# Canadian Prairie Farming, 1960-2000
# An Economic Analysis

L. Auer



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Economic Council of Canada 1989

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# Contents

# Foreword

This study was undertaken as part of the Economic Council's project on the Future of the Prairie Grain Economy – a project referred to the Council by the Prime Minister in a letter dated March 31, 1987.

> I am encouraged to see the Council proposing a significant collaborative effort with federal and provincial governments and the private sector. I am pleased to support this particular study as a vehicle for public debate on a pressing problem which concerns us all, the future of the Prairie grain economy. I expect it to produce an invaluable exchange of information, while leaving the Council, as always, to its own independent views, conclusions, and recommendations.

The present study describes the magnitude of the current farm financial crisis in the Prairie provinces, identifies its underlying causes, distinguishes between short- and long-run developments, examines the effectiveness of the major Prairie farm programs, and explores alternative policy options. Among those policy options, it focuses on "decoupled" farm-income support. Traditionally, farm programs were directed at specific farm crops; as a result, the more a farmer produced, the more the government paid. Decoupled farm programs would give similar support, but they would not link government payments to the price or the production of a specific crop. They could provide the incentive for needed adjustments in farm structure.

The Council received financial support for this project from the governments of Saskatchewan and Alberta, the federal Department of Agriculture, The Prairie Pools Incorporated, Cargill Limited, and the Royal Bank of Canada. Representatives of these organizations, as well as independent experts, gave generously of their time to attend meetings of the project's Technical Advisory Committee. The Council is glad to acknowledge this valuable support.

Other studies in this series deal with the international policy environment shaping the grain trade, the effects of eliminating agricultural trade-distortions, Canadian policy towards Prairie agriculture, the effects of the cost/price squeeze on Prairie farms and the opportunities for diversifying agriculture in the Prairie provinces. The Council put forward its recommendations for improving public policy regarding Prairie agriculture in a Statement published in November 1988.

Dr. Ludwig Auer is a Senior Economist at the Economic Council of Canada.

Judith Maxwell
Chairman

## READER'S NOTE

The reader should note that various conventional symbols similar to those used by Statistics Canada have been used in the tables:

. . figures not available
– – amount too small to be expressed
– nil or zero.

Details may not add up to totals because of rounding. Unless stated otherwise, the data in the tables are derived from special tabulations prepared for the Economic Council by Statistics Canada on the basis of the 1986 Census of Agriculture. Whenever farm financial stress is discussed, the census information is augmented by data from Statistics Canada's farm-taxfiler statistics.

# 1 Introduction

From the 1960s to the 1980s, Prairie farmers more than doubled their output, although their labour inputs diminished by more than 50 per cent during this period. This productivity improvement came at a high price: many individual farmers bought more land, invested heavily in labour-saving machinery, enlarged the size of their operation, and went deeper into debt. Then came high interest rates, a sharp decline in grain prices, and several years of drought. That put many farmers into serious financial difficulty and forced some of them into bankruptcy. There are fears, today, that many more will be struck down and that the traditional family farm will be doomed unless grain prices on world markets recover or unless the federal government continues to provide hefty subsidies.

In public debate, the issue has been raised whether current subsidies for Prairie farmers are based on "need or greed" (York, 1988). Some have argued that farmers no longer produce for the marketplace but for government subsidies. Others defend the existing system, asserting that grain prices are so low that they do not even cover the cost of production. They allege that if the subsidies were discontinued today, every grain farmer who carries debt would be forced out of business. It must be recognized, however, that the federal government is running very large budget deficits; in view of its many priorities, it cannot be expected to continue subsidizing farmers at present levels.

In recent months, grain prices firmed up somewhat. That may be welcome news to the government but not to farmers, because when market prices rise, government subsidies are likely to decline. As well, interest rates have moved up, and that hurts Prairie farmers who are burdened with loans. It will take a very substantial increase in world market prices, therefore, before the income of Prairie farmers returns to its level of the early 1980s.

## Objectives

The objectives of this study are to assess the magnitude of the current farm financial crisis in the Prairie provinces, to identify the underlying causes of the crisis, to distinguish between short- and long-run developments, to examine the effectiveness of various government support programs, to explore alternative policy options, and to project what farm adjustments will be required in the future.

The analysis begins with the developments of the 1960s and 1970s and then concentrates on the events of the mid-1980s. After a description of the main characteristics of Prairie farms, the study examines what impact the crisis has had on various types of farm – commercial, part-time, and corporate farms; crop and livestock farms; and farms on rich or poor soils – in each of the three Prairie provinces. Future projections focus on policy options for structural adjustment: If the existing farm policies are maintained, which farms are likely to survive and which are likely to disappear? If the existing policies – which are often linked to farm prices and farm commodities – were modified, how could the decision-making on the farm be made more responsive to market signals? How could farm subsidies be "decoupled" from farm commodities? And how could a program of income support be designed to replace some, if not all, of the existing farm programs?

## Adjusting to World Markets

Many of the policy questions have arisen since the mid-1980s because market and weather conditions have been much less favourable to Prairie farmers during the last few years than in earlier years.

Only a few years ago – at the beginning of the 1980s – the demand for wheat was very strong, and worldwide exports reached record levels. There was widespread concern that Canada would be unable to meet the challenge of the coming new era of world grain trade (Tyrchniewicz, 1980). Prairie farmers were worried that they could not deliver as much wheat as world markets would take. Searching questions were raised: Why had Canada failed to take advantage of the enormous growth in world trade? How did the United States manage to export three times as much grain as it did 15 years earlier, while Canada struggled just to maintain the same volume (Dawson, 1980)? Would Canada be able to match the U.S. performance and to raise its grain exports by 50 per cent above the 1979 level by the year 1985 (Murta, 1980)?

At the time, Canada's grain transportation system was identified as the single most serious bottleneck in meeting

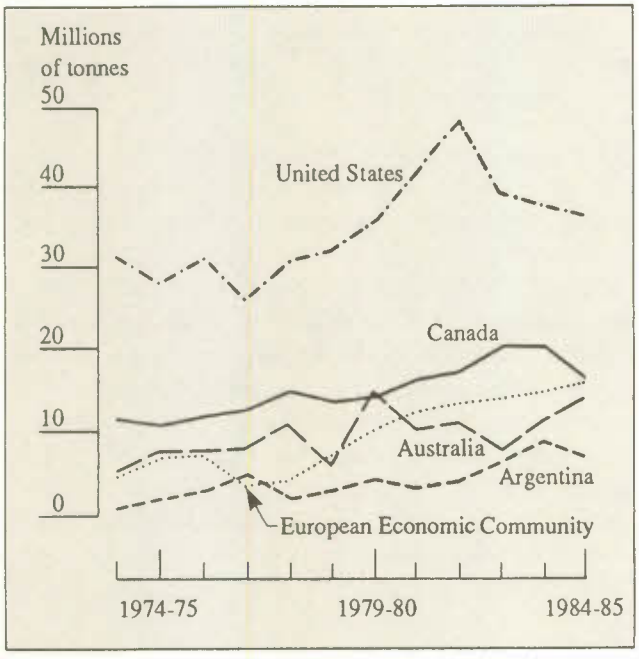
that target. In late 1979, the loading of grain cars on Saturday had already been implemented. Additional runs were being scheduled, so that more grain could be pulled in from branch lines before Canadian ports closed for the winter season. Following the recommendations of a parliamentary task force, plans were made to add thousands of boxcars to the grain fleet. There was talk of doubling the Prairie railway tracks to meet the expanding export demand for grain. And it was widely agreed that all sectors of the grain industry would have to apply their energies and innovative ideas to cope with the unprecedented market demand.

The grain industry rose to the challenge. From 1979-80 to 1983-84, Canada expanded its annual wheat exports from roughly 15 million tonnes to 21 million tonnes. At the same time, U.S. wheat exports expanded; they had reached an all-time high of nearly 50 million tonnes by 1981-82, (Chart 1-1).

But then the world commodity markets came under pressure. High commodity prices and high rates of inflation were countered by disinflationary policies and high interest rates. The industrialized countries went into economic recession. In the oil-exporting countries, the boom ended; and capital flows to the heavily indebted countries dried up. As the U.S. dollar strengthened, U.S. wheat exports fell off sharply.

**Chart 1-1**

**Total Wheat Exports, Major Producing Regions, 1973-74 to 1984-85**




SOURCE Based on data from the Canadian Wheat Board.

Then U.S. policymakers decided to cut down on exports to the Soviet Union. In addition, world wheat exports to China, India, and Eastern Europe declined as these countries began to produce better crops (Carter, McCalla, and Schmitz, 1989).

The stagnant import demand and the continued expansion of world wheat production led to a glut on world grain markets, causing Canadian export prices to drop sharply. Between 1986 and 1987, the price of Canadian Western Red Spring Wheat (No. 1 CWRS) fell by some 25 per cent. This price drop and the drought of earlier years, together with other adverse economic factors, produced the current farm crisis in the Prairie provinces.

A gradual reduction in world grain stocks, continued economic growth, trade liberalization, and further expansion of world grain trade are expected to improve wheat prices over the next few years. The prospects for the long run, however, are not very promising. Today, innumerable government programs affect farm production, world trade, and the consumption of wheat and feed grains. There are producer subsidies, preferential tariffs for transportation, export-enhancement programs, food-aid programs, low-interest farm loans, government-imposed two-price systems and import bans in exporting countries, and subsidized food prices in importing countries. Overall, these factors encourage excess production; because of sluggish demand, that tends to depress farm prices.

Most governments of the food-exporting countries subsidize their farmers in order to assure them of more stable and equitable incomes, but these measures have not been very successful. As in other industrialized countries, Canadian farm incomes are low, compared with nonfarm incomes. And there is little if any evidence that prices are more stable today than they were 50 or 100 years ago. Some would go even further and attribute the greater instability of world grain prices during the more recent years to greater government intervention (Johnson, 1986).

Regardless of future developments in domestic and trade policies, it is not very likely that demand for world grain exports will expand in any sustained fashion at a more rapid rate than it did during the 1970s and early 1980s: Western Europe, once a major net importer, has become an exporter; India is now self-sufficient; as for China and the Soviet Union, they can be expected to intensify their drive to greater self-sufficiency, but both are likely to remain net importers for years to come. Although unexpected variations in global weather conditions may augment import demand from time to time, the long-run trend will probably remain unchanged (Furtan et al., 1989).

In the absence of major shifts on the demand side, adjustments will have to be made on the supply side. Unless Prairie farmers make some major changes in resource use and are able to lower their cost per unit of output substantially, their incomes will fall further behind those of producers in other industrial sectors.

# 2 Unstable and Low Farm Incomes

Unfavourable weather, unstable market prices, and low incomes have plagued Prairie farmers, on and off, for many years.

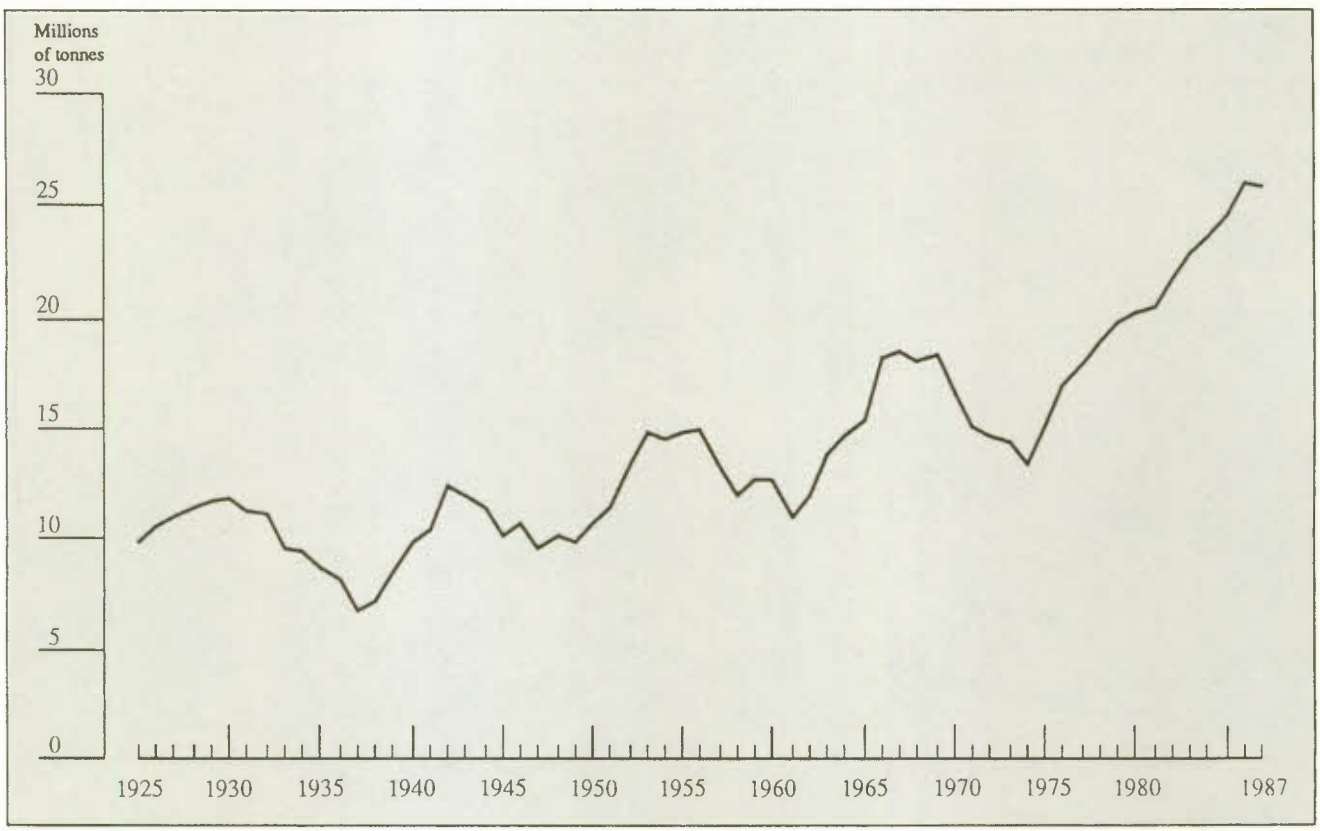
The current crisis of the Prairie grain economy is the result of oversupply on world markets and of the sharp decline in grain prices. It is not a singular event but part of a long-term pattern. On the domestic scene, the recurrence of periodic cycles in wheat production is quite striking. Since the early 1920s, production swings have occurred at fairly regular intervals of 12 to 13 years. If that pattern had continued into the 1980s, wheat production should have declined by 1982 (Chart 2-1). That it did not is due to a combination of factors, among which government intervention – not only in Canada but, to an even greater degree, in the United States as well – was one of the most important. When the next cycle peaks – sometime in the 1990s – it will again be the result of a combination of factors, and government policy over the next few years will very likely contribute to it.

## Prices and Costs

In Canada, as in the United States and other industrialized countries, much of the agricultural sector has long been encumbered by a persistent cost/price squeeze. During the

**Chart 2-1**

Canadian Wheat Production, 1925-87[1]




1 The line plots annual changes in five-year moving averages, measured at year's end. Thus the measurement for 1987 is the average of the five-year period from 1983 to the end of 1987.

SOURCE Based on data from Statistics Canada.

early years of Prairie settlement, the combination of strong population growth, rising consumer incomes, and expanding international trade in grains strengthened the demand for Prairie farm output. But the settlement of the Prairies ended with the Great Depression and the Second World War; ever since then, the adjustment from farm to nonfarm employment has continued, nearly without interruption. After a short-lived rise in the immediate postwar period, farm employment continued to decline as the number of Prairie farms diminished.

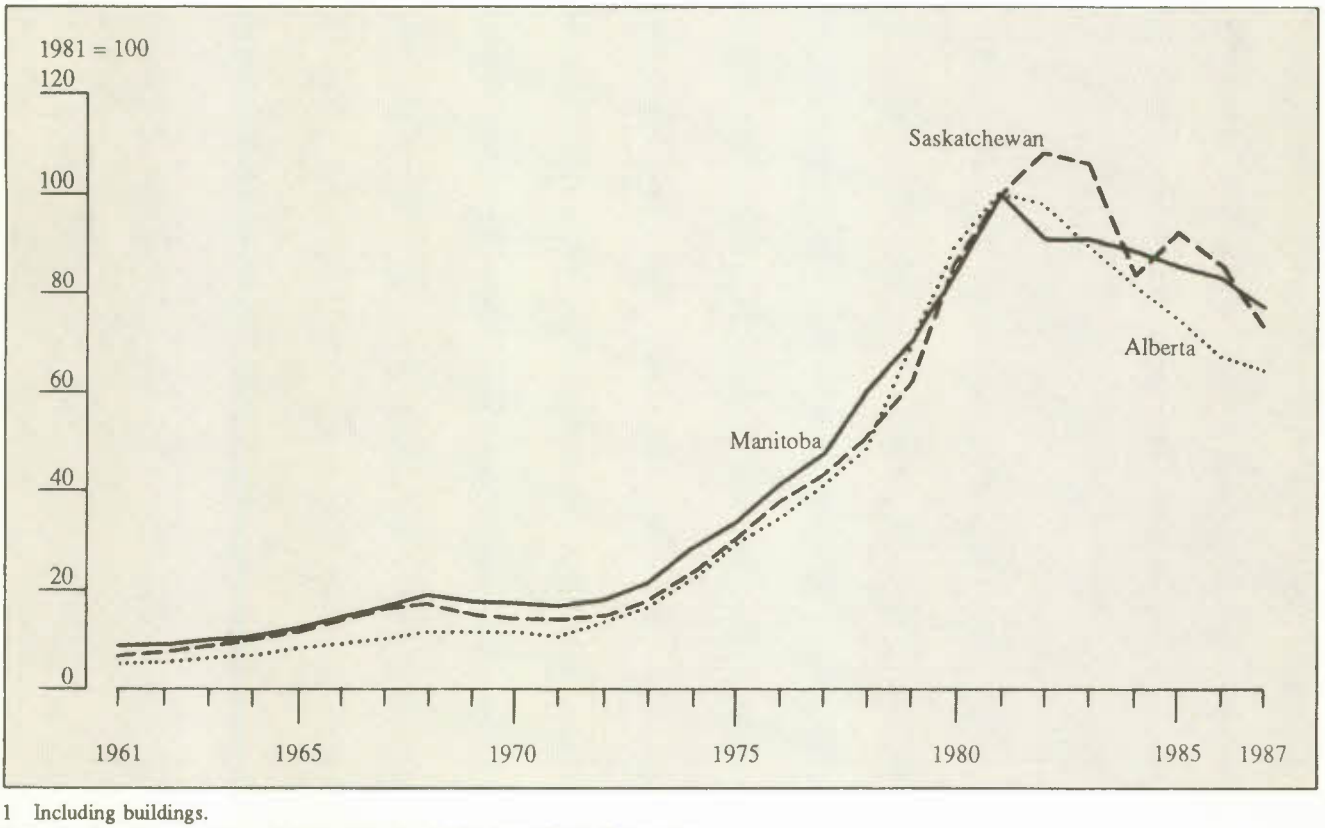
## Input Prices

Higher farm prices in the early 1970s were the signal for greater farm output. Prairie farmers reduced their summerfallow acreage and put it into crops. They purchased more fertilizer, pesticides, and herbicides to raise crop yields. They bought new and more powerful equipment to cope with the extra output. This increase in demand pushed up the prices of all farm inputs. When the prices of wheat and other crops continued to rise, many farmers tried to buy more land to capture the economies of farm size. Unlike other farm inputs, however, land was in limited supply, so that land prices rose dramatically (Chart 2-2). At a time when most people expected even higher prices for wheat and other grains, the purchase of additional land promised a substantial gain in net worth. During most of the 1970s, the annual price increases of farmland exceeded the interest rate on farm loans. Many farmers borrowed money to buy more land because they expected capital gains to exceed loan costs. Even before selling an extra bushel of grain, the newly purchased land seemed to be as good as money in the bank.

The start of the 1980s marked a turning point. Nominal interest rates were moving towards an all-time high, and real interest rates kept rising, at a time when inflationary pressures were already diminishing. The price of wheat began to decline, the psychology of the earlier years was reversed, and land values tumbled. Those who had bought land at a

**Chart 2-2**

**Price Index of Farmland per Acre,[1] Prairie Provinces, 1961-87**




1 Including buildings.

SOURCE Based on data from Statistics Canada and the Farm Credit Corporation.

high price lost part of their equity and were saddled with heavy debts.

## Cost/Price Squeeze

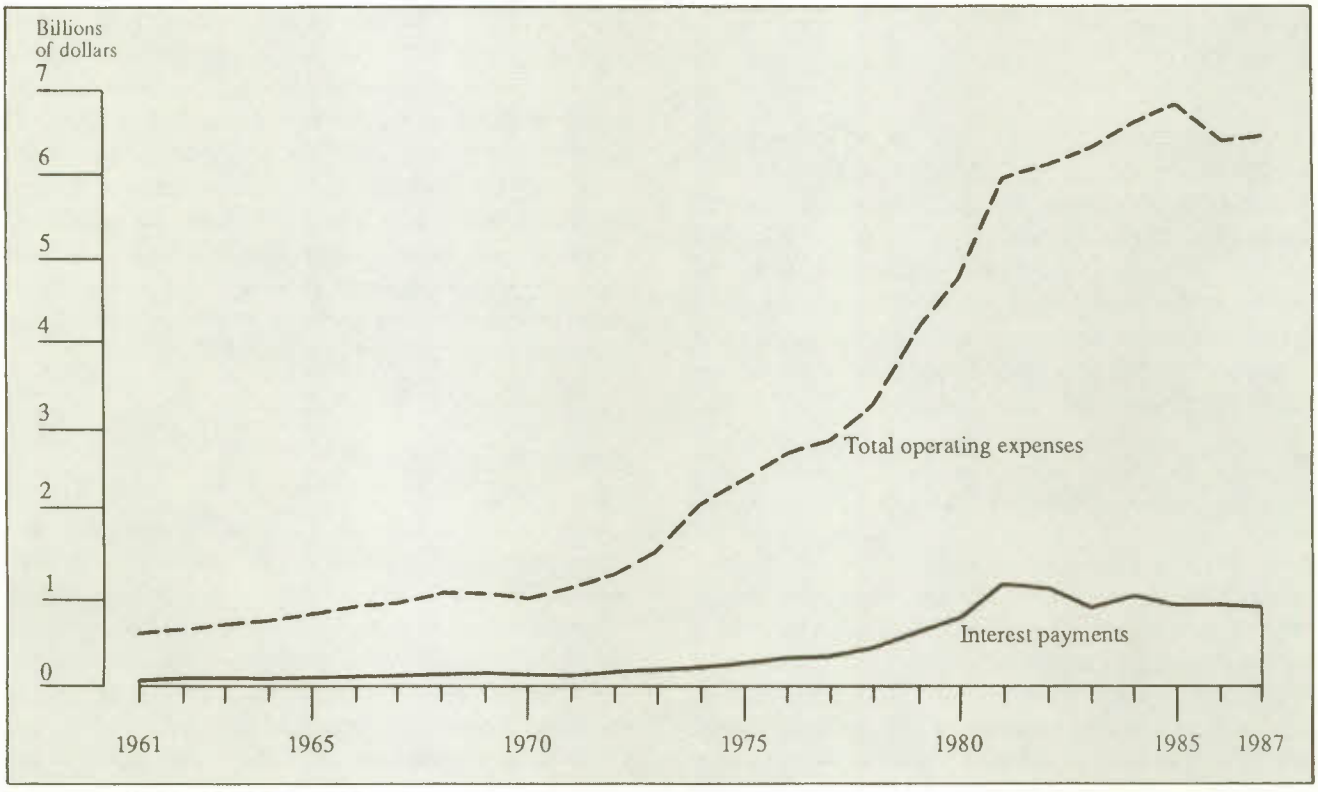
From the early 1970s to the mid-1980s, annual cash operating expenses on Prairie farms increased from roughly $1 billion to over $6 billion. Farm debt increased throughout the 1970s. The share of farm cash operating expenses accounted for by interest payments expanded until it reached nearly one fifth of the total, and then it declined when interest rates fell back in the 1980s. Since the financial returns to labour, management, and farm capital were low, the additional but unavoidable interest payments cut deeply into farm cash incomes. Interest payments increased, but total operating expenses increased even more (Chart 2-3). Thus the "debt crisis" in Prairie agriculture was only part of the problem. Lower world prices, combined with higher operating costs, put most Prairie farmers in a cost/price squeeze. Those with additional servicing costs for debt were, of course, at greater risk.

In spite of the gains in farm productivity, farm incomes today are still substantially below nonfarm incomes. Since the early 1960s, the net incomes of Prairie farm operators have, after allowance for capital costs, amounted to between 60 and 70 per cent of incomes per worker employed in other sectors of the economy. This percentage has varied over the years and from province to province: it was high during the mid-1970s and average or lower in the other years; in most years, it was higher in Saskatchewan and lower in Alberta (Chart 2-4). But these estimates include the incomes of part-time and full-time farmers, grain farmers and livestock farmers, farmers on small and large farms; not all of these categories faced the same financial problems, however. And even within each category, the problems varied. Some farmers were lucky and bought land at low prices in the early 1970s; others were not and bought it later at highly inflated prices. Some raised their own funds; others borrowed heavily.[1]

Although the financial situation varied from farm to farm, the severity of the cost/price squeeze was clearly reflected in the average income position of Prairie farmers. During the early 1980s, the average gross farm income rose from

**Chart 2-3**

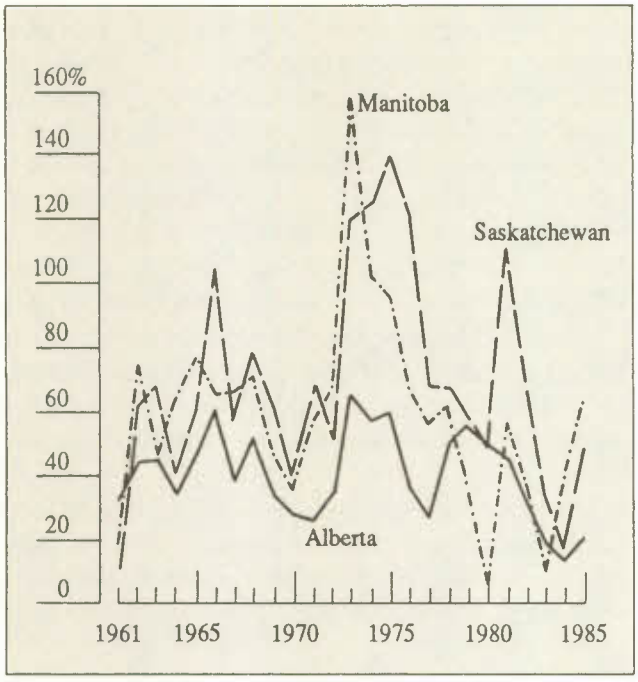
**Farm Interest Payments and Cash Operating Expenses, Prairie Region, 1961-87**




SOURCE Based on data from Statistics Canada.

Chart 2-4

**Farm Income[1] as a Proportion of Nonfarm Income, per Worker, Prairie Provinces, 1961-85**




1 Defined as the net income of farm operators from farm production, on a National Accounts basis.

SOURCE Based on data from Statistics Canada.

roughly $60,000 in 1980 to $72,000 in 1984; and then it reverted to $60,000 in 1987. Excluding all direct government subsidies, the corresponding net farm income amounted to much less – approximately $12,000 in 1980 and $10,000 in 1984. Thus, without government support, without family income from off-farm work, and without investment income or income from other sources, the average Prairie farmer in the early 1980s had only $10,000 to $12,000 left to pay for family living expenses.

## Income Decline in Recent Years

By 1987, that paltry sum had fallen below zero. A more detailed analysis of the farm financial situation of Prairie farmers, covering the years 1961-85, shows that under full-cost accounting the annual net income of farm operators was less than the average industrial wage rate (Chart 2-5). On average, farm operators earned much less than the industrial wage rate, as the unit price of farm output was well below the corresponding unit cost during most of these years (Cloutier and Wesa, 1988).

The difference between the price line and the lower cost line in Chart 2-5 illustrates what farm operators actually did receive for their labour and management inputs. Not only was that less than the average industrial wage rate in most years since 1961, but by 1985 the income of farm operators actually approached zero. And these estimates apply when the cost of land is set no higher than the rental rate of Prairie farmland – a rate that is roughly equivalent to a 4-per-cent interest rate on capital investment in farmland. At any higher rate, the farm-income estimates would have been even less favourable.

That is why some Prairie farmers who had borrowed money for the purchase of farmland at higher rates faced financial disaster. And many others were in very serious financial difficulty. Most of them managed to cope, at least temporarily, by living off the depreciation or by relying more heavily on direct government payments, on income from off-farm work, and/or on other sources of income.

## Living Off the Depreciation

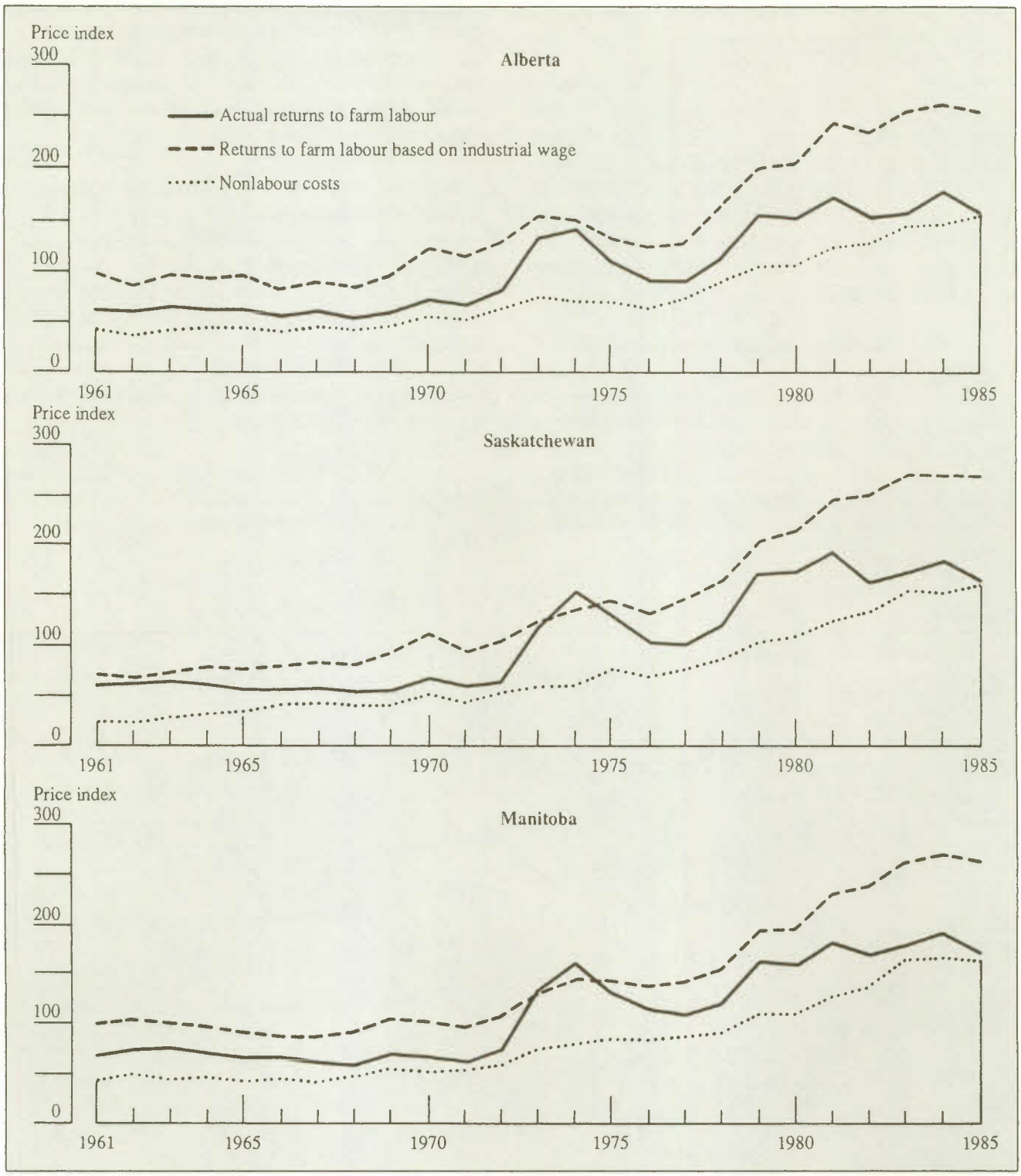
By living off the depreciation of their property, farmers were spending money that, under normal conditions, they would have set aside for the replacement of aging farm buildings and worn-out farm machinery and equipment. For example, in 1985 the total capital stock on Prairie farms (including farmland) amounted to roughly $63 billion – about $475,000 per farm operator. The allowance for depreciation on buildings and on machinery and equipment averaged approximately $12,000 per farm. Adding that amount to the 1987 net farm income of –$1,000 would have resulted in farmers having approximately $11,000 for farm living expenses, and it would have brought their net farm income close to its level of earlier years. While reliance on funds set aside for depreciation might work for one or two years, it is obviously not a viable solution for the longer run.

## Government Support

In the wake of the sharp decline in world grain prices and of the international grain price war, the Canadian government provided additional support to Prairie farmers. In 1987, direct payments under the Western Grain Stabilization Act and the Special Canadian Grains Program amounted to $2.2 billion, or roughly $17,000 per Prairie farmer. Direct and indirect payments under numerous other federal and provincial farm programs added roughly another $1.8 billion, bringing the total up to $4 billion, or about $31,000 per farmer. Thus, during the most recent years, government

## Chart 2-5

### Cost/Price Squeeze, Prairie Provinces, 1961-85[1]




1 The solid line denotes the price that the average farmer received per unit of output – e.g., the price received per bushel of wheat. The dotted line denotes his nonlabour cost per unit of output. The broken line indicates what he would have earned had he been paid, after allowing for a return on all farm capital inputs, the average industrial wage.

SOURCE J. Eden Cloutier and Lesle M. Wesa, "Aggregate provincial agricultural cost functions for the three Prairie provinces," Economic Council of Canada, Discussion Paper 352, July 1988.

support accounted for nearly all of the net farm income on Prairie farms (Chart 2-6).

## Off-Farm Income

Canadian farm families derive an increasing share of their income from off-farm sources. In the late 1940s, off-farm income accounted for less than 10 per cent of the income of farm families; by the early 1980s, that figure had risen to almost 50 per cent. For several decades, off-farm work contributed most of the increase in nonfarm income; over the past decade, however, income from nonfarm investments has increased substantially (Bollman and Smith, 1987).

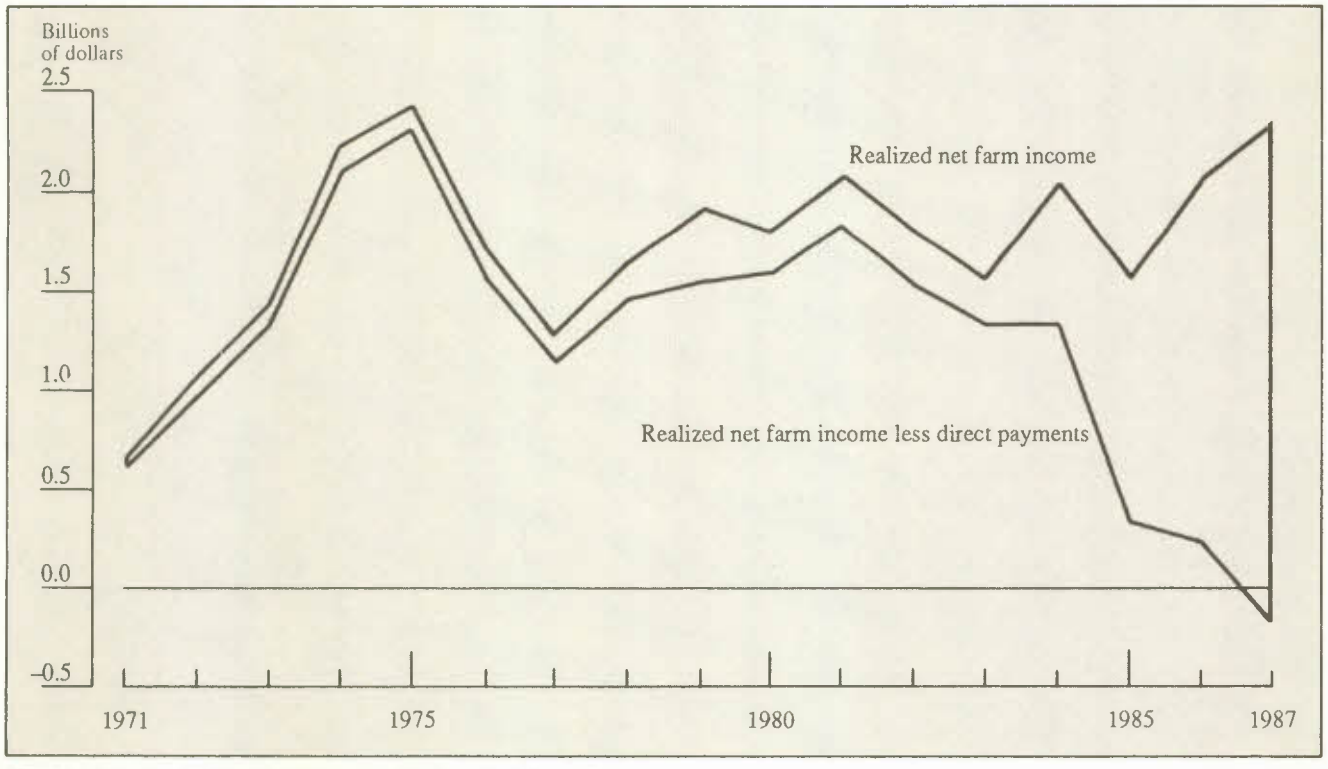
Consistent with these Canada-wide trends, off-farm income on Saskatchewan farms increased over the postwar period. Compared with the national average, however, the income of Saskatchewan farmers from nonfarm investments was less important and off-farm earnings were more important. A survey of selected communities in that province showed that in 1975, two thirds of the farm households had no family member with off-farm work; by 1987, over half of the farm households (58 per cent) had at least one member with off-farm employment. The off-farm occupations of men were mainly in the areas of processing, construction, and trade; women were mainly in the service industries – e.g., in clerical and sales occupations, and in teaching, medicine, and health care. Most of the increase in off-farm work was associated with the greater participation of women in the labour force (Smith, 1987).

By the mid-1980s, off-farm income in Saskatchewan exceeded farm income by a substantial margin. In 1985, for example, it averaged about $19,000 per farm and accounted for roughly three quarters of the farm-family income. Together, off-farm salaries and wages, as well as off-farm self-employment income, accounted for over two thirds of the farm-family income; investment income and Old Age Security payments represented one fifth; and the small remainder came mostly from family allowances and unemployment insurance benefits (Table 2-1).

Considering that even during the more favourable years from 1974 to 1984, Prairie farm income – i.e., realized net farm income less direct government payments – ranged from

**Chart 2-6**

**Direct Government Payments and Realized Net Income, Prairie Region, 1971-87**




SOURCE Estimates by the author, based on data from Statistics Canada.

**Table 2-1**

**Distribution of Off-Farm Family Income by Source, Prairie Provinces, 1985**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Wages and salaries | 62 | 61 | 65 |
| Self-employment income | 7 | 7 | 9 |
| Investment income | 14 | 16 | 13 |
| Old Age Security income | 7 | 7 | 5 |
| Retirement income | 2 | 3 | 3 |
| Family allowances | 3 | 3 | 2 |
| Unemployment insurance benefits | 3 | 2 | 2 |
| Other | 2 | 1 | 1 |
| Total | 100 | 100 | 100 |
| | | (Dollars) | |
| Off-farm and other family income | 17,231 | 18,992 | 23,847 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

$9,000 to $15,000 per year, off-farm income is a very important source of income. But it may also be a precarious source of income. Much of that income depends on the service industries of the nearby, often rural communities – e.g., schools, hospitals, and small-town stores. Their viability may depend, in turn, on the number of farm families in the surrounding farming regions. When that number declines, the need for those services diminishes, and employment opportunities may well disappear.[2]

## Adjustment Response

Historically, the changes in the prices of Prairie farm output that are associated with increased domestic consumption and greater export demand were insufficient to compensate the farmers of that region for the rise in production costs or to provide them with adequate incomes. Adjustments had to be made on the supply side.

### *Adjustments on the Farm*

Over the past two or three decades, Prairie farmers have made some major adjustments in farm production and resource use. Since 1961, for example, farm output – i.e., the constant-dollar value of farm production – increased, with substantial variations from year to year, at roughly 2.5 per cent per year, with Saskatchewan averaging somewhat lower than that figure and Manitoba somewhat higher (Table 2-2). Most of the increase came from greater crop production, with canola and barley contributing at above-average rates in all three provinces. On the livestock side, the picture was mixed: cattle and poultry contributed to greater production in Alberta, and hogs to that in Manitoba. There was little or no growth in Saskatchewan's livestock production, as the slight gains in cattle and hogs were more than offset by losses in dairy and poultry. Saskatchewan farmers opted for more crop production instead of diversifying into livestock production.

**Table 2-2**

**Growth Rates of Crop and Livestock Output,[1] Prairie Provinces, 1961-85**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Crops | | | |
| Wheat | 3.7 | 1.8 | 3.0 |
| Oats | –4.6 | .. | –1.3 |
| Barley | 9.8 | 7.7 | 5.4 |
| Canola | 15.5 | 7.3 | 10.5 |
| Rye | 5.4 | 4.3 | 2.5 |
| Flaxseed | 3.2 | –0.2 | –5.6 |
| Vegetables | 6.5 | 6.9 | 0.5 |
| Average | 4.8 | 2.6 | 3.7 |
| Livestock | | | |
| Cattle and calves | 1.5 | 0.4 | 2.1 |
| Hogs | 4.5 | 0.1 | 0.5 |
| Sheep and lambs | –2.2 | –3.6 | –3.9 |
| Milk | –1.2 | –2.4 | –0.6 |
| Poultry | 1.5 | –0.1 | 3.1 |
| Eggs | 1.6 | –2.0 | –0.2 |
| Wool, honey, and fur | 0.4 | 2.7 | 0.4 |
| Average | 1.6 | –0.1 | 1.3 |
| Crops and livestock | 3.4 | 2.0 | 2.5 |

1 Measured in 1981 constant dollars.

SOURCE Cloutier and Wesa, "Aggregate provincial agricultural cost functions."

Over the same period, Prairie farmers adjusted their resource use (Table 2-3). They invested heavily in machinery and equipment, used more fertilizer and pesticides on the expanded cropland acreage, and went deeper into debt in order to enlarge their farming operation. They also reduced their labour inputs, although most of that reduction came from the decline in the number of farm operators; the decrease in unpaid labour also contributed, to some extent.

These changes in resource use reflect the basic underlying historic trends of the substitution of (more) capital and material inputs for (fewer) labour inputs.

**Table 2-3**

**Average Annual Change in Farm Inputs, Prairie Provinces, 1961-85**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Labour | –1.4 | –2.9 | –2.2 |
| Capital | 1.8 | 1.5 | 2.1 |
| Material inputs | 5.0 | 4.1 | 4.7 |

SOURCE Cloutier and Wesa, "Agricultural cost functions."

### *Leaving the Farm*

In their attempt to keep farm incomes growing at the same rate as incomes in other sectors of the economy, Canadian Prairie farmers – not unlike farmers in other industrialized countries – improved their crop and livestock yields, mechanized their farming operations, and expanded the size of their farms. Had the adoption of new technology and expansion in farm size been without cost, they would have met that income goal. But obviously it was not. The attempt to attain the long-run income goal became a treadmill of expenses, as new farm machinery and costly farmland were purchased and as farm debts accumulated rapidly.

It is remarkable how quickly farmers respond to higher output prices and how slowly they react to greater input costs. After a decade of little change, wheat prices jumped from less than $2 per bushel in 1972 to over $4 in 1974. In response, farmers increased wheat output and kept on increasing it as wheat prices continued to rise, reaching a peak of nearly $6 per bushel in 1980. From the early 1970s to the early 1980s, Prairie farmers more than doubled wheat production, even though the real price of wheat, deflated by input prices, had already begun to decline in 1974 and continued to do so, after a weak recovery, right into the 1980s (Chart 2-7). It is as if farmers, at times of inflationary price expectations, suffered from money illusion – an affliction that bedeviled many people in other sectors of the economy as well. If so, that is one explanation why so many farmers got caught in the cost/price squeeze and were unable to cope with their expenses.

Another explanation is that leaving the farm for employment in other industries is a very difficult decision. A statistical analysis of Prairie farm employment, covering the years 1961 to 1986, shows that the structural adjustment from farm to nonfarm occupations was related to three factors: farm prices, off-farm employment opportunities, and government subsidies to agriculture. Higher farm prices and government subsidies slowed down the adjustment, while lower unemployment rates in the rest of the economy accelerated it (Serjak, 1988).

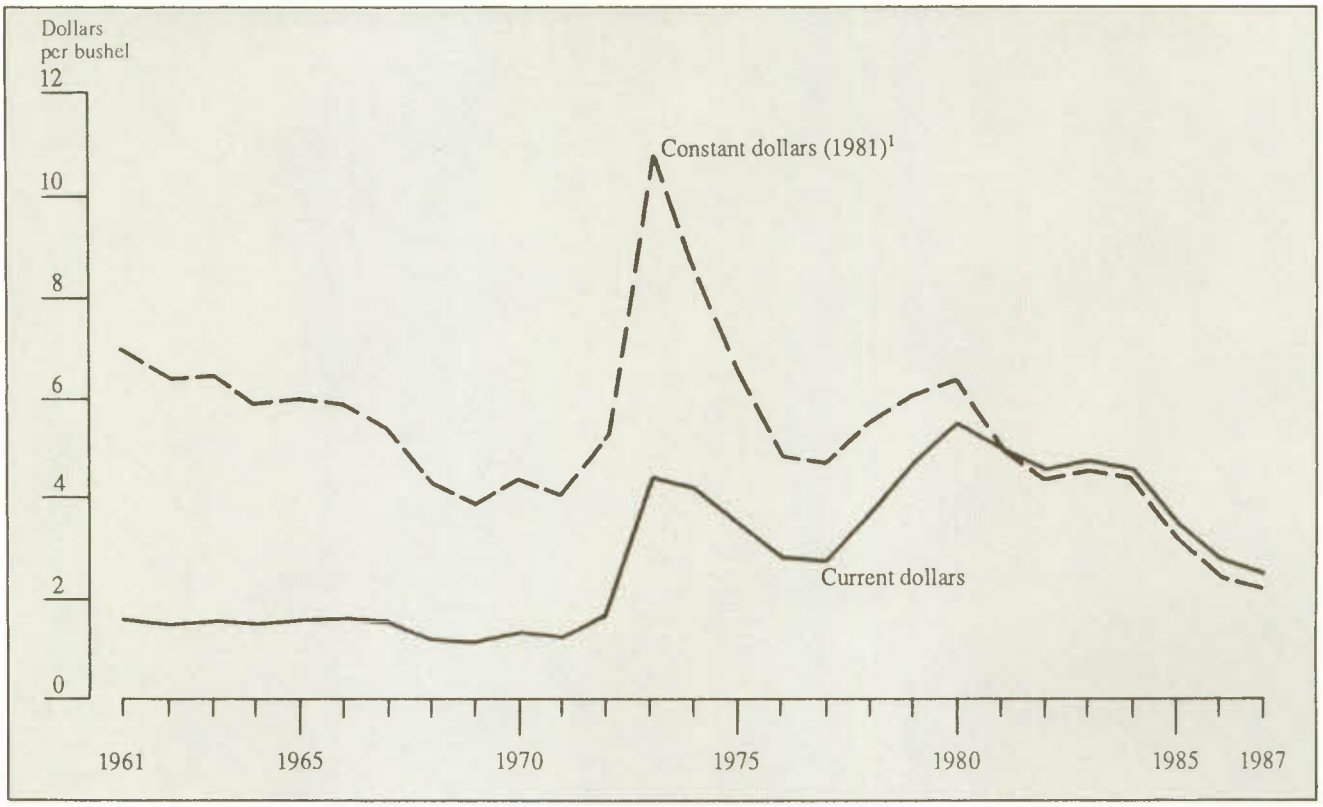
In the Prairie region – and especially in Saskatchewan – agriculture contributes in a major way to the rest of the economy. When farm prices rise, agriculture stimulates the economic activity of the province. When farm prices decline, agriculture slows down the provincial economy and adds to unemployment. That, in turn, makes it more difficult for farmers to find nonfarm work close by. Thus the time to leave the farm never seems right, neither when farm prices are up nor when they are down.

Superimposed on the free-market mechanism are government programs. Many provide farm subsidies for specific commodities. The Special Canadian Grains Program of 1987-88, for example, provided subsidies to Prairie farmers who grew specified grain crops, and offered them financial support at a time of need. At the same time, however, it also raised the cash returns to grain marketings above free-market levels, masked market signals, did not encourage farmers to diversify into livestock production, and thereby hampered resource adjustments on the farm.

Also, there is some evidence that government programs have slowed down the rate of adjustment from farm to nonfarm employment. But that is not to say that Prairie farm programs have completely blocked structural adjustment. They have not. Over the past several decades, farm employment has declined in the Prairie region at an average annual rate of 2.2 per cent, the rate being somewhat faster in Saskatchewan and somewhat slower in Manitoba. Despite this reduction, the volume of agricultural output has increased by more than 50 per cent. As older farmers retired and as many of the younger farm people found employment

**Chart 2-7**

**Wheat Prices Received by Farmers, Prairie Region, 1961-87**




1 Deflated by the farm-input price index.
SOURCE Based on data from Statistics Canada.

in other industries, much of the land was absorbed into larger farm units. It could then be operated with more powerful tractors, bigger combines, and heavier trucks. Real output increased, while farm labour inputs declined. As a result, output per unit of labour input improved at an average annual rate of nearly 5 per cent. Roughly half of that gain was associated with the reduction in farm employment, while the remainder came from productivity improvement resulting from the application of new technology and better management.

A good part of the productivity improvement could be attributed to government-funded research that was conducted at agricultural experimental stations, at universities, and in research laboratories. In large measure, that research produced higher-yielding crop and livestock strains. It made for a greater volume of output, if not for correspondingly higher incomes. By contrast, most of the structural adjustment from farm to nonfarm employment, which coincided with the expansion of the remaining farms and contributed just about as much to productivity improvements as did new production techniques, was not supported by government. Government funding was used mainly for buying time and keeping people on the farm; it was not designed to facilitate their transition to other occupations. If adjustment did take place, it was not because of any incentives offered by government but because of the strong disincentives of low and uncertain farm incomes that pushed farmers off the land.

# 3 Key Elements of Structural Change

Historically, the most important change in the industrial structure has been the employment shift from agriculture to manufacturing and to other industries. Only 100 years ago, more than three quarters of Canada's working force were engaged in farming. Today, Canada is predominantly urban, and 95 per cent of all employment is in nonfarm activities. These changes are part of a pervasive shift in the industrial structure – typical of all industrialized nations – from the primary to the secondary and tertiary sectors of production.

At the same time, the structure of agriculture itself has changed. Along with the decline in farm numbers, more farmers have shifted to part-time operations, and the number of corporate farms has multiplied. Farms have become larger, and they are now more specialized. With the expansion in farm size and the decline in farm prices during the 1980s, the farm financial situation has deteriorated, and the number of nonviable operations has risen sharply. Although the three Prairie provinces have many features in common, structural adjustments varied not only among them but also among crop districts within each of the provinces.

## Five Elements of Farm Structure

In this chapter, we look at some of the major elements of structural change. Although many others would warrant closer examination, we consider only five: farm organization; farm size; farm enterprises; farm finance; and farming regions.

Each of these structural elements will be linked to a productivity, cost, and income analysis. The structural elements will be described first, and the analysis later. (The conceptual links between the five structural elements and farm productivity, cost, and income are outlined in Appendix A.)

### *Farm Organization*

In this context, farm organization refers to the distribution of farm size and characteristics of farm ownership.

Good farm management, pride of ownership, family tradition, new technology, hard work, and an abundance of good farmland have made Canada's Prairie agriculture competitive on world markets. Over the years, farming has become more commercialized, and capital requirements have increased dramatically. A Prairie farm that cost some $40,000 in 1961 could easily have been valued at $400,000 by 1981. That makes it very difficult for anyone to get into farming, and it raises a deep concern that the family farm – once the cornerstone of Canadian agriculture – is on the way out.

Yet many believe that the postwar trend of declining farm numbers is inevitable and will continue into the future. Not only are farms expected to be fewer in number and larger in size, but there are concerns that future farms will be owned and controlled by corporations because, so the argument runs, corporations can raise the capital more easily than family farmers. And there are predictions that an alternative approach involving multiple-family ownership of larger farms, with a more business-like management style, will develop in the future. Other observers challenge this view, arguing that the economies of scale just are not there. The production costs per unit of output differ very little between a one-and-a-half section and a three-section farm, and there are no productivity gains from merging two farms into one (Ehrensaft and Bollman, 1983; Tung and Strain, 1986).

Our analysis of the data from the 1986 Census of Agriculture shows that owner-operated family farms still outnumber all other types of farms (Table 3-1). Nearly 60 per cent of all Prairie farms are family operations, with annual sales of farm products reaching close to $100,000. They are classified as *commercial* enterprises. Most of them are operated on a full-time basis by farmers aged between 35 and 64. By contrast, the large *corporate* farms account for only about 2 per cent of all farms, and even most of them are family-controlled. A large proportion of farms – nearly 40 per cent of them – are *marginal* operations. Not quite one half of the marginal farms are run by part-time farmers with annual farm sales of less than $20,000. That compares with sales of $100,000 per commercial farm and of over $500,000 per corporate farm.

In line with these enormous disparities in sales per farm unit, the sales of products from marginal farms account for less than 10 per cent of all farm sales; sales from commercial (or family) farms account for about 80 per cent, and those

**Table 3-1**

**Distribution of Farms and Farm Sales by Farm Size and by Status and Age Group of Operator, Prairie Region, 1986**

| | Number of farms[1] | | Farm sales | |
|---|---|---|---|---|
| | Number | Distribution | Average amount | Distribution of total sales |
| | | (Per cent) | (Dollars) | (Per cent) |
| Marginal farms | 50,775 | 38.0 | 16,592 | 8.6 |
| Part-time farmers | | | | |
| Aged less than 35 | 7,580 | 5.7 | 14,556 | 1.1 |
| Aged 35 to 64 | 14,835 | 11.1 | 13,169 | 2.0 |
| Full-time farmers | | | | |
| Aged less than 35 | 5,890 | 4.4 | 19,566 | 1.2 |
| Aged 35 to 64 | 22,470 | 16.8 | 18,759 | 4.3 |
| Commercial farms | 80,125 | 60.0 | 94,807 | 77.5 |
| Part-time farmers | | | | |
| Aged less than 35 | 2,925 | 2.2 | 77,875 | 2.3 |
| Aged 35 to 64 | 5,010 | 3.7 | 84,469 | 4.3 |
| Partners | | | | |
| Aged less than 35 | 9,965 | 7.5 | 95,079 | 9.7 |
| Full-time farmers | | | | |
| Aged less than 35 | 2,730 | 2.0 | 158,403 | 4.4 |
| Aged 35 to 64 | 43,260 | 32.4 | 111,747 | 49.3 |
| Elderly farmers | | | | |
| Aged 65 and over | 16,235 | 12.2 | 45,062 | 7.5 |
| Corporate farms | 2,610 | 2.0 | 522,498 | 13.9 |
| Mostly family-owned | 1,955 | 1.5 | 471,717 | 9.4 |
| Mostly owned by others | 655 | 0.5 | 674,068 | 4.5 |
| All farms | 133,510 | 100.0 | 73,424 | 100.0 |

1 The numbers of farms listed in this column exclude some 20,000 census farms. They exclude all those producers who operated on less than 10 acres of land or grew no field crops. As indicated in the text that was done to exclude market gardeners, greenhouse operators, mushroom growers, small hobby farms, and rural residences on very small acreages, all of which were considered to be atypical of Prairie farming.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

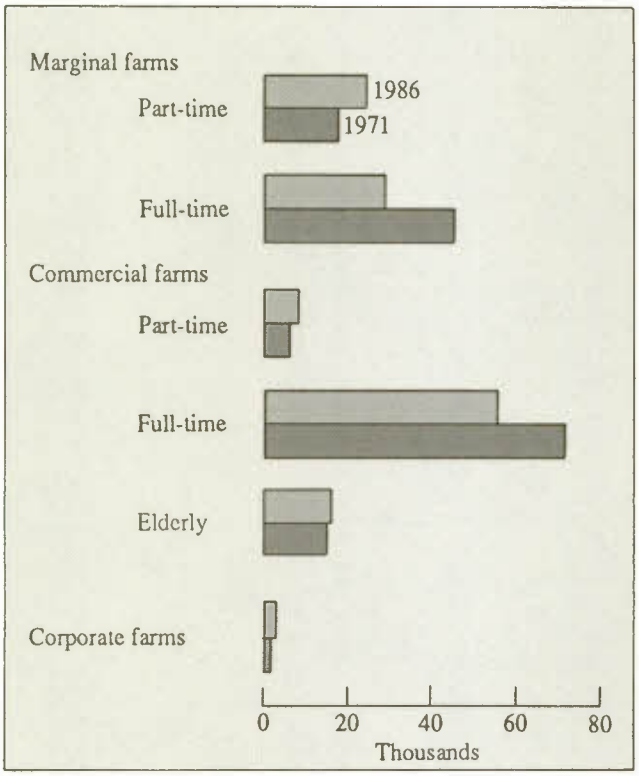
from corporate (or managerial) farms, for the remaining 10 per cent. That remainder is produced by a small number of corporate farms and exceeds the total sales volume of the numerous marginal farms.

Not included in our analysis are some 20,000 "census farms" with less than 10 acres of land and/or no field crops. That was done to exclude market gardeners, greenhouse operators, mushroom growers, small hobby farms, and rural residential properties which are not representative of Prairie farming.

The number of Prairie farmers declined over the years from roughly 159,000 in 1971 to 133,500 in 1986 – a reduction of somewhat over 15 per cent over a period of 15 years. Except for corporate farms, which actually increased in numbers, the decline was shared equally by marginal and commercial farms. There was, however, a pronounced shift towards part-time farming. By 1986, more Prairie farmers were engaged in off-farm work than ever before. Many of them were young farmers under the age of 35, and most of them operated marginal farms. Over the same time period, many farmers reached retirement age, and the number of middle-aged full-time farmers operating marginal or family farms declined sharply (Chart 3-1). We conclude from these findings, and from supporting evidence in other studies, that the adjustments in the number of farms that occurred between 1971 and 1986 came from three major sources: a

**Chart 3-1**

**Changes in the Number of Marginal, Commercial, and Corporate Farms, by Status of Operator, Prairie Region, 1971 and 1986**[1]




1 Marginal farms have below-median product sales; commercial farms have above-median product sales; and corporate farms have 103 or more weeks of labour. Part-time farmers work 97 or more days off the farm. Elderly farmers are 65 years of age or older.

SOURCE Based on data from Statistics Canada.

larger number of elderly farmers retiring; a smaller number of young farmers entering; and a substantial number of middle-aged farmers (aged between 35 and 64) leaving.

These findings lend support to the proposition that many of the medium-sized and even the larger farms are in danger of disappearing. They also lend some support to the notion that future farms will consist mainly of very small and very large units, with small farms producing very little and the few large farms producing most of the total output (Bollman and Ehrensaft 1986; Shapiro et al., 1987; Garcia et al., 1987). We shall examine later if this trend, should it continue into the future, will be towards a bimodal distribution of small and large farms.

### *Farm Size*

In the Prairie provinces, the average farm size increased from 279 acres at the turn of the century to 869 acres in 1981. Half of that increase occurred after 1951. Over the same period, the number of people employed per farm remained about the same – 1.54 persons in 1951, compared with 1.40 persons in 1981 (Bollman and Ehrensaft, 1986).

Economists have often explained the growth in farm size and the decline in farm employment in terms of the traditional theory of the firm – i.e., the substitution of capital for labour, the adoption of new technology, and the existence of economies of scale. More recently, the growth of farm size and the rate of outmigration of farm labour to nonfarm occupations have been recognized as two aspects of the same economic process (Kislev and Peterson, 1982).

As in other parts of Canada, Prairie farmers attempt to maintain their income in relation to nonfarm incomes. They do so by increasing their production through higher crop and livestock yields and/or by expanding their farm size and scale of operations. How far they can go will depend on the cost of the additional crop and livestock inputs, the purchase price of additional farmland, the price of farm machinery, their access to farm loans, interest rates, the rate of substitution of capital for labour, the opportunity cost of labour, and, of course, the farm revenue expected from the additional production. All of these factors combined explain the growth in farm size.

Not every farmer can pursue this route. It will be easier, for example, for those who inherit a debt-free family farm than for those who start from scratch. As well, some are much better farm managers than others. Yet others will find it easier to earn some extra income through off-farm work or to leave farming altogether and earn a living in other occupations.

The variations in farm size and some of the related factors are summarized in Table 3-2. They show that the average farm size in the Prairie provinces is close to 1,000 acres, with marginal farms averaging less than half that size and corporate farms being more than three times larger. Measured by the market value per acre, the land on very large farms is generally of higher quality than that on marginal farms. On marginal farms, labour inputs are much lower than on commercial and corporate farms, mainly because the farm operators are often engaged in off-farm work. The disparities in capital stock per farm are even larger: marginal farms have less than half as much capital in machinery and livestock as corporate farms; the latter, in turn, have less than half as much as large farms.

Similar to the variations in farm resources, farm-product sales range from less than $20,000 for marginal farms to $100,000 for commercial farms and to over $500,000 for

**Table 3-2**

**Selected Characteristics of Marginal, Commercial, and Corporate Farms, Prairie Provinces, 1986**

| | Manitoba | Saskatchewan | Alberta | Prairie region |
|---|---|---|---|---|
| | | (Acres) | | |
| Average farm size | 758 | 1,024 | 936 | 944 |
| Marginal | 427 | 536 | 430 | 474 |
| Commercial | 904 | 1,249 | 1,186 | 1,166 |
| Corporate | 2,350 | 3,116 | 3,766 | 3,307 |
| | | (Dollars) | | |
| Average market value per acre[1] | 342 | 338 | 412 | 366 |
| Marginal | 262 | 325 | 424 | 352 |
| Commercial | 347 | 339 | 401 | 362 |
| Corporate | 544 | 384 | 461 | 450 |
| | | (Months) | | |
| Labour inputs per farm | 12.0 | 10.6 | 12.2 | 11.4 |
| Marginal | 7.1 | 5.5 | 6.9 | 6.5 |
| Commercial | 13.8 | 12.7 | 14.4 | 13.4 |
| Corporate | 49.9 | 41.4 | 51.3 | 48.1 |
| | | (Thousands of dollars) | | |
| Capital in livestock and machinery per farm | 119 | 121 | 151 | 132 |
| Marginal | 51 | 56 | 64 | 58 |
| Commercial | 148 | 151 | 193 | 165 |
| Corporate | 494 | 392 | 643 | 540 |
| | | (Dollars) | | |
| Agricultural products sold per farm | 79,420 | 63,686 | 82,414 | 73,424 |
| Marginal | 16,488 | 18,368 | 14,848 | 16,592 |
| Commercial | 101,424 | 83,717 | 106,947 | 94,807 |
| Corporate | 557,457 | 299,496 | 640,995 | 522,498 |

1 Including buildings.
SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

corporate farms. There are variations between the three provinces, but in general the overall pattern of farm size, land value, labour, capital, and farm-product sales prevails in all three.

Later on, we shall examine the variations in sales volume, productivity, production costs, and farm revenues between different-sized farms. Our analysis should tell us whether there are constant or increasing returns to scale and whether the trend towards larger farms is simply a question of capital/labour substitution or whether other factors are involved.

### *Farm Enterprises*

Nearly two decades ago, a federal task force observed that the predominance of wheat production in the Prairie provinces made farmers in that region extremely vulnerable to the vagaries of the climate and to changing market prices. A massive carry over of grains, an acute shortage of cash among farmers, and a deteriorating market outlook required quick action. It was agreed at that time that something should be done immediately to meet the crisis. But it was also agreed that the emergency programs should not become the basis for longer-term Prairie grain policies (Federal Task Force on Agriculture, 1969).

The task force made numerous policy recommendations, ranging from a set of marketing guidelines for the Canadian Wheat Board to the establishment of a "Prairie grain price stabilization program." As well, immediate government assistance was to be provided for the reduction of wheat and barley acreage under a transitional adjustment program. The task force advocated greater diversification into livestock production. It asserted that more feeder cattle could be produced if several million acres of Prairie cropland were

converted to tame hay and grassland. It also stated that feed grains could be marketed through hogs, provided Prairie farmers could compete with U.S. farmers. No consensus was reached on whether they could successfully compete, because it was not clear what could be done if the U.S. government imposed tariffs or erected other trade barriers against Canadian imports. Nor was it clear whether Canada could duplicate the remarkable export performance of Denmark and the Netherlands. Their success was attributed to efficiency in production and to excellent market development and merchandising, but no comparative analysis of the different production and marketing systems was made.

Many of the recommendations of the task force were implemented, and the federal government did offer incentives to grain farmers to reduce their wheat acreage under the Lower Inventory for Tomorrow (LIFT) program. That reduced Canada's wheat acreage from 24 million in 1969 to 12 million in 1970. After one year, however, the LIFT program was discontinued. As the Soviet Union had sharply increased its imports, the glut on world markets disappeared, and the world prices of grains recovered and even exceeded earlier levels.

Prairie farmers expanded hog production in the early 1970s and cattle production during the mid-1970s and then cut back again in later years. Instead of continuing to expand livestock production, they went back to wheat production. Between 1971 and 1981, Manitoba farmers increased their wheat acreage by some 50 per cent, while Saskatchewan farmers nearly doubled theirs. They followed market signals, producing as much wheat as they could and making handsome profits. If they had followed earlier recommendations and produced more livestock, they would have gained less during the 1970s, but they would also have lost less during the 1980s.

By the mid-1980s, Prairie farmers had invested about one quarter of their operating capital (excluding land) and operating expenditures in livestock. Marginal farmers spent less on livestock than commercial or corporate farmers, in part because off-farm work prevented them from concentrating on livestock. Alberta farmers invested more in livestock than their Manitoba or Saskatchewan counterparts (Table 3-3).

### *Farm Finance*

After a period of relative prosperity during the 1970s, the combined effects of low grain prices, high interest rates and limited cash flows, lower land prices, and less equity generated financial stress in the grain economy of the western provinces, especially among the highly leveraged producers. No single financial indicator can adequately describe the extent of the farm financial problems, but various measures can provide a first impression of the magnitudes involved.

Farm cash expenditures account for roughly 80 per cent of cash receipts from farm-product sales. In 1985, for example, Prairie farmers retained some 20 cents per dollar of sales to cover the cost of depreciation on farm machinery and their living expenditures. On marginal farms, the cash expenditures actually exceeded the cash receipts by 15 per cent, and

**Table 3-3**

**Selected Livestock Data for Marginal, Commercial, and Corporate Farms, Prairie Provinces, 1986**

| | Manitoba | Saskatchewan | Alberta | Prairie region |
|---|---|---|---|---|
| | | (Per cent) | | |
| Livestock as a proportion of operating capital[1] | 24 | 17 | 31 | 24 |
| Marginal | 30 | 18 | 29 | 25 |
| Commercial | 22 | 16 | 29 | 22 |
| Corporate | 28 | 27 | 44 | 37 |
| Livestock expenditure as a proportion of total operating expenditures | 18 | 11 | 31 | 21 |
| Marginal | 12 | 6 | 14 | 11 |
| Commercial | 17 | 11 | 27 | 19 |
| Corporate | 27 | 23 | 51 | 42 |

1 The operating capital includes capital stock in farm machinery, equipment, and livestock but excludes land and buildings.
SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

farmers had to make up the difference from other sources of income. The debt load ranged from an estimated $35,000 on marginal farms to nearly $300,000 on corporate farms. Roughly two thirds of all farmers reported interest payments on debt. The proportions of farmers reporting debt were smaller for marginal farms and larger for corporate farms. Correspondingly, annual interest payments were lowest on marginal farms and highest on corporate farms. The debt/asset ratio, however, was highest on commercial farms (Table 3-4).

Although these data give an indication of the magnitude of farm financial transactions and of the debt load of Prairie farms, they do not measure the overall financial stress experienced by farm operators. To quantify that, it will be necessary to provide more information on the distribution of debt/asset ratios among farms, on liquidity ratios, and on the ability of farmers to service the debt. That kind of information and comprehensive analysis of the financial stress and vulnerability of Prairie farms will be provided later.

### *Farming Regions*

The Prairie region, which extends from the western tip of the Great Lakes to the Rocky Mountains, has a continental climate, with cold winters, short summers, and sparse precipitation. It contains three quarters of Canada's farmland. Its climate and soils favour the production of high-quality,

**Table 3-4**

**Selected Financial Characteristics of Marginal, Commercial, and Corporate Farms, Prairie Provinces, 1986**

| | Manitoba | Saskatchewan | Alberta | Prairie region |
|---|---|---|---|---|
| | | (Per cent) | | |
| Farm cash expenditures as a proportion of farm sales | 82 | 79 | 87 | 83 |
| Marginal | 109 | 105 | 130 | 115 |
| Commercial | 79 | 76 | 82 | 79 |
| Corporate | 84 | 84 | 89 | 87 |
| | | (Dollars) | | |
| Debt of farms reporting interest payments[1] | 78,814 | 84,387 | 95,053 | 87,282 |
| Marginal | 26,987 | 37,815 | 34,753 | 34,806 |
| Commercial | 96,143 | 101,763 | 118,679 | 106,488 |
| Corporate | 244,469 | 242,867 | 335,629 | 288,801 |
| | | (Per cent) | | |
| Proportion of farms reporting interest payments on debt | 68 | 70 | 67 | 69 |
| Marginal | 56 | 61 | 57 | 59 |
| Commercial | 75 | 74 | 74 | 74 |
| Corporate | 85 | 83 | 81 | 82 |
| | | (Dollars) | | |
| Annual interest payments of farms with debt | 9,852 | 10,548 | 11,882 | 10,910 |
| Marginal | 3,373 | 4,727 | 4,334 | 4,351 |
| Commercial | 12,018 | 12,720 | 14,835 | 13,311 |
| Corporate | 30,559 | 30,358 | 41,954 | 36,100 |
| | | (Per cent) | | |
| Debt/asset ratio | 30 | 26 | 26 | 27 |
| Marginal | 24 | 24 | 20 | 23 |
| Commercial | 30 | 26 | 27 | 27 |
| Corporate | 20 | 23 | 22 | 22 |

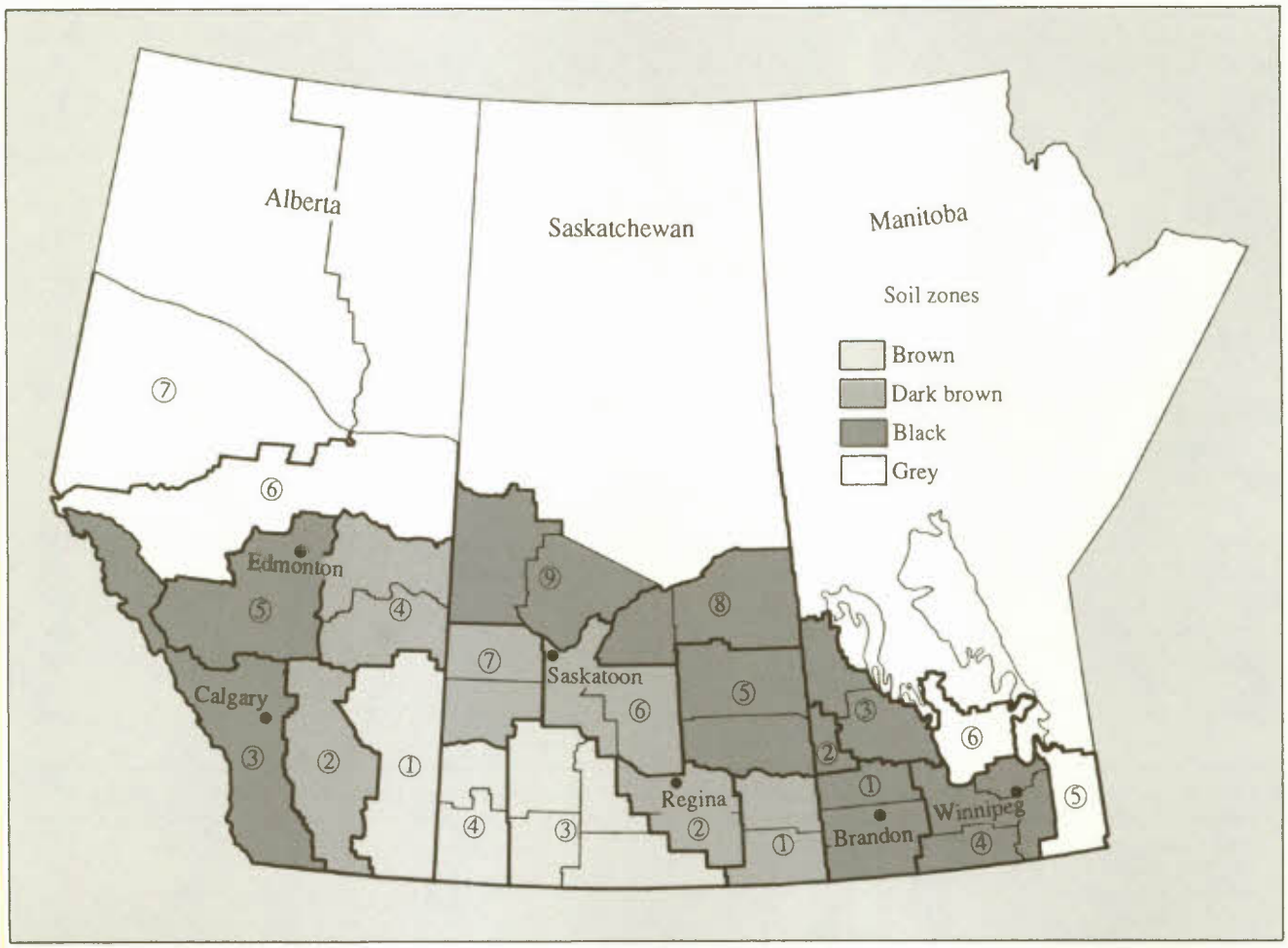
1 Debt estimates are based on the annual interest payments of farms; the average interest rate of all loans is set at 12.5 per cent.
SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

hard spring wheat. Of the three provinces, Manitoba has the highest rainfall – a factor that results in more varied farming. Wheat and other grains predominate, but rapeseed, vegetables, sunflowers, and sugar beets are also grown. Two thirds of Canada's wheat as well as large quantities of other grains are grown on Saskatchewan farmland, aided by light spring rainfall and long sunny days. Rapeseed is becoming more popular; in some regions, irrigation assists vegetable and forage production. Alberta is second only to Saskatchewan in grain production and exceeds all other provinces in beef cattle production.

Regional variations within provinces are substantial, despite a fairly uniform climate, large areas of similar soil quality, and concentration on the same crops. To analyse those differences, we divided the three Prairie provinces into 22 districts – seven in Alberta, nine in Saskatchewan, and six in Manitoba – according to their long-term characteristics with respect to weather and crop yields (Wisner, 1988). The districts could also be fairly readily aligned with the four major soil zones found in the southern regions of the three provinces: the brown-soil zone in southeastern Alberta and southwestern Saskatchewan; the dark-brown-soil zone surrounding it to the north; the black-soil zone surrounding those two zones in rainbowlike fashion, from western Alberta through central Saskatchewan and most of Manitoba; and finally, the grey-soil zone, reaching from northern Alberta and Saskatchewan to northern and eastern Manitoba.

In Manitoba, grain farms are located mostly in the black-soil zones of the central and western regions of the province, while livestock farms are mainly found in the grey-soil areas

**Subprovincial Farm-Production Regions and Soil Zones in the Prairie Provinces**




NOTE The numbers denote subprovincial farming regions and correspond to those listed in Tables 3-5, 3-6 and 4-6.

east of the Red River and in the Interlake Region (between Lake Winnipeg and Lake Manitoba). Mixed grain/livestock farms are more heavily concentrated in the western and southern regions of Manitoba than in the central region. In Saskatchewan, grain farming dominates in all regions. Mixed farms are somewhat more numerous in the southeastern region along the Manitoba border, while livestock farms more frequent in the brown-soil areas of the southwestern region and the grey-soil zones of the northwestern region, along the border of Alberta. Similarly, in Alberta, livestock farms are more heavily concentrated in the brown- and grey-soil areas along the Rocky Mountains. But further north, in the Peace River Valley, the grain farms dominate again (Table 3-5).

**Table 3-5**

**Distribution of Farms in Each Farming Region by Type, Prairie Provinces, 1986**

| | | Type of farm[1] | | | | |
|---|---|---|---|---|---|---|
| | Soil zone[2] | Grain | Livestock | Specialty | Mixed | Total |
| | | | | (Per cent) | | |
| Prairie region | | 57 | 18 | 6 | 19 | 100 |
| Manitoba: | | 54 | 17 | 9 | 20 | 100 |
| Region #1 | B | 57 | 13 | 6 | 24 | 100 |
| #2 | B | 56 | 12 | 6 | 26 | 100 |
| #3 | B | 59 | 18 | 5 | 18 | 100 |
| #4 | B | 57 | 14 | 11 | 18 | 100 |
| #5 | G | 34 | 34 | 17 | 15 | 100 |
| #6 | G | 28 | 44 | 11 | 17 | 100 |
| Saskatchewan: | | 71 | 8 | 2 | 19 | 100 |
| Region #1 | DBR | 62 | 11 | 2 | 25 | 100 |
| #2 | DBR | 80 | 4 | 3 | 13 | 100 |
| #3 | BR | 73 | 6 | 1 | 20 | 100 |
| #4 | BR | 62 | 16 | 1 | 21 | 100 |
| #5 | B | 71 | 7 | 2 | 20 | 100 |
| #6 | DBR | 72 | 7 | 4 | 17 | 100 |
| #7 | DBR | 74 | 7 | 1 | 18 | 100 |
| #8 | B | 75 | 7 | 3 | 15 | 100 |
| #9 | B | 62 | 15 | 3 | 20 | 100 |
| Alberta: | | 42 | 30 | 8 | 20 | 100 |
| Region #1 | BR | 44 | 26 | 2 | 28 | 100 |
| #2 | DBR | 53 | 20 | 7 | 20 | 100 |
| #3 | B | 28 | 47 | 8 | 17 | 100 |
| #4 | DBR | 51 | 18 | 4 | 27 | 100 |
| #5 | B | 29 | 43 | 13 | 15 | 100 |
| #6 | G | 32 | 41 | 8 | 19 | 100 |
| #7 | G | 61 | 16 | 9 | 14 | 100 |

1 Farms are defined as either grain or livestock farms when at least two thirds of their sales are derived from grain or from livestock. Dairy and vegetable farms are treated as specialty farms. Farms producing both grains and livestock are defined as mixed farms when over one third, and less than two thirds, of their sales come from either grain or livestock.

2 BR = brown soil.
DBR = dark-brown soil.
B = black soil.
G = grey soil.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

There are also varying degrees of diversification in the use of cropland among subprovincial districts. A statistical analysis of cropland use broadly confirms that Saskatchewan's agriculture is more specialized than that of either Alberta or Manitoba. As well, it shows that in some of the subprovincial regions, grain farming makes for highly specialized land use, especially in southern Saskatchewan, and mixed farming for a more diversified land use, especially in central and southern Manitoba (Table 3-6). The correspondence between the different farm types and the diversification of land use among the farming regions is quite tenuous, however. Indeed, in some of the livestock-producing regions, cropland use is less diversified than in the grain-producing regions.

This suggests that diversification from grain to livestock farming may lead to a greater diversity of farming operations but does not necessarily lead to a greater diversity of field crops. More significantly, it illustrates that there is no strict one-to-one correspondence between the various soil zones, types of farming, and cropland uses. In all likelihood, the measures of regional variation vary with other characteristics at the subprovincial level. We shall explore them further in subsequent chapters.

**Table 3-6**

**Degree of Specialization in Cropland Use,[1] by Type of Farm, Prairie Provinces and Farming Regions, 1986**

| | | Type of farm[2] | | | |
|---|---|---|---|---|---|
| | Total | Grain | Livestock | Mixed | All types |
| | | | (Per cent) | | |
| Manitoba: | 27 | 37 | 24 | 24 | 25 |
| Region #1 | 39 | 31 | 28 | 30 | 33 |
| #2 | 35 | 48 | 36 | 27 | 30 |
| #3 | 34 | 56 | 40 | 25 | 27 |
| #4 | 23 | 41 | 34 | 21 | 24 |
| #5 | 24 | 41 | 35 | 21 | 24 |
| #6 | 21 | 63 | 39 | 20 | 28 |
| Saskatchewan: | 36 | 49 | 20 | 39 | 37 |
| Region #1 | 69 | 33 | 32 | 46 | 56 |
| #2 | 79 | 35 | 31 | 54 | 72 |
| #3 | 83 | 37 | 35 | 60 | 74 |
| #4 | 86 | 35 | 34 | 49 | 62 |
| #5 | 41 | 31 | 28 | 37 | 39 |
| #6 | 61 | 33 | 32 | 43 | 53 |
| #7 | 61 | 38 | 30 | 45 | 55 |
| #8 | 25 | 27 | 26 | 23 | 24 |
| #9 | 33 | 36 | 26 | 26 | 28 |
| Alberta: | 32 | 39 | 30 | 29 | 27 |
| Region #1 | 76 | 35 | 29 | 51 | 54 |
| #2 | 50 | 31 | 22 | 38 | 41 |
| #3 | 38 | 39 | 42 | 36 | 32 |
| #4 | 32 | 34 | 33 | 29 | 28 |
| #5 | 36 | 46 | 48 | 35 | 35 |
| #6 | 33 | 52 | 52 | 36 | 36 |
| #7 | 28 | 50 | 22 | 24 | 24 |

1 The percentage estimates of this table are Herfindahl indexes, measured as the sums of the squared proportions of individual component values, multiplied by 100. In this case, the component values consist of the cropland proportions for 10 crops: wheat, other grains, canola, other oilseeds, potatoes, sugar beets, peas and lentils, vegetables, other special crops, and tame hay. A low percentage value implies crop diversification; a high value indicates crop specialization.

2 Farms are defined as either grain or livestock farms when at least two thirds of their sales are derived from grain or from livestock. Dairy and vegetable farms are treated as specialty farms. Farms producing both grains and livestock are defined as mixed farms when over one third, and less than two thirds, of their sales come from either grains or livestock.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

# 4 The Magnitude of the Farm Financial Crisis

In Chapters 2 and 3, we examined some of the long-run trends and some structural characteristics of Prairie agriculture. In this chapter, we look at the extent to which the impact of the current farm crisis varied with the different structural characteristics of Prairie farms in 1985 and 1987 – that is, how it varied between small and large farms, between full-time and part-time farmers, between beginning and retiring farmers, between crop and livestock farms, between provinces and between regions (or farming districts) in the same province. We focus our analysis on the financial situation of the farm.

## Previous Surveys

Both the Farm Credit Corporation (FCC) and Agriculture Canada have estimated the number of farms in financial difficulty by focusing on debt-servicing capacity. Both sets of estimates were based on surveys – the FCC estimates, on a survey of farm borrowers; and the Agriculture Canada estimates, on a survey of lenders. The results of the two surveys differed, in part because different definitions and different criteria were used.

The FCC defined a farmer as financially "insolvent" if 40 per cent or more of his farm sales were used to service debt, if borrowing exceeded investment by 10 per cent, or if equity was less than 15 per cent. A farmer was classified as being "in cash-flow difficulty" if 25 to 40 per cent of farm sales were used to service debt, if borrowing exceeded investment by 5 per cent, or if equity was between 15 and 40 per cent. All other farmers were considered "stable" (House of Commons Standing Committee on Agriculture, 1987, p. 10). The FCC estimates were based on some 4,000 records from the 1984 Farm Survey, which was later updated to reflect financial conditions in January 1987.

Agriculture Canada grouped farm borrowers into three categories: nonviable, deteriorating, and financially vulnerable. "Nonviable" farms were considered insolvent when creditors had initiated or intended to initiate demand for payment; "deteriorating" farms were expected to be in a nonviable position within two years; and financially "vulnerable" farms had fallen into payment arrears but were expected to continue as viable operations.

The Agriculture Canada estimates were derived from a March 1986 survey of agricultural lenders and involved contacting regional representatives of the Farm Credit Corporation, provincial credit agencies, and the commercial banks. Definitions of farmers in financial difficulty were discussed with them; and percentage estimates of the number of farmers in the nonviable, deteriorating, and vulnerable categories were established in consultation with those representatives. Many of the latter based their estimates on the premise that all nonperforming accounts were in financial difficulty. Some adjustments were made for double counting, as the survey indicated a number of farm borrowers with multiple accounts.

Both surveys showed that most Prairie farmers were financially "stable" and were not in difficulty. According to the FCC estimates, 60 to 80 per cent of all farmers had no serious financial problems; 20 to 30 per cent had cash-flow difficulties; and 5 to 10 per cent were "insolvent." The Agriculture Canada estimates were more favourable: only 10 to 15 per cent were considered to be in financial difficulty, and only 2 to 3 per cent were in "nonviable" situations. In part, these variations stem from differences in survey techniques or in definitions. It appears that the situations defined by Agriculture Canada as deteriorating and nonviable correspond roughly to the "insolvent" category of the FCC estimates. In both surveys, that category is in the 5- to 10-per-cent range (Table 4-1).

## Estimates Based on Census Data

Our own estimates fall somewhere between those two sets of results. In addition, they provide, for the first time, a detailed view of the financial stress experienced by Prairie farmers, by type and size of farm, by farming region, and by province. As well, they show how productivity performance is related to financial stress. To arrive at such estimates, we used data from the 1986 Census of Agriculture and projected them, in combination with Statistics Canada's data on annual taxation statistics, to 1987. We assessed the magnitude of farm financial difficulties of the Prairie region as they existed in 1985 and in 1987 by grouping 133,500 individual census farms into 20 categories, according to their debt/asset and liquidity ratios. At the same time, we grouped them into

**Table 4-1**

**Distribution of Farm Borrowers by Financial Status, Prairie Provinces, 1986 and 1987 – Estimates by the Farm Credit Corporation and Agriculture Canada**

| | Manitoba | Saskat-chewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Farm Credit Corporation | | | |
| Stable | 76.3 | 60.3 | 67.9 |
| Cash-flow difficulty | 18.3 | 28.3 | 22.2 |
| Insolvent | 5.4 | 11.4 | 9.9 |
| Total | 100.0 | 100.0 | 100.0 |
| Agriculture Canada | | | |
| Stable | 87.3 | 86.0 | 85.7 |
| Financially vulnerable | 6.5 | 6.3 | 6.6 |
| Deteriorating | 3.8 | 5.3 | 4.7 |
| Nonviable | 2.4 | 2.4 | 3.0 |
| Total | 100.0 | 100.0 | 100.0 |

SOURCE Canada, House of Commons Standing Committee on Agriculture, *Farm Input Costs*, June 1987, pp. 10 and 11.

four type categories (crop, livestock, mixed and specialty farms), into three size categories (small marginal farms, medium-sized commercial farms, and large corporate farms), as well as into regions within each of the three Prairie provinces. (The procedures used to estimate financial stress are described in Appendix B.)

## Financial Stress in 1985

According to our analysis, 77 per cent of Prairie farmers were in a financially stable condition in 1985, while 23 per cent (close to 30,000) were in some financial difficulty (Table 4-2). Farm situations were considered "stable" when, after payment of farm cash expenditures and of interest and principal on debt, sufficient family income was left to cover basic family living expenses. In all cases, the critical level of such expenses was set at $14,000 per year – a level that corresponds roughly to the low-income cutoff point adopted by Statistics Canada for families living in rural areas. On that basis, over three quarters of all Prairie farms were financially stable in 1985; Alberta's share was somewhat larger than the average, whereas the Manitoba share was smaller. As for the degree of financial stress, it varied. Farm situations were considered "vulnerable" when family income, aside from withdrawal of savings, was not quite enough to meet basic family expenses; 10 per cent of all farms fell into that category. Farm situations were considered "deteriorating" when very little cash income was left for basic expenses, as was the case for 9 per cent of the farmers surveyed. When farm expenses actually exceeded the family income and/or the farm debt was too high relative to assets, a farm was considered "nonviable"; that happened in 4 per cent of all cases – again less frequently in Alberta than in Saskatchewan or Manitoba.

**Table 4-2**

**Distribution of Farms by Financial Status, Prairie Provinces, 1985 and 1987**

| | Manitoba | Saskat-chewan | Alberta | Prairie region |
|---|---|---|---|---|
| | | (Per cent) | | |
| All farms, 1985 | | | | |
| Stable | 73 | 75 | 81 | 77 |
| Vulnerable | 12 | 10 | 8 | 10 |
| Deteriorating | 10 | 10 | 7 | 9 |
| Nonviable | 5 | 5 | 3 | 4 |
| Total | 100 | 100 | 100 | 100 |
| All farms, 1987 | | | | |
| Stable | 67 | 72 | 74 | 72 |
| Vulnerable | 12 | 11 | 9 | 10 |
| Deteriorating | 8 | 8 | 7 | 8 |
| Nonviable | 13 | 9 | 10 | 10 |
| Total | 100 | 100 | 100 | 100 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

## The Crisis of 1987

Although grain prices were already down in 1985, they dropped to disastrous levels in 1987. Measured in real terms, they fell to their lowest point in over 50 years. As a result, the number of farms in financial difficulty increased sharply – from 23 per cent in 1985 to 28 per cent in 1987; the proportion of nonviable operations jumped from 4 to 10 per cent. Despite the important contribution of nonfarm and off-farm sources of income, in 1987 farm cash expenditures exceeded total farm-family income on one out of every 10 Prairie farms. Living expenses on these nonviable farms could not be met from cash income but had to be financed

from past savings, new loans, or government relief. Even on the financially deteriorating farms – the next group, with somewhat lower debts relative to assets – farm cash expenses exceeded, on average, the farm-family income.

## Financial Stress and Farm Size

In 1985, nearly 60 per cent of all Prairie farms were commercial-size operations, with annual farm product sales averaging close to $100,000. Most of them were operated by full-time farmers, ranging in age from 35 to 64 years. Practically all of the remaining farms were small marginal operations. About one half were full-time operations, while the others were run by part-time farmers, with annual farm sales of less than $20,000. In addition, there was a small percentage (not quite 2 per cent) of large corporate farms with sales averaging $500,000. Although incorporated, they were mostly family-owned and -operated.

The commercial farms produced over 80 per cent of total farm sales. The remaining sales were split almost equally between marginal and corporate farms. The smaller farms, which represented almost 40 per cent of all units, produced no more than corporate farms, which represented only 2 per cent of all farming operations.

We might expect that it was the families operating marginal farms who experienced the most serious financial difficulties and who lived in the most straitened circumstances. That was not so. Indeed, our analysis shows that those who held off-farm jobs and operated marginal farms on a part-time basis were less affected by the farm crisis than their counterparts operating commercial farms. Commercial farmers, part-time and full-time, were in much greater difficulty. Their sales were, on average, five times as large as those of marginal farms, but they had borrowed more heavily and were now burdened by heavy interest payments. Among them, the young beginning farmers were the hardest-hit. In 1985, almost every second farmer below the age of 35 was in some financial difficulty; one in 10 had, after payment of interest, no cash income left to meet family living expenses. By contrast, very few farmers over the age of 65 had financial problems (Table 4-3).

By 1987, the situation had deteriorated further and nearly every third farmer was in financial difficulty. Among marginal farm operators, middle-aged part-time farmers (aged 35 to 64) were the least affected; young full-time farmers were the hardest-hit. Among commercial farm operators, middle-aged full-time farmers and elderly farmers fared better than the younger ones. Every second farmer under the age of 35 was in financial difficulty, whether working full-time or part-time, independently or as a partner. Roughly every fifth or sixth farmer in this group was in a nonviable financial situation. Only the young part-time operators of marginal farms did better.

Many marginal farmers avoided financial crisis because they relied more heavily on off-farm income and because they did not have easy access to bank loans in earlier years and thus carried little or no debt. Older farmers went unscathed because they had not borrowed much for further expansion.[1]

**Table 4-3**

**Proportion of Marginal, Commercial, and Corporate Farms in Financial Difficulty, by Status and Age Group of Operator, Prairie Region, 1985 and 1987**

| | In difficulty[1] | | Nonviable | |
|---|---|---|---|---|
| | 1985 | 1987 | 1985 | 1987 |
| | (Per cent) | | | |
| Marginal farms | 19 | 27 | 5 | 12 |
| Part-time farmers | | | | |
| Aged less than 35 | 22 | 29 | 5 | 9 |
| Aged 35 to 64 | 8 | 13 | 2 | 4 |
| Full-time farmers | | | | |
| Aged less than 35 | 40 | 47 | 14 | 23 |
| Aged 35 to 64 | 19 | 31 | 5 | 15 |
| Commercial farms | 25 | 28 | 3 | 9 |
| Part-time farmers | | | | |
| Aged less than 35 | 46 | 51 | 9 | 14 |
| Aged 35 to 64 | 26 | 31 | 4 | 8 |
| Partners | | | | |
| Aged less than 35 | 50 | 52 | 9 | 15 |
| Full-time farmers | | | | |
| Aged less than 35 | 42 | 44 | 7 | 14 |
| Aged 35 to 64 | 23 | 25 | 2 | 8 |
| Elderly farmers | | | | |
| Aged 65 and over | 9 | 16 | 2 | 6 |
| Corporate farms | 29 | 36 | 6 | 16 |
| Family-owned | 26 | 33 | 3 | 12 |
| All others | 36 | 46 | 12 | 27 |
| All farms[2] | 23 | 28 | 4 | 10 |

1 Includes all farmers in a financially vulnerable, deteriorating, or nonviable situation.

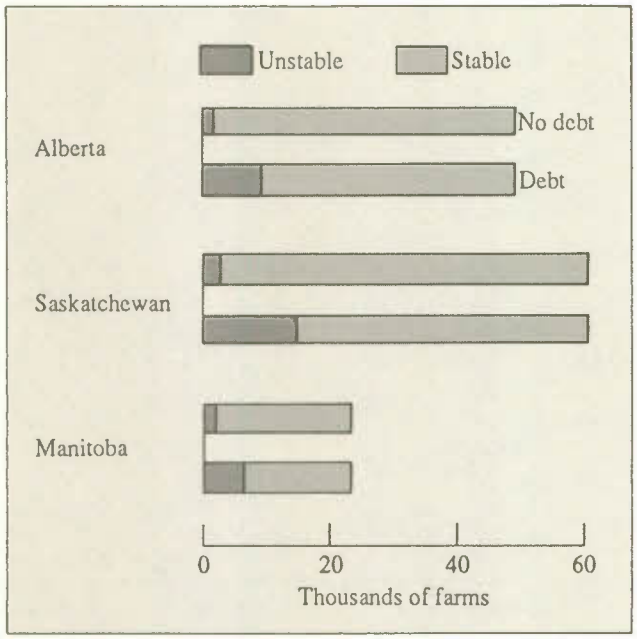
2 These estimates correspond to those in the last column of Table 4-2.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

Of course, far fewer Prairie farmers would be under financial stress today if they had been less optimistic and had borrowed less when the "price of wheat was right." With no farm debt, many of them would be in a much better financial position today (Chart 4-1). But farm indebtedness was, and is, only part of the problem. As we shall see in the next chapter, other factors contributed in a major way.

Chart 4-1

Impact of Farm Debt on Farm Financial Status, Prairie Provinces, 1985




SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

## Financial Stress by Farm Type

In our analysis, we made a distinction between grain, livestock, specialty, and mixed farms. Enterprises were defined as either grain or livestock farms when two thirds or more of their sales were derived from grains or livestock, respectively. Dairy and vegetable farms were treated as specialty farms. Farms producing both grains and livestock were defined as mixed farms when between one third and two thirds of their sales came from grains or livestock.

In 1981, Prairie farm prices, for both crop and livestock, were 31 per cent above the average for the previous 25-year period. By 1985, however, the crop price index had fallen about 10 percentage points below the index of livestock prices; by 1987, it had dropped even further. One might be tempted to conclude, therefore, that livestock farmers should have done better than grain farmers. And indeed they did – but only by a slight margin.

According to our estimates, 74 per cent of Prairie grain farmers were financially stable, compared with 76 per cent of livestock farmers. At the same time, a slightly larger percentage of livestock farmers was in a nonviable financial situation – i.e., 9 per cent versus 8 per cent (Table 4-4). Similarly, one might be tempted to conclude that mixed farms were in a stronger financial position than grain farms, but we found, in fact, that the percentage of mixed farms in financial difficulty was greater than that of grain farms.

## Farming Regions

These production characteristics are reflected in the provincial distribution of the different types of farms and of farm financial stress. Over half of the Prairie farmers derive most of their farm income from grain sales – somewhat fewer than that proportion in Alberta and a significantly greater number (nearly three quarters of them) in Saskatchewan (Table 4-5). The numbers of livestock farmers in each province are correspondingly smaller.

Saskatchewan, where traditionally more farmers specialized in grains, had fewer farmers in a nonviable financial situation in 1987 than did Alberta, where more farmers specialized in livestock. The proportion of farmers in a nonviable situation was even higher in Manitoba. More significantly, in all three provinces a larger proportion of mixed-farm operators – whose livestock sales accounted for one third to two thirds of total farm sales – than of grain-farm operators were in very serious financial difficulty.

The district analysis, summarized in Table 4-6, shows that the percentage of nonviable operations – those whose farm cash operating expenses exceeded family cash income by a large margin – was highest for mixed farms in virtually all regions. There was no obvious association between the four soil zones and the financial viability of farm operations. That was partly because the census data did not reflect long-run trends in yields and partly because farm size, farm capital, and other farm inputs were very important determinants of farm income that overrode some of the soil differences.

**Table 4-4**

**Distribution of Farms by Financial Status and by Type, Prairie Region, 1985 and 1987**

| | Financial status | | | | |
|---|---|---|---|---|---|
| | Nonviable | Deteriorating | Vulnerable | Stable | Total |
| | | | (Per cent) | | |
| 1985 | | | | | |
| All farms | 4 | 9 | 10 | 77 | 100 |
| Grain | 2 | 8 | 9 | 81 | 100 |
| Livestock | 3 | 8 | 9 | 80 | 100 |
| Specialty | 4 | 10 | 13 | 73 | 100 |
| Mixed | 11 | 13 | 13 | 63 | 100 |
| 1987 | | | | | |
| All farms | 10 | 8 | 10 | 72 | 100 |
| Grain | 8 | 8 | 10 | 74 | 100 |
| Livestock | 9 | 5 | 10 | 76 | 100 |
| Specialty | 11 | 8 | 15 | 66 | 100 |
| Mixed | 17 | 10 | 12 | 61 | 100 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table 4-5**

**Distribution of Farms by Type, Prairie Provinces, 1986**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Grain | 54 | 71 | 42 |
| Livestock | 17 | 8 | 30 |
| Specialty | 9 | 2 | 8 |
| Mixed | 20 | 19 | 20 |
| Total | 100 | 100 | 100 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

## Government Support

When the crisis hit Prairie farmers in 1987, the federal government provided support under two major Prairie farm programs: the Western Grain Stabilization Act, and the Special Canadian Grains Program.

### *The Western Grain Stabilization Act*

The Western Grain Stabilization Act (WGSA) was introduced in 1976 to stabilize the income of grain and oilseed farmers as it varies with the swings in world market prices. The program assures participants that their cash flow from sales in any one year will not fall below the average of the past several years. Participation in the program is voluntary. The program is funded in part by producers' premiums but mainly by the federal and provincial governments. Net payments to farmers under the program have risen considerably in recent years – from $480 million in 1985 to $1,358 billion in 1987.

### *Special Canadian Grains Program*

The drop in grain prices in the mid-1980s was so severe that stabilization and insurance programs were not considered sufficient to relieve the hardships endured by farmers. In response, the federal government announced the Special Canadian Grains Program (SCGP) in December 1986. The program provided a $1-billion cash payment to Canadian grain and oilseed producers to cushion the impact of the subsidy war between the United States and the European Community. Of the $1-billion payment, $815 million went to Prairie farmers. Payments were based on the acreage that farmers had seeded to the designated crops in 1986, the regional crop yield, and the relative price decline (for each crop) that was attributable to the trade war. The maximum payment to any individual was $25,000. Regional yields were calculated by averaging the yields of the best three of the previous five years. The crops covered under the 1986-87 program were wheat (including durum), barley, oats, rye, mixed grains, corn, soybeans, canola, flax, and sunflower seeds.

**Table 4-6**

**Incidence of Financially Nonviable Farms in the Prairie Provinces, by Farming Region and by Type of Farm, 1987[1]**

| | Soil zone[2] | Type of farm | | | All types |
|---|---|---|---|---|---|
| | | Grain | Livestock | Mixed | |
| | | (Per cent) | | | |
| Manitoba: | | 10 | 12 | 19 | 12 |
| Region #1 | B | 9 | 10 | 17 | 12 |
| #2 | B | 13 | 25 | 29 | 20 |
| #3 | B | 12 | 20 | 23 | 16 |
| #4 | B | 9 | 8 | 13 | 9 |
| #5 | G | 19 | 10 | -- | 22 |
| #6 | G | 14 | 13 | 33 | 18 |
| Saskatchewan: | | 7 | 11 | 17 | 9 |
| Region #1 | DBR | 6 | 10 | 21 | 11 |
| #2 | DBR | 3 | 7 | 14 | 5 |
| #3 | BR | 5 | 16 | 19 | 9 |
| #4 | BR | 5 | 14 | 19 | 9 |
| #5 | B | 9 | 11 | 21 | 12 |
| #6 | DBR | 5 | 9 | 12 | 7 |
| #7 | DBR | 8 | 17 | 20 | 11 |
| #8 | B | 7 | 9 | 17 | 9 |
| #9 | B | 8 | 8 | 9 | 9 |
| Alberta: | | 10 | 7 | 16 | 10 |
| Region #1 | BR | 10 | 8 | 17 | 12 |
| #2 | DBR | 14 | 8 | 18 | 13 |
| #3 | B | 15 | 6 | 17 | 11 |
| #4 | DBR | 9 | 9 | 15 | 11 |
| #5 | B | 6 | 5 | 11 | 7 |
| #6 | G | 7 | 8 | 15 | 9 |
| #7 | G | 9 | 13 | 22 | 12 |
| Prairie region | | 8 | 9 | 17 | 10 |

1 These estimates express the proportion of nonviable farms in each soil zone and each farm category. They are projected from the 1986 Census of Agriculture on an individual farm basis, with adjustments being made for price changes in major crops and livestock. No allowance is made for changes in crop acreages or livestock numbers, and no adjustment is made for changes in crop yields. The estimates only reflect the price changes in output and not in inputs.

2 BR = brown soil.
DBR = dark-brown soil.
B = black soil.
G = grey soil.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

### *The Impact of WGSA and SCGP Payments on Prairie Farm Incomes*

In the 1986-87 crop year, the two programs provided $2.2 billion – roughly $17,000 in additional income per farmer. Without that assistance, half the farmers in the Prairie region would have been in some financial difficulty, since they would not have had enough cash income to cover basic family living expenditures (set at $14,000 per year). With payments of $1,358 million under the WGSA and $815 million under the SCGP, the proportion of farmers in financial difficulty was lowered from 50 to 28 per cent, with a somewhat greater reduction in Alberta and a somewhat smaller one in Manitoba. In the absence of the programs,

every third farmer would have been in a nonviable financial situation, with no cash income for living expenses; the two programs reduced that proportion from one third to one tenth (Table 4-7).

Among Prairie farm operators, grain farmers benefited much more from the two programs than did other farmers. The average grain farmer received roughly $21,000, whereas the mixed grain/livestock farmer received $16,000; livestock and specialty farmers received about $5,000 each, on average (Table 4-8). After the payout, more grain farmers than mixed-farm operators were in a financially stable condition; and about twice as large a percentage of mixed farmers were in a financially nonviable situation. Thus it is clear that the two federal programs favoured grain farmers over mixed farmers. (See Fulton et al., 1989 for an analysis of these programs.)

## Conclusion

According to these findings, the financial stress on Prairie farms in 1987 was less serious on grain, livestock, and specialty farms than on mixed farms. With the exception of farms in northern Saskatchewan, the proportion of nonviable mixed-farming operations was often two to three times larger than that of grain farms. This suggests not only that grain farmers in Saskatchewan were in a somewhat stronger financial position than their counterparts in the neighbouring provinces but, more importantly, that diversification into livestock production, as practised on mixed grain/livestock Prairie farms today, is not the answer to the farm-income problem, especially in Saskatchewan.

Government support under the Western Grain Stabilization Act and the Special Canadian Grains Program favoured grain farmers over the more diversified grain/livestock farmers. But aside from uneven government support, other factors seem to have hampered the diversification of Prairie farming, as we shall see in the next chapter.

**Table 4-7**

**Distribution of Farms by Financial Status, With and Without WGSA and SCGP Payments,[1] Prairie Provinces, 1987**

| | Manitoba | Saskatchewan | Alberta | Prairie region |
|---|---|---|---|---|
| | | (Per cent) | | |
| Without WGSA and SCGP: | | | | |
| Stable | 43 | 46 | 59 | 50 |
| Vulnerable | 12 | 11 | 10 | 11 |
| Deteriorating | 10 | 11 | 9 | 10 |
| Nonviable | 35 | 32 | 22 | 29 |
| Total | 100 | 100 | 100 | 100 |
| With WGSA and SCGP: | | | | |
| Stable | 67 | 72 | 74 | 72 |
| Vulnerable | 12 | 11 | 9 | 10 |
| Deteriorating | 8 | 8 | 7 | 8 |
| Nonviable | 13 | 9 | 10 | 10 |
| Total | 100 | 100 | 100 | 100 |

1 Payments under the Western Grain Stabilization Act and the Special Canadian Grains Program.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada and on data from Agriculture Canada.

**Table 4-8**

**Distribution of Farms With and Without WGSA and SCGP Payments, and Average Payment Received, by Financial Status and Type of Farm, Prairie Region, 1987**

| | Type of farm | | | | |
|---|---|---|---|---|---|
| | Grain | Livestock | Specialty | Mixed | All types |
| | | | (Per cent) | | |
| Without WGSA and SCGP: | | | | | |
| Stable | 46 | 73 | 63 | 40 | 50 |
| Vulnerable | 10 | 10 | 15 | 11 | 11 |
| Deteriorating | 10 | 6 | 9 | 13 | 10 |
| Nonviable | 34 | 11 | 13 | 36 | 29 |
| Total | 100 | 100 | 100 | 100 | 100 |
| With WGSA and SCGP: | | | | | |
| Stable | 74 | 76 | 67 | 62 | 72 |
| Vulnerable | 10 | 10 | 14 | 11 | 10 |
| Deteriorating | 8 | 5 | 8 | 10 | 8 |
| Nonviable | 8 | 9 | 11 | 17 | 10 |
| Total | 100 | 100 | 100 | 100 | 100 |
| | | | (Dollars) | | |
| Average WGSA and SCGP payment: | | | | | |
| Stable | 19,364 | 4,436 | 4,839 | 17,498 | 15,454 |
| Vulnerable | 23,453 | 5,159 | 4,004 | 15,435 | 17,178 |
| Deteriorating | 29,418 | 5,205 | 4,908 | 17,256 | 21,999 |
| Nonviable | 26,877 | 4,153 | 3,887 | 12,875 | 17,394 |
| All farms | 21,149 | 4,522 | 4,620 | 16,455 | 16,333 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada and on data from Agriculture Canada.

# 5 The Underlying Causes of the Crisis

Many Prairie farmers accumulated debt when farm prices were high and ran into financial difficulties when prices dropped. Their income was not sufficient to service their loans and cover all other expenses as well. The immediate cause of the current Prairie farm crisis, therefore, was obvious: the debt was too high, and the cash income too low.

The unexpected finding from our research, however, was that the financial stress was more serious on mixed grain/livestock farms than on grain-only farms. Mixed farmers were under greater financial stress at a time when grain prices had already fallen below the level of earlier years and livestock prices had risen above previous levels. They should have been in a better financial position than grain farmers. But according to our estimates, they were not. This finding runs counter to the widespread notion that diversification from grain into livestock production would alleviate the perennial problems of income instability and low farm incomes in the Prairies. If anything, our results suggest that diversification would aggravate them. There are several possible explanations for these counterintuitive results:

- The distribution of farm debt: Heavier loans and higher interest payments on mixed farms than on other farms made for greater financial difficulties. As will be shown, however, that is a weak argument.

- Diversification versus specialization: Similar to insurance, diversification buys protection against price and income instability but only at the additional expense of a premium. In this sense, mixed farming raises production costs, while specialized grain farming lowers them.

- Government support: The major federal support programs for Prairie farmers – the Western Grain Stabilization Act and the Special Canadian Grains Program – are grain-, not livestock-oriented.

- Productivity: The productivity performance of mixed farms is generally lower than that of grain, livestock, or specialty farms.

- Off-farm income: The opportunities for off-farm earnings are more limited on mixed farms than on grain-only farms.

Although all Prairie farmers were exposed to the cost/price squeeze, most of them – three out of four – were not in financial difficulty (as defined previously). The others – 23 per cent in 1985 and 28 per cent in 1987 – experienced financial hardship, however. Within this group, the number of farmers in nonviable situations reached 10 per cent in 1987. Their financial stress resulted from a variety of factors.

## Farm Debt

In 1987, farmers in serious financial difficulty paid, on average, three to four times more in interest charges than did those in a more stable situation (Table 5-1). As well, their interest payments accounted for a larger share of their farm cash expenses. That applied to nearly all of these farmers – to marginal, commercial, and corporate farmers; to part-time and full-time farmers; and to young, middle-aged, and elderly farmers.

This was also true of different types of farms – grain, livestock, specialty, and mixed (Table 5-2). On nonviable grain farms, for example, interest payments were over five times as large as on stable grain farms. They were also larger on nonviable livestock and specialty farms, but not nearly as large as on grain farms. Interest payments on nonviable mixed farms were certainly not as large as on grain farms, and they were comparable with those of the other types of farms. Greater loan requirements and higher interest payments on mixed farms could not, therefore, have been the principal cause of their higher incidence of financial difficulties.

## Diversification and Cost Economies

Diversifying out of wheat production into other crops – such as canola, lentils, peas, vegetables, or alfalfa seed – can, at times, be very profitable. Except for canola, however, the opportunities for such diversification on a Prairie-wide scale are limited at present, because the Prairie region's climate and soils make for a narrow range of choices. In addition, domestic and foreign demand for most of these specialty crops is very limited, compared with that for wheat. Even for canola, the potential for further expansion is constrained not

**Table 5-1**

**Interest Payments of Stable and Nonviable Farms, by Farm Category and by Status and Age Group of Farm Operator, Prairie Region, 1987**

| | Interest payments | | | |
|---|---|---|---|---|
| | Amount | | As a proportion of farm cash expenses | |
| | Stable | Nonviable | Stable | Nonviable |
| | (Dollars) | | (Per cent) | |
| Marginal farms | 1,352 | 5,556 | 9 | 16 |
| Part-time farmers | | | | |
| Aged less than 35 | 1,852 | 6,868 | 13 | 21 |
| Aged 35 to 64 | 1,702 | 5,913 | 11 | 16 |
| Full-time farmers | | | | |
| Aged less than 35 | 1,255 | 6,504 | 8 | 18 |
| Aged 35 to 64 | 906 | 4,836 | 6 | 14 |
| Commercial farms | 5,129 | 19,217 | 8 | 15 |
| Part-time farmers | | | | |
| Aged less than 35 | 6,510 | 18,999 | 12 | 19 |
| Aged 35 to 64 | 6,566 | 20,935 | 11 | 17 |
| Partners | | | | |
| Aged less than 35 | 7,005 | 17,844 | 11 | 17 |
| Full-time farmers | | | | |
| Aged less than 35 | 9,968 | 24,628 | 9 | 15 |
| Aged 35 to 64 | 6,128 | 22,947 | 9 | 14 |
| Elderly farmers | | | | |
| Aged 65 and over | 1,040 | 4,763 | 4 | 7 |
| Corporate farms | 20,111 | 46,077 | 5 | 8 |
| Mostly family-owned | 19,870 | 55,485 | 6 | 10 |
| Mostly owned by others | 21,010 | 33,935 | 3 | 6 |
| All categories | 3,937 | 13,884 | 8 | 14 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

only because of diminishing marginal returns on the production side but also because of increasing competition from other oilseed exporters on international markets.

When grain prices are down and livestock prices are up, it may seem that Prairie farmers could benefit from raising more livestock. From the foregoing financial analysis, it is not at all clear, however, that switching to livestock production or to mixed farming would solve the problem of farm incomes.

Although our analysis covered all Prairie farmers, the preceding results pertain to specific situations. It is of interest, therefore, to examine how the performance varied over the whole range of farms, from high- to low-cost producers. To this end, we compared the cash cost per dollar of farm product sales for the four types of census farms in 1985-86 (Table 5-3). We found that the cost per dollar was generally higher on livestock and mixed farms than on grain farms, over the whole range of producers. But we also found that cost differences between farm types gradually diminished as we went from higher- to lower-cost producers. And, in Manitoba, the operations of some livestock farmers were nearly as cost-effective as, or slightly more so than, those of grain farmers. The implication is that there are significant cost economies to be achieved on livestock farms and that it

**Table 5-2**

**Interest Payments of Stable and Nonviable Farms, by Type of Farm, Prairie Region, 1987**

| | Interest payments | | | |
|---|---|---|---|---|
| | Amount | | As a proportion of farm cash expenses | |
| | Stable | Nonviable | Stable | Nonviable |
| | (Dollars) | | (Per cent) | |
| Grain | 3,238 | 18,009 | 9 | 15 |
| Livestock | 4,594 | 10,627 | 6 | 10 |
| Specialty | 6,165 | 11,456 | 10 | 13 |
| Mixed | 4,989 | 10,041 | 8 | 13 |
| All types | 3,937 | 13,884 | 8 | 14 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

is important to exploit them. Capturing such cost economies is not easy, however, and requires superior technical and management skills.

Regardless of the type of farm, the cost economies varied widely. Our cost analysis showed that on 20 per cent of all Prairie farms, cash operating costs exceeded the dollar value of farm sales. This finding implies that one in every five farmer lost money on farming operations because his cash receipts did not cover cash expenses even before making any payments on farm loans. As shown in Table 5-3, between one half and three quarters of all farmers operated in the high-cost range, and the others in the low-cost range. On the more efficient farms, the cash cost per dollar of sales was in the neighbourhood of 65 cents – that is, a dollar of cash expenses yielded about $1.50 in cash returns, leaving some room to make payments on a farm loan, cover basic living expenses, and set aside funds for depreciation on farm capital. But in 1985-86 only about one quarter of all Prairie farmers operated in this low-cost range.

Our findings also imply that most Prairie farms were not large enough to benefit from the full cost economies. On farms in the high-cost/low-return range – those around the 30th percentile, for example – the volume of sales, labour inputs, and farm acreage were often significantly smaller than on farms in the more cost-effective range (around the 70th or 80th percentile). And that applied to all types of farms alike (see Table C-11).

Our cost estimates show that with but few exceptions, mixed crop/livestock producers in the Prairie region operated in 1985-86 at less favourable cash-flow ratios than their counterparts specializing in grain production. That explains, in part, why mixed farmers were found to be in greater financial difficulty. It is noteworthy, however, that cost differences between mixed farmers and grain farmers narrowed substantially in the lower-cost range, where the size of operations was large enough to capture economies of scale.

## Government Support

Commodity-oriented Prairie farm programs lent more support to grain farmers than to livestock farmers, specialty farmers or mixed farmers. Under the two major government programs, Prairie grain farmers received about four to five times as much in government payments as livestock farmers (see Table 4-8).

Since government payouts were closely related to the volume of grain sales and to grain acreage, the operators of larger commercial farms received substantially more than those of marginal farms.

It is interesting to note, however, that cash benefits per dollar of farm sales were highest for the highest-cost producers. On grain farms, those benefits amounted to $1.20 or more for the highest-cost producers (i.e., at the 10th percentile) and to 25 cents or less for the lowest-cost producers (i.e., at the 90th percentile). Although livestock farmers and others received much lower benefits, the same relationship applied: high-cost producers received more, and low-cost

**Table 5-3**

**Cash Cost per Dollar of Farm Product Sales, by Type of Farm and by Percentile, Prairie Provinces, 1985-86, Excluding Interest Payments on Farm Loans**

| | | Type of farm | | | |
|---|---|---|---|---|---|
| | Percentile | Grain | Livestock | Specialty | Mixed |
| | | | (Dollars) | | |
| Manitoba | 10 | 0.98 | 1.29 | 1.09 | 1.10 |
| | 20 | 0.92 | 1.08 | 1.04 | 0.95 |
| | 30 | 0.89 | 1.01 | 0.93 | 0.90 |
| | 40 | 0.81 | 0.94 | 0.78 | 0.84 |
| | 50 | 0.73 | 0.89 | 0.69 | 0.75 |
| | 60 | 0.68 | 0.81 | 0.65 | 0.71 |
| | 70 | 0.68 | 0.75 | 0.60 | 0.67 |
| | 80 | 0.65 | 0.72 | 0.60 | 0.67 |
| | 90 | 0.64 | 0.69 | 0.59 | 0.66 |
| | 95 | 0.64 | 0.65 | 0.55 | 0.64 |
| Total number of farms | 100 | 12,915 | 4,075 | 2,035 | 4,700 |
| Saskatchewan | 10 | 0.90 | 1.18 | 1.11 | 1.01 |
| | 20 | 0.85 | 1.04 | 0.91 | 0.95 |
| | 30 | 0.79 | 0.96 | 0.84 | 0.88 |
| | 40 | 0.73 | 0.92 | 0.78 | 0.83 |
| | 50 | 0.65 | 0.86 | 0.74 | 0.73 |
| | 60 | 0.62 | 0.78 | 0.69 | 0.65 |
| | 70 | 0.61 | 0.75 | 0.65 | 0.63 |
| | 80 | 0.56 | 0.71 | 0.61 | 0.63 |
| | 90 | 0.55 | 0.69 | 0.58 | 0.62 |
| | 95 | 0.53 | 0.68 | 0.55 | 0.60 |
| Total number of farms | 100 | 42,570 | 5,020 | 1,395 | 11,315 |
| Alberta | 10 | 1.22 | 1.36 | 1.38 | 1.31 |
| | 20 | 1.06 | 1.30 | 1.22 | 1.10 |
| | 30 | 1.03 | 1.06 | 1.05 | 1.03 |
| | 40 | 0.92 | 0.98 | 0.92 | 0.88 |
| | 50 | 0.76 | 0.91 | 0.81 | 0.78 |
| | 60 | 0.72 | 0.86 | 0.71 | 0.72 |
| | 70 | 0.67 | 0.80 | 0.67 | 0.70 |
| | 80 | 0.62 | 0.75 | 0.62 | 0.67 |
| | 90 | 0.62 | 0.72 | 0.60 | 0.66 |
| | 95 | 0.62 | 0.68 | 0.55 | 0.65 |
| Total number of farms | 100 | 20,925 | 15,000 | 3,960 | 9,605 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

producers received less, per dollar of farm sales in each of the three Prairie provinces (Table 5-4).

To summarize: most of the government support went to grain farmers – more to operators of large commercial farms than to those of small marginal farms; and more, per dollar of sales, to high-cost than to low-cost producers.

Perhaps that is what we should have expected. Programs designed to insure grain farmers against income losses and

**Table 5-4**

**Cash Benefits per Dollar of Farm Product Sales Attributable to WGSA and SCGP Payments, by Type of Farm and by Percentile, Prairie Provinces, 1987[1]**

| | | Type of farm | | | |
|---|---|---|---|---|---|
| | Percentile | Grain | Livestock | Specialty | Mixed |
| | | | (Dollars) | | |
| Manitoba | 10 | 1.20 | 0.12 | 0.08 | 0.58 |
| | 20 | 0.99 | 0.08 | 0.01 | 0.46 |
| | 30 | 0.75 | 0.06 | 0.05 | 0.33 |
| | 40 | 0.65 | 0.11 | 0.07 | 0.47 |
| | 50 | 0.76 | 0.08 | 0.06 | 0.45 |
| | 60 | 0.76 | 0.04 | 0.10 | 0.29 |
| | 70 | 0.91 | 0.03 | 0.04 | 0.18 |
| | 80 | 0.35 | 0.05 | 0.02 | 0.11 |
| | 90 | 0.25 | 0.01 | 0.03 | 0.08 |
| | 95 | 0.18 | 0.01 | 0.01 | 0.07 |
| Total number of farms | 100 | 12,915 | 4,075 | 2,035 | 4,700 |
| Saskatchewan | 10 | 1.21 | 0.19 | 0.20 | 0.51 |
| | 20 | 0.97 | 0.15 | 0.11 | 0.53 |
| | 30 | 0.82 | 0.11 | 0.14 | 0.51 |
| | 40 | 0.84 | 0.14 | 0.08 | 0.51 |
| | 50 | 0.90 | 0.07 | 0.08 | 0.39 |
| | 60 | 0.55 | 0.05 | 0.05 | 0.28 |
| | 70 | 0.38 | 0.05 | 0.04 | 0.15 |
| | 80 | 0.23 | 0.04 | 0.02 | 0.09 |
| | 90 | 0.20 | 0.04 | 0.02 | 0.10 |
| | 95 | 0.16 | 0.02 | 0.02 | 0.09 |
| Total number of farms | 100 | 42,570 | 5,020 | 1,395 | 11,315 |
| Alberta | 10 | 1.53 | 0.07 | 0.06 | 0.71 |
| | 20 | 1.26 | 0.05 | 0.06 | 0.36 |
| | 30 | 1.05 | 0.05 | 0.09 | 0.37 |
| | 40 | 0.73 | 0.06 | 0.10 | 0.44 |
| | 50 | 0.93 | 0.03 | 0.08 | 0.35 |
| | 60 | 0.75 | 0.03 | 0.04 | 0.24 |
| | 70 | 0.45 | 0.03 | 0.04 | 0.11 |
| | 80 | 0.34 | 0.03 | 0.01 | 0.08 |
| | 90 | 0.16 | 0.02 | 0.00 | 0.09 |
| | 95 | 0.16 | 0.02 | 0.01 | 0.10 |
| Total number of farms | 100 | 20,925 | 15,000 | 3,960 | 9,605 |

1 These estimates are derived by comparing the unit cash costs of farmers with and without WGSA and SCGP payments.
SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

to compensate them for a drop in international grain prices paid grain farmers more than livestock farmers. But in doing so they scrambled market signals and weakened the adjustment response.

## Farm Productivity

On average, Prairie farms experience constant or increasing returns to scale. Constant returns to scale imply that a

doubling of inputs (such as land, labour, capital stock, and materials) will double the output on the average farm. Increasing returns imply that a doubling of those inputs will more than double farm output, provided, of course, that all inputs (including labour and management) are increased in the same proportion. Often, in practice, that cannot be done. An owner/operator may run a one-person farm more efficiently without hired labour than he could manage a larger unit with hired labour. That explains, in part, why small and large farms exist side by side. It also explains why farmers continue to expand their acreage: they are trying to capture the greater returns that accrue from operating a larger farm.

In addition to the greater output and higher returns that come with large-scale operations, further gains can be derived from the more efficient use of farm resources. As in other industries, the efficiency with which farm resources are used and converted into farm output can be measured by "factor productivity." In this context, the efficiency of marginal farms was compared with that of a standard commercial farm; the efficiency of livestock and mixed farms, with that of a standard grain farm; and the efficiency of financially troubled farms, with that of stable farms.[1] (For a discussion of our productivity analysis and estimates, see Appendix C.)

The factor productivity of marginal farms was much lower than that of commercial farms; it was generally less than half in 1980 but somewhat higher in 1985 (Table 5-5). Marginal farmers produced less, not only because they cultivated less land, had less capital, and purchased smaller quantities of fertilizer, herbicides, and other material inputs, but also because they used their limited resources much less efficiently.

On livestock and mixed farms, factor productivity was, on average, lower than on grain farms; in other words, capital and labour inputs on these farms did not yield the same output as on grain farms (Table 5-6). When we took account of the fact that some of the farm labour on livestock farms was "free" because it could not have been employed elsewhere during the winter months, the differences in factor productivity narrowed slightly but did not disappear. On average, the value of the sales of farm products by livestock and mixed farms exceeded that of grain farms by substantial margins, but capital and material expenses in those two categories were even higher. This lowered their net farm cash income in comparison with that of grain farms.

In addition, the analysis shows that factor productivity was lower on financially troubled farms than on stable farms (Table 5-7). Even after taking into account the variations in productivity attributable to differences in the type and size of farms, the soil zone, the use of farm resources, and the age of the farm operator, the productivity on these farms was lower than on stable farms, and it was lowest on the least viable farms.

This productivity analysis pertains to the year 1985, when grain prices were still quite favourable. The situation changed over the next two years, however, as grain prices dropped and livestock prices rose. Thus a productivity analysis for 1987 would probably alter the results and show that livestock production was more profitable. Under normal market conditions, however, we can expect lower productivity on livestock farms. That is substantiated not only by a similar analysis for 1980, when grain and livestock price indexes were at more comparable levels, but also by other findings.[2]

**Table 5-5**

**Factor Productivity[1] of Marginal Farms as a Proportion of That of Standard Commercial Farms, Prairie Provinces, 1980 and 1985**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| 1980 | | | |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 44 | 43 | 41 |
| Aged 35 to 64 | 44 | 41 | 41 |
| Full-time farmers | | | |
| Aged less than 35 | 51 | 51 | 44 |
| Aged 35 to 64 | 50 | 52 | 44 |
| 1985 | | | |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 80 | 66 | 58 |
| Aged 35 to 64 | 71 | 61 | 54 |
| Full-time farmers | | | |
| Aged less than 35 | 80 | 67 | 60 |
| Aged 35 to 64 | 73 | 62 | 57 |

1 The factor-productivity estimates are derived from a production-function analysis of census farms, with allowances being made for variations in regions, farm capital, labour, material inputs, acreage, land quality, farm organization, and farm financial situation. A standard commercial farm is defined as a grain farm operated on a full-time basis by a farmer aged between 35 and 64. The estimation procedure is described in Appendix C.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table 5-6**

**Relative Productivity and Other Characteristics of Livestock and Mixed Farms,[1] Prairie Provinces, 1985**

| | Livestock farms | Mixed farms |
|---|---|---|
| | (Per cent) | |
| Factor productivity[2] | | |
| Manitoba | 90 | 93 |
| Saskatchewan | 84 | 90 |
| Alberta | 82 | 86 |
| Other characteristics | | |
| Product sales | 141 | 120 |
| Farm inputs | | |
| Acreage | 122 | 127 |
| Value per acre | 76 | 84 |
| Labour (month) | 125 | 131 |
| Fixed capital | 146 | 140 |
| Materials | 163 | 128 |
| Net farm cash income | 60 | 90 |

1 Both the productivity estimates and the other characteristics are measured as a percentage of the figures for grain farms (i.e., grain farms = 100).

2 The factor-productivity estimates are derived from a production-function analysis of census farms, with allowances being made for variations in regions, farm capital, labour, material inputs, acreage, land quality, farm organization, and farm financial situation. The estimation procedure is described in Appendix C.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

The unfavourable productivity performance on mixed and livestock farms suggests that it will not be easy for grain farmers to diversify into livestock production. (For the technical details of this analysis, see Appendix C – in particular, Tables C-9 and C-10.)

## Off-Farm Family Income

Nearly 40 per cent of all farmers ran marginal operations. Together, they produced less than 10 per cent of Prairie farm output. Financially, many of them were on the critical list, not because of their excessive borrowing but because their farm income was too low to provide an adequate standard of living, even before the bottom fell out of the wheat market. They operated small farms, had very little farm capital, and used their limited resources very inefficiently. Some of them did have sufficient off-farm income to compensate for the shortfall from their marginal farm operation; others did not. Part-time operators on these small farms had, on average, twice as much off-farm income as full-time farmers, and that more than compensated for their shortfall in farm income.

**Table 5-7**

**Relative Resource Productivity[1] of Farms with Financial Problems, by Type of Farm, Prairie Provinces, 1985**

| | Manitoba | Saskatchewan | Alberta |
|---|---|---|---|
| | | (Per cent) | |
| Nonviable | | | |
| Grain | 84 | 81 | 82 |
| Livestock | 94 | 91 | 91 |
| Specialty | 85 | 84 | 88 |
| Mixed | 90 | 90 | 93 |
| All types | 89 | 85 | 90 |
| Deteriorating | | | |
| Grain | 83 | 85 | 85 |
| Livestock | 89 | 88 | 94 |
| Specialty | 89 | 87 | 91 |
| Mixed | 88 | 91 | 96 |
| All types | 88 | 87 | 92 |
| Vulnerable | | | |
| Grain | 96 | 95 | 98 |
| Livestock | 97 | 95 | 99 |
| Specialty | 103 | 92 | 101 |
| Mixed | 93 | 93 | 99 |
| All types | 97 | 93 | 100 |

1 The factor-productivity estimates are derived from a production-function analysis of census farms, with allowances being made for variations in regions, farm capital, labour, material inputs, acreage, land quality, farm organization, and farm financial situation. The estimates are measured as a percentage of the figures for financially stable farms (i.e., stable farms = 100). The estimation procedure is described in Appendix C.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

There were also substantial variations in off-farm family income among commercial and corporate farms. Part-time farmers (working three months or more off the farm) fared better than full-time farmers; among young farmers, those in partnership did better than others. On corporate farms, off-farm family incomes were higher among family-owned farms than on others (Table B-2).

With very few exceptions, off-farm family incomes exceeded (net) farm incomes by a substantial margin (Table 5-8). Without this additional income, many more farm families would have been in serious financial difficulties. It is noteworthy that off-farm incomes on mixed farms were substantially less than on other farms. Although off-farm incomes varied among the farming regions – it was higher in the vicinity of metropolitan centers and in the larger towns than elsewhere – that did not explain this difference. Off-farm incomes on mixed farms were lower on all types of farms, regardless of farm size or age of operator; overall, they were lower by some $8,000 than the average for all Prairie farms (Table B-3).

## Summary

We found that low and unstable farm incomes, combined with depressed prices and drought conditions, led to the latest financial crisis faced by Prairie farmers. In their attempt to keep their farm incomes growing, they expanded the size of their operations; many who borrowed heavily to buy land at inflated prices in the late 1970s are now in serious financial difficulty. But that was only part of the problem: the financial crisis was hardest on some of the least productive farmers.

Farmers in financial difficulty ran their farm operations less efficiently and employed their farm resources less effectively than those in financially viable and stable situations. Their resource productivity was up to one fifth lower – enough to wipe out a large part of their potential farm income. Farmers in the most serious financial situation were among the least productive.

Government support under WGSA and SCGP helped grain farmers in times of need, but it did little for livestock and specialty farmers. In spite of serious financial problems, mixed farmers received less aid than grain farmers. More support went to large-scale than to small-scale operations, and more to high-cost than to low-cost producers.

**Table 5-8**

**Farm and Off-Farm Family Incomes, by Province and by Type of Farm, 1985**

| | Type of farm | | | |
|---|---|---|---|---|
| | Grain | Livestock | Specialty | Mixed |
| | (Dollars) | | | |
| Manitoba | | | | |
| Farm income | 6,398 | 7,824 | 19,449 | 17,405 |
| Off-farm income | 19,599 | 16,934 | 17,372 | 10,914 |
| Total family income | 25,997 | 24,758 | 36,821 | 28,319 |
| Saskatchewan | | | | |
| Farm income | 4,760 | 7,968 | 18,267 | 14,459 |
| Off-farm income | 21,677 | 16,256 | 15,646 | 10,514 |
| Total family income | 26,437 | 24,224 | 33,913 | 24,973 |
| Alberta | | | | |
| Farm income | 572 | 916 | 13,277 | 15,993 |
| Off-farm income | 25,763 | 26,259 | 24,995 | 15,430 |
| Total family income | 26,335 | 27,175 | 38,271 | 31,423 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

Off-farm income accounted for a major share of the family income of Prairie farmers. It was substantially lower on mixed grain/livestock farms than on other farms.

In addition, the resource productivity of both mixed and livestock farms was significantly lower than on grain farms. Most of the livestock or mixed farming operations were found to be too small to capture the gains that come with more efficient resource use. It takes large-scale operations in both crop and livestock production for a mixed farmer to benefit from favourable operating margins, and that requires not only substantial capital but also above-average management. It follows that diversification into livestock or mixed farming will not be as easy or successful as some might hope.

# 6 "Decoupled" Farm-Income Support

We observed earlier that Prairie farmers are plagued by two problems: low farm incomes, and income instability. Not all farmers are affected equally. Low farm incomes are found primarily on small marginal farms, while unstable farm incomes tend to affect the larger commercial farms. To help farmers, federal and provincial governments have instituted assistance programs that were designed to address both problems but had varying success. Most of the programs are limited to specific crops: the greater the production of a given crop that a farmer produces, the more government will pay.

In this study, we explore the proposition that the current government programs should be replaced by "decoupled" farm-income programs. "Decoupled" programs would provide income support but would not link the payments to the price or production of a specific crop. To the extent that that could be achieved, the programs would be commodity-neutral – i.e., they would not favour any one crop or livestock enterprise over another and would thus "decouple" income support from specific farm commodities.

## Failure of Traditional Farm Support

One of the fundamental reasons for the economic failure of many farm programs – if one may refer to excess production as "failure" – not only in Canada but in the United States and Western Europe as well, is that agricultural output grows very rapidly when, from time to time, it is encouraged by market signals. Soon, however, output overtakes demand and prices start to decline again. The resulting glut on international export markets accentuates the underlying long-run disparity between supply and demand – a disparity that stems from rapid advances in production technology and sluggish growth in demand (Carter et al., 1989). When a shortage replaces the worldwide glut, prices rise and farmers overproduce. Then excess supplies and sharply lower prices intensify the long-run cost/price squeeze again.

Government programs that are intended to stabilize and raise farm incomes achieve that result in the short run. Over the longer term, however, they lead to greater farm output and eventually depress farm prices. The impact on the farming community of different types of programs varies somewhat, but its long-term effects on farm income are essentially negative. The ultimate benefits of most Prairie farm programs do not accrue to farmers but to consumers in Canada and elsewhere.[1]

To illustrate, we consider two types of government assistance: for farm inputs, and for farm output.[2] Assistance that encourages the purchase of farm inputs increases the demand for those inputs. For example, if the prices of fertilizers are lowered or if the cost of capital is reduced through lower interest rates, more fertilizer will be bought to raise crop yields and more land will be bought to expand farm production. When market demand is inelastic – i.e., when the food requirements of the domestic population are relatively stable, as they are most of the time – and supply thus exceeds demand, the initial benefits to individual farmers are soon lost. While it is true that an individual farmer can increase production and improve his income, farm prices are bound to decline if everyone is doing it. Because the price of farm output declines by more than the increase in that output, most of the gains from greater production are passed on from the farmer to the ultimate consumer.

Government programs that increase the volume of farm output – such as agricultural research and extension services aimed at improving yields in crop and livestock production – are of benefit to farmers who adopt the new technology early. But as soon as most farmers adopt it, the overall output increases and, because of inelastic demand, farm prices and incomes decline. Thus government assistance for greater farm output has essentially the same negative impact on prices incomes as government assistance for cheaper farm inputs. In the long run, neither type of program solves the farm-income problem.

That is, of course, how new technology works, not only in agriculture but in other industries as well. The production of colour TV sets, for example, is highly profitable during the early period of adoption; once everyone has a set, however, the demand for new sets falls off and becomes inelastic. To keep expanding, the electronics industry will switch to a new product line – e.g., video-cassette recorders – and will start a new production cycle. But in farming, that rarely happens. New crops, such as canola, are the exception rather than the rule. As for the new food technologies – e.g., partially

prepared foods and microwavable meals – they benefit the food-processing industry rather than the farmer. Conceivably, farm-product marketing organizations could remedy that through large-scale vertical integration with the food processors – for example, the Prairie grain pool with cereal processors – but that has not happened so far.

Historically, governments have tried to compensate farmers for low farm prices. Government programs that support prices cause further problems, however, because they encourage the production of a crop that is already in excess supply, and they discourage the production of alternative crops.

Internationally, farm-price and commodity-specific subsidies have resulted in the production of enormous surpluses. Such subsidies raise farmgate prices and inflate the real returns to investment in agriculture; they encourage excess production, change the competitive position of exporting countries, and cause trade distortions that can lead to an ever-increasing misallocation of resources between countries. Ultimately, they can give rise to serious frictions in international trade.

Domestically, the federal government has protected Prairie grain farmers against the sharp drop in world market prices, not only through payments under the Western Grain Stabilization Act (WGSA) but also through subsidies paid to grain farmers under the Special Canadian Grains Program (SCGP). As shown in Chapter 5, these commodity-specific subsidies discriminate against livestock producers.

## Alternative Policy Options

One approach to dealing with these problems is to impose tight controls over the volume of farm production. That is difficult to accomplish in domestic markets however, and it is practically impossible in export markets.

### *Supply-Management Boards*

And yet, that is essentially the way that supply-management boards work: they limit foreign imports and set quotas, which then become marketable commodities. Canadian dairy marketing boards, for example, have succeeded in restricting the domestic output of dairy products and raising the prices paid by consumers. Not all of the benefits from higher prices have accrued to dairy farmers, however. Some of them have been capitalized into a higher nominal value for the quotas. It has been estimated, for example, that Canadian farmers pay up to eight times the price of a cow for the right to sell that cow's milk through the dairy marketing board (The World Bank, 1986). A dairy farmer who wants to raise his farm income has little choice but to pay this exorbitant price, because the quota system ties his milk deliveries to the quota set for the cows in his herd.

### *Cartels*

On world markets, cartels are the international counterpart to domestic supply-management boards. Conceivably, an international cartel could restrict world exports of wheat and other grains and thereby force prices to go high enough to ensure that grain farmers would receive adequate incomes or even incomes comparable with those in other industries. Thus the benefits of crop and livestock technology would be shared equally by consumers and farmers. Such an outcome sounds plausible, but it would inevitably lead to major distortions in world trade. Because of higher world prices, farmers in the importing countries would be encouraged to grow more of their own grains. The delivery quotas set for farmers in the exporting countries, if linked to farm acreage, would push up the quota price of farmland, just as the dairy marketing boards push up the quota price of cows. Thus, after the initial adjustment, grain farmers would lose much of what they had gained.

In practice, there are additional problems, as demonstrated by the numerous international wheat and grain agreements of the past (Ellison, 1980). The goals of such agreements were laudable but could not be achieved. The International Wheat Agreements (IWAs), for example, were designed to assure member countries of export markets, to guarantee supplies to importers at reasonable prices, to stabilize market prices through buffer stocks, and to institute an international framework for cooperation between trading countries.

Five IWAs were in effect between 1949 and 1968, a period during most of which world grain prices were depressed. Because of attempts to maintain farm incomes by support prices, large stocks of grains accumulated in the exporting countries – and that, despite export subsidies. When the stocks grew large enough and depressed market prices even further, they were reduced. Unfortunately, the reductions were followed by widespread crop failures in both exporting and importing countries. The IWAs were powerless to contain the ensuing rise in market prices that took place during the 1970s. Grain stocks were not nearly sufficient to provide an effective buffer for the global imbalance between demand and supply. The international negotiations that followed the food crisis of 1974 and subsequent efforts to foster international cooperation by such bodies as the United

Nations' Food and Agriculture Organization, the International Wheat Council, the General Agreement on Tariffs and Trade, and the United Nations Conference on Trade and Development did not resolve the conundrum of recurring imbalances between price levels, stocks, and farm price supports (Ellison, 1980).

It is probably fair to say that an international grain cartel would be plagued by the same, or even greater, problems.

### *Insurance*

Another way of dealing with the unfavourable price and income trends is to continue with, and perhaps expand, the existing Prairie farm programs – in particular, not to limit the major insurance programs to grains but to expand them and cover all other crops and livestock as well. Such a scheme could be implemented, but as long as each crop and livestock enterprise is insured individually, it would raise the overall insurance premiums paid by farmers and by government. Also, it would be a more plausible solution if the insurance scheme currently available under the WGSA, which has a much narrower coverage, had not already failed. Insurance payouts have exceeded premiums by à very substantial margin over the past few years, and it is doubtful that these losses will ever be recovered by higher premiums in the future.

### *Production Restrictions*

In addition, it has been suggested from time to time that the government pay farmers to take land out of production. When grain prices are low, it would cost less to pay farmers not to produce than to compensate them for both low market prices and high production costs. Such proposals have been applied with some success in the United States under the label of "soil-bank programs." To compensate for the income losses suffered as a result of the acreage set-asides, U.S. farmers used more fertilizer and produced higher yields on the remaining acreage. And, of course, when market prices recovered, the idle land was put back into production, thus accentuating the next production swing.

## Decoupled Income Support

The preceding policy options are essentially commodity-oriented. When applied in practice, they benefit primarily those who would otherwise encounter losses in the production of a specific crop or livestock product or who limit their production of specific products.

"Decoupled" farm-income programs are designed to break the link between the support offered to farmers and the production of specific crops or farm commodities; they do not impose limitations on production or marketing.

Serious imbalances in international grain markets have led to a growing interest in decoupled farm-income support. During the early 1980s, studies by the Organisation for Economic Co-operation and Development identified national farm-commodity support programs as the root of the problem and concluded that a concerted reduction of such assistance by all countries would raise world prices. A consensus emerged that in order to improve market access, reduce price and export subsidies, let the market mechanism play a greater role, and switch resources to nonagricultural activities, government payments should neither stimulate farm production nor modify the pattern of international trade.

### *Decoupling*

Most decoupling proposals include a certain level of support for agriculture. In that sense, decoupling would not be totally neutral, since it might favour agriculture over other sectors of the economy. But within the agricultural sector, decoupling would strengthen market signals and would return more responsibility to the farmer for his management decisions. If adopted internationally, decoupling would reduce marketing pressures on specific commodities and would lessen the competition among exporting countries for a greater share of markets, such as those for wheat, other grains, or livestock products.

Although there is no general consensus on what exactly constitutes a decoupled farm program, the following definition, offered at a recent symposium on decoupling, provides a useful starting point:

> Decoupling will be achieved when any government payment, production or price subsidy, or any form of public financial support or benefit (including commodity-related regulatory measures and import-controls) received by an agricultural producer have no direct connection with, or have no direct influence on the allocation of resources (either in production or consumption) devoted to a particular commodity, or production practice related to a specific commodity. (Gilson, 1988)

This definition describes decoupling as a measure that provides government support without tying it to specific commodities. Other concepts of decoupling discussed at the same symposium were closer to a guaranteed annual income, to a negative income tax unrelated to farm production,

or to a low-slung safety net that would not encourage excess production.[3]

At the time, the representatives of farm groups were not very enthusiastic about decoupling, partly because there was no agreement on either the concept or its application and partly because they favoured the current programs. They believed that the Prairie farm crisis stemmed from low market prices and that, for farm policy to be equitable, it should compensate every farmer in accordance with production volumes and with a "fair" market price. And they saw no reason why Prairie farmers should take welfare payments or low-income subsidies, since they are internationally competitive producers until farmers in other countries overproduce because of generous subsidies.

Not surprisingly, in western Canada, where full decoupling would lead to the disappearance – or at least the radical reshaping – of some traditional forms of farm support (including the transportation subsidies and the Agricultural Stabilization Act), many farm groups were suspicious. They pointed out that, compared with farm-support programs elsewhere, the major Canadian programs – the WGSA, the SCGP, and crop insurance – were already quite decoupled.

Yet, as we saw in the preceding section, the WGSA and the SCGP do have certain weaknesses. They encourage some farmers to produce when market prices are low in order to qualify for support payments, and they reinforce specialization in wheat, thereby discouraging diversification and innovation.

In late 1988 and early 1989, an awareness emerged that decoupled programs would not only result in low-income subsidies but could also benefit those who produce efficiently and who adjust to changing market conditions. As well, the drought of 1988 is now playing a major role in world farm-products markets; in particular, stocks are low and grain prices are up (Bertin, 1989). The last time that world food supplies were so depleted – in 1973 – the exporting countries could not meet the world demand. Thus, if farm programs are to be changed, now seems to be a good time to do it.

### *Policy Objectives*

Because the design of current farm policies is complex, any proposal for change inevitably raises many questions. In examining policy proposals, it is useful to ask whether they meet certain policy objectives:

– Income stability: The extreme variations in farm incomes, arising from unstable prices in world markets and from uncertain weather conditions, should be reduced so that crisis conditions would not recur.

– Improved incomes: Overproduction and excess supplies on world markets contribute to the long-run cost/price squeeze on farms. Therefore, the adjustment from farm to off-farm occupations should not be hampered but should be facilitated by governments.

– Competitiveness: Commercial farmers should be encouraged to produce more efficiently rather than be compensated for market losses or production costs.

– Reduced government expenditures: In recent years, nearly all of the net realized farm income of Prairie farmers came from government payments. In view of the perennial government deficits, farmers, as well as entrepreneurs in other industries, should become more independent of government support.

– Commodity-neutral support: When government supports farmers, the payments should not be related to the production of specific crops or kinds of livestock. A commodity-neutral support would make farmers more sensitive to market signals; and, ideally, it should be regionally neutral as well.

– Systematic design: Ad hoc farm programs that are put into place to cope with crisis situations create uncertainty and raise future expectations. A systematic program design should enable farmers to handle high-risk situations.

– Asset diversification: Government support or quota restrictions should not be related to specific farm assets (such as land) and should not be aimed at reducing the price of farm inputs (through lower interest rates on farm loans or through lower fuel costs, for example). Rather, government assistance should accrue directly to the farmer and should enable him to adjust to changing market situations.

– Soil conservation: Government programs should not encourage the exploitation of farmland but should preserve the quality of the land and of the environment for future generations.

## A System of Decoupled Programs

To illustrate some of the potential advantages of decoupling farm-income support, we developed a set of four examples of commodity-neutral programs.

The programs address the two fundamental farm-income problems – low income, and income instability. Each of the

programs deals partially with both problems; together, they complement each other in a comprehensive system of support aimed at maintaining a viable farming system, making it more sensitive to market signals, building on its inherent strengths, and facilitating adjustment. The aims of the individual programs are to insure against variations in farm income, to promote the diversification of farm enterprises and financial assets, to encourage those who help themselves, and to protect farmers against extreme hardship. This set of programs would replace the major commodity-oriented programs that exist today.

The four illustrative programs can be summarized as follows:

1 *Farm-income insurance*: Designed to protect farmers against major losses of farm income, whether they be caused by unfavourable market prices or by adverse weather conditions; government and farmers would share the cost of the program on an equal basis.

2 *Income-stabilization fund*: Designed to encourage farmers to invest a major part of their income gains from farming operations in a self-administered fund, in order to protect against future income losses and thereby save on farm-income insurance; government would match the farmer's contribution, again on a one-to-one basis.

3 *Farm adjustment option*: Would enable a farmer to treat the assets accumulated over the years in the income-stabilization fund as a tax-free capital gain when he leaves farming or when he retires.

4 *Family-income disaster assistance*: Would be triggered when provincial or regional farm incomes drop to disastrous levels and would help farmers to cover up to one half of their essential living expenses.

These programs would be based on more realistic insurance principles than existing programs and would not be designed to provide ongoing support to low-income farmers. Instead, they would be targeted at specific income situations below or above the norm; their coverage would be broad enough, however, to benefit most farmers. At the same time, provision would be made to help needy farmers in periods of widespread economic hardship.

In the following sections, we describe each of the programs in more detail and show how they would have worked if they had been in place during the crisis year of 1987. Then, we compare the results with those achieved under the WGSA and the SCGP. And finally, we take a look at a long-run simulation of the whole system of decoupled programs. (The technical details of the four programs are described in Appendix D.)

### *Farm-Income Insurance*

Under this program, a farmer would receive cash payments whenever his farm income dropped below its "normal" level, which, in our example, would be the average income of the preceding five years. "Farm income" is defined here as net cash returns – i.e., farm cash receipts minus farm cash expenses (excluding payments on farm loans). The insurance would cover up to two thirds of the loss in farm income – to a maximum payout of, say, $60,000 per year. Participation in the program would be mandatory, so as to prevent non-participants from gaining an unfair advantage by joining late or by leaving early, and to eliminate the need for ad hoc relief programs for non-participants. Farmers would be free, however, to build up their own insurance fund, as that might enable them to save on insurance premiums.

The insurance premium, or levy, would be based on net cash farm income and would be paid by the farmer; a matching contribution would be paid by the government. This would be quite similar to insurance under the WGSA, but it would not be linked to the production of grains. The levy rates would be set at provincial averages and would be adjusted up or down for the individual farmer, depending on the frequency and size of the payouts he received. The more frequent a farmer's losses and the higher the payouts received under the insurance scheme, the higher his subsequent insurance levy.

Had such an insurance scheme been in place in 1987, the average cash payout to Prairie farmers would have been in the vicinity of $5,000 – somewhat higher in Manitoba and Alberta, and somewhat lower in Saskatchewan (Table 6-1). Grain farmers would have received an amount about one third above the average; mixed farmers, about one third below the average; and livestock and specialty farmers, somewhat less than half the average. Commercial and corporate farmers would have received above-average support. Among commercial farmers, the highest insurance payout would have gone to full-time farmers; young farmers would have received more than middle-aged farmers.

The central objective of such an insurance program would be to reduce the income variations caused by unpredictable weather conditions and volatile farm prices. Under the program, the payout of insurance benefits would not be set according to grain delivery quotas, acreage, or yield but according to the individual farmer's income experience. As

**Table 6-1**

**Estimated Government Payments per Farmer under the Proposed Decoupled Income-Insurance and Income-Stabilization Programs, Prairie Region, 1987**

| | Government payments per farmer | | | |
|---|---|---|---|---|
| | Income-insurance benefits | | Matching contribution to the stabilization fund | |
| | (Thousands of dollars) | (Per cent) | (Thousands of dollars) | (Per cent) |
| Prairie region | 5.3 | 100 | 5.8 | 100 |
| Provinces | | | | |
| Manitoba | 5.5 | 105 | 5.7 | 98 |
| Saskatchewan | 5.1 | 97 | 4.6 | 79 |
| Alberta | 5.3 | 102 | 7.2 | 126 |
| Type of farm | | | | |
| Grain | 7.0 | 132 | 2.1 | 36 |
| Livestock | 2.3 | 44 | 12.4 | 216 |
| Specialty | 2.5 | 47 | 15.8 | 276 |
| Mixed | 3.8 | 71 | 7.4 | 129 |
| Marginal farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 4.8 | 92 | 0.7 | 12 |
| Aged 35 to 64 | 4.5 | 85 | 0.7 | 12 |
| Full-time farmers | | | | |
| Aged less than 35 | 5.2 | 99 | 1.2 | 22 |
| Aged 35 to 64 | 4.4 | 84 | 1.5 | 26 |
| Commercial farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 7.4 | 141 | 4.8 | 83 |
| Aged 35 to 64 | 7.7 | 146 | 5.7 | 98 |
| Partners | | | | |
| Aged less than 35 | 5.7 | 109 | 8.3 | 145 |
| Full-time farmers | | | | |
| Aged less than 35 | 9.2 | 175 | 11.9 | 208 |
| Aged 35 to 64 | 5.4 | 103 | 10.0 | 174 |
| Elderly farmers | | | | |
| Aged 65 and over | 3.6 | 69 | 3.7 | 68 |
| Corporate farms | | | | |
| Family-owned | 13.8 | 263 | 22.0 | 383 |
| All others | 11.5 | 220 | 23.3 | 405 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

well, it would depend on the farmer's contribution from his own stabilization fund; that, in turn, would determine his annual insurance premiums (or levies).

### *Income-Stabilization Fund*

Under this program, each farmer would be able to set up his own stabilization fund and thereby reduce his dependence on the insurance program. Just as the government would match losses under the insurance program, so, too, it would match up to two thirds of a farmer's income gains from farming operations, provided that he invested the same proportion in the fund. The investment would be tax-deductible.

If, for example, a farmer had an income gain (over the average of the preceding five years) of $20,000 in a given

year, the government would contribute up to $13,333 to the fund, provided that the farmer invested an equal amount. If the farmer invested less, the government's contribution would be correspondingly lower.

If, in a later year, the farmer's income fell, cash would be drawn from his stabilization fund before additional benefits would be paid out under the income-insurance program. The combined total payout would again be limited – in our example, to $60,000 per year. The farmer's levy rates for income insurance would decline to a minimum as his stabilization fund attained a predetermined maximum to cover potential losses.

Not all farmers would have received a cash payout in 1987. Those who managed to increase their farm incomes could have deposited as much as two thirds of those gains into their own registered stabilization fund; whatever that amount, the government would have matched it, up to a maximum of $60,000. Assuming that all Prairie farmers with an income gain had done that in 1987, they would have received in matching funds close to $6,000, on average, from the government – somewhat more than would have been paid out in insurance benefits. This means that even in what was a crisis year, about half of government payouts would have gone into farmers' stabilization funds to cover future losses.

The payout of matching contributions to the funds would have varied among farmers. Most grain farmers, for example, would have received insurance benefits for income losses; most livestock, specialty, and mixed farmers, on the other hand, would have received matching funds for their stabilization funds. Most marginal farmers would have received insurance benefits for income losses, and very few would have received a contribution towards their stabilization funds for income gains. But in the case of young full-time farmers, operating in partnership or independently, the payouts for both the insurance scheme and the stabilization funds would have been well above average, in some cases compensating for farm-income losses and in other cases matching their own contributions to their stabilization funds for farm-income gains (Table 6-1).

### *Farm Adjustment Option*

A farmer could withdraw the balance accumulated in his stabilization fund, including the government's matching contribution, when he decided to quit farming. The money withdrawn from the fund would be tax-free and would be treated in the same way as a tax-free capital gain from the sale of farmland. The maximum of such tax-free capital gains from both the sale of farmland and the savings in the stabilization fund would be $500,000 – equal to the current limit on capital gains on farmland.

The withdrawal from the fund would be controlled by a set of rules to safeguard against misuse of the fund – e.g., repeated quits and starts in farming – or against the withdrawal of funds for other purposes. Since the accumulation of monies in the fund would be strictly related to gains in farm income and not to the size of farm or to cropland acreage, the experience of individuals could be closely monitored through taxation files.

### *Family-Income Disaster Assistance*

From time to time, market prices are so low and weather conditions so adverse that some farmers would suffer extreme hardship if no help were available to them. Should the average farm income in any province drop below a certain trigger point – say, 80 per cent of the average for the past five years – a family-income disaster assistance program would provide cash to farmers whose family income from all sources fell below the rural low-income line, currently set at some $14,000. Cash payments by government would pay all such families (after the payout of insurance benefits) half that amount – i.e., $7,000 per year. That assistance would also be extended to farm families with higher incomes, but cash payments would gradually decrease with higher incomes and would be replaced by matching contributions to the stabilization funds.

In 1987, above-average cash payments would have gone to the farmers of Saskatchewan, especially to grain farmers and mixed grain/livestock farmers (Table 6-2). Full-time marginal farmers and young commercial farmers, especially those operating in partnership, would also have received higher cash payments. By contrast, livestock and specialty farmers, part-time marginal farmers, and part-time (middle-aged) commercial farmers would have received mostly matching contributions for building up their stabilization funds. In total, every Prairie farmer would have received $7,000 in direct income assistance and/or in matching contributions to his stabilization fund.

### *Program Interactions*

The four illustrative programs are not independent of each other but are, to some extent, interactive and complementary.

The farm-income insurance program, for example, would provide every farmer (as defined by the eligibility criteria)

**Table 6-2**

**Estimated Government Payments per Farmer under the Proposed Family-Income Disaster Assistance Program, Prairie Region, 1987**

| | Government payments per farmer | | | |
|---|---|---|---|---|
| | Cash payments | | Matching contribution to the stabilization fund | Total |
| | Below low-income line | Above low-income line | | |
| | (Thousands of dollars) | | | |
| Prairie region | 2.1 | 2.1 | 2.8 | 7.0 |
| Provinces | | | | |
| Manitoba | 1.6 | 1.9 | 3.5 | 7.0 |
| Saskatchewan | 2.3 | 2.3 | 2.4 | 7.0 |
| Alberta | 1.5 | 2.0 | 3.5 | 7.0 |
| Type of farm | | | | |
| Grain | 2.4 | 2.3 | 2.3 | 7.0 |
| Livestock | 0.8 | 1.6 | 4.6 | 7.0 |
| Specialty | 1.1 | 1.5 | 4.4 | 7.0 |
| Mixed | 2.6 | 2.3 | 2.1 | 7.0 |
| Marginal farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 1.0 | 2.0 | 4.0 | 7.0 |
| Aged 35 to 64 | 0.4 | 0.8 | 5.8 | 7.0 |
| Full-time farmers | | | | |
| Aged less than 35 | 3.5 | 2.6 | 0.9 | 7.0 |
| Aged 35 to 64 | 2.5 | 2.8 | 1.7 | 7.0 |
| Commercial farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 2.3 | 2.9 | 1.8 | 7.0 |
| Aged 35 to 64 | 1.4 | 2.1 | 3.5 | 7.0 |
| Partners | | | | |
| Aged less than 35 | 3.2 | 2.3 | 1.5 | 7.0 |
| Full-time farmers | | | | |
| Aged less than 35 | 3.5 | 1.6 | 1.9 | 7.0 |
| Aged 35 to 64 | 2.3 | 2.1 | 2.6 | 7.0 |
| Elderly farmers | | | | |
| Aged 65 and over | 1.5 | 2.4 | 3.1 | 7.0 |
| Corporate farms | | | | |
| Family-owned | 2.6 | 1.1 | 3.3 | 7.0 |
| All others | 3.3 | 0.6 | 3.1 | 7.0 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

with protection against income losses. It would be designed to be actuarially sound, so that the farmers' levies and the government's contribution would match the payout of benefits. The levy rates would be adjusted for regional and individual variations in the frequency of payouts.

If a farmer contributed to the income-stabilization fund, his levy rate for income insurance would be reduced by an amount corresponding to a reduced need for coverage, since payouts from the insurance program would be required only when the contributor's fund was exhausted. A substantial

investment by the farmer in the stabilization fund could lower his levy rate to virtually zero. Once the farmer begins to draw on insurance benefits, however, the levy rate would be adjusted upward again.

There is also a relationship between the family-income disaster assistance payments and the first two programs. Triggered by a sharp decline in provincial or regional farm incomes, the disaster assistance program would provide cash funds only when the farm-family income, after receipt of payouts under the stabilization fund and the insurance program, fell below $28,000; the payout could reach a maximum of $7,000 if the family's net cash income fell to or below $14,000. This additional assistance would be provided mainly to help farmers pay for necessities, including the obligatory levy for the income-insurance scheme. At the same time, it would match the farmer's contribution to his stabilization fund up to a maximum of $7,000 if the family's net cash income was at or above $28,000.

### *Short-Term Costs and Benefits*

One of the underlying objectives of the WGSA and SCGP was that shifting resources into and out of grain production on Prairie farms would cause inefficiencies that could impair Canada's competitiveness in world markets. The temporary supports to be provided under the WGSA and the SCGP were meant to alleviate that problem. Decoupled farm programs, as set out above, would achieve the same goals – i.e., they would enable farm managers to deal with volatility in market prices and short-term variations in farm production. But in addition, they would make farm decisions more independent of government and allow for a more rational risk management of the farm business.

In 1987, Prairie farmers received $1.4 billion, or $10,500 per farm, in cash payments under the WGSA. Had an income-insurance program and an income-stabilization fund, similar to those described above, been in effect, our exploratory estimates suggest that roughly half of that amount would have been paid out in cash immediately and the remainder would have been credited towards the farmers' stabilization funds, assuming that farmers who had income gains would have invested in their funds.

Also in 1987, the SCGP added another $1 billion to the existing farm programs to help farmers through the income crisis. Under that program, the payout to Prairie farmers amounted to $815 million, or somewhat over $6,000 per farmer; the actual amount received by individual farmers depended on their grain acreage.

Had a family-income assistance program of similar magnitude been in existence and had it been triggered by the disastrous market conditions that prevailed in 1987, it would have paid out $7,000 per farmer, of which roughly $4,200 would have been in cash. The remainder would have been available to match the farmers' contributions to their income-stabilization funds (see Table 6-2).

Our example shows that even under very unfavourable market and income conditions, the decoupled programs could be operated at an overall cost comparable with the combined cost of the WGSA and the SCGP. Although the payouts under the decoupled programs in 1987 would have been somewhat higher than under the WGSA and the SCGP (Table 6-3), these exploratory estimates for 1987 do not take into account the fact that Prairie farmers could have drawn on their own stabilization funds if such decoupled programs had been instituted years ago.

The major difference between the proposed insurance program and a program such as that currently administered under the WGSA is that cash benefits to cover expenses would not be paid out to all farmers but only to those suffering losses. In addition, the payout would not be based on the production or sale of particular commodities but on two thirds of the losses in net cash farm income from all agricultural operations. And the funding of the insurance program by farmers and government would be based on sound actuarial principles.

The benefits of farm programs can also be quantified by examining their impact on the financial-risk profiles of farmers. Applying the same estimation procedures as in Chapter 4, one can compare the effectiveness of one program with another: the lower the farmer's risk profile, the lower the risk of financial failure and the more effective the program in relation to program expenditures.

The decoupled programs described above compare well with the current farm-assistance programs. Under the latter, the proportion of farmers deemed to be in financial difficulty is somewhat lower than it would be under the decoupled programs. In addition, the current programs favour Saskatchewan and Alberta over Manitoba, and they favour middle-sized commercial farms – but not large corporate farms – over small marginal operations. The differences narrow when one looks only at the financial situation of nonviable farms. In that case, the overall performance of both sets of programs is the same. There are differences among farmers, however. The decoupled programs would not be as favourable as the existing schemes to grain farmers or to some commercial farmers. Grain farmers would benefit less because of the shift from grain-oriented to commodity-

**Table 6-3**

**Estimated Government Payments per Farmer under the WGSA and the SCGP, and under the Proposed Decoupled Program, Prairie Region, 1987**

| | | Decoupled programs | | |
|---|---|---|---|---|
| | Current programs WGSA plus SCGP | Cash payments | Matching contribution to the stabilization fund | Total |
| | | (Thousands of dollars) | | |
| Prairie region | 15.7 | 9.5 | 8.5 | 18.0 |
| Provinces | | | | |
| Manitoba | 11.9 | 8.9 | 10.7 | 19.6 |
| Saskatchewan | 19.1 | 9.7 | 6.9 | 16.6 |
| Alberta | 17.2 | 9.0 | 9.2 | 18.2 |
| Type of farm | | | | |
| Grain | 20.7 | 11.7 | 5.0 | 16.7 |
| Livestock | 4.3 | 4.6 | 17.1 | 21.7 |
| Specialty | 4.4 | 5.0 | 20.3 | 25.3 |
| Mixed | 15.2 | 8.7 | 9.5 | 18.2 |
| Marginal farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 7.2 | 7.8 | 4.7 | 12.5 |
| Aged 35 to 64 | 4.9 | 5.8 | 6.4 | 12.2 |
| Full-time farmers | | | | |
| Aged less than 35 | 10.0 | 11.3 | 2.1 | 13.4 |
| Aged 35 to 64 | 7.4 | 9.8 | 3.1 | 12.9 |
| Commercial farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 21.2 | 12.6 | 6.6 | 19.2 |
| Aged 35 to 64 | 20.3 | 11.2 | 9.1 | 20.3 |
| Partners | | | | |
| Aged less than 35 | 22.4 | 11.3 | 9.8 | 21.1 |
| Full-time farmers | | | | |
| Aged less than 35 | 24.1 | 14.3 | 13.9 | 28.2 |
| Aged 35 to 64 | 24.0 | 9.8 | 12.6 | 22.4 |
| Elderly farmers | | | | |
| Aged 65 and over | 17.3 | 7.5 | 6.8 | 14.3 |
| Corporate farms | | | | |
| Family-owned | 34.8 | 17.5 | 25.3 | 42.8 |
| All others | 34.0 | 15.5 | 26.3 | 41.8 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

neutral support. And among commercial farmers, beginners with heavy debts would be disadvantaged because decoupled farm support would not cover all of the expenses arising from farm loans (Table 6-4). The income-insurance program would, however, provide them with some additional cash.

### *Long-Term Costs and Benefits*

In the long run, all successful farmers could derive benefits from the decoupled programs over and above those provided under the present programs, because their stabilization funds

**Table 6-4**

**Estimated Government Payments per Farmer in Financial Difficulty under the Proposed Decoupled Income-Insurance and Income-Stabilization Programs, Prairie Region, 1987**

| | Under current programs | | Under decoupled programs | |
|---|---|---|---|---|
| | Farms in difficulty | Nonviable farms | Farms in difficulty | Nonviable farms |
| | (Per cent) | | | |
| Prairie region | 28 | 10 | 34 | 10 |
| Provinces | | | | |
| Manitoba | 33 | 13 | 27 | 7 |
| Saskatchewan | 28 | 9 | 37 | 11 |
| Alberta | 26 | 10 | 39 | 13 |
| Type of farm | | | | |
| Grain | 26 | 8 | 34 | 10 |
| Livestock | 24 | 9 | 19 | 3 |
| Specialty | 33 | 11 | 28 | 5 |
| Mixed | 38 | 17 | 47 | 17 |
| Marginal farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 29 | 9 | 26 | 5 |
| Aged 35 to 64 | 13 | 4 | 11 | 2 |
| Full-time farmers | | | | |
| Aged less than 35 | 47 | 23 | 47 | 18 |
| Aged 35 to 64 | 31 | 15 | 23 | 6 |
| Commercial farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | 51 | 14 | 60 | 18 |
| Aged 35 to 64 | 31 | 8 | 36 | 8 |
| Partners | | | | |
| Aged less than 35 | 52 | 15 | 73 | 30 |
| Full-time farmers | | | | |
| Aged less than 35 | 44 | 15 | 66 | 30 |
| Aged 35 to 64 | 25 | 8 | 41 | 11 |
| Elderly farmers | | | | |
| Aged 65 and over | 25 | 6 | 12 | 3 |
| Corporate farms | | | | |
| Family-owned | 33 | 12 | 37 | 13 |
| All others | 46 | 27 | 53 | 28 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

would grow over the years. The precise impact of decoupling would obviously depend on the specification of the new programs and on farmers' reaction to them. It is impossible, within the context of this study, to model the effects of the programs or the behavioural characteristics of farm managers with sufficient realism. Nevertheless, a computer simulation based on somewhat restrictive and simplistic assumptions can illustrate how, in the abstract, the programs would work over a period of two or three decades.

In our simulation, a sample of some 3,500 Prairie farms, grouped by farm type, farm size, financial-risk profile, other farm characteristics, province, and farming region, was enlarged to represent all farms in the Prairie region. Each of the farms was "exposed" to changes in the prices for wheat, barley, canola, and other crops; for cattle, pigs, and poultry; and for farm fuel, fertilizer, herbicides, insecticides, and other farm inputs. Each was also "exposed" to weather variations modifying crop yields annually in each of 22

production regions. Then the decoupled programs were superimposed. In all cases, it was assumed that the programs were put into effect in the mid-1960s.

The estimated impact of the decoupled programs varied from one year to the next, over the medium and long term. Program benefits and costs were based on the income experience of the individual farms and then averaged across all farms. The potential payouts to Prairie farmers are summarized in Table 6-5. In 1988, each Prairie farmer would have received $6,600. Over 90 per cent of this support would have come from income-insurance benefits and income-assistance payments. The remainder would have come from the government's matching contribution to the stabilization fund. This payout would have been substantially less than the actual payout under the current programs. That is because, under the decoupled programs, most of the payout would have come from each farmer's own stabilization fund, which would have exceeded $100,000 in the 1980s.

The estimated program benefits varied among farms. During the 1980s – and, indeed, over the past two or three decades – the insurance benefits paid to grain farmers would have exceeded those received by livestock, mixed, and specialty farmers. Because grain farmers would have received more of those benefits in cash, the government's matching contributions to their stabilization funds would have been lower, and the size of the funds would have been smaller. During the 1980s, grain farmers would have reduced their fund holdings to cover market losses, while

**Table 6-5**

**Estimated Payouts and Holdings in Stabilization Fund per Farmer under the Proposed Decoupled Program, by Type of Farm, Prairie Region, Selected Time Periods**

| | Average annual payout | | | | |
|---|---|---|---|---|---|
| | Income insurance | Income assistance | Matching contribution to the stabilization fund | Total | Holdings in fund |
| | | | (Thousands of dollars) | | |
| Grain | | | | | |
| 1988 | 1.8 | 5.3 | 0.5 | 7.6 | 121 |
| 1984-88 | 0.8 | 1.7 | 0.6 | 3.1 | 133 |
| 1966-92 | 0.4 | 0.3 | 2.4 | 3.1 | |
| Livestock | | | | | |
| 1988 | 0.4 | 2.7 | 0.8 | 3.9 | 138 |
| 1984-88 | 0.5 | 2.0 | 3.3 | 5.8 | 124 |
| 1966-92 | 0.3 | 0.3 | 2.7 | 3.3 | |
| Specialty | | | | | |
| 1988 | 0.6 | 3.3 | 1.0 | 4.9 | 157 |
| 1984-88 | 0.6 | 1.1 | 3.2 | 4.9 | 153 |
| 1966-92 | 0.3 | 0.2 | 3.2 | 3.7 | |
| Mixed | | | | | |
| 1988 | 0.9 | 4.2 | 0.5 | 5.6 | 138 |
| 1984-88 | 0.6 | 1.6 | 1.7 | 3.9 | 137 |
| 1966-92 | 0.3 | 0.3 | 2.6 | 3.2 | |
| All types | | | | | |
| 1988 | 1.4 | 4.7 | 0.5 | 6.6 | 128 |
| 1984-88 | 0.7 | 1.6 | 1.4 | 3.7 | 134 |
| 1966-92 | 0.3 | 0.3 | 2.5 | 3.1 | |

SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

livestock farmers would have increased their fund holdings through contributions from market gains.

The corresponding costs to farmers are summarized in Table 6-6. In 1988, farmers would have paid $2,000, with four fifths of that amount being devoted to insurance premiums and the remainder to contributions to the stabilization fund. Over the long term, the costs would have run nearly twice as high – roughly $3,600 – most of that amount going into the stabilization fund. The farmers' costs would have been adjusted automatically to their income experience – i.e., they would have paid more during times of high income gains and less during times of losses. Mixed grain/livestock and livestock farmers would have paid lower insurance premiums; the premiums paid by grain farmers would have been average, and those paid by specialty farmers would have been higher.

The overall cost of the programs would have been shared by the government. In 1988, the government's cost would have been close to $1 billion (Table 6-7), most of it going for payment of insurance benefits and low-income assistance. That would have been about one third as much as the government spent under the current programs (Table 6-8). Over the medium to long term, the government's annual costs would have run at about $0.5 billion, amounting to an estimated $12.6 billion over a period of 25 years (1966-90). That would have been somewhat less than the $13.5 billion that the government did spend. Under the existing farm programs, all of the support was paid to farmers in cash, to be spent at their discretion; under the decoupled programs, most of it ($10 billion by 1988) would have been paid into the farmers' stabilization funds, only to be used to cover income losses or for retirement from farming. Under the existing farm programs, the government paid most of the costs; under the decoupled programs, the farmers would have shared the cost in nearly equal proportions.

The cost of this set of decoupled programs varies not only with the farmer's income experience but also with his

**Table 6-6**

**Estimated Average Annual Costs to Farmers of the Proposed Decoupled Program, by Type of Farm, Prairie Region, Selected Time Periods[1]**

| | Insurance premiums (levies) | Matching contribution to the stabilization fund | Total |
|---|---|---|---|
| | (Thousands of dollars) | | |
| Grain | | | |
| 1988 | 1.7 | 2.3 | 4.0 |
| 1984-88 | 2.1 | 0.7 | 2.8 |
| 1966-92 | 1.2 | 2.4 | 3.6 |
| Livestock | | | |
| 1988 | 1.2 | 0.7 | 1.9 |
| 1984-88 | 1.4 | 3.1 | 4.5 |
| 1966-92 | 0.8 | 2.7 | 3.5 |
| Specialty | | | |
| 1988 | 2.2 | 0.9 | 3.1 |
| 1984-88 | 2.5 | 3.0 | 5.5 |
| 1966-92 | 1.4 | 3.2 | 4.6 |
| Mixed | | | |
| 1988 | 1.3 | 0.4 | 1.7 |
| 1984-88 | 1.6 | 1.6 | 3.2 |
| 1966-92 | 0.9 | 2.6 | 3.5 |
| All types | | | |
| 1988 | 1.6 | 0.4 | 2.0 |
| 1984-88 | 1.9 | 1.4 | 3.3 |
| 1966-92 | 1.1 | 2.5 | 3.6 |

1 The estimation procedure is described in Appendix D.
SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

**Table 6-7**

**Estimated Cost of the Proposed Decoupled Program, Selected Time Periods[1]**

| | Cash payments | Matching contribution to the stabilization fund | Total |
|---|---|---|---|
| | (Billions of dollars) | | |
| Cost to government | | | |
| 1988 | 0.8 | 0.1 | 0.9 |
| 1984-88 | 1.5 | 0.9 | 2.5 |
| 1966-90 | 2.6 | 10.0 | 12.6 |
| 1966-92 | 2.6 | 11.9 | 13.6 |
| Cost to farmers | | | |
| 1988 | 0.1 | 0.1 | 0.2 |
| 1984-88 | 0.7 | 0.9 | 1.6 |
| 1966-90 | 2.9 | 10.0 | 12.9 |
| 1966-92 | 3.0 | 11.9 | 14.0 |

1 The estimation procedure is described in Appendix D.
SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

**Table 6-8**

**Estimated Cost of Current Farm Programs, Selected Time Periods[1]**

| | Cash payments | | | | WGTA subsidies | Total |
|---|---|---|---|---|---|---|
| | Crop insurance | WGSA | SCGP | Subtotal | | |
| | (Billions of dollars) | | | | | |
| Cost to government | | | | | | |
| 1988 | 0.6 | 1.0 | 0.8 | 2.4 | 0.7 | 3.1 |
| 1984-88 | 1.6 | 3.8 | 1.7 | 7.1 | 3.4 | 10.5 |
| 1966-92 | 2.2 | 4.1 | 1.7 | 8.0 | 5.5 | 13.5 |
| Cost to farmers | | | | | | |
| 1988 | 0.2 | 0.0 | – | 0.2 | – | 0.2 |
| 1984-88 | 0.8 | 0.2 | – | 1.0 | – | 1.0 |
| 1966-92 | 1.4 | 0.5 | – | 1.9 | – | 1.9 |

1 The estimation procedure is described in Appendix D.
SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

propensity to save. Throughout our analysis, it has been assumed that farmers would commit the maximum amount – i.e., two thirds of their farm income gains – to their stabilization funds. If they chose to save less, then the government contributions to the fund would be lower, and the program would cost less. If, at the same time, the farmer's insurance premiums were fully individualized and were allowed to be lowered to zero (except for a nominal charge), the cost would be further reduced if there were to be no losses.

An example will illustrate. If the farmers' savings rate were one quarter lower – i.e., reduced from two thirds to one half of the gains in farm income – the payout would remain unchanged in the short run but would decline considerably over the long run. And if, in addition, the farmers' insurance premiums were individualized, the cost to the government would drop from an estimated $13.6 billion to $11.9 billion (over the period 1966-92), and the cost to farmers would decline from $14 to $10.7 billion – a reduction of one quarter (Table 6-9). This cost reduction is somewhat more favourable to farmers mainly because of lower insurance costs.

Benefits and costs under the decoupled programs were estimated in nominal dollars, and it was assumed that the holdings in the farmers' stabilization funds earned tax-free interest at the same rate as government bonds. The benefits and costs would have been substantially different if they had been estimated in constant dollars or if the stabilization funds had not earned any interest.

**Table 6-9**

**Estimated Cost of the Proposed Decoupled Program, with Payments Adjusted for a Lower Rate of Saving, Selected Time Periods[1]**

| | Cash payments | Matching contribution to the stabilization fund | Total |
|---|---|---|---|
| | (Billions of dollars) | | |
| Cost to government | | | |
| 1988 | 0.8 | 0.1 | 0.9 |
| 1984-88 | 1.7 | 0.8 | 2.5 |
| 1966-92 | 2.9 | 9.0 | 11.9 |
| Cost to farmers | | | |
| 1988 | 0.0 | 0.1 | 0.1 |
| 1984-88 | 0.2 | 0.8 | 1.1 |
| 1966-92 | 1.6 | 9.0 | 10.7 |

1 The estimation procedure is described in Appendix D. It is assumed here that the farmer's saving rate is 50 per cent of his farm-income gains and not, as in Table 6-7, 67 per cent. Corresponding estimates for a saving rate of 25 per cent are shown in Table D-4.
SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

## Conclusion

The cost/benefit estimates of current and decoupled farm-income programs show that the totals under both sets of programs are quite similar, in the short run. Overall, Prairie

farmers would have received about the same government assistance under both types of programs. Under the decoupled programs, however, the funds would have been distributed more evenly among farmers, with less support going to grain producers and more to livestock producers. The short-run estimates were based on a comparison of the years 1985 and 1987 and did not take into account the reserves that farmers could have accumulated in their stabilization funds over the years.

The long-run estimates show that the balance in the stabilization funds would have, after gradual accumulation over the past three decades, reached substantial levels. Moreover, during recent years the decoupled set of farm programs would have been much less costly to government than the existing programs. Program funds would have been distributed more evenly and would not have discriminated against the production of livestock or other specialty crops. Under the decoupled programs, the payout would not have been linked to farm acreage or to the volume of production but to the annual gain or loss in farm incomes. Because of the link to gains or losses, the strongest support would not have gone automatically to the biggest farms. Persistent losers would have had to pay higher insurance levies, while consistent winners would have paid lower premiums. Moreover, the winners would have been able to obtain matching contributions from the government to add to their stabilization funds. And that would have helped the more efficient farmers and strengthened competitiveness. Finally, the tax-free build-up of stabilization funds should have, at times of rising farm prices, reduced the demand for speculative land purchases and encouraged earlier retirement.

Evidently, a set of decoupled farm programs could meet a wide range of objectives. But certain gaps would remain. Although low-income assistance would provide additional support at times of widespread hardship, it would not do so in good times. That is because low-income assistance is not meant to be a welfare program but a safety net for otherwise efficient farmers – young farmers who have just started, for example – in times of need. It is possible that the income incentives under decoupling would have encouraged farmers to diversify into livestock production and to let marginal farm acreage revert to grassland after grain prices fell, but it is doubtful that the incentives would have been strong enough to encourage soil conservation or land set-asides on a larger scale. Nevertheless, greater diversification into livestock production could have made for improved crop rotations and better soil management.

As well, it should be kept in mind that all the estimates of costs and benefits provided earlier are of an exploratory and tentative nature. No doubt, further refinement of the trigger points and incentive specifications could yield more realistic results and weaken or strengthen some of the conclusions reached here.

# 7 Future Perspective

Current government assistance to Prairie farmers is substantial. In 1987, direct government payments alone amounted to $1.7 billion for the three Prairie provinces. That does not include the $815 million emergency payment under the Special Canadian Grains Program, nor does it include indirect assistance provided through farm credit, freight subsidies, crop and livestock research, food-aid and -trade programs, social adjustment, and rural development. When all of these are also included, the total assistance to Prairie farmers amounts to $4 billion. That averages out to roughly $30,000 per farm.

## The Immediate Future

As a result of the emergency payments, of the somewhat earlier-than-expected firming of grain prices, and of a profitable situation in the livestock sector, average Prairie farm incomes have remained relatively stable. Programs such as the Special Canadian Grains Program, the Western Grain Stabilization Act, and the Western Grain Transportation Act have raised income levels to the point where, for many farmers who are free of debt, prices are sufficient to cover at least the variable costs of production. Removing any one of those programs, however, would cause a significant decline in farm incomes.

There is little doubt that the enormous farm debt weighs heavily on Prairie agriculture and is a major factor in today's farm crisis. In recent months, the prime lending rate has moved up again and that will add to farmers' financial burdens. But it is not the only factor; as we have shown, other factors are involved. If Prairie agriculture had diversified more successfully and had been less dependent on wheat, or if Prairie farmers had been better protected against the extreme price variations in world markets, a crisis of such magnitude might have been avoided.

Yet the current Prairie farm crisis is not a unique event but part of a historic pattern. Since the early 1920s, production swings in Prairie wheat production have occurred at fairly regular intervals. In addition, there has been a secular decline in wheat prices that continues to plague Prairie grain producers. In view of worldwide improvements in production technologies and of the chronic excess supplies on world markets – occasionally interrupted by shortages and sharp price increases – Prairie farming in future is not expected to be much more stable or much more profitable than in the past. Not all farmers will be able to compete under those difficult conditions, even if governments continue to support agriculture.

## Policy Challenges

The Economic Council has recently published a report on the Prairie grain economy (Economic Council of Canada, 1988). That document covered a wide range of research findings and recommended numerous changes in Prairie farm policies. Its recommendations were grouped into two categories: improvements to existing programs; and, depending on progress in international trade liberalization, the replacement of existing programs by decoupled income support. The present study concentrated on the second category. Correspondingly, the policy challenges that are outlined here focus on decoupled farm-income support.

Prairie farmers have had a comparative advantage in grain and livestock production for many years. The challenge is not to lose that advantage but to maintain and strengthen it in the future. The recent dramatic decline in world market prices played havoc with the Prairie farm economy. The policy alternatives, described in the preceding chapter, suggest what could be done to improve the situation, now and in the future. The intention is not to add even more programs to the existing ones but to replace them by more-effective programs that could, in the longer run, contribute to the solution of the chronic problem of low and unstable farm incomes.

Through the General Agreement on Tariffs and Trade (GATT), Canada, along with other countries, has taken the initiative towards reducing farm subsidies. With treasuries aiding the farmers of rich nations to the tune of some C$200 billion a year in support payments, political pressures are building up to reduce subsidies and liberalize trade. Plans have been tabled at the GATT negotiations to phase out all farm subsidies by the year 2000.

Past efforts to reduce subsidies have not been very successful. Among farmers, the reduction of subsidies has

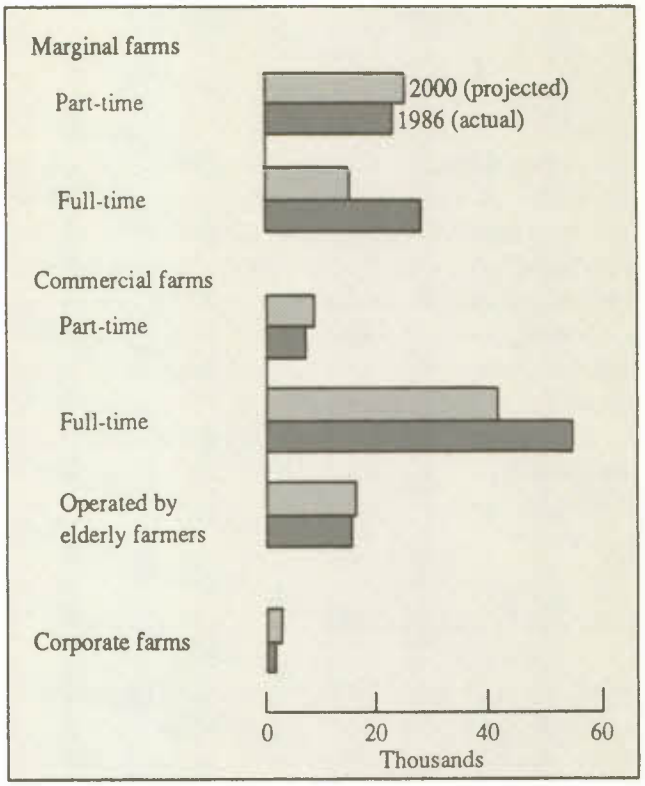
been no more popular than the imposition of higher taxes among consumers. Although there is some evidence that trade liberalization in agricultural products would lower food prices in the importing countries and raise farm prices in the exporting countries, that evidence is not overwhelming. And it is doubtful that trade liberalization by itself will solve the endemic farm-income problems, eliminate the inherent instability of agricultural production, or remove the uncertainties in the global marketplace.

As in other countries, Canadian farm subsidies have reached levels today that are not sustainable over the long term. But eliminating farm subsidies altogether would cause social and economic upheaval. Farm exports from the Prairie region have consistently made a positive contribution to Canada's balance of trade. The challenge is to implement farm programs that will lend support to the more efficient farmers, strengthen the market signals, and not hinder adjustment from farming to other occupations. To help accomplish that, farm programs should be given preference when they are income-oriented rather than commodity-oriented and when they are adjustment-oriented rather than subsidy-oriented.

Replacing commodity-based support with decoupled support will require extensive planning and consultation with farmers and with provincial governments. It will also require a favourable economic climate both at home and abroad. Strong economic growth, price recovery in export markets, and progress in the GATT negotiations would offer the Canadian government an opportunity to reform its farm programs.

Chart 7-1

**Number of Prairie Farms, by Type, 1986 and 2000**




SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

## What of the Longer Term?

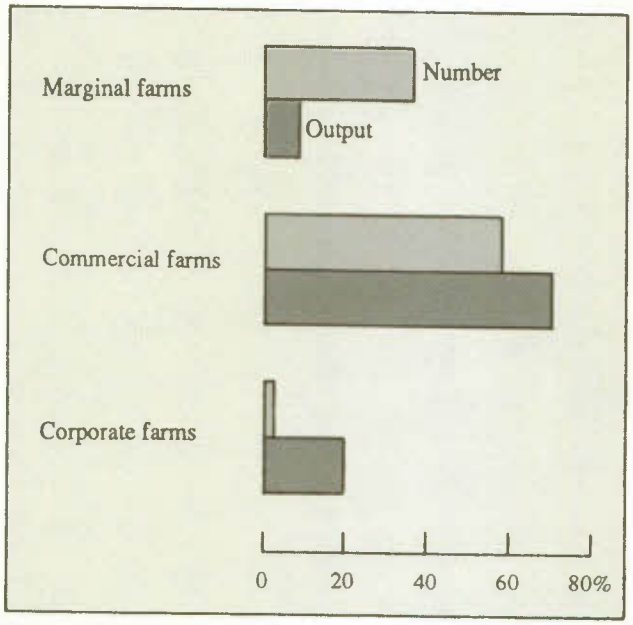
Given the typical boom-and-bust cycle of the world demand and supply of farm products, it is impossible to predict the future with any degree of certainty. If one assumes, however, that the average long-term demand and supply trends of the period 1971-86 will persist into the years to come, the ensuing cost/price squeeze will cause a continued decline in the number of farms. Between now and the year 2000, the number of farms in the Prairie provinces is expected to decrease from 130,000 (in 1985) to 115,000 (or possibly as low as 95,000). Most of that drop will come from the decline in the number of full-time farmers, as the number of part-time farmers and corporate farmers is expected to increase (Chart 7-1).

The total volume of Prairie farm output can be expected to increase by roughly 40 per cent, whereas farm employment will decline by 12 per cent; the number of farms is also expected to drop by 15 per cent. At the same time, the average farm size is likely to increase from 950 acres to over 1,100 acres. The reduction in farm employment will be somewhat less than that in the number of farms, because the larger number of corporate farms will require some additional labour. Those requirements can be easily met, however, by additional part-time farmers, and they will not provide employment opportunities for all of those who discontinue farming. Prairie farm output is expected to increase; by the year 2000, less than 10 per cent of the total will be produced by marginal farmers; over 20 per cent, by large corporate (but mostly family-owned) farms; and nearly three quarters, by the medium-sized commercial farms (Chart 7-2).

Those are rather optimistic estimates. There is no assurance that the current Prairie farm crisis will not accelerate the adjustment process. In either case, the burden of such structural adjustment will not be shared equally among all farmers. Often, the adjustment from farm to nonfarm employment occurs between generations, when young

**Chart 7-2**

**Distribution of Farms and Farm Output by Type of Farm, Prairie Region, Year 2000**




SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

members of the farm family become aware of the greater income opportunities that exist in the nonfarm sector. But, at times, the burden falls on those who, because of poor management or bad luck, cannot hang on to the farm any longer and must find a way out, with little help from anyone.

We have outlined in this study examples of farm programs that would help the more efficient farmers to prosper while alleviating the burden of those who must adjust.

# Appendixes

# A Farm Structure: A Conceptual Approach

The mainstream of the literature on the analysis of agricultural policy focuses on the evaluation of alternative policies in a theoretical welfare context. It requires specification of the means to achieve certain policy goals.

Applied to the topic at hand, the goals might be to maximize farm incomes, to attain levels of farm-family incomes comparable with nonfarm incomes, to balance sectoral economic growth, to achieve a more equitable income distribution, to eliminate extreme social and economic hardship, to ensure adequate returns to farm resources, and/or to guarantee the survival of the family farm.

By and large, farm policies have had the objective of improving farm incomes. They were designed

- to ensure adequate farm incomes;
- to match the rate of returns earned by labour and capital in other occupations; and
- to reduce year-to-year variations in returns.

In short, farm-income policies have been aimed at achieving income adequacy, comparable rates of return, and income stability. With those objectives in mind, a substantial part of government expenditures has been allocated to research and development – especially to the development of yield technology (producing higher-yielding crop and livestock strains, for example). In more recent years, the issues of international competitiveness, productivity, and cost-effectiveness have been raised, and they have become a major policy objective.

In this context, it is of interest to relate structural changes in agriculture to income and productivity improvements and to determine which changes are most effective. Fiscal restraints will require better targeting and program specification; they also provide the rationale for favouring some structural changes over others.

From past research of Prairie farm economics, it appears to be useful to incorporate into the analysis data on various aspects of farm organization, as well as on farm type, farm size, and farming regions, and to link them to characteristics of farm finance and productivity. In outlining the conceptual framework, farm-family income will be defined first, and the structural variables will be added later.

## Changes in Farm-Family Income

At the risk of oversimplification, farm-family income $Y$ can be defined as the dollar difference between farm output $O$ and farm input $I$, government payments $J$ and off-farm income $K$ as in equation (1) or as income per farm, as in equation (2). Each item consists of numerous elements, with quantity and price components.

$$Y = O - I + J + K \tag{1}$$

$$\frac{Y}{N} = \sum_o \frac{Q_o P_o}{N} - \sum_i \frac{Q_i P_i}{N} + \sum_j \frac{G_j}{N} + \sum_k \frac{Y_k}{N} \tag{2}$$

where

$Y$ = total farm-family income
$N$ = number of farms
$Q_o$ = farm output of the $o^{th}$ enterprise
$P_o$ = farm price per unit of the $o^{th}$ output
$Q_i$ = farm input of the $i^{th}$ type
$P_i$ = farm cost per unit of the $i^{th}$ input
$G_j$ = direct government payment of the $j^{th}$ type
$Y_k$ = nonfarm income of the $k^{th}$ kind.

Given this breakdown, the annual changes in farm-family income can be attributed to changes in each of the elements as in equation (3) where the notation is the same as above, where change is denoted by $\Delta$, and where the type of function is denoted by $f$. The selection of an appropriate functional form will enable us to estimate weights for the growth rates of individual outputs, inputs, prices, and farm labour, as denoted by $w_1$ and * respectively. The weights measure by how much the farm-family income will change when any one of the elements changes.

$$y = f(\Delta q_o, \Delta p_o, \Delta q_i, \Delta p_i, \Delta q_j, \Delta y_k) \tag{3}$$

$$\overset{*}{y} = w_1 \overset{*}{q}_o + w_2 \overset{*}{p}_o - w_3 \overset{*}{q}_i - w_4 \overset{*}{p}_i + w_5 \overset{*}{q}_i + w_6 \overset{*}{y}_k \tag{4}$$

This degree of disaggregation enables us not only to show how crop and livestock prices, farm expenses on fertilizer, pesticides, and purchased feed grains affect annual incomes but also how much technology, mechanization, interest rates, and government intervention contributed to changes in farm-family income over the years. Once the weights $w_{1\ldots6}$

of the variables in equation (4) are determined with sufficient accuracy, the simulation of selected policy interventions can provide an estimate of costs and benefits. Computationally, that is always possible when equation (4) is a differentiable function, with finite derivatives of all orders.

In short, this formulation establishes an accounting frame for relating changes in farm production and nonfarm revenues to changes in total income per farm family.

## Structural Characteristics: An Overview

The preceding outline applies to broad provincial or global aggregates but does not cover any distributional variables of farm structure. We look at them next.

In a recent overview of Canadian agriculture, Brinkman and Warley (1983) enumerate a wide range of such structural variables. They summarize them under the following headings: farm size and distribution characteristics by gross sales, assets and acres; the current income situation of farmers and farm and nonfarm earnings; trends in concentration of farm numbers and sales; specialization by product type; age profiles; the extent of different kinds of business organizations; trends in input use; and tenure.

They emphasize that this description does not include all structural elements. In a more comprehensive profile of farm structure, they would incorporate, for example, information on farm finances; on the distribution of government payments, by farm size; on financial performance ratios; on farm credit; on types of loan, source, and interest costs; on multifactor productivity economies of farm size, and degree of specialization; on control over assets and decision-making, by farm type; and on numerous other statistical characteristics of farm structure.

They recommend that all farm data be cross-classified by farm size, by degree of concentration, by farm commodity, and by farming region; and that they should be arranged in time series, cross-tabulated according to specific farm characteristics and augmented with profiles of representative farms. This extensive data background, according to the authors, would provide a useful "top-down" overview of the underlying forces of structural changes in agriculture. And they go on to say that such an aggregate analysis would need to be complemented by "bottom-up" studies to examine the "economic metabolism" of individual farms at the micro-level and thereby explain better what is happening to agriculture at the aggregate level.

## Five Elements of Prairie Farm Structure

The present study of the Prairie grain economy does not attempt to incorporate all of these aspects. It covers five factors of farm structure: 1) farm organization; 2) farm size; 3) farm enterprise; 4) farm finance; and 5) farming regions. Admittedly, they are selected arbitrarily, but it is assumed that they cover the major characteristics of Prairie agriculture.

### *Farm Organization*

In this context, farm organization pertains mainly to the organization of human resources on the farm. We differentiate between a dozen categories with the following characteristics:

*A Marginal Farms*

Part-time farmers on part-time farms, operating farm units with sales below the median; the operator works 97 or more days off the farm and is aged less than 65:

- operator aged less than 35;
- operator aged between 35 and 64.

Full-time farmers on part-time farms, operating farm units with sales below the median; the operator works between 0 and 96 days off the farm and is aged less than 65:

- operator aged less than 35;
- operator aged between 35 and 64.

*B Commercial Farms*

Part-time commercial farms are similar to full-time commercial farms, but the operator works 97 or more days off the farm:

- operator aged less than 35;
- operator aged between 35 and 64.

Full-time commercial farms are proprietorships, partnerships or family corporations with gross sales above the median, with under 2 person-years of paid labour, and the operator works between 0 and 96 days off the farm.

- operator aged less than 35, partnership;
- operator aged less than 35, no partnership;
- operator aged between 35 and 64.

Farms operated by elderly farmers:

- operator aged 65 years or over; farm units with below- and/or above-median sales.

In the context of the present study, the full-time farm operators aged less than 35, were split into partnerships and others. Elderly farm operators aged 65 years and over were grouped together, regardless of the size of operation.

*C Corporate Farms*

Semi-managerial farms are proprietorships, partnerships, and family corporations with gross sales above the median and from 2 to 5 person-years (103-260 weeks) of paid labour:

- mostly family-owned;
- mostly owned by others.

Corporate integrated managerial farms are similar to semi-managerial farms but employ over 5 person-years (103-260 weeks) of paid labour; they are nonfamily corporations, with gross sales above the 75th percentile:

- Hutterite farms and other trust, estate, and co-operative farms;
- all other farms: the remainder of agricultural holdings by nonfamily corporations with less than 2 person-years and with gross sales:
  - below the 75th percentile;
  - equal to, or above, the 75th percentile.

In most cases, the last four categories were lumped together with corporate farms mostly owned by others.

The key elements of the foregoing definitions are summarized in Table A-1.

This typology is closely related to that of Statistics Canada, applied in earlier work by Ehrensaft and Bollman (1985). Some categories were added for age distribution, partnerships, and managerial farms, however.

### *Farm Size*

On Prairie farms, the size of the operation is often measured in terms of farm acreage and, more specifically, of sections of land (1 farm section = 640 acres = 1 square mile). Although the Census of Agriculture provides a more detailed breakdown, we limited the farm-size distribution to four categories:

| Size | Typical acreage | Range |
|---|---|---|
| | (Acres) | |
| Very small to small (1/4 section) | 160+ | 10-239 |
| Small to medium (1/2 section) | 320+ | 240-559 |
| Medium to large (1 section) | 640+ | 560-1,119 |
| Large to very large (2 sections) | 1,280+ | 1,120+ |

The data sets excluded all of those producers who operated on fewer than 10 acres of land or who grew no field crops. That was done to exclude market gardeners, greenhouse operators, mushroom producers, and others who cultivated insignificant farm acreages or grew no field crops. This exclusion reduced the number of census farms by some 20,000 – to 133,500, a number that roughly corresponds to the farm-employment estimate of 130,000 of the Labour Force Survey.

Although the very small farms of fewer than 10 acres were excluded from the analysis, the degree of disaggregation was more detailed at the lower end of farm acreage than at the upper end. That was done to have a similar percentage of farms (in 1986) in each of the four size categories.

As it turned out, the farm-size variable was deleted during the course of the statistical analysis because the number of observations in each of the many data subsets became too small.

### *Farm Enterprise*

The type of farm enterprise pertains to crop and livestock enterprises. The classification differentiates between four major farm types: grain farms; livestock farms; specialty farms; and mixed grain/livestock farms.

We did not follow the usual census procedure of classifying farms as grain or livestock farms when 50 per cent or more

**Table A-1**

**Characteristics of Farm Operations in Canada Selected for Our Analysis[1]**

| | Proportion of farms[2] | Age of operator | Off-farm work | Farm labour |
|---|---|---|---|---|
| | (Per cent) | (Years) | (Days per year) | (Weeks per year) |
| Marginal farms | | | | |
| Part-time farmers | | | | |
| Young | < 50 | less than 35 | ≥ 97 | |
| Middle-aged | < 50 | 35 to 64 | ≥ 97 | |
| Full-time farmers | | | | |
| Young | < 50 | less than 35 | ≤ 96 | |
| Middle-aged | < 50 | 35 to 64 | ≤ 96 | |
| Commercial farms | | | | |
| Part-time farmers | | | | |
| Young | ≥ 50 | less than 35 | ≥ 97 | < 103 |
| Middle-aged | ≥ 50 | 35 to 64 | ≥ 97 | < 103 |
| Full-time farmers | | | | |
| Young | ≥ 50 | less than 35 | ≤ 96 | < 103 |
| Middle-aged | ≥ 50 | 35 to 64 | ≤ 96 | < 103 |
| Elderly farmers | | | | |
| Partly retired | < 50 | 65 and over | | |
| Not retired | ≥ 50 | 65 and over | | |
| Corporate farms | | | | |
| Semi-managerial | | | | |
| Family farms | ≥ 50 | | | 103-260 |
| Other farms | ≥ 50 | | | 103-260 |
| Integrated farms | ≥ 75 | | | ≥ 260 |
| Other nonfamily corporate farms | | | | |
| Small-volume | < 75 | | | < 103 |
| Large-volume | ≥ 75 | | | < 103 |

1 Symbols:
< = less than
> = greater than
≤ = less than or equal to
≥ = greater than or equal to
The data used in our analysis pertain to census year 1985-86.

2 The percentages refer to the proportions of farms below, at, or above a given level of farm-product sales. The median level for all farms (50 per cent) was $37,684.

of the cash receipts were derived from either grains or livestock, because we wanted to identify mixed and specialty farms as well. We first tried a 75/25 criterion, which categorized farms as either grain or livestock farms when 75 per cent or more of their receipts were derived from either grains or livestock, respectively, but we found that this made the mixed farm the dominant farm type of the Prairie region. We then decided on a 67/33 criterion. As shown in Table A-2, that reduced the proportion of mixed farms to more realistic levels and increased the proportionate numbers of grain and livestock farms. The adjustments left the numbers of specialty farms unchanged.

**Table A-2**

**Distribution of Prairie Farms by Type of Farm and by Criterion of Aggregation, 1986**

| | Criterion of aggregation | |
|---|---|---|
| | 75/25 | 67/33 |
| | (Per cent) | |
| Manitoba | | |
| Grain | 35 | 57 |
| Livestock | 15 | 18 |
| Specialty | 3 | 3 |
| Mixed | 47 | 22 |
| Total | 100 | 100 |
| Saskatchewan | | |
| Grain | 52 | 71 |
| Livestock | 6 | 9 |
| Specialty | 1 | 1 |
| Mixed | 41 | 19 |
| Total | 100 | 100 |
| Alberta | | |
| Grain | 22 | 43 |
| Livestock | 28 | 31 |
| Specialty | 5 | 5 |
| Mixed | 45 | 21 |
| Total | 100 | 100 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

### *Farm Finance*

The financial profile of individual farms was based on five liquidity ratios and four farm debt/asset ratios, as shown below:

| Debt/asset ratios | 1 (< 0) | 2 (0 – < 0.5) | 3 (0.5 – < 1.0) | 4 (1.0 – < 1.5) | 5 (≥ 1.5) |
|---|---|---|---|---|---|
| | Liquidity ratios | | | | |
| 1 (= 0) | $N_{11}$ | $N_{21}$ | $N_{31}$ | $N_{41}$ | $N_{51}$ |
| 2 (> 0 – < 0.4) | $N_{12}$ | $N_{22}$ | $N_{32}$ | $N_{42}$ | $N_{52}$ |
| 3 (0.4 – < 0.7) | $N_{13}$ | $N_{23}$ | $N_{33}$ | $N_{43}$ | $N_{53}$ |
| 4 (≥ 0.7) | $N_{14}$ | $N_{24}$ | $N_{34}$ | $N_{44}$ | $N_{54}$ |

The 20 ratios in this table were aggregated into four risk categories:

$$R_1 = (N_{41} + N_{42}) + (N_{51} + N_{52} + N_{53}) = \text{stable}$$
$$R_2 = (N_{31} + N_{32}) + (N_{43} + N_{44}) + N_{54} = \text{vulnerable}$$
$$R_3 = (N_{21} + N_{22} + N_{23}) + (N_{33} + N_{34}) = \text{deteriorating}$$
$$R_4 = (N_{11} + N_{12} + N_{13} + N_{14}) + N_{24} = \text{nonviable.}$$

A numerical example of the statistical derivation of the liquidity and debt/asset ratios from census data will be given later (Appendix B). Suffice it to note here that the stable farm situations defined under $R_1$ represent the low-stress cases; the nonviable situations defined under $R_4$, the high-stress cases.

### *Farming Regions*

The three Prairie provinces were subdivided into 22 consolidated crop districts. The correspondence between the consolidated and the standard crop districts is shown in the listing on page 70. In the cases of Alberta and Saskatchewan, the consolidated districts matched the crop districts very closely. In Manitoba, several crop districts were aggregated into consolidated districts. This aggregation was based on long-run crop-yield variations and trends of the major grains (Wisner, 1988).

### *Disaggregation of Census Data*

We disaggregated the 1986 Census of Agriculture data for some 133,500 Prairie farms according to various aspects of farm organization, farm size, farm enterprise, and farming region. The analysis of farm financial stress required some further disaggregation according to various degrees of stress. To keep a sufficient number of census records in individual cells, we deleted the farm-acreage variable. This was not a very serious loss, since we already differentiated between

| | Crop districts | |
|---|---|---|
| | Consolidated[1] | Standard |
| Manitoba | 1 | 1 + 2 + 3 |
| | 2 | 4 |
| | 3 | 5 + 6 |
| | 4 | 7 + 8 + 9 + 11 |
| | 5 | 10 |
| | 6 | 12 |
| Saskatchewan | 1 | 1a + 1b |
| | 2 | 2a + 2b |
| | 3 | 3an + 3as + 3bn + 3bs |
| | 4 | 4a + 4b |
| | 5 | 5a + 5b |
| | 6 | 6a + 6b |
| | 7 | 7a + 7b |
| | 8 | 8a + 8b |
| | 9 | 9a + 9b |
| Alberta | 1 | 1 |
| | 2 | 2 |
| | 3 | 3 |
| | 4 | 4a + 4b |
| | 5 | 5 |
| | 6 | 6 |
| | 7 | 7 |

1 The geographic outlines of the consolidated crop districts are shown on the map in Chapter 3.

marginal, commercial, and corporate farms among the 12 different categories of farm organization described earlier.

The degree of disaggregation can be readily illustrated by the potential number of cells – 4,224. It is the simple arithmetic product of the various elements of farm structure, assuming that all possible cells are filled with at least one census record.

This number is substantially greater than suggested by the listing in Table B-1. Divided into 133,500 farms, it averages about 30 census records per cell. Since farm records were not evenly distributed over all cells, the actual number of census farms per cell varied around this average. If, in addition, the four farm-acreage sizes had been included, that would have reduced the number of census records to 7.5 per cell. That number was considered insufficient, since random rounding to zero or five, dictated by the requirement for confidentiality, would have distorted the averages too much. Farm size was quantified, therefore, by the farm-output variable, already imbedded in the data on farm organization.

For each of the cells, numerous items were quantified in dollar or physical terms, or both. Each item was averaged over the number of farms in the cell. As shown in Figure A-1, each cell contained items related to the farm operator, farm outputs, and farm inputs.

## Structural Changes and Provincial Farm Incomes

To analyse the impact of structural changes on farm-family income, the earlier accounting framework is expanded. We begin with the farm-family income ($Y/N$) of equation (2) above but redefine it as in equation (5). In equation (5), farm-family income does not refer to the provincial average but to farms located in different subregions (e.g., crop districts or census division) that fall into the same size group and that have the same enterprise combination and farm organization. Farm-family income $(Y/N)_{rseo}$ is summed over various categories of farm organization – e.g., part-time farmers, full-time farmers, partnerships, and incorporated farms – and is averaged over all categories, to yield $(Y/N)_{rse.}$. In equation (6), that same average is summed again and averaged over all farm enterprises, to yield $(Y/N)_{rs..}$. In equation (7), it is averaged over all farm-size groups. And finally, in equation (8), it is averaged over all regions to arrive at the provincial average. That last average should equal ($Y/N$) in equation (2); if not in practice – because of data gaps – at least in theory. By this method, farm structure can be quantified by the frequency distributions of the number of farms of different farm organization categories, enterprise combinations, size classes, and farming regions.

| | Organization | Type | Risk | Region | Total |
|---|---|---|---|---|---|
| Manitoba | 12 | 4 | 4 | 6 | 1,152 |
| Saskatchewan | 12 | 4 | 4 | 9 | 1,728 |
| Alberta | 12 | 4 | 4 | 7 | 1,344 |
| Prairie region | 12 | 4 | 4 | 22 | 4,224 |

**Figure A-1**

**List of Items Included in the Database, 1981 and 1986**

*Farm Operator*
Age of operator
Length of residence on the farm, weighted at endpoint of time periods – i.e., four, eight or 12 months

*Farm Output*
Value of agricultural products sold (dollars)
Imputed value of agricultural products sold (dollars)
Rapeseed-canola (acres, dollars)
Potatoes (acres, dollars)
Sugar beets for sugar (acres, dollars)
Dry field peas, plus
Lentils (acres, dollars)
Total wheat (acres, dollars)
Total grains (acres, dollars)
Total oilseeds (acres, dollars)
Total hay and fodder crops (acres, dollars)
Total vegetables for sale (acres, dollars)

*Farm Inputs*
Land
Present market value of land and buildings operated on:
- Farm acreage owned
- Farm acreage rented
- Cropland harvested
- Improved pasture
- Summerfallow

Labour
- Hired labour, year round (weeks)
- Hired labour, seasonal (weeks)
- Off-farm work, agricultural (operators' days)
- Off-farm work, nonagricultural (days)
- Number of farms having item

Capital
- Livestock:
  - Total cattle and calves (number, dollars)
  - Number of farms having item
  - Cows and heifers, mainly for dairy purposes (number, dollars)
  - Total pigs (number, dollars)
  - Total chickens (number, dollars)
  - Total other poultry (number, dollars)
- Machinery and equipment:
  - Total value of all machinery and equipment (dollars)
  - Sum of tractors (number, dollars)
  - Tractor horsepower (hp) – i.e., for each farm, number of tractors in each cell, multiplied by mid-point horsepower for each cell
  - Self-propelled combines (number, dollars)
  - Farm trucks (number, dollars)

*Farm Operating Expenses (Dollars)*
Machinery:
- Fuel oil and lubricants before rebates, plus
- Repairs and maintenance, plus
- Custom work, contract work, machine rental

Crop:
- Seed and seedlings purchases, plus
- Fertilizer purchases, plus
- Agricultural chemicals (pesticides and herbicides)

Livestock:
- Feed and supplement purchases (including hay)
- Livestock and poultry purchases (1986 only)

*Other*
Interest paid on farm loans (1986 only)
Number of farms having item
Cash wages paid to hired labour
Total farm operating expenditures
Rent paid for land
Total area fertilized in 1985 (acres, 1986 only)
Total tonnes (standardized) applied (tonnes, 1986 only)
Total area sprayed and dusted (acres, 1986 only)
Total area irrigated (acres, 1986 only)
Computers on farm (number, 1986 only)

SOURCE Statistics Canada, 1986 Census of Agriculture.

$$\left(\frac{Y}{N}\right)_{rse.} = \sum_{o} \frac{N_{rseo}}{N_{rse.}} \left(\frac{Y}{N}\right)_{rseo} \tag{5}$$

$$\left(\frac{Y}{N}\right)_{rs..} = \sum_{e} \frac{N_{rse.}}{N_{rs..}} \left(\frac{Y}{N}\right)_{rse.} \tag{6}$$

$$\left(\frac{Y}{N}\right)_{r...} = \sum_{s} \frac{N_{rs..}}{N_{r...}} \left(\frac{Y}{N}\right)_{rs..} \tag{7}$$

$$\left(\frac{Y}{N}\right)_{....} = \sum_{r} \frac{N_{r...}}{N_{....}} \left(\frac{Y}{N}\right)_{r...} \tag{8}$$

The objective of the structural analysis is to measure not only the impact of changes in farm outputs, inputs, and farm prices but also the impact of changes in the distribution of structural elements on provincial farm-family incomes. That is conveyed in equation (9), where provincial changes in farm-family income are ascribed to changes in farm numbers among farming regions, farm size, farm enterprises, and farm organization, as well as changes in farm-family income, which, in turn, are a function of farm output, farm inputs, farm prices, government subsidies, and off-farm income. To separate the contribution of each of the structural variables from the income variable, it is necessary to estimate the weights for each, as suggested by the $w$'$s$ and the $v$ in equation (10).

$$\Delta \frac{Y_{....}}{N} = g\left(\Delta \frac{N_{r...}}{N_{....}}, \Delta \frac{N_{rs..}}{N_{r...}}, \Delta \frac{N_{rse.}}{N_{rs..}}, \Delta \frac{N_{rseo}}{N_{rse.}}, \Delta \frac{Y_{rseo}}{N_{rseo}}\right) \quad (9)$$

where

$\Delta$ = change from one census period to the next;

$$\frac{\overset{*}{Y}_{....}}{N} = w_r \frac{\overset{*}{N}_{r...}}{N_{....}} + w_{rs..} \frac{\overset{*}{N}_{rs..}}{N_{r...}} + w_{rse.} \frac{\overset{*}{N}_{rse.}}{N_{rs..}} + w_{rseo} \frac{\overset{*}{N}_{rseo}}{N_{rse.}}$$

$$+ v_{rseo} \{(w_{1j} \overset{*}{Q}_j + w_{2j} \overset{*}{P}_{oj}) - (w_{3k} \overset{*}{Q}_k + w_{4k} \overset{*}{P}_{ik})$$

$$+ w_5 \overset{*}{G} + w_6 \overset{*}{Y}_m\} \quad (10)$$

Thus the overall changes in provincial farm income could be attributed to changes in the (relative) numbers of the farms – i.e., changes in structure – as well as in production technology and in resource use.

## Application

From a policy point of view, it would be of interest to quantify in a systematic way the impact of specific changes in farm structure and resource use on provincial farm income and productivity. But this went beyond the scope of the present study.

Instead, we only examined selected aspects. We looked, for example, at some of the changes in the major structural elements as they occurred over the past decades (Chapters 2 and 3) and at the farm financial situation (Chapter 4); we also identified some of the underlying causes of the current farm crisis (Chapter 5) and examined one of the policy options (Chapter 6).

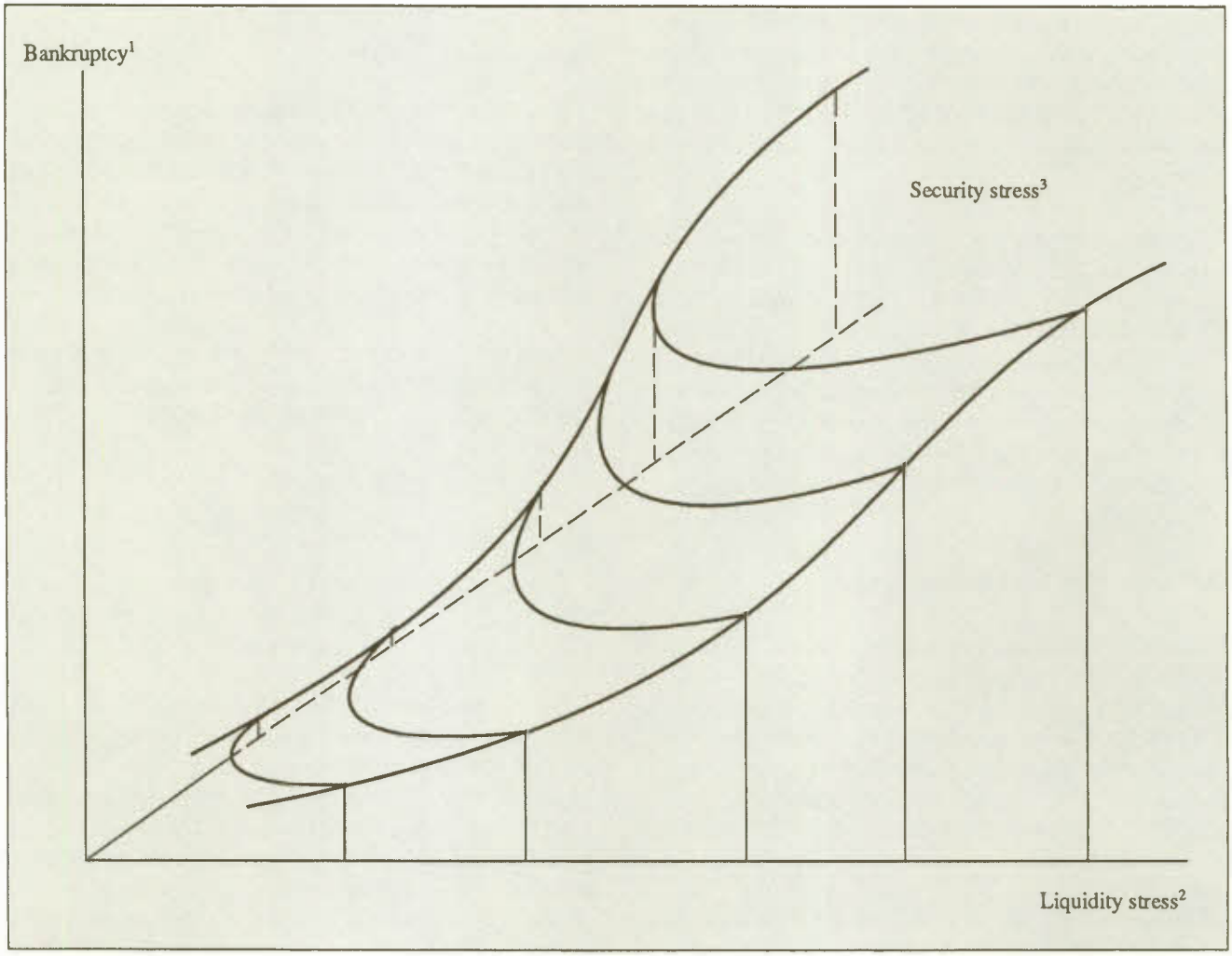
# B Estimation of Farm Financial Stress

To measure the degree of farm financial stress, we applied procedures that have been widely used in industry analysis (*The Economist*, 1988). Following Ashmead (1986 and 1987), we based the financial-risk profile of Prairie farmers on measures of security stress and liquidity stress. We quantified security stress by the debt/asset ratio and liquidity stress by the ratio of debt service charge to cash flow.

As illustrated in Chart B-1, the combination of a high security stress and a high liquidity stress makes for a high

**Chart B-1**

**Hypothetical Bankruptcy, Liquidity, and Security Stress**




1 Probability of financial insolvency.
2 Debt service/cash-flow ratio.
3 Debt/asset ratio.

probability of insolvency; conversely, low security and liquidity stress makes for financial stability. A financial-risk profile of the farming industry can be derived by various combinations of these stress factors.

## Database

Before deciding on the analytical approach and the precise measures of financial stress, we examined which database would be best suited for the farm financial analysis. The databases are briefly described under their respective sponsors:

### *Saskatchewan Wheat Pool*

A study of farm credit and land transfer policy options was prepared by a Saskatchewan Wheat Pool Task Force in June 1986. The results of this survey were based on a questionnaire dealing with the financial status of Pool members and the acceptability of various policy options. The object was to obtain a better understanding of the financial situation of Saskatchewan farmers and their views on alternative farm policies.

The questionnaire was mailed to 7,500 farmers randomly selected from the Saskatchewan Wheat Pool's membership list. A total of 753 questionnaires were returned; of these, 434 were complete. The major reason for the incomplete questionnaires was that no response was given to questions on the farm's financial situation. The analysis of the policy initiatives was based on the 753 responses returned, and that of farm finance on the 375 questionnaires that included responses to questions about the farm's financial situation.

### *The Farm Credit Corporation (FCC)*

The FCC conducted two surveys – one in 1981 and another in 1984. The latter was based on a random sample drawn from the census address file; it included 6,000 farms, of which 2,935 were located in the three Prairie provinces. Records were obtained by contacting individual farmers. That sample yielded 1,965 complete records. The survey was conducted at a cost of approximately $500,000. Because of budgetary restraints, no repeat survey was planned.

Cloutier and MacMillan (1986) used this database and reported their findings in an Economic Council Discussion Paper. This analysis showed that in 1984, farm financial problems were more serious on livestock farms in eastern Canada than on grain farms in the western provinces.

### *The Canadian Bankers' Association (CBA)*

The CBA published statistics on bankruptcies at the provincial level on a monthly basis. Farm bankruptcy rates were not strictly comparable with nonfarm rates, because farm bankruptcies could only be initiated from the farmer's side and not from the banker's side.

The CBA data were only available on a provincial basis; they were not disaggregated by farming region, farm type, or any other farm characteristics.

### *Agriculture Canada*

These estimates of farm loans are not broken down by provinces. Agriculture Canada has used data from the Census of Agriculture for a farm financial analysis with provincial disaggregation.

### *The National Farm Survey*

This survey has been conducted by Statistics Canada for a number of years. It is a sample survey, providing annual statistics on some 7,000 Prairie farms. Roughly one quarter of the sample is replaced each year. The survey has statistics on interest payments, classified by type of farm loan – i.e., for farm machinery, real estate and livestock, and operating expenditures. The data can be linked to other farm statistics.

Access to this database is as costly as that for the Census of Agriculture, but the data cannot be disaggregated to the same degree as the census data, because of the size of the sample.

### *The Census of Agriculture*

This census contains information on the interest payments made by some 130,000 Prairie farms during 1985. It also provides statistics on farm characteristics.

In the context of this study, sample-size limitations posed a serious constraint, as we were interested in disaggregating the data on Prairie farms according to farm size, farm type, degree of financial stress, province, and subprovincial region. If all of these categories were to be filled by at least one record, it would require a larger sample than that provided in any of the above surveys. Ideally, the number of records should be much larger. Statistics Canada recommends, for example, to allow for 30 to 50 census records per category. Figure B-1 shows that, by this criterion, only the census database came close to meeting that requirement. Since we wanted to capture a wide range of farm situations and to

**Figure B-1**

**Coverage of Agricultural Surveys**

| | Saskatchewan Wheat Pool | Farm Credit Corporation | Canadian Bankers' Association | Agriculture Canada | Census of Agriculture |
|---|---|---|---|---|---|
| Frequency | 1984<br>1985 | 1983<br>1984 | Annual | Annual | 1985 |
| Number of records | 735<br>(434) | 1986 | Creditors only | Creditors Only | 133,500 |
| Manitoba | No | 465 | Yes | No | Yes |
| Saskatchewan | 753 | 829 | Yes | No | Yes |
| Alberta | No | 671 | Yes | No | Yes |
| Canada | No | No | Yes | Yes | Yes |
| Farm size (3) | Yes | Yes | No | No | Yes |
| Farm type (3) | Yes | Yes | No | No | Yes |
| Financial stress (4) | Yes | Yes | No | No | Yes |
| Provinces (3) | Yes | Yes | No | No | Yes |
| Regions (7) | Yes | Yes | No | No | Yes |
| Number of records per farm type | 1 | 3 | No | No | 177 |

obtain estimates of farm financial stress for each case, we opted for an analysis of the census data.

## Estimates of Off-Farm Family Income

An exploratory analysis of the census data showed that the degree of financial stress on farms depended on both farm and off-farm income: the greater the off-farm income, the lower the degree of financial stress. It also suggested that what lessened the degree of stress was not so much the off-farm income of the farm operator but that of other members of his family, including his spouse. While the 1986 Census of Agriculture did not provide this information, the 1986 Census of Population did contain data on this. Unfortunately, at the time of the analysis the Census of Population had not yet been linked with the Census of Agriculture. The 1981 data from both censuses had been linked, however, and so we used that information together with the data from the 1986 census. To produce estimates of off-farm family income, we combined the 1981 and 1986 census data with Statistics Canada's data on farm taxfilers. That involved projecting the 1981 off-farm income data and, after aligning them with the taxfiler statistics, integrating them with the 1986 census statistics. The estimation procedure is outlined below.

The 1981 census describes farm-family income in terms of nine dollar values:

$V(81,1)$ = farm income,
$V(81,2)$ = self-employed off-farm income,
$V(81,3)$ = family allowance,
$V(81,4)$ = investment income,
$V(81,5)$ = retirement income,
$V(81,6)$ = Old Age Security income,
$V(81,7)$ = unemployment insurance benefits,
$V(81,8)$ = other government payments, and
$V(81,9)$ = wages and salaries of the farm operator and other family members.

The family-income data were projected from the 1981 census to the 1986 census, in several steps. Initially, it was assumed that 1986 census incomes were exactly the same as those of census year 1981 for each type of farm, each farm size, and each farming region within each of the three Prairie provinces. Any changes in provincial farm-family incomes, therefore, came from changes between 1981 and 1986 in the numbers of farms of different types, sizes, and farming regions.

On that basis, we computed a preliminary set of off-farm family incomes for 1986. The corresponding 1986 provincial totals – i.e., $T(86,j)$ – were estimated for each type of off-farm income as in equation (1):

$$\begin{aligned} T(86,2) &= \sum_{olsr} N_{olsr} \cdot V(81,2)_{olsr} \\ T(86,3) &= \sum_{olsr} N_{olsr} \cdot V(81,3)_{olsr} \\ &\vdots \\ T(86,9) &= \sum_{olsr} N_{olsr} \cdot V(81,9)_{olsr} \end{aligned} \quad (1)$$

where

$V(81,2)_{olsr} \cdots V(81,9)_{olsr}$ = 1981 dollar values of each of eight types of off-farm income;

$T(86,2) \cdots T(86,9)$ = the 1986 preliminary provincial totals based on the 1986 census distribution of farms; and

Subscripts $o, t, s, r$ = farm organization ($o$), type ($t$), size ($s$), and region ($r$).

The 1986 provincial totals $T(86,j)$ in equation (1) differed from the corresponding 1981 totals as the distribution of farm numbers $N_{olsr}$ changed. The ratios $RT(j)$ of these 1986/1981 totals were defined by equation (2):

$$\begin{aligned} RT(2) &= T(86,2)/T(81,2) \\ RT(3) &= T(86,3)/T(81,3) \\ &\vdots \\ RT(9) &= T(86,9)/T(81,9) \end{aligned} \quad (2)$$

The provincial $RT$ ratios of the two census years were compared with the corresponding $RF$ ratios of provincial data on farm taxfilers. The taxfiler ratios were defined in equation (3) in the same manner as in equation (2) above:

$$\begin{aligned} RF(2) &= F(86,2)/F(81,2) \\ RF(3) &= F(86,3)/F(81,3) \\ &\vdots \\ RF(9) &= F(86,9)/F(81,9) \end{aligned} \quad (3)$$

The comparison of the ratios of provincial totals $RT(j)$ and of the provincial taxfiler data $RF(j)$ yielded a set of eight adjustment factors $A(j)$ for each province, as in equation (4):

$$\begin{aligned} A(2) &= RF(2)/RT(2) \\ A(3) &= RF(3)/RT(3) \\ &\vdots \\ A(9) &= RF(9)/RT(9) \end{aligned} \quad (4)$$

The adjustment factors $A(j)$ were applied uniformly to each off-farm income element, so that, in the aggregate, each corresponded with the adjusted provincial total as in equation (5):

$$\begin{aligned} T(86,2) \cdot A(2) &= \sum_{olsr} N_{olsr} \cdot V(81,2)_{olsr} \cdot A(2) \\ T(86,3) \cdot A(3) &= \sum_{olsr} N_{olsr} \cdot V(81,3)_{olsr} \cdot A(3) \\ &\vdots \\ T(86,9) \cdot A(9) &= \sum_{olsr} N_{olsr} \cdot V(81,9)_{olsr} \cdot A(9) \end{aligned} \quad (5)$$

The adjusted off-farm income elements on the far right of equation (5) were then added, as in equation (6). Each total $T(86)_{olsr}$ was an estimate of the off-farm income of farm families included in the 1986 Census of Agriculture:

$$\begin{aligned} T(86)_{olsr} &= V(81,2)_{olsr} \cdot A(2) \\ &\quad + V(81,3)_{olsr} \cdot A(3) \\ &\vdots \\ &\quad + V(81,9)_{olsr} \cdot A(9) \end{aligned} \quad (6)$$

Each total differed from one farm organization to the next, as well as by farm type, farm size, and farming region.

Applying this estimation procedure, we obtained off-farm family-income characteristics for some 1,000 different categories, each applicable to a different farm situation and a different farming region within each province.

Estimates of off-farm family income, stratified by age of operator, size of farm, and type of farm, are listed in Tables B-1 and B-2.

**Table B-1**

**Off-Farm Family Income on Marginal, Commercial, and Corporate Farms, by Status and Age Group of Operator, Prairie Region, 1985**

| | Amount | Proportion |
|---|---|---|
| | (Dollars) | (Per cent) |
| Marginal farms | 25,875 | 126 |
| Part-time farmers | | |
| Aged less than 35 | 30,697 | 150 |
| Aged 35 to 64 | 40,949 | 200 |
| Full-time farmers | | |
| Aged less than 35 | 14,720 | 72 |
| Aged 35 to 64 | 17,221 | 84 |
| Commercial farms | 17,034 | 83 |
| Part-time farmers | | |
| Aged less than 35 | 10,954 | 53 |
| Aged 35 to 64 | 34,545 | 169 |
| Partners | | |
| Aged less than 35 | 22,904 | 112 |
| Full-time farmers | | |
| Aged less than 35 | 10,887 | 53 |
| Aged 35 to 64 | 15,010 | 73 |
| Elderly farmers | | |
| Aged 65 and over | 20,763 | 101 |
| Corporate farms | 21,260 | 104 |
| Mostly family-owned | 26,486 | 129 |
| Mostly owned by others | 5,663 | 28 |
| All farms | 20,479 | 100 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

## Farm Financial Stress

The estimates of farm financial stress took into account the cash flow from farm and off-farm family income, and were based on debt/asset and liquidity ratios. The numerical derivation of the two ratios is described below.

The *debt/asset ratios* were derived from the data on interest payments on farm loans and on farm assets, as listed in the 1986 Census of Agriculture:

$$D_t/A_t = (I + 0.115) + (V_1 + V_2 + V_3)$$

where

$D_t$ = $I + 0.115$ = total farm debt;

$A_t$ = $V_1 + V_2 + V_3$;

$I$ = interest payments on farm loans, mortgages, and credit from suppliers;

0.115 = weighted interest rate period on farm loans (later adjusted to 0.095, to match provincial totals);

$V_1$ = $\frac{V}{A} \cdot A_0$ = present market value of owned farm acreage (including share of buildings);

$V$ = present market value of all total farmland and buildings;

$A$ = total acres of land operated (including rented land and buildings);

$A_0$ = acreage owned; and where

$V_2$ = total value of livestock including cattle and calves, dairy cows and heifers, pigs, and poultry but excluding mink, fox, and otter;

$V_3$ = total value of machinery and equipment, including tractors, combines, trucks, and all farm machinery and equipment.

Thus the debt/asset ratios of individual farms were derived from the capitalized debt – since only the annual interest payments and not the actual size of the debt were listed in the census records – as well as from the estimate of the market value of the owned farmland and buildings, and from the market value of livestock and of farm machinery and equipment.

The *liquidity ratios* compared debt payments with farm-family incomes after other farm operating and living expenditures had been met. They also compared debt service with cash flow. They are defined below by $L_1$ and $L_2$, for no-debt and debt situations, respectively:

$$L_1 = \frac{NOM + OFFI}{LX}$$ = liquidity ratio of farms *with no debt*

$$L_2 = \frac{NOM + OFFI - LX}{IP}$$ = liquidity ratio of farms *with debt*

where

$NOM$ = $VAS - FOX$ = net operating margin of sales less cash expenses;

$VAS$ = value of agricultural products sold;

$FOX$ = farm cash operating expenses;

*OFFI* = off-farm family income (estimated as described earlier), consisting of:

- off-farm income from self-employment,
- family allowance,
- investment income,
- retirement income,
- Old Age Security income,
- unemployment insurance,
- other government payments, and
- wages and salaries of the farm operation and of other family members (but excluding farm wages paid to own-family members);

*LX* = living expenditures set at a specific level – e.g., $14,000, roughly corresponding to that of low-income families in rural areas; and

*IP* = $I^* 1.727272$ = annual interest payments multiplied by an adjustment factor for the payment of principal.

On that basis, farms with no debt and farms with debt were stratified, according to their debt/asset ratios ($D/A$) and their liquidity ratios ($L_1$ and $L_2$) into 20 categories, as illustrated by the following numerical example.

### *Example*

To assess the magnitude of the farm financial crisis, we divided 133,510 Prairie farms into 20 categories according to four debt/asset ratios and five liquidity ratios. At the same time, we divided them by subprovincial region, farm size, farm type (crop and livestock, specialty and mixed), status of operation (part-time and full-time), and other criteria.

The estimates of farm financial stress varied not only with each of these categories but also with the underlying assumptions about income and expenditures. In most cases, it was assumed that farmers were in financial difficulty when,

**Table B-2**

**Off-Farm Family Income on Marginal, Commercial, and Corporate Farms, by Type of Farm and by Status and Age Group of Operator, Prairie Region, 1985-86**

| | Type of farm | | | | |
|---|---|---|---|---|---|
| | Grain | Livestock | Specialty | Mixed | All types |
| | | | (Thousands of dollars) | | |
| Marginal farms | 28 | 28 | 30 | 15 | 26 |
| Part-time farmers | | | | | |
| Aged less than 35 | 34 | 31 | 26 | 17 | 31 |
| Aged 35 to 64 | 43 | 41 | 47 | 27 | 41 |
| Full-time farmers | | | | | |
| Aged less than 35 | 18 | 15 | 16 | 4 | 15 |
| Aged 35 to 64 | 19 | 19 | 18 | 12 | 17 |
| Commercial farms | 19 | 18 | 15 | 12 | 17 |
| Part-time farmers | | | | | |
| Aged less than 35 | 13 | 12 | 10 | 6 | 11 |
| Aged 35 to 64 | 39 | 42 | 11 | 11 | 35 |
| Partners | | | | | |
| Aged less than 35 | 28 | 18 | 16 | 1 | 23 |
| Full-time farmers | | | | | |
| Aged less than 35 | 13 | 11 | 9 | 6 | 11 |
| Aged 35 to 64 | 16 | 14 | 16 | 14 | 15 |
| Elderly farmers | | | | | |
| Aged 65 and over | 23 | 23 | 16 | 10 | 21 |
| Corporate farms | 25 | 29 | 23 | 4 | 21 |
| Mostly family-owned | 30 | 40 | 25 | 5 | 26 |
| Mostly owned by others | 9 | 6 | .. | .. | 6 |
| All farms | 22 | 23 | 21 | 12 | 20 |

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

after payment of their financial obligations, they did not have enough cash left to pay for annual living expenditures of $14,000. That level of living expenditures was roughly equivalent to the rural low-income point, set by Statistics Canada, at which income was deemed to be sufficient to meet the food, shelter, and clothing requirements of the average family.

When the minimum annual living expenditure of Prairie farm families was assumed to be $10,000 (instead of $14,000), the estimated proportion of Prairie farm families in financial difficulty was relatively low – 16 per cent (Table B-3). Within this group, 8.1 per cent were in a financially vulnerable situation, 6.2 per cent in a deteriorating situation, and 1.3 per cent in a nonviable situation. Table B-4 shows the numerical distribution of farms among debt/asset ratios and liquidity ratios from which the estimates were derived.

This profile of farm financial risk differs significantly from that of Table 4-2. The figures in Tables B-3 and B-4 imply less financial stress. Whereas Table 4-2 states that 77 per cent of Prairie farms are in a financially stable condition, Table B-3 puts that estimate at 84 per cent. And compared with 13 per cent of Prairie farmers in a financially nonviable or deteriorating situation in Table 4-2, Table B-3 puts that estimate at only 7.5 per cent (i.e., 1.3 per cent nonviable plus 6.2 per cent in a deteriorating situation).

One of the reasons for this disparity is that the base for living expenses was set at $10,000 in Tables B-3 and B-4 and at $14,000 in Table 4-2. Another is that the off-farm family income was estimated in much more detail for the risk profiles described in Chapter 4: whereas some 200 adjustment factors were taken into account in this appendix, over 1,000 were applied to arrive at the estimates in Chapter 4. As described earlier, the more refined adjustments were based on the 1981 Census of Agriculture, combined with data on the farm population from the 1981 census and data from the 1985 annual taxfiler statistics, and projected to the census year 1986. At the time, it was not possible to combine the 1986 Census of Agriculture data with the 1986 Census of Population data because the latter were not yet ready for data linkage. Once the appropriate data become available, our estimates could be updated.

**Table B-3**

**Number and Distribution of Farms by Financial Status, Prairie Provinces, 1985**[1]

| | Farm financial situation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nonviable | | Vulnerable | | Deteriorating | | Stable | | Total | |
| | Number | Share | Number | Share | Number | Share | Number | Share | Number | Share |
| | | (Per cent) | | (Per cent) | | (Per cent) | | (Per cent) | | (Per cent) |
| Manitoba | 450 | 1.9 | 1,825 | 7.7 | 2,125 | 9.0 | 19,325 | 81.5 | 23,720 | 100.0 |
| Saskatchewan | 665 | 1.1 | 3,900 | 6.5 | 5,185 | 8.6 | 50,535 | 83.8 | 60,315 | 100.0 |
| Alberta | 585 | 1.3 | 2,550 | 5.2 | 3,565 | 7.2 | 42,780 | 86.4 | 49,490 | 100.0 |
| Prairie region | 1,715 | 1.3 | 8,285 | 6.2 | 10,875 | 8.1 | 112,645 | 84.4 | 133,510 | 100.0 |

1 The numbers appearing in this table are the totals of those appearing in Table B-4. For example, the total number of nonviable farms in Alberta (585) is the sum of the figures designated by * ("nonviable") in Table B-4. Figures may not add to the totals because some confidential data were deleted. Living expenses are set at $10,000 per year.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table B-4**

**Distribution of Farms by Liquidity Ratio and by Debt/Asset Ratio, Prairie Provinces, 1985[1]**

| | Liquidity ratio | | | | |
|---|---|---|---|---|---|
| | Below 0 | 0–0.49 | 0.50–0.99 | 1.0–1.49 | 1.50+ |
| | (Number of farms) | | | | |
| Debt/asset ratio: | | | | | |
| Manitoba | | | | | |
| No debt | 0* | 10† | 25‡ | 100§ | 7,510§ |
| 0.01–0.39 | 100* | 430† | 625‡ | 795§ | 9,845§ |
| 0.40–0.69 | 30* | 300† | 615† | 560‡ | 1,075§ |
| 0.70 and over | 35* | 285* | 470† | 345‡ | 570‡ |
| Saskatchewan | | | | | |
| No debt | 0* | 15† | 15‡ | 70§ | 18,130§ |
| 0.01–0.39 | 75* | 685† | 1,635‡ | 2,355§ | 27,460§ |
| 0.40–0.69 | 20* | 630† | 1,360† | 1,375‡ | 2,520§ |
| 0.70 and over | 15* | 555* | 1,210† | 825‡ | 1,335‡ |
| Alberta | | | | | |
| No debt | 0* | 20† | 40‡ | 85§ | 16,110§ |
| 0.01–0.39 | 125* | 500† | 1,100‡ | 1,490§ | 22,845§ |
| 0.40–0.69 | 35* | 420† | 885† | 845‡ | 2,250§ |
| 0.70 and over | 15* | 410* | 730† | 545‡ | 1,035‡ |
| Prairie region | | | | | |
| No debt | 5* | 45† | 80‡ | 255§ | 41,750§ |
| 0.01–0.39 | 305* | 1,620† | 3,355‡ | 4,645§ | 60,145§ |
| 0.40–0.69 | 90* | 1,350† | 2,860† | 2,785‡ | 5,850§ |
| 0.70 and over | 65* | 1,250* | 2,410† | 1,715‡ | 2,940‡ |

1 The following symbols are used to designate farm financial situations:
* nonviable
† vulnerable
‡ deteriorating
§ stable.
Living expenses are set at $10,000 per year.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

# C Productivity and Cost Analysis

## Farm Production Functions

Typically, empirical estimates of farm production functions quantify output as a function of several inputs – e.g., land, labour, capital, fertilizer, feed, and other operating expenses. They show to what extent farm output varies with different levels of farm inputs. Sometimes, the production functions are estimated across all types of farms; at other times, they are estimated for subsets of farms.

In industry studies, the *KLEM* (capital, labour, energy, material inputs) production function is applied extensively. In studies of agriculture, the *KLAM* (capital, labour, acreage, material inputs) production function is very popular, but often the individual inputs are further disaggregated to differentiate between crop and livestock inputs (Heady and Dillon, 1961).

In terms of the conventional Cobb-Douglas function, the *KLAM* production function is specified as in equation (1):

$$O = c\, K^k L^l A^a M^m \qquad (1)$$

where

| | | |
|---|---|---|
| $O$ | = | farm output; |
| $c$ | = | constant term; |
| $K$ | = | farm capital excluding land; |
| $L$ | = | farm labour; |
| $A$ | = | farm land acreage; |
| $M$ | = | material inputs; and |
| $k, l, a, m$ | = | production elasticities of capital, labour, acreage, and materials. |

This production function can be specified in greater detail by allowing explicitly for various kinds of inputs.

If, for example, each of the four inputs in equation (1) is broken down into its crop and livestock components, equation (1) becomes equation (2):

$$O = c\, K_1^{k_1} K_2^{k_2} L_1^{l_1} L_2^{l_2} A_1^{a_1} A_2^{a_2} M_1^{m_1} M_2^{m_2} \qquad (2)$$

where capital is split into livestock $K_1$ and equipment $K_2$, and materials into feed $M_1$ and fertilizer $M_2$ or other livestock and crop inputs. Alternatively, equation (1) could be fitted separately to crop and livestock farms.

In practice, a compromise between the specifications of equations (1) and (2) has produced reasonable results. Capital and material outputs have been split into their crop and livestock components, while labour and land have not. That is mainly because of a lack of detailed information about the labour and land components.

It could well be that so few variables are not sufficient to account for variations in output arising from differences in farm organization or farm type. To test for the existence of other factors, equations (1) or (2) could be further modified by estimating not one but several $c$ coefficients, as suggested in equation (3):

$$O = c_0\, c_1 \cdots c_n\, K^k L^l A^a M^m \qquad (3)$$

The precise specification of a particular production function is conditioned, at least in part, by the available data. We review them first and come back to the specification of the production function later.

### Data

The data for the production-function analysis were based on the 1986 Census of Agriculture. This census, conducted every five years, provides consistent statistical information on all farms across the provinces and across regions within provinces. The census statistics pertain to the years 1985 and 1986. They describe the farm inventory items – e.g., acres of wheat, numbers of cattle and calves, and so on – as of June 1986, and contain data on farm-product sales completed during the year 1985, mainly because the data on farm cash receipts for 1986 were not available until some time after the census statistics were collected.

*Farm output* was measured in terms of the value of "farm products sold" and included the following: sales of all agricultural products; the value of the landlord's share of the products sold; any Canadian Wheat Board payments received during 1985, regardless of the crop year to which they apply; cash advances for stored crops; patronage dividends;

crop insurance; and stabilization and deficiency payments. The sales data did not include capital items – e.g., land, buildings, and machinery; products received from land rented or loaned to others; products bought for immediate resale; or the value of forest products sold. Generally, the data on farm-product sales pertained to the year 1985, but in cases where records were not kept on a calendar-year basis, they pertained to the last complete fiscal year.

*Farm inputs* were divided into four major categories: capital, labour, land, and material inputs. Some of the capital and material inputs were disaggregated further.

Capital included livestock and capital stock in machinery and equipment. Livestock referred to animals kept on their owner's farm and excluded those owned by him but kept on a farm, ranch, or feedlot operated by someone else. Included among the livestock were cattle and calves for beef and dairy production, all hogs, and all poultry. All livestock was quantified in terms of standardized dollar values – i.e., of numbers multiplied by a standard price for each type of livestock. The capital stock in machinery and equipment included farm tractors, trucks, grain combines, swathers, balers, mower-conditioners, forage harvesters, grain dryers, potato harvesters, and all other machinery and equipment (such as tillage and planting machinery, tractor attachments, wagons, shop tools, dairy equipment and a share of cars and station wagons).

Farm vehicles, machinery, and equipment were enumerated at their current market value as of 3 June 1986.

*Farm labour* consisted of own and hired labour. In the context of this study, farm labour was assessed according to the length of residence on the farm, which could be either four, eight, or 12 months, and then adjusted for off-farm labour and hired labour. The operator's off-farm labour was measured in terms of days and converted into weeks on the basis of a five-day week – e.g., 10 days of off-farm work was set as being equal to two weeks. To arrive at the number of weeks worked on the farm, the operator's off-farm labour was subtracted from the months of residence. At times, however, a further adjustment was made for off-farm work. It could happen, for example, that a part-time farmer worked an estimated 20 weeks off the farm. At four weeks per month, it was assumed that he worked only seven months (i.e., 12 – [20 + 4]) on the farm, even though he may have resided there for as many as nine months. Or, if a farmer did not reside on the farm at all and did not employ any hired labour, it was assumed that he worked on the farm except for the weeks of off-farm work. The months of hired labour (seasonal or year-round) were added to those of the operator's farm labour. Since the labour inputs were estimated for groups of farms and not for individual farms, the estimates were derived according to equation (4).

$$\begin{aligned} L &= (M_1 + M_2 + M_3) + N \\ &+ ([W_1 + W_2] + 4) + N \\ &- ([D_1 + D_2] + 26) + N \end{aligned} \qquad (4)$$

where

$L$ = labour input per farm, in months;

$N$ = number of farms in the group;

$(M_1 + M_2 + M_3) + N$ = four-, eight-, and 12-month residence (per-farm average);

$([W_1 + W_2] + 4) + N$ = months of year-round and seasonal hired labour months per farm (four weeks converted to one month);

$([D_1 + D_2] + 26) + N$ = months of agricultural and non-agricultural off-farm work (26 days converted to one month).

The length of the operator's farm residence related to the previous 12 months – i.e., from June 1985 to May 1986 – while those of hired labour and off-farm work pertained to the calendar year 1985. Farm labour provided by the operator's spouse and/or other family members was not included because the Census of Agriculture did not provide this information.

*Land* was measured in terms of farm acreage and market value. The farmland acreage included the total area of land operated by the farmer – i.e., land in crops, summerfallow, improved land for pasture or grazing, other improved land (e.g., farm yard and home garden), unimproved land for pasture, woodland, and all other unimproved land (e.g., dugouts and marshlands). It referred to farmland owned by the operator as well as all land rented or leased from others, including land rented from government.

Correspondingly, the market value of the farm included not only the value of farmland and buildings owned by the farm operator but also the land and buildings rented or leased from the government and/or others. It did not include, however, the value of any land, buildings, and farm dwellings rented or leased to others.

*Livestock and crop inputs* consisted of expenses directly associated with livestock and crop production. Feed and

supplement purchases, livestock and poultry purchases, veterinary services, medicines, and artificial insemination were included under livestock expenses. Crop expenses included fertilizer purchases and custom spreading; herbicides, insecticides, fungicides, and other pesticides; seed and seedling purchases; and seed treatment and cleaning costs. Home-grown feed grains and hay were excluded from livestock expenditures, while home-grown seed and seed bought for sale were excluded from crop expenditures.

*Other inputs*, such as fuel and electricity, general custom work, and machine rentals, were allocated to livestock or crop inputs in direct proportion to cash expenditures on each. Rent for the leasing of agricultural land and buildings, cash wages for hired farm labour, and interest on farm loans were excluded because their inclusion would have resulted in the double-counting of inputs within the context of the production-function analysis.

Also, a weather index was estimated for each of the 22 farming districts (Wisner, 1988), but the test did not prove this factor to be statistically significant in the cross-sectional production-function analysis.

## Estimates of Farm Production Functions

All farm production functions were estimated as simple Cobb-Douglas functions. The basic set of functions was specified in the same way as equation (1), but additional terms for factor productivity were included as indicated by equation (5).

$$O = C_0 C_1 \cdots C_n K^k L^l AV^a M^m \qquad (5)$$

This modified specification was equivalent to equation (3), except that farm acreage was replaced by farmland value $AV$. Replacing the farm-acreage variable by farmland values provided an automatic adjustment, in part, for regional variations in soil quality and for farm-to-farm variations in cropland, improved and wild pasture, and unimproved farmland. It yielded empirical estimates of the production elasticities of the major farm inputs – i.e., capital, labour, land, and materials. In addition, it yielded factor-productivity estimates for farm financial risk, major farm enterprises, marginal farms, commercial farms, corporate farms, and production regions within each of the three Prairie provinces. The parameter estimates of the farm production functions are listed, by province, in Tables C-1 to C-5.

### *Production elasticities*

The production-function estimates were not "restricted" to constant returns to scale and yielded production elasticities that suggested increasing returns to scale in the case of Manitoba and of mixed crop/livestock farms (Table C-6). Broadly speaking, this implies that farms in Manitoba and mixed farms in all three Prairie provinces could benefit from expanded operations.

The production elasticities of individual resource inputs varied according to the type of resource, the type of farm, and the province. The tests for material inputs (e.g., fertilizer, herbicides, insecticides, and feed and livestock purchases) produced statistically significant results for all three provinces (Table C-7). For mixed farms, capital inputs in Saskatchewan, and Alberta, as well as farmland acreage in Manitoba and Saskatchewan, tested highly significant.

### *Factor productivities*

Aside from the production elasticities of the four major resource inputs (capital, labour, land, and materials), additional coefficients were estimated (simultaneously) to separate the impact of other farm characteristics from those of the resource inputs.

The estimated coefficients of financial risk, farm type, organization, and farming region represent deviations from an (arbitrary) norm. In our case, the norm was a farmer in a financially stable situation, operating a grain farm of commercial size, aged between 35 and 64, farming in a particular region of a Prairie province – i.e., Region 4 in Manitoba, Region 5 in Saskatchewan, and Region 2 in Alberta. This approach was taken, not only to obtain simple percentage estimates of statistical variations from the norm but also to avoid singularity in the matrix inversion.

### *Financial risk*

With few exceptions, the coefficients under this heading are negative and statistically significant (at the 1-, 5-, or 10-per-cent levels in Tables C-1 to C-5). The antilogs of these coefficients, expressed in percentage terms, are reproduced in Table 5-7.

### *Major enterprise*

The coefficients for livestock and mixed farms of the "all-farm" production functions in Table C-1 are negative and are statistically significant at the 1-per-cent level, indicating that the productivity of resources on these farms in 1985-86 was

**Table C-1**

**Regression Coefficients of Farm Production Functions, All Farms, Prairie Provinces, 1986**

| | Regression coefficients[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| Resources | | | |
| Capital (dollars) | 0.17** | 0.11** | 0.27** |
| Land (dollars) | 0.15** | 0.15** | –0.04 |
| Labour (months) | 0.12** | 0.09** | 0.14** |
| Materials (dollars) | 0.75** | 0.67** | 0.70** |
| Financial status | | | |
| Nonviable | –0.05** | –0.06** | –0.05** |
| Deteriorating | –0.05** | –0.06** | –0.04** |
| Vulnerable | –0.01 | 0.03** | –0.00 |
| Major enterprise | | | |
| Livestock | –0.05** | –0.08** | –0.09** |
| Specialty | –0.00 | –0.00 | –0.02** |
| Mixed | –0.03** | –0.04** | –0.06** |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | –0.10** | –0.18** | –0.23** |
| Aged 35 to 64 | –0.15** | –0.22** | –0.27** |
| Full-time farmers | | | |
| Aged less than 35 | –0.10** | –0.17** | –0.22** |
| Aged 35 to 64 | –0.14** | –0.21** | –0.24** |
| Commercial farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 0.05* | –0.04* | 0.04* |
| Aged 35 to 64 | 0.03+ | –0.00 | 0.00 |
| Partners | | | |
| Aged less than 35 | 0.03** | 0.02** | 0.02** |
| Full-time farmers | | | |
| Aged less than 35 | 0.00 | 0.02+ | 0.02 |
| Elderly farmers | | | |
| Aged 65 and over | –0.04** | –0.07** | –0.08** |
| Corporate farms | | | |
| Family-owned | –0.04 | 0.02 | –0.00 |
| All others | –0.07* | –0.00 | –0.04+ |
| Producing regions | | | |
| #1 | 0.00 | –0.01* | 0.00 |
| #2 | 0.00 | –0.00 | – |
| #3 | –0.01 | –0.01* | –0.02** |
| #4 | – | 0.00 | –0.02** |
| #5 | –0.03* | –0.02** | 0.03** |
| #6 | –0.02 | – | –0.05** |
| #7 | | 0.00 | –0.07** |
| #8 | | –0.01** | |
| #9 | | –0.02** | |
| Other statistics | | | |
| Intercept | –0.44** | 0.31** | 0.33** |
| Degrees of freedom | 574 | 1,008 | 899 |
| Adjusted multiple $R^2$ | 0.99 | 0.99 | 0.99 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-2**

**Regression Coefficients of Farm Production Functions, Grain Farms, Prairie Provinces, 1986**

| | Regression coefficients[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| Resources | | | |
| Capital (dollars) | 0.01 | –0.03 | 0.18** |
| Land (dollars) | 0.11+ | 0.24** | 0.04 |
| Labour (months) | 0.06 | 0.09 | –0.01 |
| Materials (dollars) | 0.91** | 0.68** | 0.77** |
| Financial status | | | |
| Nonviable | –0.07** | –0.09** | –0.08** |
| Deteriorating | –0.08** | –0.07** | –0.07** |
| Vulnerable | –0.02* | –0.02** | –0.01 |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | –0.11* | –0.20** | –0.27** |
| Aged 35 to 64 | –0.16** | –0.23** | –0.30** |
| Full-time farmers | | | |
| Aged less than 35 | –0.10** | –0.20** | –0.21** |
| Aged 35 to 64 | –0.15** | –0.24** | –0.23** |
| Commercial farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 0.02 | 0.02 | –0.01 |
| Aged 35 to 64 | –0.00 | –0.01 | –0.05* |
| Partners | | | |
| Aged less than 35 | 0.02+ | 0.01 | 0.02 |
| Full-time farmers | | | |
| Aged less than 35 | 0.02 | 0.02 | 0.01 |
| Elderly farmers | | | |
| Aged 65 and over | –0.03+ | –0.07** | –0.06** |
| Corporate farms | | | |
| Family-owned | –0.02 | 0.01 | 0.03 |
| All others | –0.01 | –0.06* | –0.00 |
| Producing regions | | | |
| #1 | 0.01 | –0.01 | 0.04** |
| #2 | –0.01 | –0.00 | – |
| #3 | –0.03* | –0.01 | –0.04** |
| #4 | – | 0.01 | –0.01 |
| #5 | –0.04* | –0.02* | –0.04** |
| #6 | –0.06** | – | –0.06** |
| #7 | | –0.00 | –0.07** |
| #8 | | –0.02** | |
| #9 | | –0.03** | |
| Other statistics | | | |
| Intercept | –0.08 | 0.47* | 0.21 |
| Degrees of freedom | 155 | 312 | 237 |
| Adjusted multiple $R^2$ | 0.99 | 0.99 | 0.99 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-3**

**Regression Coefficients of Farm Production Functions, Livestock Farms, Prairie Provinces, 1986**

| | Regression coefficients[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| Resources | | | |
| Capital (dollars) | 0.26** | 0.04 | 0.19** |
| Land (dollars) | 0.08 | 0.01 | –0.04* |
| Labour (months) | 0.03 | 0.05 | 0.16** |
| Materials (dollars) | 0.84** | 0.82** | 0.80** |
| Financial status | | | |
| Nonviable | –0.03 | –0.04** | –0.04** |
| Deteriorating | –0.05** | –0.05** | –0.03** |
| Vulnerable | –0.01 | –0.02* | –0.00 |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | –0.09 | –0.30** | –0.22** |
| Aged 35 to 64 | –0.15** | –0.30** | –0.25** |
| Full-time farmers | | | |
| Aged less than 35 | –0.09** | –0.18** | –0.20** |
| Aged 35 to 64 | –0.09** | 0.21** | –0.21** |
| Commercial farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 0.01 | –0.02 | 0.04 |
| Aged 35 to 64 | 0.02 | –0.05 | 0.01 |
| Partners | | | |
| Aged less than 35 | 0.03 | 0.01 | 0.02 |
| Full-time farmers | | | |
| Aged less than 35 | –0.02 | –0.02 | –0.00 |
| Elderly farmers | | | |
| Aged 65 and over | –0.02 | –0.09** | –0.07** |
| Corporate farms | | | |
| Family-owned | –0.04 | –0.02 | –0.04 |
| All others | –0.18** | 0.08 | 0.01 |
| Producing regions | | | |
| #1 | –0.01 | –0.01 | 0.00 |
| #2 | 0.04 | –0.04* | – |
| #3 | 0.02 | 0.00 | –0.01 |
| #4 | – | 0.01 | –0.00 |
| #5 | –0.00 | –0.02 | –0.00 |
| #6 | –0.01 | – | –0.00 |
| #7 | | 0.01 | 0.05** |
| #8 | | 0.01 | |
| #9 | | –0.01 | |
| Other statistics | | | |
| Intercept | –0.86** | 0.70** | 0.20 |
| Degrees of freedom | 123 | 211 | 218 |
| Adjusted multiple $R^2$ | 0.99 | 0.98 | 0.99 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-4**

**Regression Coefficients of Farm Production Functions, Specialty Farms, Prairie Provinces, 1986**

| | Regression coefficients[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| Resources | | | |
| Capital (dollars) | 0.16 | 0.10 | 0.21** |
| Land (dollars) | 0.29** | 0.20* | 0.07 |
| Labour (months) | 0.22+ | 0.10 | 0.12+ |
| Materials (dollars) | 0.65** | 0.65** | 0.66** |
| Financial status | | | |
| Nonviable | –0.07+ | –0.08+ | –0.06* |
| Deteriorating | –0.05+ | –0.06+ | –0.04* |
| Vulnerable | 0.01 | –0.03 | –0.01 |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | –0.12 | –0.21 | –0.29** |
| Aged 35 to 64 | –0.16+ | –0.29** | –0.35** |
| Full-time farmers | | | |
| Aged less than 35 | –0.09 | –0.07 | –0.34** |
| Aged 35 to 64 | –0.20** | –0.25** | –0.33** |
| Commercial farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 0.20 | 0.03 | 0.03 |
| Aged 35 to 64 | 0.04 | 0.04 | –0.01+ |
| Partners | | | |
| Aged less than 35 | 0.04 | 0.04 | 0.03 |
| Full-time farmers | | | |
| Aged less than 35 | 0.00 | 0.02 | 0.05+ |
| Elderly farmers | | | |
| Aged 65 and over | –0.09+ | –0.15** | –0.15** |
| Corporate farms | | | |
| Family-owned | –0.11 | 0.03 | 0.03 |
| All others | –0.17 | 0.22* | 0.12 |
| Producing regions | | | |
| #1 | 0.00 | 0.03 | 0.05 |
| #2 | 0.04 | –0.04 | – |
| #3 | 0.10 | 0.06 | –0.03 |
| #4 | – | .. | 0.00 |
| #5 | 0.03 | –0.02 | –0.01 |
| #6 | 0.02 | – | 0.00 |
| #7 | | 0.15** | 0.01 |
| #8 | | 0.02 | |
| #9 | | 0.02 | |
| Other statistics | | | |
| Intercept | –0.75 | 0.20 | 0.31 |
| Degrees of freedom | 88 | 106 | 136 |
| Adjusted multiple $R^2$ | 0.97 | 0.96 | 0.99 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-5**

**Regression Coefficients of Farm Production Functions, Mixed Farms, Prairie Provinces, 1986**

| | Regression coefficients[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| Resources | | | |
| Capital (dollars) | 0.08 | 0.32** | 0.37** |
| Land (dollars) | 0.40** | 0.39** | –0.09 |
| Labour (months) | 0.14+ | 0.11+ | 0.26** |
| Materials (dollars) | 0.66** | 0.44** | 0.64** |
| Financial status | | | |
| Nonviable | –0.04** | –0.04** | –0.03+ |
| Deteriorating | –0.05** | –0.04** | –0.02 |
| Vulnerable | –0.03* | –0.03** | –0.01 |
| Marginal farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | –0.11* | –0.08* | –0.20** |
| Aged 35 to 64 | –0.15** | –0.12** | –0.24** |
| Full-time farmers | | | |
| Aged less than 35 | –0.07* | –0.11** | –0.20** |
| Aged 35 to 64 | –0.11** | –0.14** | –0.25** |
| Commercial farms operated by: | | | |
| Part-time farmers | | | |
| Aged less than 35 | 0.05 | 0.13** | 0.07+ |
| Aged 35 to 64 | 0.06+ | 0.04 | 0.03 |
| Partners | | | |
| Aged less than 35 | 0.04* | 0.05** | 0.04* |
| Full-time farmers | | | |
| Aged less than 35 | –0.01 | 0.01 | 0.01 |
| Elderly farmers | | | |
| Aged 65 and over | –0.04+ | –0.05** | –0.09** |
| Corporate farms | | | |
| Family-owned | –0.08 | –0.03 | –0.03 |
| All others | –0.13 | –0.02 | 0.10+ |
| Producing regions | | | |
| #1 | 0.02+ | 0.01 | –0.02 |
| #2 | 0.05* | 0.00 | – |
| #3 | 0.05* | –0.03** | –0.01 |
| #4 | – | –0.03+ | –0.03 |
| #5 | –0.04 | 0.03** | –0.04** |
| #6 | 0.06** | – | –0.07** |
| #7 | | –0.03* | –0.05** |
| #8 | | 0.04** | |
| #9 | | 0.02 | |
| Other statistics | | | |
| Intercept | –1.01** | –1.13** | 0.24 |
| Degrees of freedom | 139 | 302 | 236 |
| Adjusted multiple $R^2$ | 0.98 | 0.98 | 0.98 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.
SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-6**

**Returns to Scale of Farm Operations, by Type of Farm, Prairie Provinces, 1986**

| | Sum of production elasticities | | |
|---|---|---|---|
| | Manitoba | Saskat-chewan | Alberta |
| Grain | 1.09 | 0.98 | 0.98 |
| Livestock | 1.21 | 0.92 | 1.11 |
| Specialty | 1.32 | 1.05 | 1.06 |
| Mixed | 1.28 | 1.26 | 1.18 |
| All types | 1.19 | 1.02 | 1.07 |

SOURCE Estimates based on Tables C-1 to C-5.

significantly lower than on grain farms (which are used here as the norm). The antilogs of these coefficients are provided (as percentages) in Table 5-6.

As shown by the results of the cost analysis in Chapter 5 (Tables 5-3 and 5-4), these coefficients were affected by the government programs that favoured grain farmers over livestock farmers. The effects were, however, much less significant in 1985-86 than in 1987-88.

### *Marginal farms*

Regardless of the age of the farmer and of whether he operated his farm on a part-time or a full-time basis, – the factor productivity on marginal farms was much lower than on commercial farms, as indicated by the highly significant negative coefficients. It is quite unlikely that these estimates were distorted by government programs. Table C-1 forms the basis for the lower panel of Table 5-5. The upper panel of that table is based on the corresponding coefficient estimates for census year 1981 in Table C-8.

### *Commercial farms*

The coefficients listed under this heading are generally small and irregular, indicating that these farms are "close to the norm," except for those operated by young managers (aged less than 35) in partnership and those operated by elderly farmers (aged 65 and over). Although the regression coefficients are not statistically significant in all cases, they imply that partnerships were generally more efficient in resource use and that elderly farmers were less efficient. Other young full-time and part-time operators were generally close to the norm. And there is no convincing evidence that, aside from those operating in partnerships, younger farmers were generally more efficient in resource use than middle-aged farmers.

**Table C-7**

**Production Elasticities of Farm Resources, by Type of Farm, Prairie Provinces, 1986**

| | Production elasticities[1] | | |
|---|---|---|---|
| | Manitoba | Saskat-chewan | Alberta |
| Capital | | | |
| Grain | 0.01 | –0.03 | 0.18** |
| Livestock | 0.26** | 0.04 | 0.19** |
| Specialty | 0.16 | 0.10 | 0.21** |
| Mixed | 0.08 | 0.32** | 0.37** |
| All types | 0.17** | 0.11** | 0.27** |
| Land | | | |
| Grain | 0.11+ | 0.24** | 0.04 |
| Livestock | 0.08 | 0.01 | –0.04* |
| Specialty | 0.29** | 0.20* | 0.07 |
| Mixed | 0.40** | 0.39** | –0.09 |
| All types | 0.15** | 0.15** | –0.04 |
| Labour | | | |
| Grain | 0.06 | 0.09 | –0.01 |
| Livestock | 0.16** | 0.05 | 0.03 |
| Specialty | 0.22+ | 0.10 | 0.12+ |
| Mixed | 0.14+ | 0.11+ | 0.26** |
| All types | 0.12** | 0.09** | 0.14** |
| Materials | | | |
| Grain | 0.91** | 0.68** | 0.77** |
| Livestock | 0.84** | 0.82** | 0.80** |
| Specialty | 0.65** | 0.65** | 0.66** |
| Mixed | 0.66** | 0.44** | 0.64** |
| All types | 0.75** | 0.67** | 0.70** |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates based on Tables C-1 to C-5.

### *Corporate farms*

Similarly, there is no clear-cut evidence that resources on corporate farms, whether family-owned or not, were used more efficiently than on commercial farms, which included most of the traditional family farms.

## Table C-8

### Regression Coefficients of Farm Production Functions, All Farms, Prairie Provinces, 1981

| | | Regression coefficients[1] | | |
|---|---|---|---|---|
| | | Manitoba | Saskatchewan | Alberta |
| Resources | | | | |
| Capital (dollars) | | 0.05+ | 0.17** | 0.29** |
| Land (dollars) | | 0.05 | 0.15** | 0.01 |
| Labour (months) | | 0.05 | –0.05 | 0.07* |
| Materials (dollars) | | 0.65** | 0.46** | 0.53** |
| Type of farm | | | | |
| Livestock | | 0.01 | –0.04** | –0.02* |
| Specialty | | 0.03* | –0.02 | 0.01 |
| Mixed | | 0.00 | –0.03** | –0.04** |
| Marginal farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | | –0.36** | –0.37** | –0.38** |
| Aged 35 to 64 | | –0.36** | –0.39** | –0.35** |
| Full-time farmers | | | | |
| Aged less than 35 | | –0.29** | –0.29** | –0.35** |
| Aged 35 to 64 | | –0.30** | –0.28** | –0.35** |
| Commercial farms operated by: | | | | |
| Part-time farmers | | | | |
| Aged less than 35 | | –0.05 | –0.07** | –0.01 |
| Aged 35 to 64 | | 0.00 | –0.06* | –0.01 |
| Partners | | | | |
| Aged less than 35 | | 0.01 | –0.01+ | –0.00 |
| Full-time farmers | | | | |
| Aged less than 35 | | –0.29** | –0.26** | –0.31* |
| Elderly farmers | | | | |
| Aged 65 and over | | 0.09 | 0.02+ | 0.03* |
| Corporate farms | | | | |
| Mostly family-owned | #12 | 0.09** | 0.14** | 0.10** |
| Mostly owned by others | #13 | 0.26* | 0.23 | 0.20 |
| Corporate farms | #14 | 0.32** | –0.23 | 0.19+ |
| Institutional farms | #15 | 0.15* | –0.05 | 0.11+ |
| Other nonfamily corporations | | | | |
| Small-scale | #16 | –0.34** | –0.13 | –0.12 |
| Large-scale | #19 | 0.01 | 0.11 | 0.02 |
| Producing regions | | | | |
| #1 | | 0.04** | 0.02+ | 0.02 |
| #2 | | 0.04** | 0.02 | – |
| #3 | | 0.01 | 0.05** | –0.04** |
| #4 | | – | 0.05** | –0.04** |
| #5 | | –0.05** | –0.01+ | –0.06** |
| #6 | | –0.02 | – | –0.11** |
| #7 | | | 0.02* | –0.12** |
| #8 | | | –0.03** | |
| #9 | | –0.03** | | |
| Other statistics | | | | |
| Intercept | | 1.34** | 1.23** | 0.99** |
| Degrees of freedom | | 673 | 1,079 | 974 |
| Adjusted multiple $R^2$ | | 0.98 | 0.97 | 0.98 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

### *Production regions*

Regional variations in productivity existed, but in most cases they did not consistently test statistically significant. In part, that was because of variations among farm enterprises and in part because the variations were already captured in the dollar value of the land input variable.

### *"Free" farm labour*

The coefficient estimates of livestock and mixed grain/livestock farms implied that the resource productivity on these farms was significantly lower than on grain farms. Applying the same estimating equation to the same data sets – but deleting the labour input variable – yielded almost identical results. The differences in labour inputs between grain, livestock, and mixed farms, therefore, could not have been a critical factor in the variations in factor productivity (Table C-9).

**Table C-9**

**Estimated Relative Factor Productivity of Livestock and Mixed Farms, Prairie Provinces, 1986[1]**

| | Livestock farms | Mixed farms |
|---|---|---|
| | (Per cent) | |
| Including labour inputs: | | |
| Manitoba | 90 | 93 |
| Saskatchewan | 84 | 90 |
| Alberta | 82 | 86 |
| Excluding labour inputs: | | |
| Manitoba | 90 | 94 |
| Saskatchewan | 84 | 90 |
| Alberta | 82 | 86 |

1 The upper panel corresponds to that of Table 5-6. The lower panel is based on a regression identical to that of Table C-1, except that the labour-input variable has been removed from our estimation. Only in one case (Manitoba mixed farms) are the estimates not identical.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

### *Comparisons between 1981 and 1986*

All of the regression estimates examined so far were based on the 1986 Census of Agriculture. One would expect that production functions based on data from another census year would produce different results. That was indeed the case when we derived similar estimates for 1980-81. They differed, in part because crop yields and farm prices were not the same, in part because data on interest payments on farm loans were not available, and in part because the specifications of the functions were different. Nevertheless, compared with the 1985-86 regressions (Table C-1), the rank order of the 1980-81 regression coefficients was similar (Table C-8). Among regression coefficients, the production elasticities of materials and capital ranked high, while those of land and labour ranked low. And in both years, the factor-productivity estimates of livestock and mixed farms in Saskatchewan and Alberta were significantly lower than those of grain farms. As well, the productivity estimates of marginal farms and of farms operated by elderly farmers were much lower than those for other commercial and corporate farms. There were also some year-to-year similarities in the regional variations of productivity, especially in Alberta.

It is noteworthy that in spite of differences in the databases of the two census years and in the specifications of the production functions, factor productivity on livestock and mixed farms was significantly lower than on grain farms, in both Saskatchewan and Alberta (Tables C-1 and C-9). The existence of these differences was confirmed when the specifications of the production functions were simplified and the two years were aligned with each other. Clearly, resource productivity on livestock and mixed farms was lower than on grain farms, in both years (Table C-10).

## Costs

In Chapter 5, we looked at the unit cost of farm output and found that only one quarter to one third of all Prairie farmers operated in the low-cost range. Further analysis showed that cost economies were often associated with farm size; in other words, the greater the sales volume and the larger the farm acreage, the lower the cash operating cost per dollar of sales. This is reflected in Table C-11. The estimates also show that scale and cost economies did not form a one-to-one relationship. Some of the lowest-cost producers (above the 70th percentile) managed to do so on farms of the same size – or even smaller – than some of the higher-cost producers (at the 50th percentile).

Although the relationship tested statistically significant, farm size was not the only determinant of unit costs. Cash operating costs represent only part of total costs, and so a more comprehensive cost analysis might have delivered more-consistent results.

**Table C-10**

**Regression Coefficients of Farm Production Functions, All Farms, Prairie Provinces, 1981 and 1986**

| | Production-function estimates[1] | | |
|---|---|---|---|
| | Manitoba | Saskatchewan | Alberta |
| 1980-81 | | | |
| Capital (dollars) | 0.10** | 0.46** | 0.37** |
| Land (dollars) | –0.02** | 0.18** | 0.03 |
| Labour (months) | 0.14** | 0.09** | 0.13** |
| Materials (dollars) | 1.08** | 0.46** | 0.86** |
| Livestock farms | –0.06** | –0.13** | –0.05** |
| Specialty farms | –0.01 | –0.08** | –0.01 |
| Mixed farms | –0.02 | –0.08** | –0.05** |
| Intercept | 0.21* | –0.65** | –1.12** |
| Degrees of freedom | 693 | 1,102 | 995 |
| Adjusted multiple $R^2$ | 0.95 | 0.92 | 0.94 |
| 1985-86 | | | |
| Capital (dollars) | 0.14** | 0.21** | 0.27** |
| Land (dollars) | –0.04 | 0.04 | –0.08** |
| Labour (dollars) | 0.05** | 0.05** | 0.11** |
| Materials (dollars) | 1.07** | 0.92** | 1.02** |
| Livestock farms | –0.11** | –0.16** | –0.14** |
| Specialty farms | –0.02* | –0.07** | –0.05** |
| Mixed farms | –0.05** | –0.10** | –0.09** |
| Intercept | –0.68** | –0.73** | –0.95** |
| Degrees of freedom | 850 | 1,317 | 1,183 |
| Adjusted multiple $R^2$ | 0.98 | 0.96 | 0.97 |

1 Tested statistically significant at the 1-per-cent (**), 5-per-cent (*), or 10-per-cent (+) level.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

**Table C-11**

**Cash Cost per Dollar of Farm-Product Sales, by Type of Farm and by Percentile, Prairie Provinces, 1985-86**

| | Percentile[1] | Grain | Livestock | Specialty | Mixed |
|---|---|---|---|---|---|
| | | | (Thousands of dollars) | | |
| Sales | | | | | |
| Manitoba | 30 | 23 | 31 | 78 | 28 |
| | 50 | 104 | 55 | 155 | 93 |
| | 70 | 61 | 93 | 123 | 204 |
| Saskatchewan | 30 | 43 | 56 | 98 | 35 |
| | 50 | 67 | 83 | 86 | 78 |
| | 70 | 86 | 90 | 136 | 100 |
| Alberta | 30 | 19 | 22 | 24 | 28 |
| | 50 | 102 | 175 | 139 | 130 |
| | 70 | 89 | 188 | 199 | 112 |
| | | | (Months) | | |
| Labour | | | | | |
| Manitoba | 30 | 12 | 13 | 17 | 13 |
| | 50 | 15 | 13 | 23 | 14 |
| | 70 | 14 | 14 | 17 | 13 |
| Saskatchewan | 30 | 13 | 14 | 17 | 12 |
| | 50 | 12 | 14 | 18 | 15 |
| | 70 | 14 | 15 | 21 | 16 |
| Alberta | 30 | 12 | 12 | 9 | 12 |
| | 50 | 14 | 18 | 22 | 16 |
| | 70 | 14 | 16 | 31 | 16 |
| | | | (Acres) | | |
| Land | | | | | |
| Manitoba | 30 | 383 | 506 | 570 | 534 |
| | 50 | 947 | 942 | 794 | 970 |
| | 70 | 606 | 997 | 694 | 1,528 |
| Saskatchewan | 30 | 802 | 1,090 | 617 | 853 |
| | 50 | 970 | 1,632 | 564 | 1,360 |
| | 70 | 1,117 | 2,404 | 792 | 1,248 |
| Alberta | 30 | 480 | 633 | 312 | 642 |
| | 50 | 1,162 | 1,110 | 589 | 1,456 |
| | 70 | 915 | 1,609 | 633 | 1,101 |

1 The percentiles pertain to the following percentile ranges: 30 = 25 to 34.99; 50 = 45 to 54.99; and 70 = 65 to 74.99.

SOURCE Estimates by the author, based on special tabulations by Statistics Canada.

# D A System of Decoupled Farm Programs

In Chapter 6, the proposed decoupled-program system was described under four headings: farm-income insurance, income-stabilization fund, farm-adjustment option, and family-income disaster assistance.

In the following discussion, we deal with the first three programs under the heading "income insurance" and with the fourth under "income assistance." Under both sets of programs, the government would share in the costs and all farmers would share in the benefits.

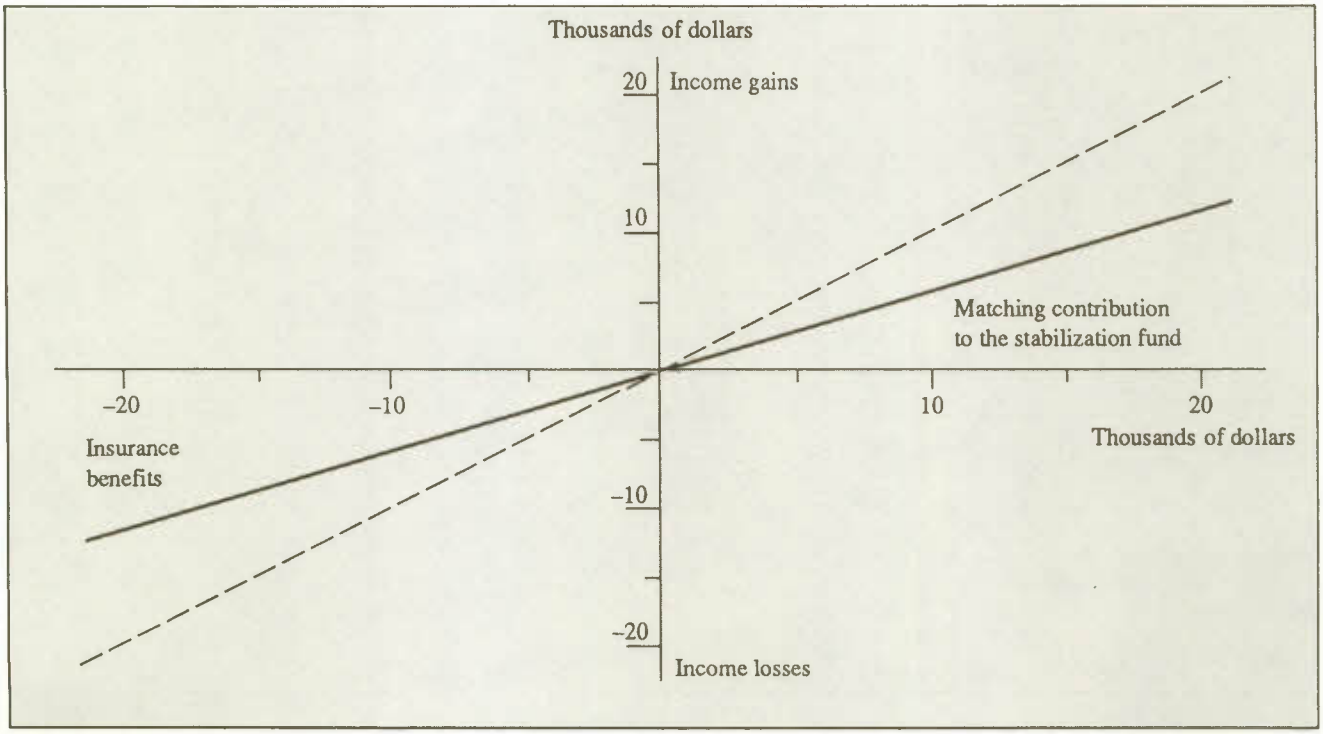
## Income Insurance

The farm insurance program is designed to stabilize farm incomes. It is similar to that provided for in the Western Grain Stabilization Act, but it is not directly linked to the sale of grain or of any other commodity. It would be a universal program, in the sense that farmers with income losses would receive insurance benefits but others with income gains would not go empty-handed. Farmers would receive cash benefits whenever their net cash income – i.e., their farm cash receipts minus their farm cash expenses (excluding interest payments on loans) – dropped below the normal level; only part of their loss (i.e., two thirds) would be reimbursed. Farmers would receive a matching contribution to their stabilization fund whenever they had an income gain and whenever they themselves contributed to that fund. Their maximum contribution to the fund would amount to part of their gain (i.e., two thirds) in net cash income.

The cash payments and the contributions to the stabilization fund are illustrated in Chart D-1. The scales on the vertical and horizontal axes measure the farmer's net cash

**Chart D-1**

**Hypothetical Payments to Farmers under the Proposed Income-Insurance Program**



income. Income gains (upper right) and losses (lower left) are plotted by the broken 45° line. The solid line depicts the government's contribution to the farmer's stabilization in the upper right quadrant and the insurance benefits in the lower left quadrant.

The estimation procedure is further exemplified by the numerical examples of Table D-1. To estimate the insurance payments that would have been made to a farmer in 1987, the net cash income is averaged over the preceding five years, and the 1987 cash income is subtracted from that average, or normal, income. The insurance payments are deemed to amount to two-thirds of the gains or losses. In the example, only the livestock farmer is deemed to have had an income gain in 1987; if this income gain had been deposited into his stabilization fund, it would have been matched by the government's contribution, resulting in a balance of $10,370 in the fund. All the other farmers are deemed to have had losses, and the insurance benefits would have covered two-thirds of their losses.

Whether the insurance benefits would come as a direct payment from the government or from the farmer's stabilization fund would depend on the balance in that fund. That is an important feature of the proposal, and we shall return to it later, when we examine the flow chart of the computer program.

## Income Assistance

Payouts under this program would be triggered whenever the provincial, or possibly regional, net cash receipts fell well below the normal level – say, down to 80 per cent of the average of the preceding five years. Whether the payment would be in cash or in the form of a matching contribution to the farmer's stabilization fund would depend on the level of the farm-family income. Farm families whose net cash family income fell below the low-income line (roughly $14,000 in 1987) would receive up to one-half of that amount in direct cash payment. If the farm-family income rose above $28,000, the government would match the farmer's contribution to the stabilization fund, up to a maximum of $7,000 or two-thirds of his income gains, whichever was the lower. If the family income were between $14,000 and $28,000, the government would pay one-half of the difference

**Table D-1**

**Estimated Insurance Benefits Paid Out to Farmers for Gains and Losses in Farm Incomes under the Proposed Decoupled Program, by Type of Farm, 1987**

| | Type of farm | | | | |
|---|---|---|---|---|---|
| | Grain | Livestock | Specialty | Mixed | All types |
| | | | (Dollars) | | |
| "Normal" sales | 69,087 | 92,029 | 94,286 | 81,139 | 76,935 |
| Normal expenses | 51,043 | 83,090 | 77,119 | 65,352 | 61,015 |
| Interest on loans | –6,951 | –7,427 | –10,908 | –8,119 | –7,480 |
| Adjusted expenses | 44,092 | 75,663 | 66,211 | 57,233 | 53,535 |
| "Normal" net cash income | 24,995 | 16,366 | 28,075 | 23,896 | 23,400 |
| Net cash income in 1987 | –3,208 | 24,105 | 25,656 | 10,543 | 5,959 |
| Gain (loss) | (28,203) | 7,739 | (2,419) | (13,353) | (17,441) |
| 67 per cent of gain (or loss) | (18,896) | 5,185 | (1,621) | (8,947) | (11,685) |
| Insurance payment or matching contribution to the stabilization fund | | 5,185 | | | |
| Insurance benefit | 18,896 | | 1,621 | 8,947 | 11,685 |

SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

between $28,000 and the farm-family income in cash, and would match the remainder with a contribution to the farmer's stabilization fund, again up to a maximum of two thirds of his farm income gains or $7,000, whichever was the lower amount.

The payments to farmers under the income-assistance program are illustrated in Chart D-2, which shows that farm families would receive cash payments of $7,000 if their income fell below the low-income line. The cash payments would decline linearly from $7,000 to zero as family incomes rose from $14,000 to $28,000. Corresponding to the decline in cash payments, the government's contributions to the farmers' stabilization funds would increase, provided, of course, that the farmer contributed an equal amount to the fund. Thus, under the income-assistance program, all farmers would be entitled, subject to specific conditions, to a maximum government payment of $7,000 – i.e., an amount equal to one half of the low-income level. The same relationships are spelled out numerically in Table D-2.

## Computer Simulation

To find out whether decoupled farm programs could be operated at reasonable costs or whether they would produce outrageous results, simulations were run on the assumption that farmers would always invest enough in their stabilization funds to maximize the government's contributions to their funds. Depending on the reserves in the stabilization fund, a farmer would cover part or all of his income losses from the fund. If not, he would have to draw on insurance benefits, and his premiums would be adjusted accordingly. Figure D-1 outlines the step-by-step procedures for calculating the benefit and cost estimates provided in Chapter 6.

As long as weather and market prices varied within a normal range, farmers would be able to draw on the insurance scheme to stabilize their farm income. Gains or losses would be determined by comparing the current year's income with the normal income; maximum gains or losses would be set at $90,000; and two thirds coverage would allow for a maximum contribution of $60,000 to the stabilization fund in case of a gain, or for a maximum of $60,000 in insurance benefits in case of a loss. Whatever the farmer would contribute to the stabilization fund, the government would match it until a fund limit of $250,000 would be reached. Should the farmer experience an income loss, he would cover it by drawing on his insurance fund. Once the fund was exhausted, he would cover two thirds of the remaining loss by drawing on insurance benefits. Each year,

**Chart D-2**

**Hypothetical Payments to Farmers under the Proposed Income-Assistance Program**

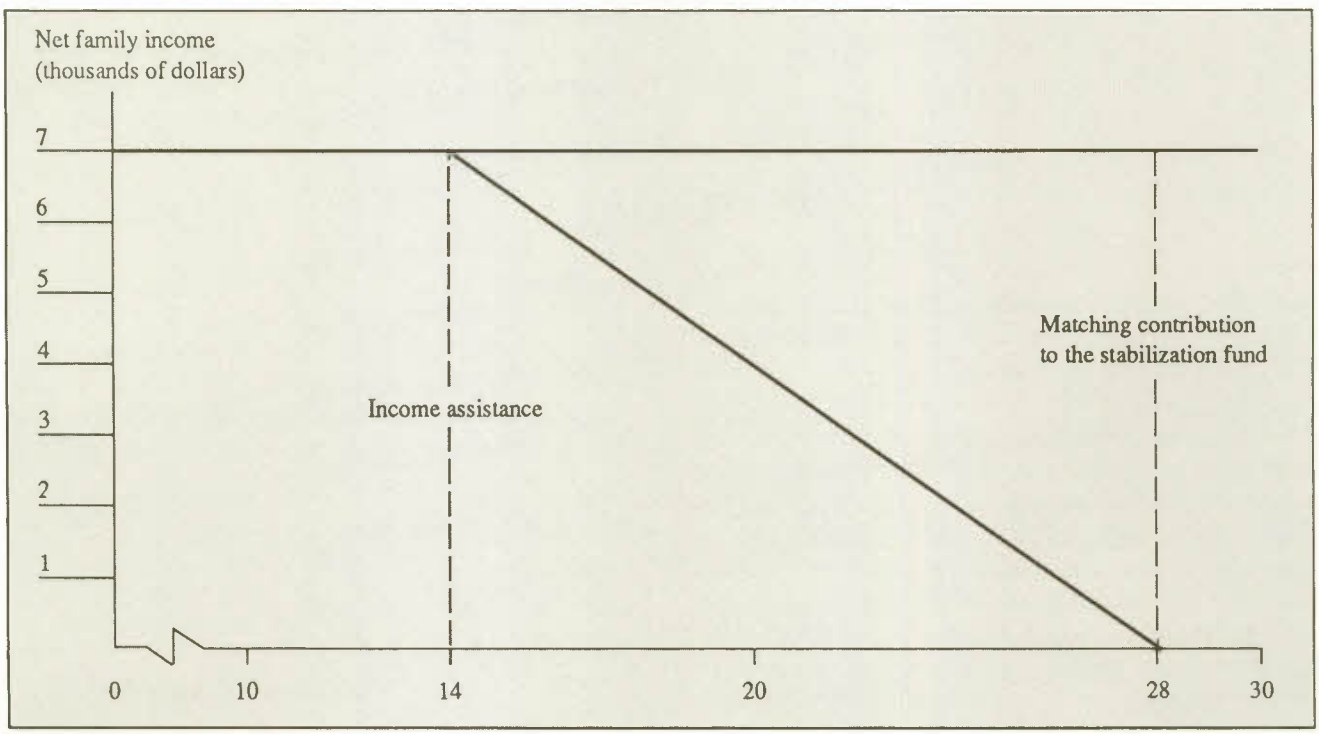


**Table D-2**

**Estimated Income Assistance to Farmers at Times of Widespread Hardship under the Proposed Decoupled Program**

| Farm-family income | Cash payment to farmers | Matched contribution to the stabilization fund | Total assistance |
|---|---|---|---|
| | (Thousands of dollars) | | |
| 5 | 7 | 0 | 7 |
| 6 | 7 | 0 | 7 |
| 7 | 7 | 0 | 7 |
| 8 | 7 | 0 | 7 |
| 9 | 7 | 0 | 7 |
| 10 | 7 | 0 | 7 |
| 11 | 7 | 0 | 7 |
| 12 | 7 | 0 | 7 |
| 13 | 7 | 0 | 7 |
| 14 | 7 | 0 | 7 |
| 15 | 6.5 | 0.5 | 7 |
| 16 | 6 | 1 | 7 |
| 17 | 5.5 | 1.5 | 7 |
| 18 | 5 | 2 | 7 |
| 19 | 4.5 | 2.5 | 7 |
| 20 | 4 | 3 | 7 |
| 21 | 3.5 | 3.5 | 7 |
| 22 | 3 | 4 | 7 |
| 23 | 2.5 | 4.5 | 7 |
| 24 | 2 | 5 | 7 |
| 25 | 1.5 | 5.5 | 7 |
| 26 | 1 | 6 | 7 |
| 27 | 0.5 | 6.5 | 7 |
| 28 | 0 | 7 | 7 |
| 29 | 0 | 7 | 7 |
| 30 | 0 | 7 | 7 |

the farmer's insurance premium would be set on the basis of his own experience in income gains, losses, and withdrawal of insurance benefits.

Should a widespread drought or disastrously low market prices cause a sharp drop in farm sales of, say, 20 per cent or more in any one year, additional income assistance of up to $7,000 (or up to one half of the rural low-income line) would be paid out to farmers. Whether or not a farm family would qualify for cash income assistance that year would depend on the family's total net cash income – i.e., its farm income plus all off-farm-family income and one-half of any farm-income insurance benefits, minus payment of the premium for farm-income insurance. If the family's net cash income should exceed $28,000 (or double the rural low-income line), the government would match the farmer's contribution of $7,000 to the stabilization fund. Should the family's net cash income fall short of $14,000, the government would pay $7,000 in cash. And should the income fall somewhere between $14,000 and $28,000, the government would pay part in cash (at a declining rate with higher income) and would match any funds deposited into the stabilization fund (at an increasing rate). Whatever amount would be added to the stabilization fund would earn interest; if, after deposit of the additional amount (a maximum of $14,000 plus interest), the stabilization fund exceeded $250,000, the contribution would be adjusted downward to that limit.

The farmer's insurance premium would initially be set at 6 per cent and would then be adjusted up or down, to reflect more nearly his actual experience. The insurance formula would be based on the ratio of the actual (sum of) withdrawals of the farmer's insurance benefits to the potential (sum of) withdrawals should be cover two thirds of all his losses by income insurance. The insurance rates would not be fully individualized, however. The rates would begin at 6 per cent and would be modified over a five-year period by lowering the 6-per-cent rate to 3 per cent and by adding one half of the farmer's own rate to it.

## Alternative Specifications

The preceding computer simulation was based on very specific assumptions. Should the underlying parameters be altered, some of the results would naturally change as well. While other aspects of the simulation model could also be modified, we only consider a very limited number of changes here.

### *Changes in the Farmer's Insurance Formula*

In our original simulation, the farmer's insurance premium *FP* was initially set at 6 per cent of his normal net cash receipts *NNCR*; then that rate was gradually lowered to 3 per cent by adding his own loss experience *FEXP* to it:

$$FP = NNCR_{t-1} * 0.06\ (1 - \eta_{t-1}) + FEXP * \eta_{t-1} \qquad (1)$$

where

$\eta_6 = 0.0$ $\quad$ $\eta_8 = 0.2$ $\quad$ $\eta_{10} = 0.4$
$\eta_7 = 0.1$ $\quad$ $\eta_9 = 0.3$ $\quad$ $\eta_{11} = 0.5$

**Figure D-1**

**Decoupled Income-Insurance and Income-Assistance Programs: A Flow-Chart View**

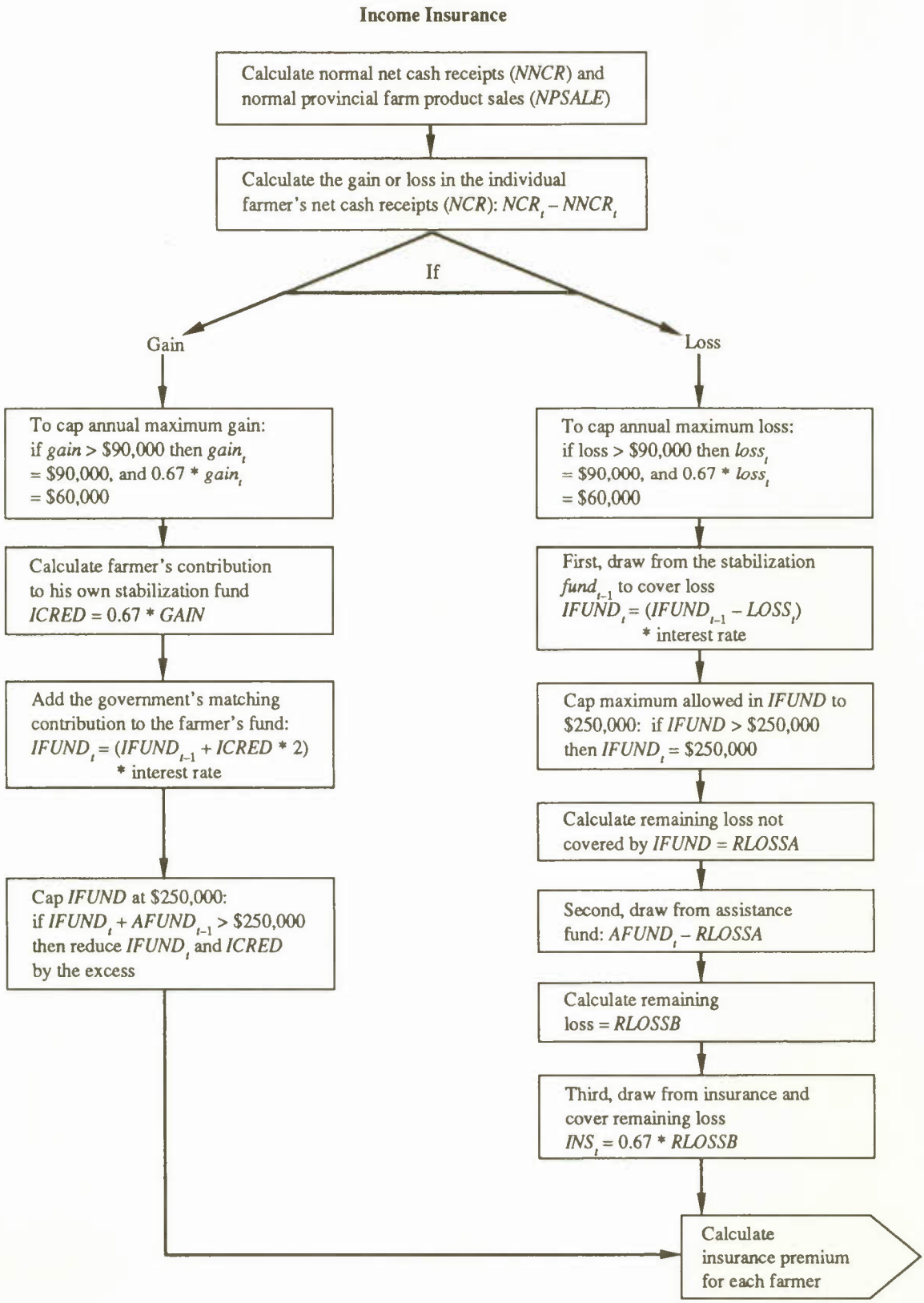


**Figure D-1 continued**

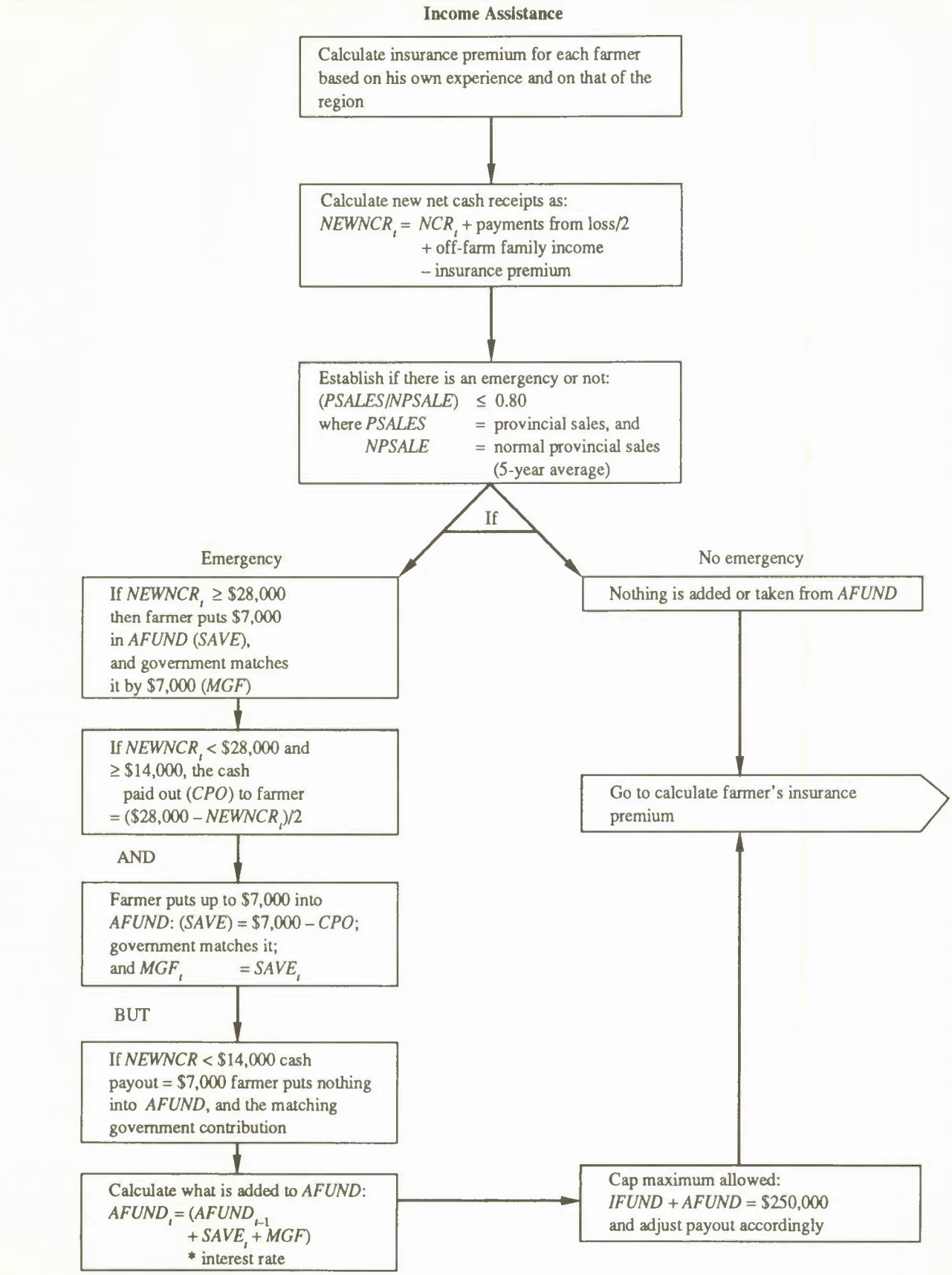


**Figure D-1 concluded**

**Insurance Premiums**

Calculate farmer's premium for the following year, based on the percentage of normal cash receipts and on the farmer's experience *FEXP* as in:

$NNCR * 0.06 * (1-\eta) + FEXP * \eta$

where:

$\eta$ = 0.1, 0.2, . . . 0.9, 1.0

*FEXPS* = sum of insurance payouts/sum of two thirds losses, where insurance payouts are net of payments from the farmer's stabilization fund.

As indicated in equation (1), the farmer's 6-per-cent contribution of *NNCR* is lowered over a period of five years to 3 per cent, as $\eta$ goes from 0.0 to 0.5. At the same time, *FEXP* is increased. The rate *FEXP* is defined by equation (2).

$$FEXP_t = \frac{\frac{\sum_t AP_{it}}{\sum_t PP_{it}}}{\frac{\sum_t \sum_i AP_{it}}{\sum_t \sum_i PP_{it}}} \qquad (2)$$

where

$AP_{it}$ = actual insurance payout to farmer $i$ for his loss in year $t$;

$PP_{it}$ = potential insurance payout to farmer $i$ for his loss in year $t$ – e.g., two thirds of farm-income loss.

The numerator on the right-hand side of equation (2) compares the actual insurance payout to the potential payout, both referring to an individual farmer's experience. The actual payout would differ from the potential payout if the farmer received insurance benefits that amounted to less than the amount that two thirds of all his farm-income losses would have allowed him to collect. Correspondingly, the denominator of equation (2) compares the actual payout to all farmers with the potential payout to all farmers.

If, over a period of five years, the individual farmer's payout ratio *FEXP* equalled 1, that would imply that the farmer was required to pay the average premium. If, however, his *FEXP* ratio was less than 1 because payouts to him were below average, his premium would have been reduced. Under the initial program, described in Chapter 6, a 20-per-cent lower rate in payouts of insurance benefits would have reduced his premium by 10 per cent.

Under a revised insurance program, the same 20-per-cent lower rate in payouts would have reduced the farmer's premium by a full 20 per cent. And if under the revised insurance program, the farmer had not drawn at all on the insurance benefits, his insurance premiums would have dropped to zero.

Computationally, this modification would require only a small change in the premium formula, instead of letting $\eta$ in equation (1) go up to 0.5 over a period of five years, it would go up to 1.0 over a period of 10 years.

Full adjustment of the insurance premiums to the individual farmer's income losses would reduce the government's cost only slightly – from $13.6 billion to $13.5 billion – over the period 1966-92. It would, however, lower the total cost to farmers significantly, because their insurance levies would drop by $1 billion – from $2.6 to $1.6 billion – over the years 1966-92. Most of that cost reduction would result from lower levies in the 1980s, when Prairie farmers could have drawn on their own stabilization funds (Table D-3).

### *Changes in the Farmer's Propensity to Save*

The preceding cost estimates of decoupled farm programs were based on the assumptions that the insurance would cover two thirds of farm-income losses and that the matching contribution to the farmer's stabilization fund would amount to two thirds of the income gains. This symmetry of

**Table D-3**

**Estimated Cost of the Proposed Decoupled Program, with Insurance Levies Adjusted to the Individual Farmer's Losses, 1966-92**

| | Cash payments | Matched contribution to the stabilization fund | Total |
|---|---|---|---|
| | | (Billions of dollars) | |
| Cost to government | | | |
| 1988 | 0.8 | 0.1 | 0.9 |
| 1984-88 | 1.5 | 1.0 | 2.5 |
| 1966-92 | 2.6 | 10.9 | 13.5 |
| Cost to farmers | | | |
| 1988 | 0.0 | 0.1 | 0.1 |
| 1984-88 | 0.2 | 1.0 | 1.2 |
| 1966-92 | 1.6 | 10.9 | 12.5 |

SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

compensation for income losses or gains may not hold in practice. It is quite likely that a farmer's contribution to the stabilization fund would amount to less than two thirds of his income gains. As shown in Tables 6-8 and 6-9, and in Tables D-3 and D-4, such changes could have a significant impact on program costs.

### *Other Changes*

When farm-income losses or gains were estimated in constant, rather than current, dollars, the income-assistance program was triggered more frequently, and that, of course, added to the cost of the government's program. And when no interest was paid on savings in the stabilization fund, the rate of accumulation was slower.

## Limitations

The preceding description of the decoupled farm programs was based on the flow chart of the computer program. Although the program simulates the income gains and losses of some 3,500 Prairie farmers, it reflects only part of their hypothetical history under the proposed scheme. It shows how the incomes on these farms would have changed in response to annual variations in weather conditions, market prices, inflation, and interest rates. But it does not show how the farmers would have reacted to those changes, whether they would have switched from livestock to crop production or from wheat to canola, how they might have enlarged their farm acreage over the years, or whether they might have sold part of their farm or rented it out as they approached retirement. To produce a more realistic picture, such behavioural aspects would need to be built into the model explicitly.

**Table D-4**

**Cost of the Proposed Decoupled Program, with Insurance Levies Adjusted to the Individual Farmer's Losses and with Payments Adjusted to a Lower Rate of Saving, 1966-92[1]**

| | Cash payments | Matched contribution to the stabilization fund | Total |
|---|---|---|---|
| | | (Billions of dollars) | |
| Cost to government | | | |
| 1988 | 1.5 | 0.1 | 1.6 |
| 1984-88 | 3.2 | 0.6 | 3.8 |
| 1966-92 | 5.0 | 4.9 | 9.9 |
| Cost to farmers | | | |
| 1988 | 0.0 | 0.1 | 0.1 |
| 1984-88 | 0.2 | 0.6 | 0.8 |
| 1966-92 | 1.8 | 4.9 | 6.7 |

1 The rate of saving is assumed to be 25 per cent of the farm-income gains. The estimates in this table compare with those in Table 6-9, which are based on a 50-per-cent rate of saving, and with those in Table D-3, which are based on a 67-per-cent rate of saving.

SOURCE Estimates by the author, based on special tabulations by Agriculture Canada and Statistics Canada.

# Notes

## Chapter 2

1 Of course the inverse applied to those who sold their farmland. They were unlucky if they sold during the early 1970s and lucky if they sold it later. To the extent that farmers who sold their land retired from farming, and those who purchased land got into farming, the gains and losses within the farming industry did not automatically cancel each other.

2 The fact that the number of farm families needing employment diminishes too, does not necessarily make the remaining farmers as well-off as before. It would do so, however, if they were totally indifferent to the changes and potential deterioration of their communities, social contacts and amenities.

## Chapter 4

1 In as far as our analysis of farm financial stress is based on cash and flow and debt/asset ratios of individual farms, it ignores the possibility that some of the elderly farmers may have lent money to their next of kin who just started farming. Some of the elderly farmers, therefore, may now be burdened by a loss of income or additional interest payments on loans not directly associated with their own farming operation. To that extent, our estimates understate the financial stress of beginning farm operators. If, of course, the elderly farm operators assumed a mortgage on their own farm to help their son or daughter to start farming, the cost of servicing that mortgage and the associated financial stress were attributed in our analysis to the elderly farm operator.

## Chapter 5

1 The factor-productivity estimates were tested for interactions with weather effects that could have caused distortions. They were not found to be significant. The derivation of the regional weather indexes is described in Wisner (1988).

2 An analysis of returns on investment, covering the years 1971 to 1987 (Brown, 1989), confirms the low cost-effectiveness of some of the major livestock enterprises in Saskatchewan. Another study shows that prices of the major Prairie farm commodities are highly correlated (Kerr, 1989).

## Chapter 6

1 The literature on farm prices and stabilization is extensive; see, in particular, Cochrane and Danin (1976), Ezekiel (1938), Just et al. (1978), Schmitz (1984), Spriggs (1985), Spriggs and Van Kooten (1988), and Zwart and Meilke (1979).

2 The underlying conceptual analysis of input- and output-oriented farm support is described in detail by Crown and Heady (1972).

3 A wide range of papers was presented at the Symposium on Decoupling: The Concept and its Future in Canada. A Symposium convened by the Canadian Institute of Resources Law, Ottawa, Ontario, Skyline Hotel, February 11-12, 1988.

## List of Tables, Charts and Figures

### Tables

**Charts**

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