empirical research finds the inverse relationship between yield variability and use of price hedging (e.g., Miranda and Glauber, 1997). The correlation of risks is also critically important. Coble *et.al*. (2000) find that price hedging is less attractive in the location with strongly negative price-yield correlation. Farmers are less interested in protecting price risk because the inverse relationship between price and yield already function as a natural stabilizer of revenue.

Interactions exist between different risk management instruments. Both analytical model and empirical simulation using U.S. data show that price hedging and crop yield insurance are complementary (Coble *et.al.*, 2000). If the yield risk is covered by the crop insurance program, farmers are more interested in covering price risk through price hedging. On the other hand, since revenue insurance protects both price and yield risks, farmers enrol in revenue insurance program has less interest in protecting single source of risk through price hedging or crop yield insurance. Several studies show that revenue insurance has a substitution effect on hedging (Coble *et.al*., 2000; Wang *et.al*., 2004).

Payments that are triggered when an individual farmer experiences low income (e.g. AgriStability in Canada) are more targeted to low income risk than fixed decoupled support or payments linked to any aggregate indicator or index such as revenue, price or yield at the regional or national level (e.g. ACRE and counter cyclical payment in the United States). However, these risk reducing policies significantly modify the distribution of revenue and income of the farm and therefore modify the whole production and risk management strategy of the farmer (OECD 2009). Turvey (2010) finds that Canada's safety net programs (e.g., GRIP, CAIS and AgriInvest) have a significant effect on farm portfolio choice. If the farm income risk is protected by the government, the farmers reallocate their production portfolio to pursue higher level of income, taking more income risk. The magnitude of this unintended effect of income stabilization programs is crucial in evaluating the effectiveness and efficiency of such government programmes as a risk management measure. Diversification decisions often need to weigh the gains in terms of reduced profit variability with losses from reduced scale economies; the optimal scope and composition of the diversification portfolio is specific to each farm.

However, the relationship between the degree of income risk coverage by the income stabilization payments and the crowding out effect of producer's risk strategies is not clear in the existing literature. We adopt the simulation approach to analyze the initial impacts of Canada's AgriStability program, based on the farm-level data. Stochastic analysis of risks and payments triggers is combined with a micro economic model of risk management decision under uncertainty to explore these interactions.

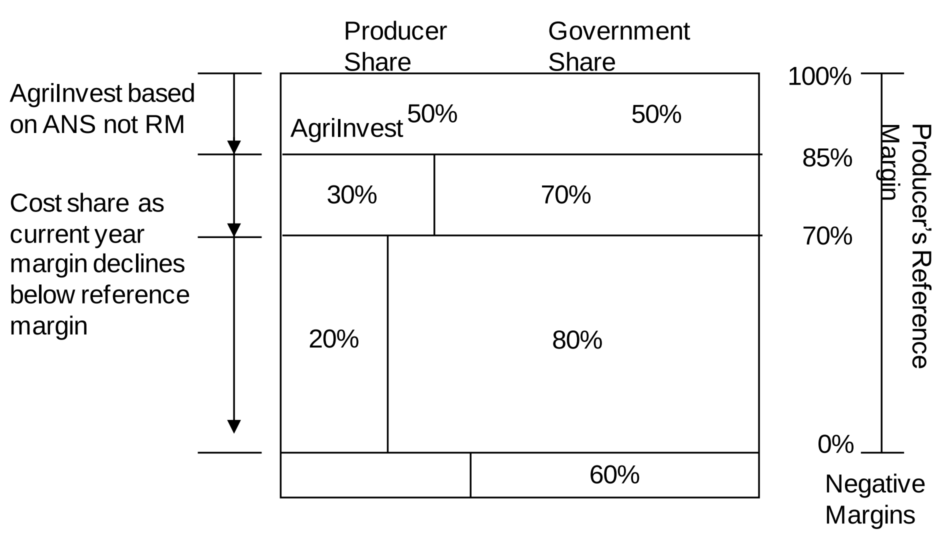
This paper develops the technical modelling work in Antón *et.al*. (2011) and Kimura *et.al.* (2010). Section two describes the policy framework in Canada, where farm income stabilization is the central objective of the agricultural policy. Section 3 provides descriptive stochastic analysis of AgriStability program in Canada, considering the delay of the payment. Section 4 develops the stochastic simulation model assuming the endogenous choice of risk management strategy by the farmer, followed by the presentation of simulation results in Section 5. Section 6 concludes and summarizes the lessons leaned from AgriStability program in Canada.

2. Policy framework in Canada: Growing Forward

Reducing risks faced by producers has been a central objective of Canadian agricultural policy for decades. Business risk management programs are also the center of the current growing forward framework developed in 2008. This is a multilayered system that targets to risks of all sizes and types using a number of programs whose joint effect is to provide relief for most of the risks faced by producers (Annex 1). AgriStability is a main program that provides support when a producer experiences more than 15% loss of margin relative to the olympic average of previous five years (reference margin), which replaced the former Canadian Agricultural Income Stabilization Program (CAIS). AgriRecovery allows triggering *ad hoc* relief payments that respond quickly to a natural disaster event. In addition, the government provides public crop insurance program (AgriInsurance) as well as a saving account that allows famers to save up to 1.5% of annual net sale with matching payments from the government (AgriInvest).

AgriStability is composed of three layers according to the magnitude of margin loss (Figure 1). The program payment covers 70% of the margin loss between 70 to 85% of the reference margin (Tier 2). This rate of compensation increases to 80% in the tier which covers between 0 to 70% of the reference margin (Tier 3). In addition to two tiers of payments, the government may cover 60% of the negative margin loss. Producers are expected to manage less than 15% of margin loss through saving account supported by AgriInvest (Tier 1).

Figure 1. Structure of AgriStability payment



Source: Agriculture and Agri-Food Canada

Payments under AgriStability typically come after two years or more after the producer experienced a margin loss. Participants file applications based on their income tax filings, which are typically made on the basis of cash accounting. This must be converted to accrual by the agency operating the program, which requires collecting additional information from farmers. Further, when farm enterprises change the scale of their operation by more than 10% and CAD 5 000, their reference margin must be adjusted for this "structural change" in their operation. Therefore, to which extent AgriStability is stabilizing farm income is an empirical question.

3. Descriptive stochastic analysis of AgriStability

We analysed AgriStability payments and margins for 457 crop farms in Saskatchewan based on the longitudinal CAIS/AgriStability data between 1998 and 2008. One of the main advantages of using farm-level data in this study is that it contains the information on the income risk that is specific to the individual farmer. The simulation conducted one hundred Monte-Carlo draw of farm revenue and variable costs based on the joint empirical distribution of these variables generated for each farm. The current production margin (PM) is defined as the simulated farm revenue less variable costs and the reference margin (RM) is calculated as an Olympic average of the last five draws of the Monte-Carlo simulation. AgriStability payment (*g*) is calculated according to the specified formula.[2] In addition, indemnity from AgriInsurance is simulated based on the joint empirical distribution of farm revenue and crop insurance indemnity generated from the observed data.

$$g = \begin{cases} 0 \quad \text{if } PM \geq 0.85 * RM \quad \text{(Tier 1)} \\ 0.7*(0.85*RM - PM),\ if\ 0.7*RM \leq PM < 0.85*RM \text{ (Tier 2)} \\ 0.8*(0.7*RM - PM) + 0.7*0.15*RM\ ,\ if\ 0 \leq PM < 0.7*RM \text{ (Tier 3)} \\ 0.6*-PM + 0.7*0.15*RM + 0.8*0.7*RM\ ,\ if\ PM < 0 \text{ (Tier 4)} \end{cases}$$

Table 1 presents the simulation results. AgriStability can significantly reduce the farm income risk if it is paid within the same production year. The simulation shows that the payment reduced the variance of production margin for 96.3% of farms and by 44.1% on average. The minimum income also increases for more than 90% of farms. Much weaker reductions in variability are seen when different assumptions about payment lags are introduced: one and two years lag. In some cases, variability can increase, with the majority of farmers not seeing the variance in their income reduced. Moreover, the minimum income does not increase for the majority of farms if the payment is delayed for one or two years. The simulation exercise implies that, under these circumstances, AgriStability payments are unlikely to reduce the variability of income for most farmers. On the other hand, the indemnity of crop insurance is usually paid within the same production year. The simulation indicates that the crop insurance reduces the farm income risk for 69.8% of farms and by 12.9% on average. The crop insurance program is more effective in reducing income risk than the AgriStability in the presence of payment delay.

---

[2] We assumed that the program covers negative margin if two out of three PM calculated for RM are positive as it is stipulated in AgriStability program.

Table 1 Simulated impacts of AgriStability with payment delay

	Expected receipt per farm (CAD)	Mean percentage reduction of variance	Percentage of farms with reduced variance	Percentage of farms with higher minimum income
Production margin	22220	-	-	-
+ Indemnity from insurance	27310	-12.89	69.8	64.1
+ AgriStability payment without lag	26474	-44.14	96.3	90.2
+ AgriStability payment with one year lag	26471	0.32	45.7	42.0
+ AgriStability payment with two years lag	26468	0.95	43.5	40.0

The Mote-Carlo simulation of AgriStability indicates that the delay of the payment reduces its effectiveness in reducing farm income variability. However, the simulations in this section assumed that the production decisions by the farmer are exogenous. As Turvey (2010) points out, the Canada's programs may affect the producer's portfolio choice. The effectiveness of AgriStability as an income risk management policy is reduced even further if it crowds out the use of other risk management strategy or instruments. The next section conducts alternative policy simulation, assuming the endogenous decisions on production and risk management strategies.

4. Stochastic simulation model with endogenous risk management strategies

In order to introduce the endogenous risk management strategies to the stochastic simulation model, the model hypothesizes a "reference" producer deciding a set of available risk management strategies; acreage allocation across *n* crops, coverage of crop yield insurance (λ) at the planting period. The model assumes that the producer maximizes the expected utility over the end-of-season wealth (*w*), which is a sum of an initial wealth (w_0) and a net farm income in a crop year (π). *E()* is the expectation operator, *U()* is a von Neumann-Morgenstern utility function that represents the risk attitude of the producer. Net farm income includes the government transfer of payments (*g*) and the net receipt from crop insurance (CI_i) in addition to the production margin.

(1) $Max\,E[U(w)]$, and $w = w_0 + \pi$

(2) $\pi = \sum_{i=1}^{n}[\tilde{p}_i * \tilde{q}_i * L_i] - \tilde{c} + g + \sum_{i=1}^{n} CI_i(\lambda)$

where:

$\tilde{p}_i$ uncertain output price of crop *i*

$\tilde{q}_i$ uncertain yield of crop *i*

L_i area of land allocated to crop *i*

$\tilde{c}$ uncertain variable cost

We assumed that the reference producer has constant relative risk aversion with the utility function as

$$(3)\ U(w) = (1-\rho)^{-1} w^{(1-\rho)}$$

, where ρ is the Allow-Platt relative risk aversion coefficient. The complex structure of AgriStability triggers and payments and the expected utility function maximization program advises for a numerical approach based on the simulated price, yield and cost distributions.

Empirical distributions of aggregate and individual price and yield are generated based on the longitudinal farm-level data of 457 Saskatchewan crop farms in Canada, which is used in the simulation in the previous section. A reference farm is constructed as an average farmer in the sample data, and calibrated for the maximization simulation exercise. This farm produces three major crops (wheat, barley and canola) under price, yield uncertainty in addition to the uncertainty in other crop revenue and variable cost. The initial wealth that is necessary to compute farm welfare is set as the average net worth of grain and oilseed farms in Saskatchewan in 2008 (1467 CAD per hectare). The farmer initially allocates 52.0% of land to wheat, 7.3% to barley, 2.1% to canola and the rest to other residual crop production. The variable cost in the data is not crop specific, but crop specific cost adjustment factors are calibrated so that the initial land allocation becomes the optimum. The model assumes that the reference farm is moderately risk averse with Allow-Platt relative risk aversion coefficient of 2.

The government transfer of payments (*g*) includes three types of payments: AgriStability, AgriInvest and AgriRecovery. AgriStability is modelled according to the specified formula used in the previous section.[3] AgriInvest is modelled as a lump sum transfer of 1.35% of crop revenue. We modelled AgriRecovery in a reduced form to pay a fixed amount of payment in case the farmer experiences a systemic yield shock, in which the yields of all three crops fell below 30 percentile of the distribution.[4] The model is designed to estimate the impact of marginal changes and not suitable to estimate the full impact of all the programs. Therefore, the amount of all three payments is reduced to a quarter of the calculated payments to avoid the corner solution.

The net receipt from a stylized version of the crop insurance of crop *i* (CI_i) is paid in case the crop yield ($\tilde{q}_i$) turns out to be below 95% of the insured level of yield and the payment is determined by the area of land that the farmer insures (L_{Ii}). To avoid moral hazard and adverse selection effects (*e.g.* increase the historical yield to receive indemnities in the future), the model assumes the perfect insurance market so that risk neutral insurance companies offer crop insurance contact at the price equal to the expected value (fair insurance premium) without administrative cost and government subsidy. A fixed forward price (p_{fi}) and historical average yield of commodity (q_{hi}) are applied to calculate the insurance premium and indemnities.[6] γ represents net of

[3] The simulation assumed that the reference farm is eligible for the negative margin coverage (Tier 4) of the AgriStability.

[4] The expected payment of AgriRecovery is set according to the estimated amount of ad hoc payments in the data. The ad-hoc program payment is estimated as a half of non-CAIS payments in the dataset.

[6] The forward price is set at 5% lower than the expected price.

administration cost of insurance and subsidy to insurance premium.[7] The model calibrates γ so that the reference farm insures a third of land in the absence of the government transfer of payments in place.

$$CI_i = \sum p_{fi} * q_{hi} * L_{Ii} * Max(0, 0.95 - \frac{\tilde{q}_i}{q_{hi}}) - (1+\gamma) * p_{f1} * q_{hi} * L_{Ii} * E[Max(0, 0.95 - \frac{\tilde{q}_i}{q_{hi}})$$

In order to model a farm producing multiple crops under price, yield, residual revenue and cost uncertainty, the joint distribution of prices and yields of three major crops, revenue of other crops, and variable costs was constructed based on the observed distributional information in the farm level data. We assumed each factor to be distributed normally, but with truncations at the extreme values observed in the data.

Table 2. Descriptive statistics of the simulated joint distribution for the reference farm

(1) Mean, standard deviation, coefficient of variation, minimum and maximum

	Price (CAD per tonne)			Yield (tonne per hectare)			Revenue from other crops	Variable costs
	Wheat	Barley	Canola	Wheat	Barley	Canola		
Mean	134.3	99.1	296.5	0.7	0.8	0.5	96.5	144.1
StDev	77.0	20.2	43.6	0.2	0.1	0.1	60.2	56.9
CV	57.3	20.4	14.7	29.1	18.1	24.2	62.4	39.5
Min	20.0	20.0	117.0	0.0	0.0	0.0	5.0	20.0
Max	380.0	215.0	445.0	2.0	2.0	1.7	750.0	800.0

(2) Correlations

		Price			Yield			Revenue from other crops	Variable costs
		Wheat	Barley	Canola	Wheat	Barley	Canola		
Price	Wheat	1	0.59	0.66	-0.06	0.10	-0.05	0.24	0.33
	Barley		1	0.34	-0.07	-0.16	-0.08	0.15	0.39
	Canola			1	0.01	-0.10	0.03	0.24	0.08
Yield	Wheat				1	0.42	0.11	-0.08	-0.04
	Barley					1	0.13	0.09	0.05
	Canola						1	-0.07	0.03
Revenue from other crops								1	0.33
Variable costs									1

Based on the Monte-Carlo draw of 1000 price, yield, revenue and variable cost combinations from the joint distribution, the model maximizes the expected utility with respect to area of land allocated to each crop and the level of insurance coverage. Since the specification of crop production is neutral to the farm size in this model, the reference farm is assumed to cultivate an average area of land in the sample data (820 hectare) and allocate land between available crops.

[7] Under AgriInsurance, producers pay 40% of total premium while the federal and provincial governments contribute the remaining premiums and fully cover the administrative cost.

5. Simulation results

The simulation first added AgriInsurance, followed by the AgriInvest, AgriStability and AgriRecovery programs (Table 3). The welfare change of the risk averse farm is computed by the certainty equivalent of net farm income, which can be decomposed to the contribution of change in mean and variability. The degree of crop diversification is represented by the coefficient of variation of market receipt per hectare. The initial value of diversification index is set as 100 and the change of the diversification index is expressed as the negative of the percentage change in the coefficient of variation of market receipt. If the farmer uses less diversification strategy and specializes in a specific crop, the diversification index declines because the farmer allocates more land to crops that generate a higher return with higher variability.

The programs in total reduce the coefficient of variation of income by 7.7 %, but almost entire welfare gain for the reference farm is due to the increase in the level of expected income, rather than to the reduction in the variability of income. However, the different programs have different impacts on farm welfare and the risk management strategy. Unlike all the other programs, entire welfare effect of AgriInsurance is coming from the lower variability of farm income. It also has relatively large impact on minimum income level. On the other hand, the risk-reducing effect of crop insurance is partially offset by the crowding out of crop diversification strategies. The farmer responds by using crop yield insurance and producing more of the crop that that tends to generate higher returns with more variability.

AgriStability and AgriInvest programs cover four different tiers: from the most frequent and small scale risks, to the most catastrophic risks implying negative margins. The AgriInvest program is designed to manage normal fluctuation of income by providing incentives to save. The simulation results show that this program has a minimum risk effect and purely increases the level of income without crowding out other risk management strategies: production diversification and the use of crop yield insurance.

AgriStability has by far the largest welfare impacts among the four programs. The composition of the welfare impact shows that the farmer in the simulation values the program almost entirely as an income support rather than a risk reducing program. The coefficient of variation of income is reduced, but AgriStability has a strong crowding out effect of other risk management strategies. AgriStability provides support when the producer experiences a margin decline of more than 15%. Such comprehensive risk coverage creates an incentive for farmers to specialize in riskier crops that generate higher return. Moreover, AgriStability reduces the incentive to use crop insurance by half, as it already provides coverage for the same layers of income risk.

Since the simulation is based on a static model, the farmer receives the payment from the AgriStability program simultaneously. However, the payment is likely to be delayed for one to two years as we discussed in the previous section. Although the modelling structure does not allow the simulation of payment delay, a random noise to the payment is introduced to estimate the impact of uncertainty in payment. The random noise is calibrated for the reference farm based on the empirical distribution of the difference between the case that the payment is made without delay and one year delay in the simulation in Table 1. The simulation result shows that the AgriStability becomes less effective in reducing farm income risk, leading to smaller welfare gains. The crowding out effects of the program on diversification strategies is unchanged, while crowding out of crop yield insurance is slightly reduced. The noise in payments makes AgriStability less effective in covering income risks, which increase an incentive to use crop yield insurance. It may be the case that delays in the AgriStability payment indirectly creates a role for crop yield insurance that has an advantage of compensating yield loss rapidly.

The simulation results show that AgriRecovery can have a very strong effect on crop specialization. When systemic yield risks are covered by the AgriRecovery program this, combined with the AgriStability program, provides greater incentive for the farmer to specialize in high-return crops. This leads to higher variability of income and lower minimum income before program payments. AgriRecovery increases income, offsetting the higher income variability. These simulation results suggest that the AgriRecovery program is not effective in mitigating catastrophic income risk beyond the amount already provided by AgriStability. The farmer represented in the simulation benefits more from the income support component of the programs rather than the risk reduction they provide.

Table 3 Simulated impacts of business risk management programs in Canada

	Certainty equivalent income (change in CAD)			CV of income (Change in percentage)	Change in Diversification index (Initial=100)	Minimum income (change in CAD)	Change in the share of land insured (change in percentage points)
	Overall change	Contributing factors					
		Change in mean	Change in variability				
Total impacts	5296.5	5250.1	46.3	-7.7	-30.0	12914.1	16.3
contribution of….							
AgriInsurance	10.8	-4.2	15.0	-0.5	-3.9	5424.2	33.1
AgriInvest	484.4	483.9	0.5	-0.7	0.0	479.6	0.0
AgriStability	3769.2	3634.2	135.1	-9.0	-17.8	12388.6	-16.6
AgriRecovery	1032.1	1136.3	-104.2	2.5	-8.3	-5378.4	-0.2
AgriStability with lag	3317.4	3285.4	32.0	-4.9	-17.8	11551.4	-16.2

The additional simulation decomposed the impacts of three different tiers of AgriStability, assuming the payments are made without delay (Table 4). The simulation first introduced Tier 4 of the program and then Tiers 3 and 2 are added subsequently. The results in Table 3 indicate that AgriStability as a whole reduces income risk but it may also have a strong crowding out effect of other risk management strategies. Table 4 shows that payments under Tier 2, the coverage of frequent and small margin loss between 15% and 30%, do not reduce the overall variability of income, as the payment leads to strong reductions in diversification. This effect also results in a lower minimum income. In the simulation, Tier 2 of AgriStability is having very strong negative effects on farmers' active risk management strategies and potentially increasing overall farm income risk.

Payments under tier 3 are triggered for reductions in margin between 30% and 100% compared with the reference margin. This tier provides the largest payment to the farmers and is the most effective in reducing the variability of income. Payments under this tier also discourage diversification, but to a lesser extent than other tiers. Nevertheless, the welfare gain remains almost entirely due to the increase in the level of income rather than reductions of income risk. Tier 3 of the program covers a same layer of risk covered by the crop yield insurance, which explains why it reduces incentive to use it.

Tier 4 is triggered in the case the farmer experiences negative margins. This tier most effectively increases minimum income, but is not as effective in reducing income variability as Tier 3 as it promotes increased crop specialisation. Despite this effect, the variability of income remains almost unchanged because the farmer increases the use of crop yield insurance. This may be explained by some complementarities between the risks covered by Tier 4 of the program and crop yield insurance.

Table 4. Simulated impacts of different tiers of AgriStability in Canada

	Certainty equivalent income (change in CAD)			CV of income (change in percentage)	Change in Diversification index (Initial=100)	Minimum income (change in CAD)	Change in the share of land insured (change in percentage points)
	Overall change	Contributing factors: Change in mean	Contributing factors: Change in variability				
Total impacts	3769.5	3728.9	40.6	-5.9	-31.9	8224.2	-5.4
contribution of the coverage							
between 70-85% of reference margin (Tier 2)	335.4	418.5	-83.2	2.6	-6.8	-4887.7	-1.1
up to 70% of reference margin (Tier 3)	2488.1	2336.7	151.4	-8.6	-6.6	-2804.7	-21.3
of negative margin (Tier 4)	946.0	973.6	-27.7	0.1	-18.6	15916.6	17.0

6. Conclusions

This paper analyzes the effectiveness and efficiency of farm income stabilization programs using AgiStability in Canada as an example. This program intends to reduce the farm income risk through providing support for farmers experiencing more than 15% of margin loss. However, this study finds that Canada's AgriStability faces two critical drawbacks: 1) the delay of payments significantly reduce the counter-cyclical nature of the program and 2) the program crowds-out other risk management strategies and allow farmer to take on more risk.

The delay of payments is unavoidable in the program design that requires the government to capture the correct information on the individual margin loss through tax file. The delay is particularly problematic in case the government tries to assist farmers to manage disaster risks, which requires immediate response for quick recovery. In Canada, the existence of more rapid AgriRecovery and AgriInsurance programs enhance this drawback of AgriStability. In this sense, counter-cyclical payments based on aggregate index is less targeted to farm income risk in its definition, but could be more effective in reducing farm income risk in practice if they can be paid quicker.

We also learned that the farm income stabilization program generates crowding out effects in other strategies such as insurance or diversification that are covering the same layers of risk as such program. This is a typical moral hazard problem that can only be resolved by ensuring that farmers continue to have an incentive to manage risks, such as through participation costs that are dependent on behaviour. However, this is technically difficult for any kind of insurance, and almost impossible for a programme like Canada's

AgriStability in which the farmer pays a fee that is only a small fraction of the actuarially fair premium (Schaufele *et al*. 2010). The simulations in this paper show that the part of the program that is triggered with small margin reductions of 15-30% (frequent normal risk) is found to have the strongest crowding out effects of diversification strategy. This implies that an income stabilization payment for frequent and normal fluctuation of income is most likely ineffective. On the other hand, a fixed payment such as AgriInvest is found to have a minimum crowding out effect. This type of policy could help farmers to manage normal fluctuation of income more neutrally.

Moreover, the simulation also indicates that the middle range part of the program enters in competition with AgriInsurance, the subsidized insurance program. The simulation exercise indicates that AgriStability could reduce incentives to use crop yield insurance. This is because these two programs cover the same layers of farm income risk. The simulation also implies that the delay of the AgriStability payment may leave incentives for farmers continuing to participate in crop insurance program.

Income stabilization payments are often found to be more socially acceptable form of support to farmers than a fixed income support such as the single farm payments in EU. However, this study identifies such policy design face major challenges. Evidence of two major drawbacks as discussed in this section indicates income stabilization programs such as AgriStability in Canada are not likely to be an efficient risk management tool. An efficient risk management policy should consider the impacts of policies on farmer's endogenous choice and give the farmers the responsibility of choosing their most efficient risk management strategies.

References

Antón, J., S. Kimura and R. Martini (2011), *Thematic Review on Risk Management: Canada*, OECD Food, Agriculture and Fisheries Working papers No. 26, Paris.

Coble, K.H., R.G. Heifner, and M. Zuniga (2000), "Implication of Crop Yield and Revenue Insurance for Producer Hedging", *Journal of Agricultural and Resource Economics*, 25 (2): 432-52.

Kimura, S., J. Antón and Ch. Le Thi (2010), *Farm Level Analysis of Risk and Risk Management Strategies and Policies: Cross Country Analysis*, OECD Food, Agriculture and Fisheries Working papers No. 26, Paris.

Miranda, M.J. and J.W. Glauber (1997), "Systemic Risk, Reinsurance, and the Failure of Crop Insurance Markets", *American Journal of Agricultural Economics*, 79 (1): 206-15.

OECD (2009), *Managing Risk in Agriculture: A Holistic Approach*, Paris.

Schaufele, B., J. R. Unterschultz and T. Nilsson (2010): "AgriStability with Catastrophic Price Risk for Cow-Calf Producers". *Canadian Journal of Agricultural Economics* 58 (2010) 361-380.

Turvey, C. (2010) *Whole Farm Income Insurance in a Canadian Context*. Paper presented at the Agricultural & Applied Economics Association's 2010 AAEA, CAES & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010.

Wang, H.H., L.A. Makus, and X. Chen (2004), "Impact of US commodity programmes on hedging in the presence of crop insurance", *European Review of Agricultural Economics*, 31 (3): 331-52.