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Abstract

An analysis of Canadian farmland risk and return on investment shows that a Farmland Mutual Fund (FMF) would have been a reasonably good investment over the past 15 years. Investors at the very low or very high end of the risk spectrum would not include FMF in their portfolios. Financial gains from a FMF result from low level risk with an expected yield that is greater than bonds and low correlation with other financial asset returns. Non-farm families gained from improvements to their pension and non-pension investment portfolios. Farm families gained from having more external non-farm equity entering the agricultural industry.

The Financial Benefits to Investors in a Canadian Farmland Mutual Fund

By Marvin J. Painter

Introduction

Over the past 60 years, average farm size in Canada has been steadily increasing as a result of new production technologies that allow one farmer to manage an ever-increasing number of acres, and because commodity prices have been steadily declining on a real basis, requiring farmers to achieve maximum economies of size to be profitable. Painter (2005) showed the average annual rate of growth in labour and management income per acre for the period 1972-2003 to be very close to zero and in some provinces, negative. Canadian farmers have been offsetting the lack of growth in labour and management income per acre by increasing the average number of acres per farm. Farmers have been able to grow their earnings by expanding farm size, but on average, they have not been expanding fast enough to keep up with non-farm employment earnings. The conclusion is that Canadian farmers will have to continuously grow their farms (not unlike any other business) at a faster pace than in the past to more than offset declining economic returns per acre if they expect their earnings to keep up with the rest of the economy. However, that accelerated growth will require new sources of farm equity financing.



Marvin J. Painter is Professor of Management and Marketing at the University of Saskatchewan. He teaches agribusiness management in the MBA program as well as to farmers and others in the agribusiness industry. Dr. Painter has been involved in consulting projects that include farmland and business valuation, both for forensic and investment purposes.

To finance growth, farmers need equity. Average Canadian farm debt ratios have ranged from 14 to 31 percent between 1972 and 2003¹ and Bigge and Lengemeier (2004) report average farm debt ratios of 25 percent for Kansas farmers. It is difficult for farmers to use higher debt ratios because normally the farmland cash operating yield ranges between 10 and 40 percent of the total farmland ownership yield (total farmland return on investment), with the remainder of the farmland investment yield coming from capital gains. Therefore, farmers keep debt ratios close to the average cash operating yields in order to cash flow the purchase of farmland. That means a significant portion of growth has to be financed with equity, and the rate of growth in farm size is limited by the amount of internal equity (profits) generated by farmers. However, it is clear that relying on farm profits alone will not generate the rate of growth in farm size needed for farmers to keep pace with average incomes in the rest of the economy (Painter 2005). In addition, farmers are being required to invest ever-increasing amounts in new technologies (equipment, seed, fertilizer, etc.) which also require similar proportions of equity financing. And, there is an ever-increasing demand on farmers' equity for investment further along the value-added chain, such as food processing facilities, which is part of Canadian farmers' strategies to enhance their market power and profitability. Therefore, to finance farm expansion, new agricultural technologies, and investment in value-added activities, the farm sector needs new sources of external equity.

What are the current external sources of equity for farmers? The two main sources of external equity financing being used by Canadian farmers are off-farm employment income and farmland leases. Painter (2005) showed that on average, 80 percent of total Canadian farm family income is from non-farm sources. This implies that farm families are using off-farm income to finance family living expenses, which frees up more of the farm income for reinvestment as internal equity. The largest source of external equity is farmland leases. Close to 50 percent of all farmland in Canada is leased, often from farmers who have retired. However, not all retiring farmers want to lease their land and some want to be able to access the capital as well as transfer the farmland to one or more children who plan to farm. In these cases external equity financing is required. Therefore, to serve both groups of farmers, the expanding farmers and the retiring farmers, new external sources of equity financing are required.

Purpose and Objectives

If the farm sector needs more external equity financing, where could it come from? This paper addresses the question of whether the non-farm community can benefit financially from investment in Canadian farmland. Specifically, it addresses the idea of a stock market listed Canadian Farmland Mutual Fund (FMF), which owns farmland as the underlying assets and leases the farmland to farmer operators (the FMF is similar to a real estate investment trust). This would provide a liquid and marketable financial vehicle for the non-farm community to invest in farmland through individual pension accounts, company and government pension accounts, and non-pension investment/savings accounts. This paper also addresses the question of whether farm families can benefit from investing some of their wealth, such as their family pension savings, in non-farm financial assets such as stocks and bonds. If both farmers and non-farmers can benefit, then a FMF could efficiently facilitate a swap of farm family equity for non-farm family financial assets at the same time as providing more external equity to the farm sector. Therefore, the main question addressed in this paper is whether a Canadian Farmland Mutual could provide financial benefits to farm and non-farm families.

Theoretical Background

Markowitz (1959) introduced the concept of efficient portfolios, where assets were chosen for investment based not only on their expected returns and risk but also on how their returns were correlated with other assets. The main contribution from Markowitz was that the risk in a portfolio of risky assets will often be less than the risk associated with any of the individual assets held. Tobin (1958) and Treynor (1961) introduced the two-fund separation theorem with the inclusion of the risk-free asset, producing the Capital Market Line (CML). Efficient investments were those that provided the highest return on investment for a chosen or acceptable level of risk, where portfolios always dominated individual assets (portfolios provided a higher return for a chosen level of risk). This led to the development of the Capital Asset Pricing Model (CAPM) by Sharpe (1964), which indicated that the risk component in single asset valuations should be based only on the risk that the asset adds to a diversified portfolio, called systematic risk, as opposed to the asset's total risk. An asset could have a high total risk level, but if most of that risk is diversified away within an efficient portfolio, then it would add little risk to the overall portfolio and would be considered a low-risk asset.

Figure 1 illustrates the concept of efficient investment². The efficient frontier represents all those investments that dominate on a risk-return basis. For a chosen level of risk, the investment that dominates is the one that provides the highest expected rate of return. The efficient frontier is made up mostly of portfolios because combining assets into portfolios provides risk reduction due to diversification, while still maintaining levels of return. When the risk-free asset is added to the mix, the CML becomes the efficient set of investment opportunities, where every investment on the CML is a combination of the risk-free asset and the tangency portfolio. To maximize utility, investors choose their desired level of risk and the corresponding CML portfolio, which maximizes the expected return for that chosen level of risk.

Many studies have been done that assess the risk level, valuation, and portfolio investment quality of farmland. Peter Barry (1980) applied the CAPM to farmland in eleven different regions in the United States. He found that farmland added very little risk to a diversified portfolio of stocks and bonds. Kaplan (1985) found that farm real estate had two favorable attributes: high total return and low correlation with other assets, making it an excellent diversification vehicle. Moss, Featherstone, and Baker (1987) as well as Lins, Kowalski, and Hoffman (1992), assessed efficient portfolios using U.S. financial assets and farmland and concluded that the addition of farmland to stock and bond portfolios improved portfolio performance. Painter (2000) assessed whether Saskatchewan farmland could improve portfolio performance, where the choice set of assets includes stock markets from the G7 countries, Canadian bonds and treasury bills, and Saskatchewan farmland. He found that farmland improved portfolio performance, especially at medium levels of risk. More recently, Bigge and Langemeier (2004) found that Kansas farmland's low level of systematic risk meant that strong benefits could be derived from an individual farm's investment in the stock market. Libbin, Kohler, and Hawkes (2004) indicate their results suggest that farmers could benefit financially from investing in financial assets and/or paying down their debt liabilities. These studies suggest that both farm and non-farm families could potentially improve their long-term financial performance by mixing farmland and financial assets in their investment portfolios.

The Expected Value-Variance (E-V) Model

A Canadian FMF would operate like a mutual fund or possibly a real estate investment trust³. A fund manager and management team would be responsible for managing the underlying farmland assets which would include buying land from retiring and/or other farmers, negotiating lease contracts with farmer operators, collecting lease payments and paying expenses, and providing distributions to the mutual fund shareholders. As new mutual fund shares were issued and new capital entered the fund, the fund managers would seek to purchase more farmland. Ideally, the mutual fund units would trade on a major stock exchange so that a market price was constantly being determined by the marketplace. If it is not listed, then a pricing mechanism would have to be established that would provide a periodic value for the mutual fund units. An important objective of the FMF vehicle is to provide all investors with a liquid secondary market for farmland investment, making it easy for anyone to invest or divest and to keep transaction costs competitive with other investment vehicles.

The main research question is whether farm and non-farm families can benefit financially from a FMF. In assessing this question, an efficient portfolio model (E-V model as shown in Figure 1) is used to measure financial performance both when the FMF is included in the choice set of assets and when it is not to see whether financial performance is improved. The model is used to calculate the Capital Market Line (CML) for two cases: first, from the set of assets that includes only stocks and bonds (referred to as CML without FMF); and second, from a set of assets that includes stocks, bonds, and Canadian farmland (referred to as CML with FMF). The resulting efficient frontier in each case is used to determine whether financial performance is enhanced with the addition of Canadian farmland.

Data

The choice set of assets from which efficient portfolios are derived includes:

- Canadian FMF
- Risk-free asset (lending rate), represented by Government of Canada 90-day treasury bills (t-bills), and the prime bank lending rate (borrowing rate for investors)
- Long-term Government of Canada bonds

- Stock markets in Canada, Australia, United States, Europe, Nordic countries, Hong Kong, and the World Stock Market Portfolio⁴.

The Expected Return on FMF Investment

The FMF investment returns are based on the annual returns associated with the underlying farmland assets. It is assumed that the FMF would purchase farmland in each of the five major agricultural producing provinces: Alberta, Saskatchewan, Manitoba, Ontario, and Quebec. The return on farmland investment was calculated for each province for each year in the study period (1989-2003) and simply averaged to derive the annual FMF return, which assumes roughly equal capital investment in each province. The average return for the FMF over the study period represents the expected return on FMF investment. The study period 1989-2003 was chosen because it does not include the spiked farmland values of the 1970s and 1980s but still represents a reasonably long period of time, 15 years. As a result, average farmland investment returns were lower than if the 70s and 80s were included, but provided a much more realistic estimate of current and expected farmland returns.

The return on investment⁵ to farmland ownership in each province was based on a standard crop share lease agreement which provided one-quarter of the gross receipts to the lessor (FMF). The FMF was then responsible for paying property taxes and depreciation on farm grain storage buildings. The crop share lease agreement represented the most common form of rental agreement in Canada over the past 35 years.

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

$$NCS_t = CS_t - PT_t - BD_t \tag{1}$$

where,

- NCS_t = net crop share/acre in year t;
- CS_t = average FMF crop share/acre in year t;
- PT_t = average property tax/acre in year t; and
- BD_t = average grain storage building depreciation/acre in year t.

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

$$ROI_t = \frac{NCS_t}{V_{t-1}} + \frac{V_t - V_{t-1}}{V_{t-1}} \tag{2}$$

where,

ROI_t = average return on farmland and buildings investment in year t;

V_t, V_{t-1} = average value of farmland and buildings/acre in year t and t-1;

$\frac{NCS_t}{V_{t-1}}$ = operating yield on farmland investment in year t;

and

$\frac{V_t - V_{t-1}}{V_{t-1}}$ = capital gain yield in year t.

In each year of the study period, the annual FMF operating yield, capital gain yield, and total investment yield was simply the arithmetic average of the respective yields in each province.

Capital Market Investment Yields

T-bill rates, prime lending rates, and long-term government bond yields are taken from The Canadian Economic Observer (Statistics Canada). Morgan Stanley Capital International has provided the annual investment yields for stock markets. No adjustment has been made to the stock market returns for investment transaction costs such as brokerage fees or mutual fund management fees. As well, stock market returns do not include gains or losses associated with fluctuations in exchange rates.

Figure 2 represents the estimated expected returns and risk levels for the choice set of assets.

Results

Figure 3 compares annuals yields for the Canadian FMF and Canadian and U.S. stock markets. Over the past 15 years Canadian FMF yields have been relatively stable, especially when compared to stock market yields. This was mainly because the large farmland price fluctuations of the 70s and 80s were not included and because there was some risk-reducing diversification benefit from combining farmland yields in five provinces⁶. The FMF would be considered a relatively low risk-low return asset when compared with stock markets. Painter (2000) found that the level of risk associated with

Saskatchewan farmland was as high as with stocks, however those farmland yields were negatively correlated with stock yields, implying a very low level of systematic risk with farmland investment. In this study, the FMF risk level was much lower than stocks, but as Table 1 illustrates, there was very little negative correlation with stock or bond yields, although still relatively low correlation. Therefore, the attractiveness of the FMF for investors' portfolios was not that it had high expected returns, but rather that it was a reasonably low risk asset with an expected return greater than other safe assets such as t-bills and bonds and had very low correlation with other financial asset returns (low level of systematic risk) so it adds little risk to a portfolio.

Applying the data to the E-V model, the CML with FMF and the CML without FMF are determined and presented in Tables 2 and 3, and plotted in Figure 4. The CML represents all of the Markowitz efficient portfolios, those combinations of assets that provide the best return on investment at each level of risk. Investors maximize their utility by choosing the efficient portfolio for their chosen level of risk, where investors range from being very risk averse to those who are risk seekers. The addition of FMF to the choice set of assets has the impact of moving the CML up and to the left, which implies better performing portfolios at each level of risk. This implies that financial performance can be improved with the addition of FMF.

Table 4 compares the portfolio investment returns for high, medium, and low risk levels. At both high and low levels of risk there is no advantage to adding FMF to the choice set of assets. However, at the medium level of risk where most investors are located, there was a significant financial gain from including FMF in the choice set. When Tables 2 and 3 are compared, it can be seen that most of the financial gain was from replacing long term bonds with FMF in the medium risk category. This would be especially true today as bonds are offering very low investment yields.

Discussion of Results

Can non-farm families gain from a FMF? Regardless of financial benefit, purchasing farmland is not an option for most non-farm families because of the minimum investment required and the transaction costs associated with managing a land lease.

A FMF would provide the liquidity and marketability required for non-farm families to consider farmland investment. If the returns and risk levels associated with the past 15 years are a reasonable indicator, then FMF is a competitive investment, especially for investors in the average risk category. FMF is a relatively low-risk investment that can be substituted for government and corporate bonds, especially when bonds are paying very low rates of interest.

FMF also compares well with stock market returns. FMF would distribute net farmland leasing income as dividends to unit holders. Therefore, the operating yield on farmland would be comparable to the dividend yield on equity mutual funds. Table 5 compares dividend and capital gain yields and risk for FMF and stock markets for the study period. FMF compares very closely with average stock market dividend yields, being in the range of 1.7 to 1.9 percent per year. The FMF average capital gain yield is lower at 4.6 percent, with the World portfolio at 5.1 percent, Canadian stocks at 6.5 percent, and U.S. stocks averaging 9.8 percent. The higher capital gain yields for stocks give them higher overall yields than the FMF; however, the FMF has significantly lower risk as measured by the standard deviation of total yields. Overall, this makes FMF an attractive addition to a non-farm investment portfolio.

FMF returns would also be tax-favored compared with bonds. Interest income is taxed at the highest personal tax rates, where the top marginal rate is 45 percent when income exceeds \$115,000 cdn. Dividends and capital gains have top marginal tax rates of 28 percent and 22.5 percent respectively. This would not be a significant factor for pension investments but would be for non-pension investment decisions.

Can farm families gain from a FMF? The FMF could make it easier for retiring farmers who want to liquidate because the FMF would bring new external non-farm equity into the agriculture industry. Retiring farmers would have more flexibility in that they could take cash, FMF shares, or some combination. The FMF could help expanding farmers because it would be offering farmland leases. This would provide expanding farmers with new external equity financing and allow them to use their own equity to invest in farm technologies and other value-added ventures. For existing farmers who are intent on purchasing more farmland, the FMF

would likely be a detriment, because the FMF would be a competing bidder for farmland.

Implications of the Study

What are the implications for governments? Provincial governments would have to eliminate any ownership restrictions so that the FMF could attract investors from anywhere in Canada (or the world). To the extent that the FMF would facilitate growth in farm size, and therefore farm family incomes, there would be less pressure on provincial and federal governments for farm subsidies.

What are the implications for rural communities in each province? FMF would likely hasten the pace of increasing farm size, which implies fewer and fewer farm families. This would not be good for rural communities unless they were able to offset the declining farm population with increased off-farm employment opportunities.

Conclusions

The Farmland Mutual Fund would have been a reasonably good investment over the past 15 years. The results show that for average risk levels, the FMF could enhance the financial performance of an investment portfolio. Investors at the very low or very high end of the risk spectrum would not include FMF in their portfolios. The financial gains from FMF result from a low level of risk with an expected yield that is greater than for bonds and because the FMF has low correlation with other financial asset returns (low level of systematic risk).

In conclusion, there are gains to both farm and non-farm families from the implementation of a FMF. Non-farm families gain from improvements to their pension and non-pension investment portfolios. Farm families gain from having more external non-farm equity entering the agricultural industry.

Endnotes

- ¹ Farm financial statistics were supplied by Saskatchewan Agriculture and Food (provincial government) for all Canadian provinces.
- ² Libbin, Kohler and Hawkes (2004) do a good job of presenting these concepts in more detail than provided here.
- ³ The intent of this paper is not to determine the details of the structure and rules associated with a FMF but rather to assess

its investment attractiveness if it could be made available to farm and non-farm investors.

- ⁴ All stock market returns were supplied by Morgan Stanley Capital International. Normally, Japan and the Far East would have been included in the choice set of assets; however, for this study period the average stock market returns in those areas of the world are negative, which makes them poor proxies for expected returns.
- ⁵ 'Return on Investment' is used interchangeably with 'yield'.
- ⁶ The arithmetic average of the 1989-2003 standard deviations of total farmland investment yield for the 5 provinces is 4.7% while the standard deviation of the FMF total investment yield for the same period is only 3.6%, which indicates some risk reduction due to diversification across provinces.

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Table 1. Yield Correlations for the Choice Set of Assets (1989 - 2003)

	T-Bills	Bonds	FMF	Canada	Aus	US	Nordic	Europe	World	H Kong
T-Bills	1.00	0.60	0.09	-0.12	-0.08	0.08	-0.09	0.00	-0.06	0.10
Bonds		1.00	0.15	-0.20	-0.13	0.13	-0.14	0.01	-0.09	0.17
FMF			1.00	0.14	-0.23	0.38	0.20	0.30	0.15	-0.38
Canada				1.00	0.68	0.61	0.87	0.72	0.77	0.51
Aus					1.00	0.45	0.61	0.63	0.73	0.66
US						1.00	0.65	0.87	0.88	0.32
Nordic							1.00	0.77	0.85	0.54
Europe								1.00	0.94	0.48
World									1.00	0.52
H Kong										1.00

Table 2. Capital Market Line Portfolios (CML with FMF included in choice set of assets)

%	%	Portfolio weights for the choice set of assets (%)							
Return	Risk	T-Bills	Bonds	FMF	Aus	US	H Kong	Borrowing	
13.0	24.5	0.0	0.0	0.0	0.0	115.5	16.5	-32.0	
12.0	20.1	0.0	0.0	0.0	0.0	94.7	13.5	-8.2	
11.6	18.4	0.0	0.0	0.98	0.0	87.3	11.7	0.0	
11.0	16.5	0.0	0.0	12.1	0.0	76.9	11.1	0.0	
10.5	14.9	0.0	0.0	21.4	0.0	68.1	10.5	0.0	
10.0	13.2	0.0	0.0	30.7	0.0	59.3	10.0	0.0	
9.5	11.6	0.0	0.0	39.9	0.0	50.6	9.4	0.0	
9.0	10.0	0.0	0.0	49.2	0.0	41.9	8.9	0.0	
8.5	8.5	0.0	0.0	58.5	0.0	33.2	8.3	0.0	
8.0	6.9	0.0	0.0	67.8	0.0	24.4	7.8	0.0	
7.5	5.5	0.0	0.0	77.1	0.0	15.7	7.2	0.0	
7.0	4.2	0.0	0.0	86.4	0.0	7.0	6.7	0.0	
6.5	3.1	0.0	14.1	78.2	0.6	1.8	5.2	0.0	
6.0	2.2	0.0	41.1	53.8	2.5	0.0	2.7	0.0	
5.7	1.8	0.0	60.8	35.1	3.3	0.0	0.8	0.0	
5.0	1.3	20.5	56.9	19.9	2.8	0.0	0.0	0.0	
4.0	0.7	58.4	29.8	10.4	1.5	0.0	0.0	0.0	
3.5	0.4	77.3	16.2	5.7	0.8	0.0	0.0	0.0	
2.9	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	

Note: The bolded rows are the tangency portfolios.

Table 3. Capital Market Line Portfolios (CML with FMF excluded from choice set of assets)

%	%	Portfolio weights for the choice set of assets (%)							
Return	Risk	T-Bills	Bonds	Canada	Aus	US	H Kong	Borrowing	
13.0	24.6	0.0	0.0	0.0	0.0	115.5	16.5	-32.0	
12.0	20.1	0.0	0.0	0.0	0.0	94.7	13.5	-8.2	
11.6	18.4	0.0	0.8	0.0	0.0	87.8	11.4	0.0	
11.0	16.8	0.0	10.1	0.0	0.0	79.6	10.3	0.0	
10.5	15.3	0.0	17.9	0.0	0.0	72.8	9.4	0.0	
10.0	13.9	0.0	25.6	0.0	0.0	66.0	8.4	0.0	
9.5	12.5	0.0	33.3	0.0	0.0	59.2	7.5	0.0	
9.0	11.1	0.0	41.1	0.0	0.0	52.3	6.6	0.0	
8.5	9.7	0.0	48.8	0.0	0.0	45.5	5.6	0.0	
8.0	8.3	0.0	56.6	0.0	0.0	38.7	4.7	0.0	
7.5	6.9	0.0	64.3	0.0	0.0	31.9	3.8	0.0	
7.0	5.5	0.0	72.1	0.0	0.0	25.1	2.9	0.0	
6.5	4.2	0.0	79.8	0.0	0.0	18.3	1.9	0.0	
6.0	3.0	0.0	87.3	0.0	0.5	11.4	0.9	0.0	
5.3	1.7	0.0	96.6	2.3	1.1	0.0	0.0	0.0	
5.0	1.5	12.4	84.6	2.0	1.0	0.0	0.0	0.0	
4.0	0.8	54.1	44.3	1.0	0.5	0.0	0.0	0.0	
3.5	0.4	75.0	24.2	0.0	0.3	0.0	0.0	0.0	
2.9	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	

Note: The bolded rows are the tangency portfolios.

Table 4. Financial Benefits from adding FMF to the choice set of assets

Risk Level	Portfolio Return on Investment			
	Standard Deviation	CML with FMF	CML without FMF	Financial Gain
High	24.6%	13.0%	13.0%	0.0%
	18.4%	11.6%	11.6%	0.0%
Medium	6.9%	8.0%	7.5%	0.5%
	5.5%	7.5%	7.0%	0.5%
Low	4.2%	7.0%	6.5%	0.5%
	1.0%	4.5%	4.5%	0.0%

Table 5. Average Dividend, Capital Gain and Total Yields, and Risk Level (1989 - 2003)

	Div Yield	Cap Gain Yield	Total Yield	Risk (Std Dev)
FMF	1.7%	4.6%	6.3%	3.6%
Canada	1.9%	6.5%	8.4%	22.4%
U.S.	1.8%	9.8%	11.6%	18.9%
World	1.7%	5.1%	6.8%	17.3%

Figure 1. Efficient Investment and the Capital Market Line

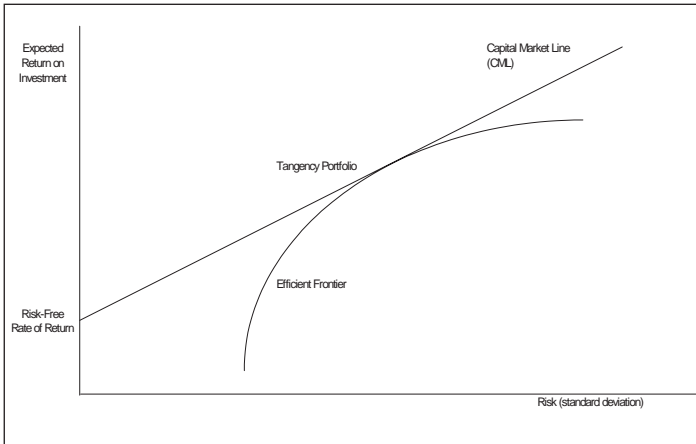


Figure 2. Expected Returns and Risk Levels for the Choice Set of Assets

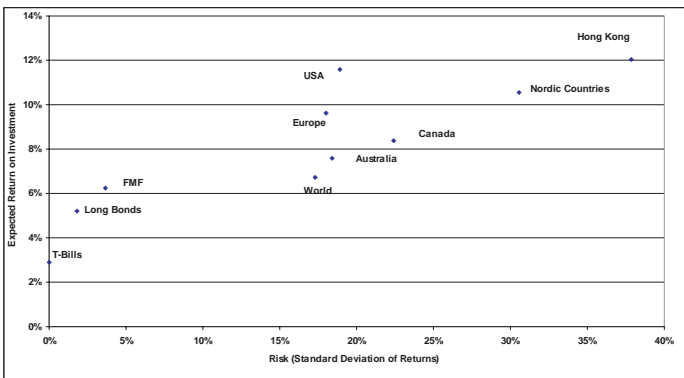


Figure 3. Comparison of Canadian and U.S. Stock Markets and FMF (Annual Return on Investment 1989 - 2003)

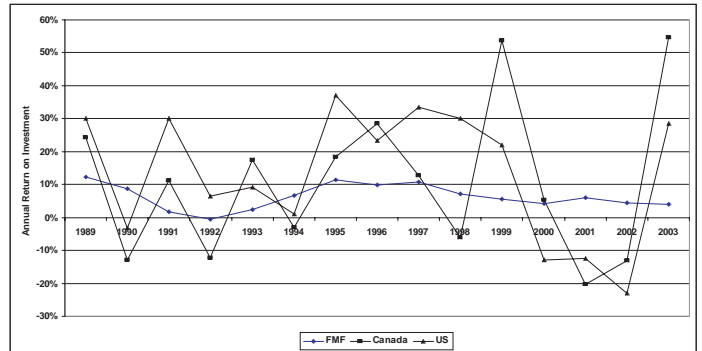


Figure 4. The Capital Market Line (CML) with and without FMF included

