HOW DO NET FARM RETURNS COMPARE WITH RETURNS FROM STOCKS OR BONDS?

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ABSTRACT

Net returns from farming as measured as income less expenses as a percentage of asset value have traditionally been low. However, when capital gain from land is added in, the rate of return is competitive with other investments available in the economy. In addition, rates of return from farming have been shown to fluctuate significantly different from net returns of other investments. This means that farmers may be able to gain by reducing their risk when investing in stocks and bonds. It has also been shown that grain farmers may be able to gain by reducing their risk by investing in specialty crops, and large scale hog and cattle operations. History has shown that bigger is almost always better when it comes to agricultural production. The number of farms in Saskatchewan has decreased since 1936. The average size of Saskatchewan farms has increased since the first census in 1906. Over time Saskatchewan farms have shifted from small mixed farms producing many products such as grain, cattle, milk, hogs, and poultry to more specialized and larger operations producing only 2 or 3 different crops or 1 kind of livestock. Should Saskatchewan farms get bigger and specialize more or should they diversify into specialty crops, hogs, cattle, stocks, or bonds? There is no definitive answer to this question, but the information should prove to be interesting and helpful.

INTRODUCTION

Net returns from farming as measured by income less expenses as a percentage of the value of all farm assets have traditionally been low. However, when capital gain from land is added in, the rate of return is competitive with other investments available in the economy (Monke, Boehlje and Pederson (1992); Sherrick, Irwin and Forster (1986)). In addition, rates of return from farming have been shown to fluctuate significantly differently from net returns of other investments (Erickson; Moss, Featherstone and Baker (1991); Turvey and Driver (1986); Young and Barry (1987). This means that farmers may be able to increase rates of return and reduce their risk by investing in stocks and bonds. This paper begins by presenting data from 1949 to 1995 representing total annual net rates of return from farming in Saskatchewan (farming), investing in Government of Canada 10 year Bonds (bonds), and the Toronto Stock Exchange 300 Total Return Index (TSE). These total annual net rates of return are compared by calculating their averages (means) and degree of variability (standard deviations), their relationship between each other, that is, whether they drop or rise at the same time (correlation) and the means and standard deviations of various combinations (portfolios) of farming, bonds, and TSE returns. The second section describes the increase in the economies of size of farming over the last several decades. Next, the relationship of average net returns between various farm enterprises, such as grain, hogs, and beef will be discussed from an investment point of view. Finally, the investment strategy of expanding the farm versus investing in a Registered Retirement Savings Plan (RRSP) or the Net Income Stabilization Account (NISA) will be discussed.

RATES OF RETURN (1949-1995)

The annual rates of return used in this paper are measured by income less expenses as a percentage of the value of assets at the beginning of the year plus the capital gain or loss on the value of the asset during the year. The annual rate of return for farming was calculated by taking the total net income from farming operations for Saskatchewan for a particular year and dividing it be the value of all farming assets in Saskatchewan for that particular year. The farming assets included the value of livestock, poultry, implements, machinery, land, and buildings. In addition the rate of gain or loss in the value of land and buildings was also added or subtracted to represent the capital gain or loss during the particular year. The annual rate of return for bonds was calculated by taking the interest rate on 10 year Government of Canada Bonds. The annual rate of return for the TSE was calculated by taking the total TSE return index for that particular year. The TSE total return index is made up of the dividend return from the stocks represented by the index and the rate of gain or loss in the value of the stocks in the index.

THE RELATIONSHIP BETWEEN FARM AND NONFARM RETURNS

The annual rates of return for these farm and nonfarm investments are presented in Table 1 and Figure 1. As one can see the farm and TSE returns fluctuate a great deal between large positive and large negative values whereas the bond returns are substantially lower but always positive. The average (mean) and measure of variability (standard deviation) and lowest and highest returns for farming, bonds, and TSE are presented in Table 2. Table 2 shows that returns from farming average substantially higher than returns from bonds and somewhat higher than TSE returns. Table 2 also shows that farming

and TSE returns have large positive and negative values in particular years. Figure 2 plots the mean (vertical axis) and standard deviation (horizontal axis) of the farming, bonds, and TSE returns. Figure 2 allows one to see how the three types of investments compare with each other with respect to average returns and variability of returns (risk). Ideally one would want high returns and low variability (risk) (high up and close to the vertical axis). Unfortunately, high returns are usually accompanied by higher levels of risk. This can be seen in Figure 2 where the low return low risk bonds are near the origin and the higher return and higher risk farming and the TSE are further from the origin. One can also see from Figure 2 an investor can trade-off between the returns and risk characteristics of various investments by accepting more risk with higher returns.

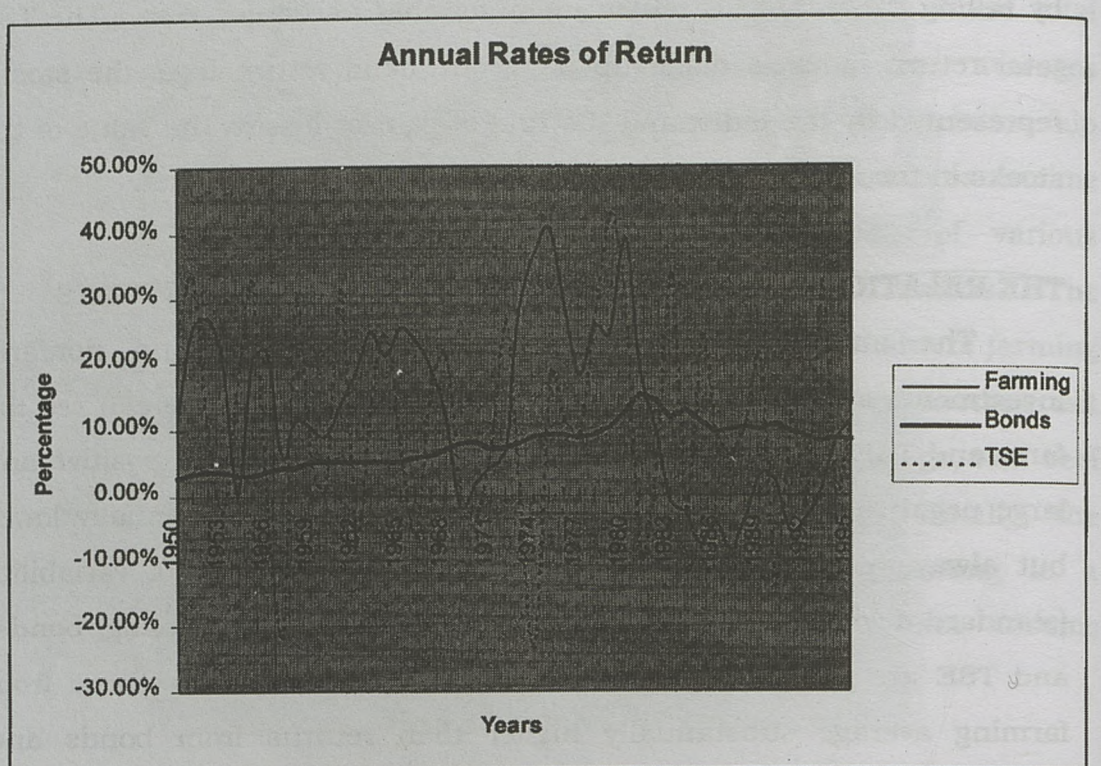

Figure 1: Annual Net Rates of Return

Table 1: Annual Rates of Return for Farming in Saskatchewan, 10-year Government of Canada Bonds, and the Toronto Stock Exchange 300 Total Return Index

Year	Farming	Bonds	TSE
1950	11.12%	2.78%	25.51%
1951	25.49%	3.24%	33.21%
1952	27.07%	3.59%	8.26%
1953	21.51%	3.68%	-2.49%
1954	0.03%	3.18%	17.10%
1955	20.76%	3.14%	32.51%
1956	22.04%	3.62%	-4.43%
1957	5.64%	4.11%	-20.53%
1958	11.34%	4.11%	29.75%
1959	10.56%	5.07%	4.35%
1960	8.96%	5.19%	1.14%
1961	13.85%	5.05%	31.66%
1962	18.32%	5.11%	-7.25%
1963	25.07%	5.09%	14.72%
1964	20.88%	5.18%	24.46%
1965	25.61%	5.21%	6.23%
1966	23.38%	5.69%	-6.52%
1967	19.35%	5.94%	17.44%
1968	12.33%	6.75%	21.24%
1969	-1.91%	7.58%	-0.78%
1970	1.65%	7.91%	-3.59%
1971	4.35%	6.95%	7.70%
1972	6.50%	7.23%	26.44%
1973	28.00%	7.56%	0.48%
1974	36.79%	8.90%	-23.72%
1975	40.39%	9.04%	17.91%
1976	28.40%	9.18%	10.73%
1977	18.02%	8.70%	9,50%
1978	25.78%	9.27%	28.05%
1979	24.34%	10.21%	42.40%
1980	39.33%	12.48%	28.78%
1981	18.57%	15.22%	-9.37%
1982	10.29%	14.26%	4.23%
1983	-1.00%	11.79%	33.57%
1984	-2.62%	12.75%	-2.26%
1985	-7.53%	11.04%	23.97%
1986	-3.99%	9.52%	8.70%
1987	-8.52%	9.95%	6.14%
1988	-4.18%	10.23%	10.64%
1989	2.97%	9.92%	20.35%
1990	2.15%	10.85%	-14.13%
1991	-5.44%	9.82%	12.02%
1992	-3.85%	8.77%	-1.43%
1993	0.49%	7.86%	32.56%
1994	7.90%	8.60%	0.18%
1995	7.01%	8.35%	14.53%

Source: Saskatchewan Agriculture and Food, *Agricultural Statistics 1995.* Regina: Statistics Branch, December, 1996. and The Bank of Canada, *Annual Report.* 1996, Annual Update. and The Toronto Stock Exchange, *The Toronto Stock Exchange '300' Indices, Total Return Indices.* 1996, Annual Update.

Table 2: Average (Mean) and Variability (Standard Deviation) and Lowest and Highest Returns for Farming, Bonds, and TSE

Measure	Farming	Bonds	TSE
Average (Mean)	12.77%	7.6%	11.09%
Variability (Standard Deviation)	13.02%	3.14%	15.58%
Lowest	-8.52% in 1987	2.78% in 1950	-23.72 in 1974
Highest	40.39% in 1975	15.22% in 1981	42.4% in 1979

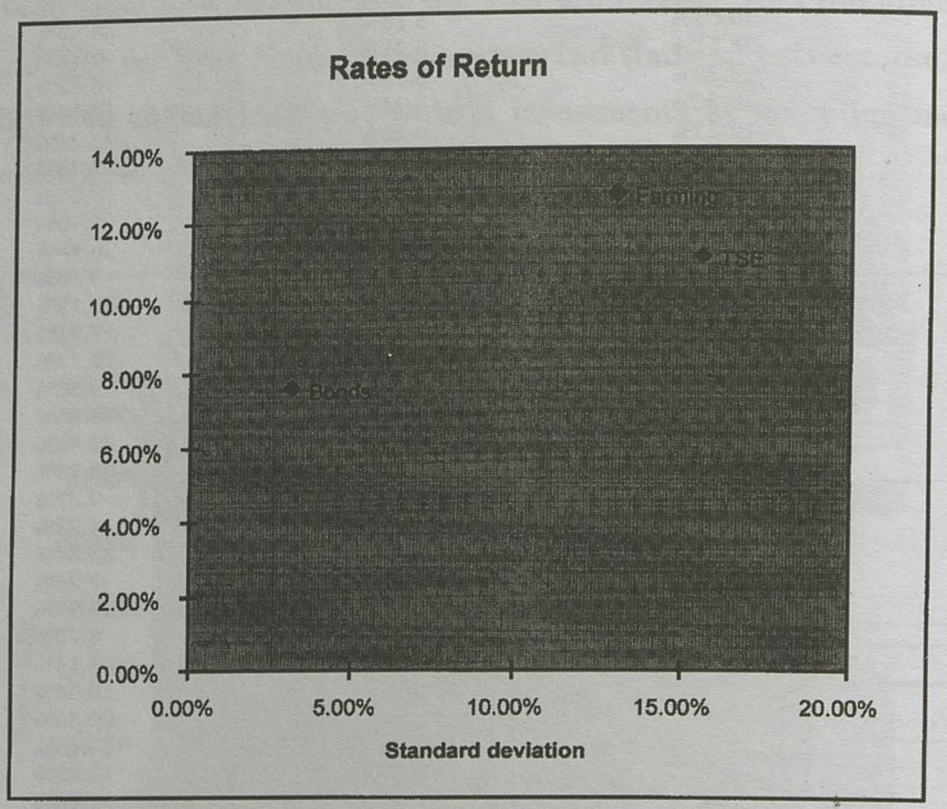

Figure 2: Trade-off Between Average (Mean) Return and Variability of Average Return (Standard Deviation)

The next question is whether combinations of investments can generate higher returns while also reducing risk. Table 3 presents the

correlation coefficients between bonds and farming, bonds and TSE, and farming and TSE. The correlation coefficient is a calculation of the degree to which two variables move in the same direction. A correlation coefficient of +1.0 means the two variables move in exactly the same direction all the time, that is when one is decreasing the other is decreasing and when one is increasing the other is increasing. A correlation coefficient of 0.0 means the two variables move in a completely unrelated pattern, that is, when one is decreasing the other may be decreasing, increasing or remaining the same and when one is increasing the other may be increasing decreasing or remaining the same. A correlation coefficient of -1.0 means the two variables move in exactly the opposite direction all the time, that is when one is decreasing the other is increasing and when one is increasing the other is decreasing. The old saying of not having all your eggs in one basket is a practical application of negative correlation of returns. An investor that has all of his/her investments in one area or in areas that have highly correlated net returns will experience boom and bust cycles. An investor that spreads his/her investments among those areas that have low or negative correlations of net returns will experience lower fluctuations in net returns because when one areas has low net returns an other is likely to have high net returns. The information in Table 3 indicates that those currently invested in farming could reduce their risk without substantially reducing their returns by investing in bonds and/or the TSE.

Figure 3 presents the results of mixing investments, that is, creating portfolios, of farming, bonds, and the TSE. Figure 3 is in the same format as Figure 2 and shows the trade-off between average or

Table 3: Correlation Coefficients Between Bonds and Farming, Bonds and TSE, and Farming and TSE

Bonds and Farming	Bonds and TSE	Farming and TSE
-0.18	-0.07	0.06

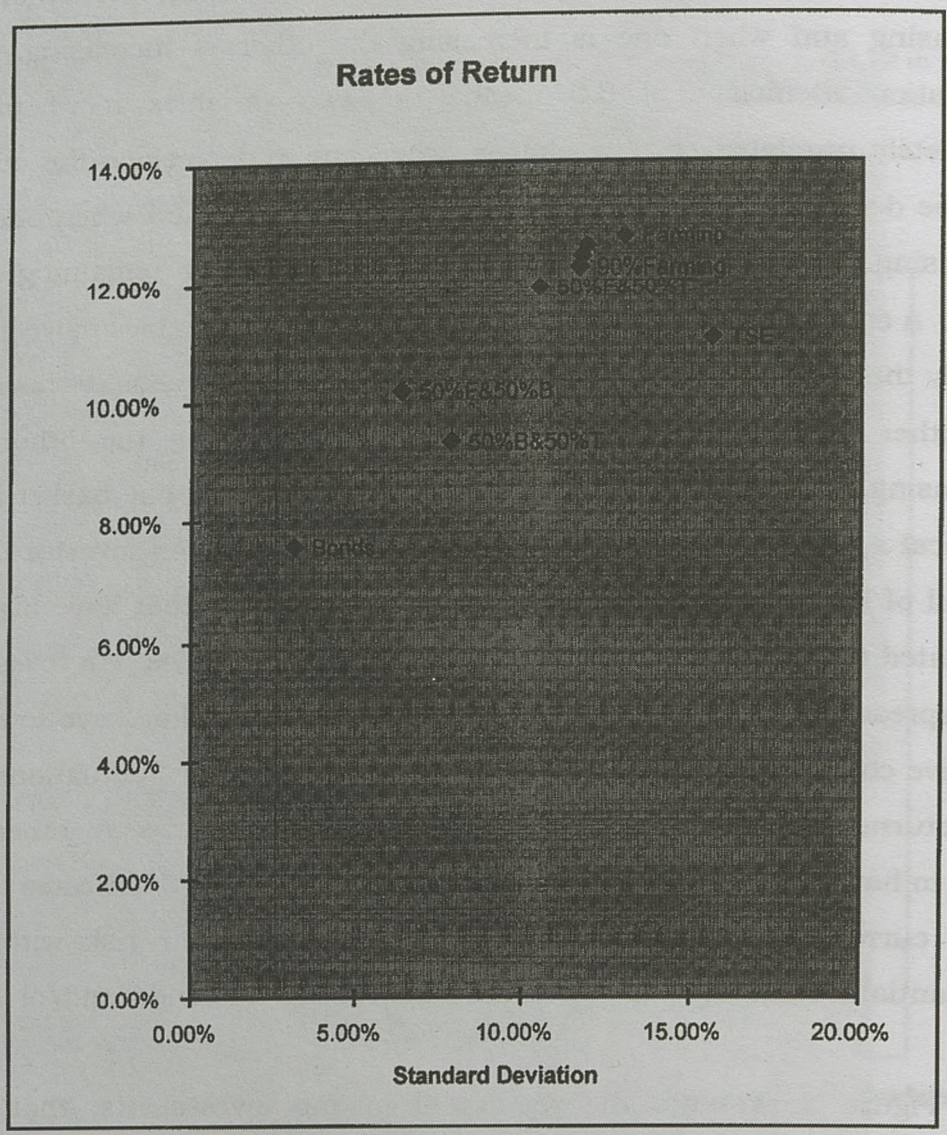

Figure 3: Trade-off Between Average (Mean) Return and Variability of Average Return (Standard Deviation)

mean returns and the degree of variability (standard deviation) between a number of combinations of farming, bonds, and the TSE. One can see

that combinations of farming and bonds, and farming and TSE reduce the variability (standard deviation) of returns more than they reduce the average (mean) return. This is because of the low and negative correlation between farming returns and bond and TSE returns. Therefore those farmers wishing to reduce their risks without substantially reducing their returns should invest in bonds and the TSE.

It should also be noted from Figure 3 that investors currently investing in the TSE can both reduce their risk and increase their average returns by investing in farming in Saskatchewan. This is a relatively rare occurrence in an economy and current TSE investors should be interested in investing in farming. Unfortunately for them, farming is not set up the way TSE investors would like it to be. They would like to be able to buy and sell small units that represent the returns from farming on a day to day basis. Unfortunately they have to buy large tracks of land and machinery and equipment to farm it or find renters to rent it. It also usually takes a great deal of time and some effort to sell the land and machinery if they decide to quit farming. In addition the Government of Saskatchewan will not allow nonresidents to own farm land in Saskatchewan. All of the above factors fall into what economists call 'transactions costs'. Transactions costs of farming, as it is currently set up, are high.

FARM SIZE, SPECIALIZATION, AND DIVERSIFICATION

It is a well known fact that Saskatchewan farms have become larger and more specialized over the last number of decades. It is not known how large Saskatchewan farms will become or how large they have to be to keep fixed costs (mainly depreciation and interest on investment) per unit of production reasonably low. It is known that as farms get larger these fixed costs per unit of production decrease. Figure

4 presents a typical long run average cost curve for farms. One can see that it is somewhat L shaped. It is very difficult to determine what is the least cost size of farm given the shape of the curve, but that is not as important as the "threshold" size. The threshold enterprise size is defined as that approximate size of operation below which the costs per unit of production increase very rapidly. Table 4 presents the results of studies of threshold enterprise sizes done in the late 1980s and early 1990s (Brown (1989), Kulshrehtha, Brown, Taylor, and Mirotchie (1991); and Leung, Kulshrehtha, and Brown (1991)). These threshold sizes have probably increased substantially since then.

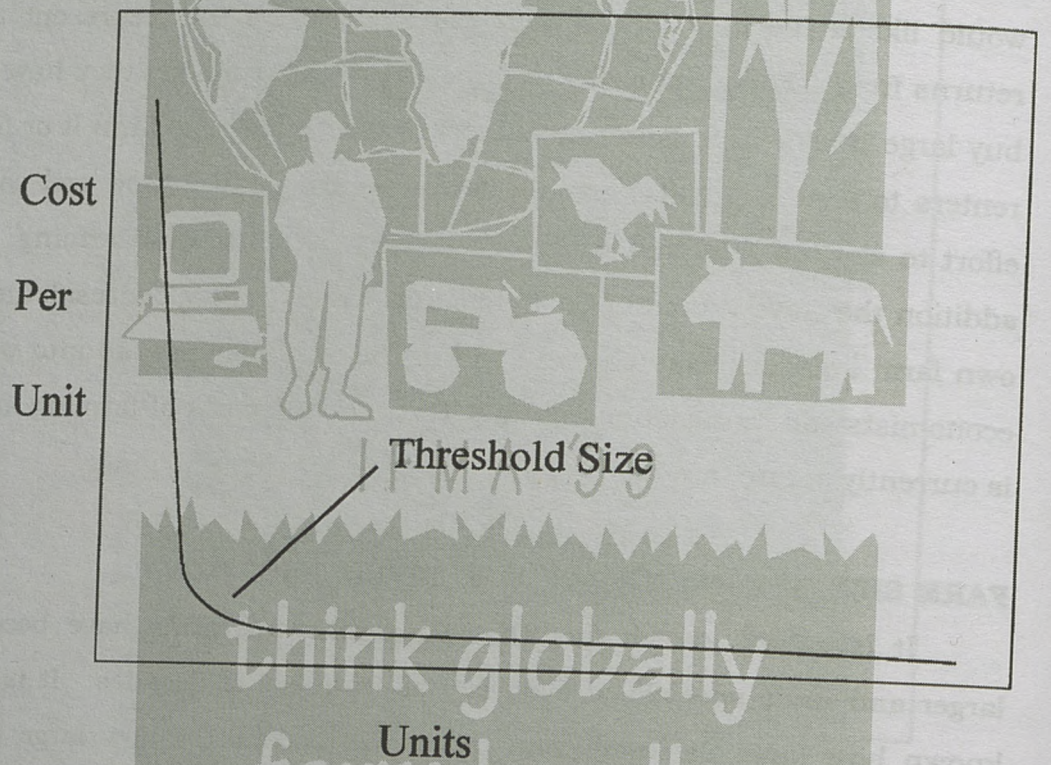

Figure 4: Typical Long Run Average Cost Curve for Farms

Table 4: Threshold Enterprise Sizes (late 1980s and early 1990s)

Grain-Oilseed	Brown Soil Zone Saskatchewan - 1200 acres Black Soil Zone of Saskatchewan - 700 acres	
Cow/Calf	Western Canada	- 40 cows
Beef Feedlot	Western U.S.	- 5,000 head capacity
Hog Farrowing	Saskatchewan	- 250 sows
Hog Feeding	Saskatchewan	- 2,000 head capacity

Source: Brown, W.J. *A Review of the Economies of Farm Enterprise Size and Implications for Farm Diversification.* Discussion Paper #360, Economic Council of Canada, Ottawa: Ontario, 1989. and Kulshrehtha, S.N., W.J. Brown, J.S. Taylor, and M. Mirotchie, *Economies of Size in the Saskatchewan Hog Industry.* Saskatchewan Beef and Hog Sector Study Report 2. Department of Agricultural Economics, University of Saskatchewan, Saskatoon: Saskatchewan, 1991. and Leung, C.Y., S.N. Kulshrehtha, and W.J. Brown, *Economies of Size of Beef Cattle Production in Saskatchewan* . Saskatchewan Beef and Hog Sector Study Report 6. Department of Agricultural Economics, University of Saskatchewan, Saskatoon: Saskatchewan, 1991.

It appears from the information above that farms will continue to get larger, but is there potential gains from diversification? The previous section discussed the concept of correlation coefficient and the gains that can be had from investing in enterprises that exhibit low or negative correlations. Table 5 presents the results of a study done in the late 1980s that calculated the correlation coefficients for a number of crop rotations, hogs, cattle, bonds, and the TSE from 1971 to 1987 (Brown (1989)). One can see from Table 5 that all the crop rotations are highly correlated thereby representing no significant gains from diversifying. The correlation coefficients are lower, but still positive for the cowcalf, beef feedlot, hog weanling, and hog finishing operations showing some potential for gains from diversifying into these enterprises. However these cattle and hog enterprises should be at least the threshold size as out lined in Table 4. These threshold enterprise sizes are outside the

reach of most individuals and will have to rely on community and cooperative effort to be realized. The correlation coefficients for bonds and the TSE are negative and concur with the results in the section above that gains can result from farmers investing in these areas.

Table 5: Correlation Coefficients of Net Returns for Crop Rotations, Hogs, Cattle, Bonds, and the TSE from 1971 to 1987

Rotation	Correlation Coefficient
Sask. Average - 32% Summerfallow, 28% Wheat on Fallow, 29% Wheat on Stubble, 4% Canola on Fallow, 4% Canola on Stubble, 3% Lentils on Stubble	+1.00
50% Summerfallow, 50% Wheat on Fallow	+0.99
100% Wheat on Stubble	+0.94
50% Summerfallow, 25% Wheat on Fallow, 25% Canola on Fallow	+0.98
50% Summerfallow, 25% Wheat on Fallow, 25% Lentils on Fallow	+0.93
10% Summerfallow, 3.3% Wheat on Fallow, 26.7% Wheat on Stubble, 3.3% Canola on Fallow, 26.7% Canola on Stubble, 3.3% Lentils on Fallow, 26.7% Lentils on Stubble	+0.87
Cow-Calf	+0.13
Beef Feedlot	+0.38
Hog Weanling	+0.40
Hog Finishing	+0.40
TSE 300	-0.06
Bonds	-0.33

Source: Brown, W.J. *A Review of the Economies of Farm Enterprise Size and Implications for Farm Diversification.* Discussion Paper #360, Economic Council of Canada, Ottawa: Ontario, 1989

LONG TERM PLANNING STRATEGIES

The current generation of farmers has to ask themselves whether they are satisfied with their current long term business plan (if they have one), or whether they would like to change it. If the current long term business plan is to pass the farm onto the next generation, it could take 30 to 40 years to implement and may never be fully successful. If the plan is to farm till retirement, sell to the highest bidder, and try and spend the money before death, not much, other than some income tax planning is needed.

The first stage of a long term business plan begins when the farming career begins. At this juncture the farm business should be growing to keep up with economies of size in agriculture and attaining at least "threshold" size in all enterprises. This does not mean trying to own all assets farmed, (leasing and renting strategies can be used), but it does mean using the farm assets as efficiently as possible. Dependents at this stage should be protected by life insurance on the major decision maker(s). Retirement planning should also begin at this time by starting RRSPs for both spouses and/or investing in the the NISA. As can be seen from the analysis earlier the negative correlation to farming returns of bond type investments in RRSPs and NISA can reduce risk substantially while maintaining reasonably good average returns. TSE types of investments in RRSPs have low correlation to farming returns and can also have risk reducing advantages as well as higher potential returns than bonds. Added to this are the income tax advantages of deductible RRSP contributions and the government matching and interest rate bonus of the NISA contributions.

Many farmers wonder what the best alternative is between RRSPs and NISA. RRSPs tend to have better after tax returns than the NISA for individuals in high tax brackets. Individuals with no taxable income or

in low tax brackets are usually further ahead investing in the NISA rather than RRSPs, if they have any funds to invest.

Relying on the sale of farm assets to solely finance retirement rather than saving through RRSPs and the NISA is a way to guarantee troubles for the next generation. Farm assets have never been able to consistently service debt of greater than 40% of their market value and for much of the 1980s and early 1990s it was closer to 25% (Taylor, (1989), (1991)). The current generation must generate enough net income from the farm business to allow for financing of a good portion of their retirement outside the sale of farm assets, or lower their expectations of a quality retirement, or lower their expectations of transferring the farm to the next generation.

CONCLUSIONS

Net returns from farming in Saskatchewan have been shown to be substantially greater than bonds and somewhat greater than those from the TSE. The variability of net returns from farming in Saskatchewan have been shown to be substantially greater than bonds and somewhat less than those from the TSE. The correlation of net returns from farming in Saskatchewan and bonds is negative, and close to zero between farming in Saskatchewan and the TSE. Therefore those farmers wishing to reduce their risks without substantially reducing their returns should invest in bonds and the TSE. It should also be noted that investors currently investing in the TSE can both reduce their risk and increase their average returns by investing in farming in Saskatchewan.

It appears that farms will continue to get larger and will have to be at least of "threshold" size, but there are potential gains from diversification. The results of a study done in the late 1980s that calculated the correlation coefficients for a number of crop rotations,

hogs, cattle, bonds, and the TSE from 1971 to 1987 showed that all the crop rotations are highly correlated thereby representing no significant gains from diversifying. The correlation coefficients were lower, but still positive for the cowcalf, beef feedlot, hog weanling, and hog finishing operations showing some potential for gains from diversifying into these enterprises. The correlation coefficients for bonds and the TSE were negative thereby resulting in gains for farmers investing in these areas.

The negative correlation to farming returns of bond type investments in RRSPs and the NISA can reduce risk substantially while maintaining reasonably good average returns. TSE type of investments in RRSPs have low correlation to farming returns and can also have risk reducing advantages as well as higher potential returns than bonds. Added to this are the income tax advantages of deductible RRSP contributions and the government matching and interest rate bonus of the NISA contributions. RRSPs tend to have better after tax returns than the the NISA for individuals in high tax brackets. Individuals with no taxable income or in low tax brackets are usually further ahead investing in the NISA rather than RRSPs, if they have any funds to invest.

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