

## CANADIAN FARMERS' ADAPTATION TO DECLINING COMMODITY PRICES

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### ABSTRACT

The five major agricultural producing provinces are compared in terms of farm labour and management incomes, return on investment to farm capital, total farm family income, and farm family net worth. In each province, comparisons are made with non-farm incomes, investment returns and net worth levels. The results show that farm family incomes in Canada are much better today than 30 years ago, returns on farmland investment are very comparable to average stock market returns, and average farm family net worth is significantly higher than the average for all families. The conclusion is that Canadian farmers have adapted well to declining commodity prices mainly by being adapters of and investors in new technologies, allowing them to increase farm size (increased cost efficiencies) and by diversifying their income sources to include more off-farm income.

**Key words:** Farm Labour and Management Income, Return on Invested Farm Capital, Real Commodity Prices, Farm Family Income, Off-Farm Employment, Farm Family Net Worth.



### INTRODUCTION

Each year, Canadian farm lobby groups produce new charts and figures that indicate there is a growing farm income crisis in Canada. Usually the information compares farm incomes or farm commodity prices from the 1970's with incomes and prices today and the comparisons would lead most observers to conclude that farmers are going broke, or at least living in poverty. For example, a common presentation made by Canadian farm lobby groups includes

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the 1973 price of wheat<sup>2</sup> (\$161 per tonne for hard red spring and \$236 per tonne for durum) inflated to the present day using the Canadian consumer price index (CPI). If wheat prices had increased by the average CPI each year since 1973, in 2003 hard red spring wheat would have been priced at \$695 per tonne and durum at \$1,020 per tonne. But actual prices in 2003 for hard red spring and durum were only \$202 and \$212 per tonne, respectively. Similarly, Figure 1 illustrates what has happened to average net farm income in the province of Ontario<sup>3</sup> over the last 30 years, showing average net farm income of \$446.15 per hectare in 1973 but only \$14.06 per hectare in 2003 (comparison in 2003 Cdn \$). Both of these illustrations make it appear that Canadian farm families have faced a severe downward slide in family incomes. Farm lobby groups use these illustrations to press their case for larger farm subsidies from both the federal and provincial governments.

There are several problems associated with using commodity prices and net farm incomes as indicators of farm financial health. First, declining real commodity prices have been offset by increasing technological efficiencies, such as new fertilizers and seed varieties that have increased average yields, and improved machinery and equipment that allows individual farmers to manage many more hectares than they could have 30 years ago. Secondly, the lobby groups usually do not report the extent to which farm families have adapted to declining commodity prices by increasing farm size and/or by diversifying to off-farm sources of income. And thirdly, reported net farm income in Canada can be misleading and is not an accurate reflection of returns to farm labour, management and capital invested. For Canadian farm financial data, Net Farm Income is calculated as follows:

Gross Farm Cash Receipts (including gov't program payments)  
 Less: Gross Cash Operating Expenses  
 Equals: Net Farm Cash Income  
 Less: Depreciation on Building and Equipment  
 Equals: Realized Net Farm Income  
 Less: Value of Inventory Changes (can be plus or minus, depending on whether inventories have increased (+) or decreased (-))  
 Equals: Net Farm Income

It is important to note that in the calculation of Net Farm Income, no allowance is made for farmers' labour and management efforts, although one of the expenses is wages, which may be to family members or hired hands. Also included in expenses are rents, interest on land and building debt, property taxes, and depreciation on buildings, all of which are associated with the return on capital invested in land and buildings. Therefore, the first step will be to calculate Adjusted Net Farm Income, of which part will represent farm labour and management income and the rest will represent the return on invested farm capital. Then, the analysis will assess the financial health of Canadian farm families, for major agricultural producing provinces of Alberta, Saskatchewan, Manitoba, Ontario, and Quebec. The study objectives are;

1. Calculate Adjusted Net farm incomes in each province and disaggregate into two

<sup>2</sup> Source: Saskatchewan Agriculture, Food and Rural Revitalization. These prices are Canadian Wheat Board Final Prices, basis in store Saskatoon, Saskatchewan. All figures are reported in Canadian dollars.

<sup>3</sup> Ontario has been illustrated here but each of the other provinces in this study show a similar pattern for net farm incomes.

streams; a) labour and management income, and b) income to invested capital in land and buildings.

2. For each province, average farm labour and management income is compared to average employment income for the province for the past 30 years to assess whether farmers are being underpaid for their labour and management efforts. Similarly for each province, the average yield (%) on invested farm capital is compared to average yields on various stock and bond markets, domestically and internationally, to assess whether farmers have kept pace on the investment side.

3. Total income comparisons are made between average farm families and the average for all families to determine whether farm families are better or worse off today than they were 30 years ago. This comparison is also used to discuss what farm families have done to offset declining commodity prices.

4. Average farm family net worth is compared to average net worth for all families to assess whether farm wealth levels have been improving or getting worse, relative to the population average.

#### **METHODOLOGY AND DATA<sup>4</sup>**

Data for farm income and expenses, farmland values, average farm size and number of farmers for each of the provinces throughout the study period (1972 – 2003) is derived from the provincial departments of agriculture; Alberta Agriculture, Food and Rural Development, Saskatchewan Agriculture, Food and Rural Revitalization, Manitoba Agriculture and Food, Ontario Agriculture and Food, and Ministère de l'Agriculture in Quebec<sup>5</sup>. The main part of the methodology is in disaggregating adjusted net farm income into two components; labour and management income and returns to capital invested.

#### **Return on Invested Farm Capital (ROI)**

The return on investment<sup>6</sup> to farmland ownership<sup>7</sup> is based on a standard crop share lease agreement which provides one-third of the gross receipts to the lessor (farmland owner) up to 1985, after which the crop share is reduced to one-quarter. The reduction in crop share to the lessor was a market reaction to increasing input costs without corresponding increases in commodity prices (Painter, 2000). The lessor<sup>8</sup> is then responsible for paying property taxes and depreciation on farm buildings. The crop share lease agreement represents the most common form of rental agreement in western Canada over the past 35 years.

The Net Lessor Crop Share/hectare (NCS) in each province is calculated as follows:

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<sup>4</sup> The methodology employed here is from Painter (2005), where labour, management and capital returns were compared for Alberta, Saskatchewan and Manitoba.

<sup>5</sup> Other data sources that were used include Agriculture and Agri-Food Canada, Canada Grains Council, Canadian Wheat Board, Canadian Grain Commission, Canadian Transport Agency, Farm Credit Canada, and Statistics Canada.

<sup>6</sup> Return on Investment<sup>6</sup> is used interchangeably with 'yield'.

<sup>7</sup> The return on invested farm capital is the return on farmland and buildings investment. The expenses associated with owning, leasing and maintaining equipment are considered operating expenses and are deducted to arrive at net income available for labour, management and invested capital.

<sup>8</sup> The lessor, or farmland owner, may or may not be the farmer operator. In many cases, farmers operate a combination of owned and leased land. For this purpose, all farmland is treated as if it is leased.

<sup>9</sup> In the data set and calculations, a one-third crop share is used up to 1985 after which a one-quarter crop share is used for the remaining years.

$$NCS_t = CS_t - PT_t - BD_t \quad (1)$$

where,

- NCS<sub>t</sub> = net crop share/hectare in year t;
- CS<sub>t</sub> = average lessor crop share/hectare in year t<sup>9</sup>;
- PT<sub>t</sub> = average property tax/hectare in year t; and
- BD<sub>t</sub> = average building depreciation/hectare in year t.

Then, the return on investment, or yield, is calculated as:

$$ROI_t = \frac{NCS_t}{V_{t-1}} + \frac{V_t - V_{t-1}}{V_{t-1}} \quad (2)$$

where,

- ROI<sub>t</sub> = average return on farmland and buildings investment in year t;
- V<sub>t</sub>, V<sub>t-1</sub> = average value of farmland and buildings/hectare in year t and t-1;

$$\frac{NCS_t}{V_{t-1}} = \text{farmland owner's operating yield on farmland investment in year t; and}$$

$$\frac{V_t - V_{t-1}}{V_{t-1}} = \text{farmland owner's capital gain yield in year t.}$$

### Farmer Labour and Management Income (L&M)

With this approach, the farmer's labour and management income is the residual left after all other expenses and returns to capital have been paid. In Canada, close to 50% of all farmland is leased. The farmer lessee must pay the lease payment just like any other expense, leaving the residual as the return to labour and management. In the case where the farmer owns the land, the farmer's opportunity cost is the lease revenue that could otherwise be obtained by leasing out the land, leaving the residual as the return to labour and management.

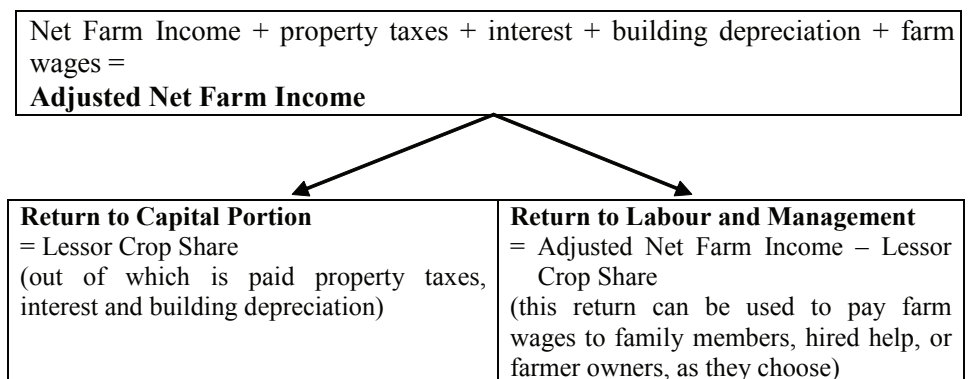
The residual return to labour and management is the net income left after paying all cash

<sup>10</sup> All paid hired and family labour must be added back in order to determine the total amount available to be paid to labour and management efforts. How the farm owners choose to pay out this portion is their choice, as they can pay themselves a wage, or a wage to other family members, or they can hire workers if the farm owners decide to engage in off-farm employment. Regardless of who it is paid to, it represents the return available to the labour and management effort.



operating expenses and deducting the crop share paid to the lessor. The accounting for net farm income does not provide an indication of returns available to labour, management or capital. Adjustments need to be made to arrive at the total net income each year that is available to pay a return to labour and management and a return to capital. The expenses that need to be adjusted in the calculation (added back to arrive at adjusted net farm income) are: 1) land rent, building depreciation and interest expenses, as they are paid out of the return to capital, and 2) paid hired and family labour expenses (often paid to family members for tax purposes) as they are part of the overall farm labour and management income. Although there are other acceptable methods of disaggregating total farm returns into returns to labour, management and capital, this method has been employed in a number of cases: Painter and Schoney (1994), Painter (2000), and Painter (2005).

As Painter (2005) pointed out, the adjustments to farm net income must determine what is available to pay the two returns. In the calculation of net farm income, property taxes, interest on land and building debt, building depreciation and paid hired and family labour<sup>10</sup> have all been deducted as expenses. Therefore, these expenses need to be added back to arrive at annual adjusted net income, which can then be divided into return to capital and return to labour and management, as follows:



Therefore, the calculation of the return to labour and management excludes all paid hired and family workers and any imputed value for unpaid family work and represents labour and management income available to the farm family. The net dollar return to labour and management per hectare (L&M) is calculated for each year in the study period and for each province, as follows.

$$L\&M_t = ANFI_t - CSt \quad (3)$$

where,

ANFI<sub>t</sub> = adjusted net farm income/hectare in year t; and

CSt = lessor crop share/hectare in year t.

## RESULTS AND ANALYSIS

### Average Farm Labour and Management Income

Table 1 provides average farm labour and management incomes per hectare for each province over the last 30 years along with the average real growth in labour and management

income per hectare. In all of the provinces, except Quebec, there has been zero or negative real growth in average farm labour and management income generated per hectare. However, this does not take into account that farmers in all provinces have adapted to new machinery technology by increasing average farm size. Larger and more efficient machinery has allowed each farmer to operate more hectares with fewer labour hours required. Table 2 shows that real labour and management income per farm has been increasing in each province because the positive growth in average farm size has been greater than the negative growth in labour and management income per hectare. For example, in Alberta the average labour and management income/hectare has decreased by 0.1% per year since 1972, but during the same period, Alberta farmers have increased their average hectares farmed by 0.7% per year so that overall, average farm labour and management income has increased by 0.6% per year. This illustrates one of the ways in which Canadian farmers have adapted to falling commodity prices and lower returns per hectare.

Farm labour and management income represents the farmers' salaries for their labour and management efforts. To assess how well farmers have been paid over the past 30 years, average farm labour and management income is compared to average employment income in each province. Table 3 shows average real farm labour and management income and average real provincial employment income, along with average real growth rates, for each province. In all provinces, except Quebec, average farm labour and management income is less than average provincial employment income, indicating that farmers have received less for their labour and management efforts than others in the province. The growth rates indicate that in Quebec and Manitoba, farmers' labour and management incomes have been growing at a faster rate than other employment income, while Ontario farmers have matched other employment growth, but in Alberta and Saskatchewan, farmers' labour and management income growth have lagged the rest of the provincial economy. Figures 2 and 3 illustrate average real farm labour and management earnings and average real provincial employment earnings for the study period for two of the provinces; Saskatchewan, where farm income has lagged provincial employment income, and Quebec, where farm income has surpassed provincial employment income. As Figures 2 and 3 illustrate, farm labour and management income in all five provinces is more variable than average provincial employment income, especially in Saskatchewan. Table 3 also provides the coefficient of variation<sup>11</sup> for average real farm labour and management income and average real provincial employment income. The coefficient of variation indicates that Saskatchewan farmers experience the greatest variability in farm labour and management income while Ontario and Quebec farmers experience the least.

### **Average Return on Farm Capital Investment**

Table 4 shows a comparison of farm capital investment yields in each province and average investment yields for stocks and bonds<sup>12</sup>. The comparison is done for two time periods (1972 – 2003 and 1990 – 2003) to illustrate that farm capital investment yields have declined in recent years. During the period 1972 – 2003, the return on investment for Canadian farmland

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<sup>11</sup> The coefficient of variation is a standardized measure of variability and is calculated as the standard deviation of the income stream divided by the average income.

<sup>12</sup> Average bond yields are from Statistics Canada (*The Canadian Economic Observer*) and average stock market yields are from Morgan Stanley Capital International.

<sup>13</sup> Average family income and average farm family income, by province, was provided by Statistics Canada, and derived from census data.

<sup>14</sup> For this comparison, census data is used, which means that the years do not correspond exactly with the 1972-2003 study period.



has been very competitive with stock market yields. In the more recent time period of 1990 – 2003, farmland yields have been lower than stock yields, however, Figures 4 and 5 illustrate an interesting comparison. When risk is included in the comparison, the risk-return tradeoff for farmland is relatively good in both time periods. Figure 4 (1972 – 2003) shows farmland yields almost as high as stock yields but with significantly less risk than stocks. Based on the Capital Market Line, farmland investment in all five provinces performed as well as or better than the average stock market portfolio in the world. Figure 5 (1990 – 2003) shows the lower farmland yields in recent years but again shows significantly less risk than stocks. Therefore, declining farmland investment yields may have been a market reaction to lower perceived risk associated with farmland investment. In both figures, farmland performs very well on a risk-return basis, relative to most stock markets, and much better than some stock markets.

### **Compare Average Total Farm Family Income to Average Provincial Family Income**

Table 5 compares average family income (all families) with average farm family income<sup>13</sup>, for each province. In 1971<sup>14</sup>, average total farm family income was 70%, 77%, 64%, 82% and 78% of provincial average family income for Alberta, Saskatchewan, Manitoba, Ontario and Quebec, respectively. By 2001, average farm family income as a % of average provincial family income had risen to 94%, 96%, 85%, 100%, and 99%, for Alberta, Saskatchewan, Manitoba, Ontario and Quebec, respectively. This was accomplished by farm families even as the labour and management returns from the farm (especially in Alberta and Saskatchewan) were declining relative to overall employment earnings in the province. Farm families have been able to narrow the income gap by increasing average farm size and, most importantly, by increasing off-farm sources of income. In every province the off-farm income as a proportion of total farm family income increased between 1971 and 2001, the largest increase being from 62% to 78% in Saskatchewan and the smallest being 78% to 84% in Ontario.

### **Compare Average Farm Family Net Worth with Average Provincial Family Net Worth**

Table 6 compares average farm family net worth with average family net worth, by province. The data for family and farm family net worth is not available in time series, which means a comparison can be made at one point only. In 1999, Statistics Canada conducted a Canada-wide survey to determine average family net worth (all families). This was compared to average farm family net worth for 1999, which was collected in an annual farm financial survey by Statistics Canada. Table 6 shows that, on average, farm families have a significantly higher net worth than the average family, in every province studied. In Alberta and Ontario average farm family net worth is the highest, and in each case it is over three times the average family net worth in those provinces. Even in Saskatchewan, where average farm family net worth is the lowest amongst the five provinces, it is over twice as large as average family net worth. This indicates that farm families, on average, have done very well in accumulating wealth, relative to all families in the province. Figure 6 illustrates the comparison of net worth and shows farm families with significantly higher levels of wealth in all provinces.

## **CONCLUSIONS**

Average farm labour and management incomes have been lower than average provincial employment incomes, over the past 30 years, in all provinces studied except Quebec. Saskatchewan farmers have the lowest average labour and management incomes and the lowest growth (-1.0% per year) in labour and management income per hectare. Quebec has the highest farm labour and management income (almost double Saskatchewan's level) and is the only province

with positive growth (1.3% per year) in labour and management income per hectare. All provinces have positive growth in average farm size, which offsets the low and negative growth in labour and management income per hectare. When growth in labour and management income per hectare is combined with growth in average farm size, there is positive real growth in farm labour and management incomes in all provinces, with the lowest growth in Saskatchewan and the highest in Quebec. In Manitoba and Quebec, growth in farm labour and management income exceeds growth in provincial employment income, indicating that farm income is improving relative to other sectors in the economy. However, in Alberta and Saskatchewan, average farm labour and management incomes are lower and growing at a slower rate than average employment incomes, which implies that the gap may be widening in those provinces. It is also important to note that, in all five provinces, the variability of farm labour and management income is greater than average employment income, which must be considered when comparing farm incomes with average provincial incomes.

Average capital investment returns for farmland compare very favorably with average stock and bond yields. Over the past 30 years (1972 – 2003), average returns on farmland investment have outperformed many stock markets in the world, and have performed at least as well as the World Portfolio and the United States stock markets. In the shorter term (1990 – 2003), Quebec, Manitoba and Alberta farmland has continued to perform as well as stock markets, even though their investment yields have fallen, because their risk levels have also decreased. Saskatchewan and Ontario farmland investment risk levels have also declined but their investment yields have fallen to levels that make them somewhat less attractive than some leading stock markets.

When average farm family incomes are compared to the average incomes of all families, it is clear that farm families are better off today than they were 30 years ago. The once large gap between farm family and other incomes has been mostly eliminated. Farm families have achieved this by increasing average farm size and by significantly increasing their off-farm incomes. This shows that farm families have adapted to falling commodity prices by being adapters of and investors in new technologies, allowing them to increase farm size (increased cost efficiencies) and by diversifying their income sources to include more off-farm income.

While farm families are closing the income gap with non-farm families, farm families have clearly exceeded non-farm families in wealth accumulation. In all five provinces, average farm family net worth is significantly greater than the average for all families. This implies that when all sources of income are considered, including farm labour and management income, off-farm employment income, and farmland investment returns, farm families have done very well, relative to non-farm families. The higher net worth comparison implies that farm families are significantly better off today (financially) than others.

Given the financial health of farm families in Canada, can a case be made for having governments provide greater farm subsidies? From a government policy perspective, based on the income and especially the net worth comparisons, it is difficult to justify providing non-repayable transfers to farmers. Certainly, like other businesses, farmers face significant risks and should be compensated in the market place for taking those risks. In the last several years Canadian farmers have faced some serious setbacks, including severe droughts and frosts in western Canada, the closed United States border to beef due to the BSE scare, and recently, United States tariffs on pork. These risks have led to greater uncertainty and variability associated with farm incomes. However, it is not the level of income or wealth that is the problem; it is the risk and variability of farm income that is the problem. The implication of the analysis is that cash subsidies are not needed, but rather, good risk management programs that help to reduce the variability of farm incomes over time.





**Figure 1: Average Net Farm Income/hectare in Ontario (2003 C\$) 1972 - 2003**



**Figure 2: Average Farm Labour and Management Income and Average Provincial Wage and Salary Income for Saskatchewan (2003 C\$) 1972 – 2003**

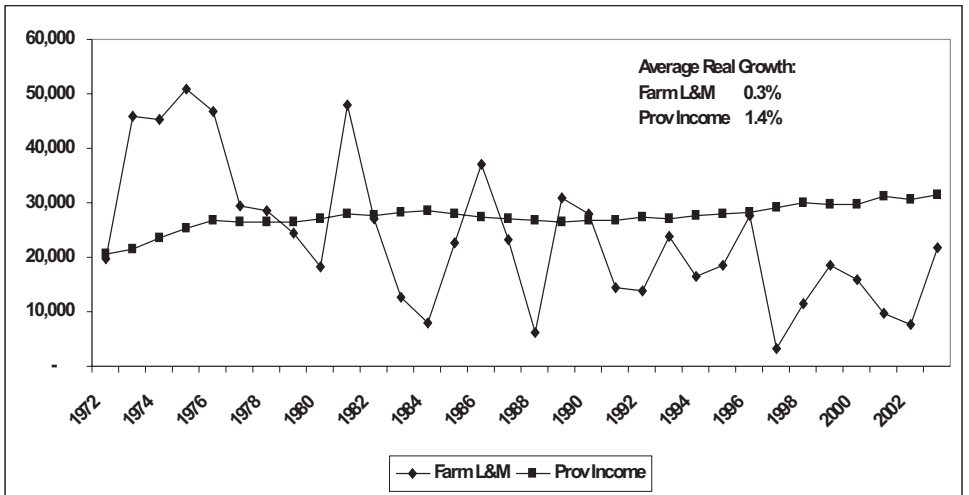


Figure 3: Average Farm Labour and Management Income and Average Provincial Wage and Salary Income for Quebec (2003 C\$) 1972 – 2003

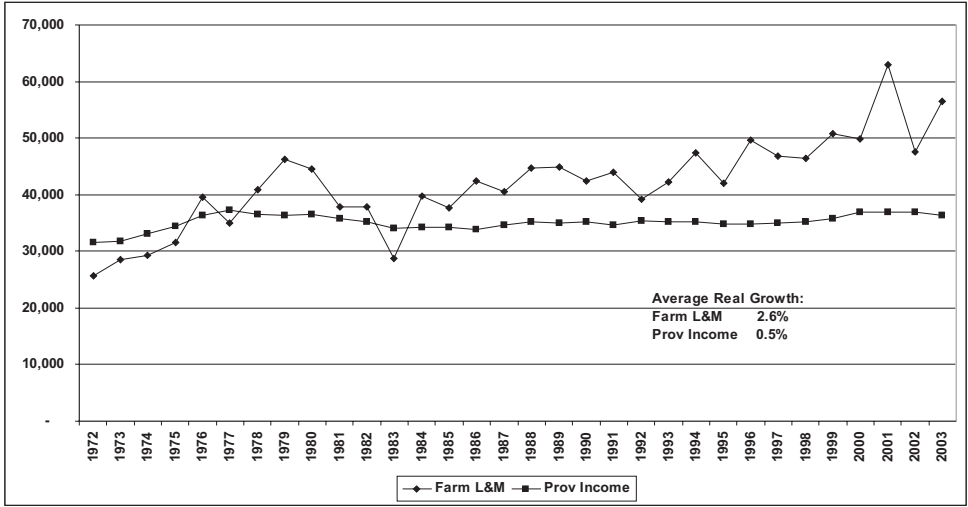
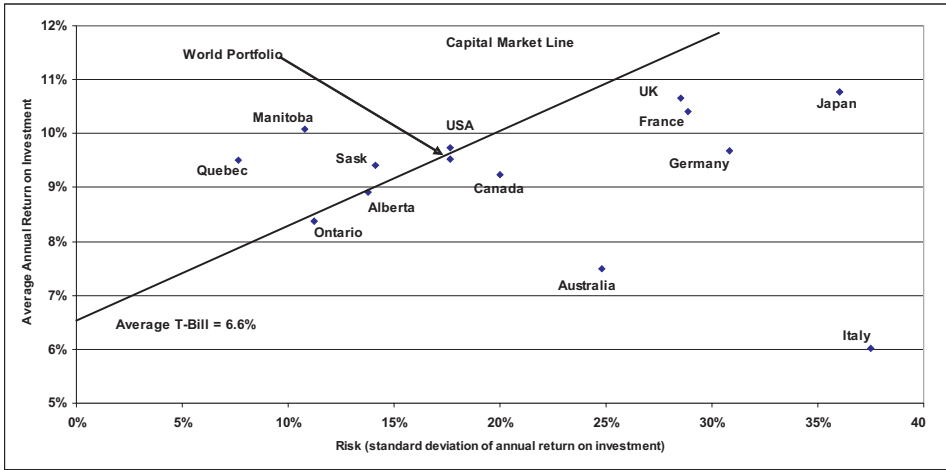
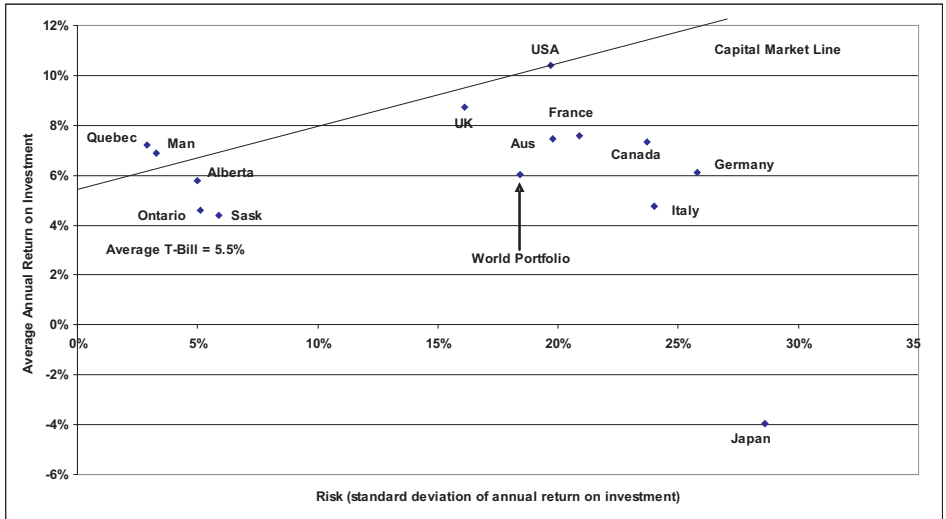


Figure 4: Risk – Return Comparison for Canadian Farmland and Stock Market Investment Yields (1972 – 2003)

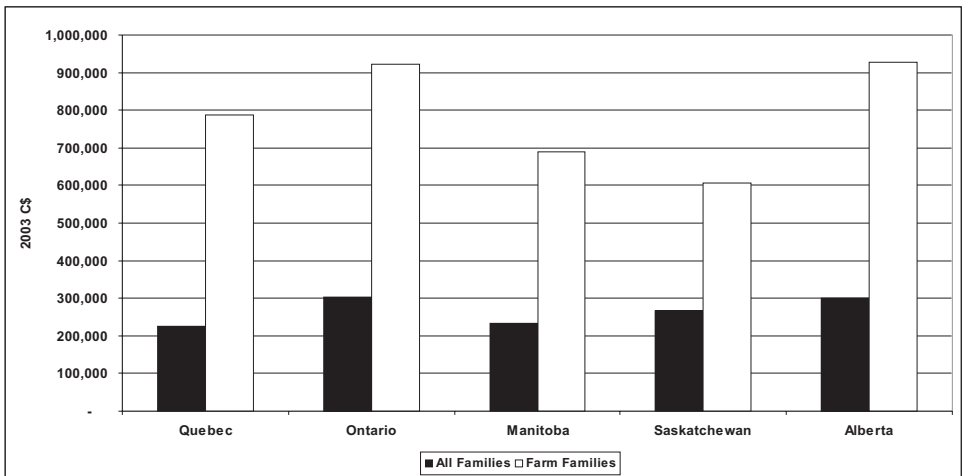




**Figure 5: Risk – Return Comparison for Canadian Farmland and Stock Market Investment Yields (1990 – 2003)**



**Figure 6: Average Net Worth for Farm Families and All Families, by Province (2003 C\$)**



**Table 1: Average Annual Real Labour and Management Income per hectare (2003 C\$) and Average Real Growth (1972 – 2003)**

	<b>Labour &amp; Management Income/hectare</b>	<b>Average Real Growth in L&amp;M Income/hectare</b>
Alberta	\$ 74.89	-0.1%
Saskatchewan	\$ 59.44	-1.0%
Manitoba	\$ 86.86	0.0%
Ontario	\$ 394.36	-0.6%
Quebec	\$ 476.45	1.3%

**Table 2: Average Real Growth in Farm Labour and Management Income/hectare, Average Farm Size, and Labour and Management Income for the Average Farm (1972 – 2003)**

	<b>Labour &amp; Mgt Income/hectare</b>	<b>Average Farm Size (hectares)</b>	<b>Farm Labour and Mgt Income</b>
Alberta	-0.1%	0.7%	0.6%
Saskatchewan	-1.0%	1.4%	0.3%
Manitoba	0.0%	1.6%	1.6%
Ontario	-0.6%	0.9%	0.4%
Quebec	1.3%	1.3%	2.6%

**Table 3: Comparison of Average Farm Labour and Management Income and Average Provincial Employment Income (2003 C\$), Average Real Growth in Incomes (1972 – 2003), and Coefficient of Variation of Incomes**

	<b>Average Farm Labour and Management Income</b>	<b>Average Provincial Employment Income</b>
Alberta	\$ 25,911	\$ 36,678
Average Growth	0.6%	1.2%
Coefficient of Variation	0.33	0.09
Saskatchewan	\$ 23,603	\$ 27,348
Average Growth	0.3%	1.4%
Coefficient of Variation	0.55	0.09
Manitoba	\$ 23,984	\$ 31,793
Average Growth	1.6%	0.5%
Coefficient of Variation	0.42	0.03
Ontario	\$ 30,633	\$ 39,120
Average Growth	0.4%	0.4%
Coefficient of Variation	0.17	0.06
Quebec	\$ 41,988	\$ 35,125
Average Growth	2.6%	0.5%
Coefficient of Variation	0.19	0.04

Source for Average Provincial Employment Income: Statistics Canada's Canadian Economic Observer



**Table 4: Average Nominal Investment Yields for Farm Capital, Stock Markets, and Bonds (1972 – 2003) and (1990 – 2003)**

<b>Farmland</b>	<b>1972 - 2003</b>	<b>1990 - 2003</b>
Alberta	8.9%	5.8%
Saskatchewan	9.4%	4.4%
Manitoba	10.1%	6.9%
Ontario	8.4%	4.6%
Quebec	9.5%	7.2%
<b>Bonds</b>		
Canada 3-mth T-bills	6.6%	5.5%
Canada Long Bonds	7.6%	7.3%
<b>Stock Markets</b>		
Australia	7.5%	7.5%
Canada	9.2%	7.3%
France	10.4%	7.6%
Germany	9.7%	6.1%
Italy	6.0%	4.8%
Japan	10.8%	-4.0%
UK	10.6%	8.7%
USA	9.7%	10.4%
World Portfolio	9.5%	6.0%

Sources: Bond Yields – Statistic Canada's Canadian Economic Observer; Stock Market Yields – Morgan Stanley Capital International