

A STUDY ON THE FEASIBILITY OF A  
CROP-HAIL INSURANCE PROGRAM  
IN MANITOBA

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by  
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## ABSTRACT

Variations in crop yields cause variations in farm incomes. To help stabilize the income from crop production most Manitoba farmers may insure their crops against unavoidable losses with hail insurance and all-risk crop insurance.

The all-risk crop insurance in Manitoba protects against losses due to all unavoidable losses including hail. However, this insurance does not cover to the full value of the insured crops. The coverage is sixty percent of the long-term average yield of the crop in each area. Only crops which yield below the coverage level are indemnified the amount the actual yield is different from the coverage level. Hail damage on crops is in most cases not to the extent that the crop qualifies for indemnity from all-risk crop insurance. From the field survey in this study cases were found where the crops were damaged from sixty to eighty percent by hail but the average yield of these crops were above the all-risk crop insurance coverage level.

Three alternatives were examined in the study to determine the alternative which would give the best protection against the crop losses due to hail damage and all other unavoidable causes. The alternatives examined were:

- (1) Insuring the crops with both all-risk crop insurance and hail insurance.
- (2) Raising the coverage level of all-risk crop insurance

to eighty percent of the long term average yield.

- (3) Insuring the crops with a proposed crop-hail insurance program.

The proposed crop-hail insurance program offers separate coverage for hail damage under the all-risk crop insurance program.

Some conclusions drawn from the study are:

- (1) All-risk crop insurance does not apparently offer adequate protection against hail damages.
- (2) Separate coverage for hail under the all-risk crop insurance is feasible in an area where hail damage is to the extent that the average crop yield is not brought substantially below the all-risk crop insurance coverage level. A program of this type would be feasible in the Russell and Silvercreek Municipalities of Manitoba.
- (3) A feasible crop-hail insurance program is one which offers better protection to the farmers than any existing formal insurance or any conceivable alternative. It is also a self-sustaining program which may be put into operation by an insurer such as the Manitoba Crop Insurance Corporation, providing that the portion of the yield variability between farms attributable to the risk hail, may be estimated from past records of an all-risk crop insurance program.

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## CHAPTER I

### INTRODUCTION

Agriculture in Manitoba is characterized by much uncertainty. One of the major contributors to uncertainty in agriculture is the year to year fluctuations in crop yields and the resulting variations in income from crop production. Agriculture has many unique risks as compared to non-agricultural industries because of its close contact with nature. To the individual farmer, weather is not predictable and is viewed as uncertainty. However, in the aggregate, the probability of weather conditions may be calculated from past records, changing the uncertainty atmosphere to one of risk.

An individual farm is faced with years of favourable weather conditions, and resulting high incomes from crop production, and years of unfavourable weather conditions and resulting low incomes from crop production. To-day, modern farming requires large capital investments. Usually the bulk of the capital has to be acquired outside the farm, especially in the earlier years of a farm operation. In order to realize the returns from invested capital in future years, the yearly income from crop production must be protected in one way or another in the event of unfavourable weather conditions which would result in low incomes from crop production. A crop

loss due to unavoidable risks may cause the bankruptcy of a farm business at the worst, as is likely in the situation of large amounts of borrowed capital, and in any event a crop loss will retard the growth of the farm business.

Insurance is available to farmers to help them cope with uncertainty. Insurance is a means by which people join together to share the risks they may suffer. A group of people with a common risk may pay a certain amount of premium. In the event of any one person's loss, an indemnity will be paid to him. The premium rates are tied to the past; usually based on the frequency of the unfavourable outcome.

Insurable risks common to urban and rural people are fire, accident, health and life. Risks common to agricultural production are weather, pests, insects, diseases and so on.

### Objectives

The objective of this study in general is to examine the feasibility of a hail-crop insurance program in Manitoba.

Specifically the objectives are;

- (1) to determine the adequacy of coverage by all-risk crop insurance for the hail risk.
- (2) to determine the feasibility of separating hail coverage from the all-risk crop insurance.
- (3) to present the findings of the field survey in the

Russell and Silvercreek Municipalities of Manitoba.

- (4) In light of the above objectives, either one or the other of the following two objectives will apply;
- (a) If separate hail coverage with all-risk crop insurance is feasible, then the statistical structure of a crop-hail insurance program is to be formulated; that is, suggestions of premium rate calculations, coverage levels and so on.
  - (b) If separate hail coverage with all-risk crop insurance is not feasible, then it is the task of this study to give supporting reasons and evidence for this conclusion.

#### Background Information

The Prairie Farmers Assistance Act, Manitoba Crop Insurance and Hail Insurance are three forms of insurance available to Manitoba farmers to help them protect their incomes from crop production. Farmers with crop insurance are not eligible for assistance under the Prairie Farmers Assistance Act. A general description of the three forms of crop income protection insurance is necessary before the problem which arises in this study may be understood.

(a) Prairie Farm Assistance Act. The Prairie Farm Assistance Act, passed in 1939, was the first attempt by the

Canadian Government to protect the Canadian grain farmers' incomes from crop production. The Act covers Manitoba, Saskatchewan, Alberta and the Peace River Block of B.C. The Act may have some features of crop insurance but its main purpose is to supply financial relief or compensation in the event of complete crop losses. The total payments to an individual farm are below operating expenses but may be enough to supply the farmer with seeds and funds for planting a crop in the following year.

Payments are made on the basis of the average yield of wheat in a township. The method of determining payment is as follows:<sup>1</sup> (a) If the average yield of wheat in a township is more than eight but not more than twelve bushels per acre the award is two dollars an acre of the farmer's cultivated land for each cent, or fraction thereof, not exceeding ten, by which the average price is less than eighty cents a bushel. (b) If the average yield of wheat is more than five but not more than eight bushels an acre, the award is two dollars an acre. (c) If the average yield of wheat is more than three and not more than five bushels an acre, the award is three dollars an acre. (c) If the average yield of wheat is not more than three bushels an acre the award is four dollars

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<sup>1</sup> D. W. WARE "Crop and Livestock Insurance in Canada" The Economic Analyst, Vol. XXX No. 4, Aug. 1960, p.p. 108-109

an acre.

Awards are made up to two hundred cultivated acres, making the maximum payment under P.F.A.A. eight hundred dollars. If the average yield in a township is such that the farmers are qualified for payments, the same award will be made to every farmer within the township, regardless of their individual yields.

Each farmer in the designated area contributes one percent of the purchase price paid for all grain by country elevators, grain dealers and other agents for the grains wheat, oats, barley, rye, flax and rapeseed. Farmers with government crop insurance do not contribute to P.F.A.A. and are not eligible for payments.

P.F.A.A. was enacted after a period of drought and chronic distress in the 1930's. An investigation by the Manitoba Crop Insurance Commission resulted in the following general opinion;<sup>2</sup> "The opinion was fairly widely held that under today's farming conditions, P.F.A.A. is inadequate, and that it has outlived any useful purpose it might once have served in Manitoba".

Some of the reasons for the discontent with P.F.A.A. were;<sup>3</sup> (1) A general one percent levy on all farmers does

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<sup>2</sup>"Report of the Manitoba Crop Insurance Commission ", December 1, 1954; p. 12.

<sup>3</sup>Ibid.

not recognize the different productivity of land. (2) The 18-section block used as the basis of qualification is too large to give a fair estimation of individual farm yields, and (3) the Act does not recognize the different sizes of farms beyond four hundred cultivated acres, the maximum payments being fixed.

Manitoba farmers had a particular reason to show discontent with P.F.A.A. since between the period 1939 and July 31, 1964 Manitoba farmers received only \$1.32 for each dollar paid into the fund, whereas Saskatchewan received \$2.44 for each dollar paid and Alberta farmers received \$2.16 for each dollar paid.<sup>4</sup>

The next active government program to assist farmers in protecting their incomes from crop production was all-risk crop insurance.

(b) Crop Insurance The Manitoba Government passed the "Crop Insurance Test Areas Act" in August, 1959 following the passage of the "Crop Insurance Act" on July 18, 1959 by the Canadian Government.

The Crop Insurance Act enables the Minister of Agriculture to enter into agreements with the provinces to assist in

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<sup>4</sup>Report on Activities under the Prairie Farm Assistance Act for the Crop Year 1963-64, Department of Agriculture, Canada.

crop insurance schemes designed by the individual provinces, on condition that a minimum number of farmers enter into the scheme and that the amount of insurance shall not exceed eighty percent of the long term average of each particular area. The contributions provided by Canada to each of the provinces are:

- (1) Payment of fifty percent of the administration costs.
- (2) Payment of twenty-five percent of the premiums, and
- (3) Either (i) loans to the provinces in respect of the costs incurred by the provinces in the operation of an insurance scheme, or (ii) the re-insurance of a portion of the liability of the province for the payment of indemnities under an insurance scheme.

Manitoba became the first province to organize a crop insurance scheme. This was done on an experimental basis in four test areas. The areas covered are gradually being expanded with the hope that eventually all the farmers in the province will have crop insurance available to them. In five years of operation the Manitoba Crop Insurance Corporation expanded coverage from 4.1 million dollars in 1960-61 to 13.7 million dollars in 1964-65.

The Manitoba legislation provides coverage for all unavoidable losses which includes losses caused by hail, drought, flood, frost, wind, disease and pests. Protection is provided for sugar beets under a separate plan.

The coverage is up to sixty percent of the long term average, which is the figure intended to cover the costs of production. The average yield is determined by areas which have similar costs of production and are situated on soils of similar productivity. The productivity of the soil is rated from 10 to 100, 10 being the lowest yielding soil and 100 being the highest yielding soil.

Claims are made on the basis of average yields. If the average yield of an insured crop is below the crop insurance coverage, then an indemnity will be paid to the insured equal to the amount the actual yield differs from the coverage yield. For example; a one hundred acre field of wheat insured at fourteen bushels per acre will have a coverage of fourteen hundred bushels. If the final yield is one thousand bushels or ten bushels per acre, the insured will be indemnified by the amount of four hundred bushels or four bushels per acre. The value of the grain is predetermined at the time the rates are calculated for the crop year.

Premium rates vary with the productivity of the soil. A scientifically established productivity index is used as the basis for calculating premium rates and coverages. The average yield is calculated for the preceding thirty-five years for each soil type area. For any one year, the loss cost ratio is the average loss of the thirty-five years total



loss, that is, the total loss below the coverage level divided by the number of years. As mentioned before twenty-five percent of the premium is paid by the Canadian Government and no administration costs are added to the premium as these are shared equally by the provincial and Canadian governments.

Two types of insurance coverage are offered:

- (1) Combined Adjustment Plan: The total value of all crops insured is subtracted from the total coverage to arrive at the indemnity payments and
- (2) Separate Adjustment Plan: Each crop is adjusted separately and indemnities are paid for losses on individual crops.

The premium rate for the separate adjustment plan is higher than for the combined adjustment plan because of the greater probability of a loss claim on separate crops.

There is also a choice between one hundred percent and seventy-five percent of dollar coverage. Both cover for the same amount of bushels, but the seventy-five percent coverage pays only for seventy-five percent of the value of the bushels loss, at a proportionately lower premium rate.

(c) Hail Insurance. Hail insurance covers crop losses from the single hazard, hail. Protection against hail losses takes the form of a certain coverage per acre. Hail

insurance differs from most other types of insurance in that it does not take the value of the crop into consideration. The only stipulation is that the crop must have been harvestable before the hail damage. For example; a forty bushel per acre crop covered for ten dollars per acre would receive the same indemnity as a ten bushel per acre crop covered for ten dollars per acre, if both crops received the same percentage hail damage.

Claims are made on the percentage basis. A hail adjustor, with the agreement of the insured, determines the percentage damage in a field by selecting from a representatively damaged portion of the field, one hundred plants and examining these plants closely to determine the number damaged. The percentage damaged in a row is used as the percentage damaged in the whole field. Usually one hundred plants are examined per twenty acres. The indemnity paid is the average percentage damage times the amount of insurance. For example; a one hundred acre field insured at ten dollars. A fifty percent hail damage would result in five hundred dollars indemnity.

Premium rates for hail insurance are established by townships. A loss-cost ratio is used in calculating premium rates, which is the amount of loss paid out for each one hundred dollars of insurance sold. Three loss-cost ratios are determined for each township from past records: (1) the

township loss cost - this is calculated from the total amount of loss paid and coverage in each township, (2) the elevation loss cost - all townships are grouped according to the elevation above sea level and a loss cost is calculated for all townships within each group, and (3) the area loss cost - all townships are grouped according to soil zone and a loss cost is calculated for all townships within each area. To arrive at the final premium rate, administration costs are added to the arithmetic mean of the township loss cost, the elevation loss cost and the area loss cost.

Three types of hail insurance coverage are offered: (1) full coverage, (2) ten percent deductible and (3) twenty-five percent deductible. The full coverage hail insurance indemnifies for the the total damage caused by hail. For example; a crop insured for one thousand dollars, receiving hail damages of twenty percent, would receive an indemnity of two hundred dollars. A ten percent deductible policy pays no indemnity for the first ten percent damage. In the above example the indemnity would be one hundred dollars, with a ten percent deductible policy. A twenty-five percent deductible policy pays no indemnity for the first twenty-five percent hail damage. Under this policy a crop damage of twenty percent would receive no indemnity.

The premium rates for a ten percent deductible policy are twenty-five percent less than the full coverage rates and

the rates for the twenty-five percent deductible policy are fifty percent less than the full coverage policy.

Deductible policies are particularly well adapted to areas in which hail risks and full cover premium rates are high.<sup>5</sup> For the same amount of premium a full coverage policy will pay the largest indemnity if the loss is forty percent or less. The ten percent deductible policy will pay the largest indemnity if the loss is between forty and fifty percent. If the loss is more than fifty percent, the twenty-five percent deductible policy will pay the largest indemnity.<sup>6</sup>

#### THE PROBLEM

The problem in this study arises from the differential in coverages by crop insurance and hail insurance, and the resulting differences in claiming for indemnities after crop damages from hail have occurred. Crop insurance in Manitoba is on an experimental basis and needs to be examined periodically as more experience is acquired in order to check the adequacy of coverage and fairness of the program. After

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<sup>5</sup>The Canadian Hail Underwriters Association; "How to Write Hail Insurance", p. 2.

<sup>6</sup>These losses are calculated on a township basis where the full cover rate is eight percent, the ten percent deductible rate is six percent and the twenty-five percent deductible rate is four percent.

five years of experience, sufficient data could be acquired to examine the adequacy of coverage by the Manitoba Crop Insurance program for specific hazards such as hail.

Hail insurance was available to farmers for a number of years and they became familiar with its policies. With crop insurance, however, unlike hail insurance, many farmers found that they would receive severe hail damages but would not be indemnified. The reason for this is that hail insurance pays indemnities on the percentage of damage basis whereas crop insurance pays indemnities on the amount the total yield is below their total coverage. Crops may survive a hail storm to the degree that they do not qualify for crop insurance indemnities. For example; a crop damaged twenty percent by hail and yielding twenty bushels per acre, would not qualify for crop insurance if the crop insurance coverage level was fourteen bushels per acre. However, the same crop, insured with hail insurance for ten dollars per acre would receive an indemnity of two dollars per acre or twenty percent of the coverage.

Another problem that arises with crop insurance is found in the method of adjustment where severe damages may not be indemnified. Adjustment for losses by crop insurance is done by measuring the total yield after harvest and subtracting this yield from the coverage yield. Hail damages unlike other

hazards such as drought which covers whole areas, are spotty, that is, a hail storm covers only a limited area and its boundaries are easily distinguished. Many cases arise, where one crop of an individual farm is severely damaged by hail while another field of the same crop from the particular farm is not. The portion of the crop not damaged by hail will raise the overall average yield of the crop above the qualifying coverage level for crop insurance indemnity. For example; a farm with two separate one hundred acre fields of wheat, insured with all-risk crop insurance at fourteen bushels per acre will have a total coverage of twenty-eight hundred bushels. Suppose one field is completely destroyed by hail while the other yields thirty bushels per acre. The total yield for the farm will be three thousand bushels which is above the coverage level. In this example the total loss is three thousand bushels but no indemnity may be received from crop insurance. The same farm, covered with ten dollars per acre hail insurance will receive an indemnity of one thousand dollars.

In essence, therefore, the problem is one with the adequacy of coverage for hail damages by all-risk crop insurance.

## CHAPTER II

### THEORETICAL CONSIDERATIONS IN THE ECONOMICS OF INSURANCE

The category of economics in which insurance falls is dynamics. Dynamics are involved in the sense that the element 'time' is necessarily present. In contrast to static situations, events must be dated in dynamics. The probability of an outcome is determined at one point in time for an outcome which will be forthcoming at some future point in time.

Formal insurance is "a device for the reduction of the uncertainty of one party, called the insured, through the transfer of particular risks to another party, called the insurer, who offers a restoration, at least in part, of economic losses suffered by the insured."<sup>7</sup> Formal insurance, therefore, involves two different principles. One set of principles are those of the insured, and the other set are those of the insurer. Usually, the risk is viewed as uncertainty by the insured and as a pure risk by the insurer.

In this chapter, an attempt will be made to discuss the principles of insurance from the standpoint of the insured and from the standpoint of the insurer. The discussion will centre

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<sup>7</sup> Pfeffer, Irving; Insurance and Economic Theory, Richard D. Irwin Inc., Homewood, Illinois; 1956, p. 53.