

## **Equity Financing and Investment Opportunities in Canadian Primary Agriculture**

Author: Marvin Painter, University of Saskatchewan, Canada

### **Abstract**

This study shows that for the period 1990 – 2007, international portfolio investment performance was significantly improved with the addition of Canadian farmland. Farmland in Canada is considered relatively low risk, enters the efficient portfolios at low risk levels and adds the most financial improvement to low and medium risk portfolios. Compared to T-bills and long bonds, farmland has higher risk and yield, but lower risk than stocks. Compared with stocks, farmland has income yields and risk that are similar or better than dividend yields and risk on stocks while farmland has capital gain yields and risk that are usually lower, on average, than stocks. The low and negative correlation of farmland yields with stocks and bonds make it a good candidate for portfolio diversification benefits.

## Equity Financing and Investment Opportunities in Canadian Primary Agriculture

Baby boomers around the world are preparing for retirement and with the recent meltdown in world equity markets, they are rethinking their investment strategies. Many investors are looking for portfolios that will give them some growth potential at a reasonable level of risk. Some investors have retreated to only very safe debt securities in their portfolios, but most recognize that it is very costly over the long run because of very low interest rates and high tax rates associated with interest income<sup>1</sup>. However, investors are seriously considering equity instruments other than traditional stock market common shares or equity mutual funds. After the collapse of housing prices in the United States and parts of Canada, investors have also redefined the risk in that sector. So, where can investors go with their hard earned savings, such that they can earn a positive real return after tax (difficult to achieve with safe debt securities) and not be subject to huge swings in value, such as recent stock market fluctuations or housing prices?

During the past twenty five years, mutual funds have become the choice investment vehicles because they are very easy for individuals to manage. Diversification has become a key word for investors and it has become much easier to achieve international diversification through various types of mutual funds. Choosing the right mix of geographic, industry and sector, and asset types is of key importance in achieving the targeted financial performance over an investment horizon. Real estate represents a significant percentage of world asset value and has been an important component of investment portfolios but farmland has not been easily accessible to average investors.

Farmers have been using more and more leased land, which is an important source of external equity financing as average farm size grows. Approximately 50% of farmland in Canada and the United States is now leased by farm operators and the demand for leased land is growing as average farm size continues to increase (Painter 2005 and Painter 2006), which implies a growing demand for external equity in the farmland sector. There are only a few rural property investment trusts established in Canada and are not easily available in the financial sector. Liquid and marketable farmland investment vehicles would provide a ready source of external equity financing to farmers who want to grow and provide investors with a reasonably low risk growth investment. But even if a liquid and marketable farmland investment vehicle is available, the average

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<sup>1</sup> At time of writing (November 2008) annual interest rates on government debt securities were less than 2% in Canada and less than 1% in the United States.

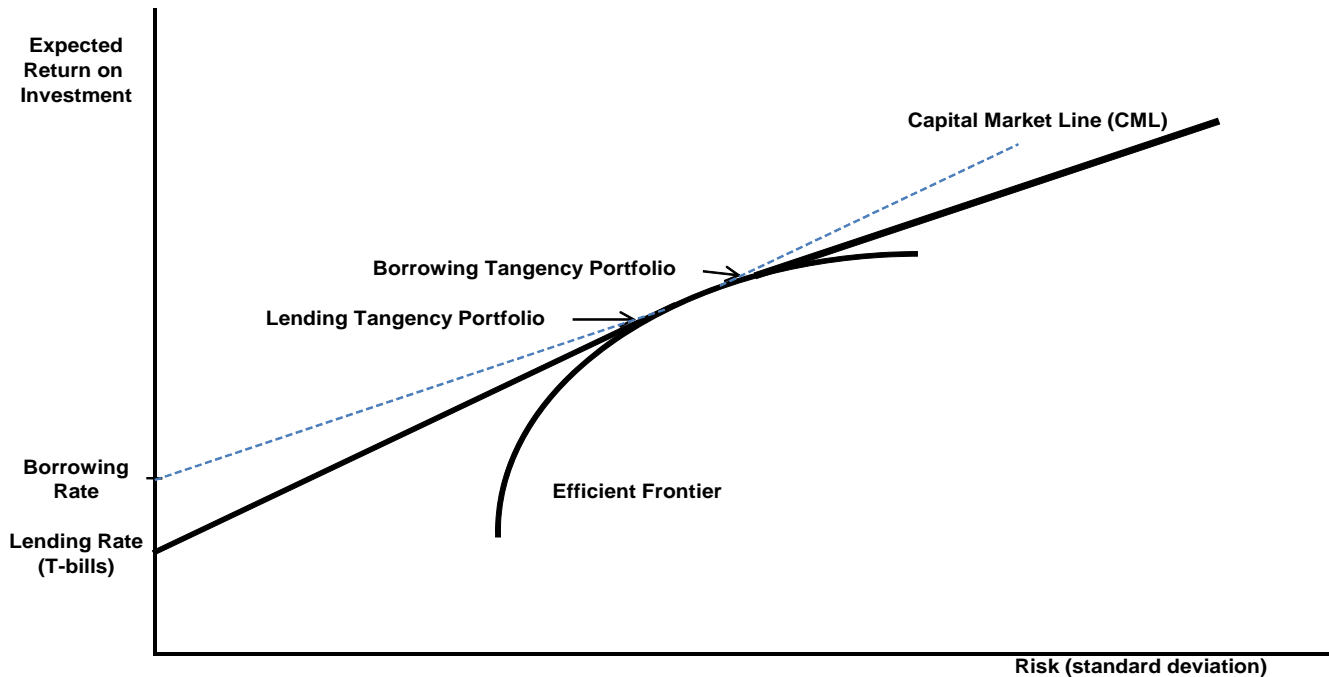
investor needs to know whether farmland is a good mix in their portfolios. What are the risk-return characteristics of a farmland investment and what is the impact on portfolio performance when a farmland investment is added to the portfolio? In this paper, farmland investments in Canada are assessed to determine their impact on the financial performance of a well-diversified international portfolio.

## **Background**

Markowitz (1959) first introduced the concept of efficient portfolios, where assets were considered for portfolios based not only on their individual expected returns and risk but on how their returns were correlated with other assets. Tobin (1958) and Treynor (1961) introduced the two-fund separation theorem by including the risk-free asset in the mix, producing the Capital Market Line (CML). CML Efficient investment portfolios were those that provided the highest return for a chosen level of risk, or conversely, the lowest risk for a chosen level of return. It was found that portfolios always dominated individual assets, providing a higher return for a chosen level of risk.

Figure 1 illustrates the concept of efficient investment. The efficient frontier (Markowitz) represents all those investments that dominate on a risk-return basis when the risk-free asset is not included in the mix. The efficient frontier is made up mostly of portfolios because combining assets into portfolios allows risk reduction without necessarily reducing return. When the risk-free asset is added to the choice set, the Capital Market Line (Tobin and Treynor) 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 mix the risk-free asset and the market (tangency) portfolio to achieve their desired level of risk, which maximizes the expected return for that chosen level of risk. In Figure 1 and in this study, the borrowing rate for investors is also added, which means there are two tangency portfolios; the lending and borrowing tangency portfolios. The CML (heavy line) is slightly kinked as the borrowing rate is higher than the risk-free lending rate and a small part of the concave efficient frontier is a segment of the CML.

**Figure 1: Efficient Investment and the Capital Market Line**



A number of studies have been done that assess the risk level and portfolio investment quality of farmland. Peter Barry (1980) found that farmland added very little risk to a diversified portfolio of stocks and bonds because most of farmland risk can be diversified away. Kaplan (1985) found that farm real estate had two favorable attributes: high total return and low correlation with other assets, which meant that including farmland in a portfolio added a high return asset with very little risk added. Moss, Featherstone and Baker (1987) as well as Lins, Kowalski and Hoffman (1992) and Ruebens and Webb (1995), assessed efficient portfolios using US financial assets and farmland and concluded that the addition of farmland to stock and bond portfolios improved portfolio performance. Studies by Eves (2005) and Newell and Eves (2007) also confirmed that farmland in Australia and the US provides significant portfolio diversification benefits. Painter (2000) found that Saskatchewan farmland improved portfolio performance, especially at medium levels of risk. Bigge and Langemeier (2004) found that Kansas farmland's low level of systematic risk meant that farmers could improve overall portfolio performance with investment in the stock market. Libbin, Kohler and Hawkes (2004) suggest that farmers could improve financial performance by investing in financial assets and/or paying down their debt liabilities. Painter (2006) found that the financial gains from a Canadian Farmland Mutual Fund result from a low level of risk with an expected yield that is greater than for bonds and because the Farmland Mutual Fund has low correlation with other financial asset returns. These studies

suggest that both farmer and non-farmer investors could potentially improve their long-term financial performance by diversifying farmland and financial assets in their investment portfolios.

### The Expected Value-Variance (E-V) Model

An E-V model is used to assess whether farmland would enhance the financial performance of an internationally diversified portfolio of financial assets. The expected value-variance model has been a fundamental approach in showing how the efficient set of portfolio investments is derived. The usual method of deriving the efficient set of investments is to minimize risk for various expected return constraints. The mapping of the minimum risk levels provides the efficient set or frontier. The efficient frontier is derived by minimizing investment risk (variance), subject to expected return and wealth constraints.

$$\text{Minimize } X' Q X \quad (1)$$

$X$

subject to:

$$R_p = C' X$$

$$1.0 = 1' X$$

where:

$X$  = vector of the wealth share invested in each asset,  $x_i$  being the proportion of total wealth invested in asset  $i$

$Q$  = variance-covariance matrix of asset returns,  $\text{Cov}(r_i, r_j)$

$R_p$  = portfolio return on investment

$C$  =  $N \times 1$  vector of expected return on investment for  $N$  choice assets

The inclusion of the risk-free asset changes the investment opportunity surface to a straight line, the CML, which is a linear combination of the risk-free asset and the point of tangency with the concave investment opportunities surface. The greater is the slope of the CML, the better the investment performance (return per unit of risk) for all levels of risk greater than zero. This E-V model is used to calculate the CML from the set of choice assets, both with and without Canadian farmland included in the choice set, to determine whether financial performance is enhanced with the addition of farmland.

## Calculating Farmland and Financial Asset Returns

Financial returns are calculated for each of the choice assets for the study period 1990-2007. The choice set of assets includes T-bills, long term Canadian bonds, Canadian farmland, and stock markets in Australia, Canada, New Zealand, United States, Europe, Nordic countries, Hong Kong, and the World Stock Market Portfolio<sup>2</sup>. For T-bills and bonds, average annual yields are calculated while for stock markets, average annual dividend, capital gain and total yields are calculated. T-Bill and long term bond yields are from the Bank of Canada and all stock market yields are calculated from the Morgan Stanley International stock market data base.

### *Calculating Income and Capital Gain Yields to Farmland Ownership*

The total return to farmland ownership is divided into two parts; income return and capital gain return. The income return is the portion of the farm revenues or profits that are attributed to the land as opposed to labour and management. The capital gain return is the change from year to year in the market value of the land.

The income return to Canadian farmland is calculated using an average net lease value that could be obtained by a farmland owner for leasing their land<sup>3</sup>. The method used in this study is based on the standard crop share approach, where the land owner receives a percentage of the gross revenues produced (20% of total revenue is used to calculate the gross lease revenue to the farmland owner<sup>4</sup>). The farmland owner is then responsible for paying property taxes, building depreciation and interest on debt used to purchase farmland (but not operating or machinery debt) to arrive at a net lease amount or income return to farmland ownership. Hence, the annual income return per hectare to farmland ownership in Canada is calculated as follows;

$$IR_t = LR_t - PT_t - BD_t \quad (3)$$

Where,

$IR_t$  = income return to farmland per hectare in year t;

$LR_t$  = gross lease revenue per hectare in year t (20% of Gross Farm Revenues);

<sup>2</sup> 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.

<sup>3</sup> Canadian farmland returns are an average of the returns in the five major agriculture producing provinces: Alberta, Saskatchewan, Manitoba, Ontario and Quebec.

<sup>4</sup> 20% is a common crop share arrangement in North America, which compares closely with cash rents that are usually in the 5% - 7% of land values range.

- $PT_t$  = property taxes per hectare in year t;  
 $BD_t$  = building depreciation<sup>5</sup> per hectare in year t;

The annual income and capital gain yields for farmland are calculated as follows:

$$IY_t = \frac{IR_t}{V_{t-1}} \quad (4)$$

Where;

- $IY_t$  = income yield (income return on investment) per hectare in year t;  
 $IR_t$  = income return to farmland per hectare in year t;  
 $V_{t-1}$  = average farmland value per hectare in year t-1.

$$CGY_t = \frac{V_t - V_{t-1}}{V_{t-1}} \quad (5)$$

Where;

- $CGY_t$  = capital gain yield (capital gain return on investment) per hectare in year t;  
 $V_t, V_{t-1}$  = average farmland value per hectare in years t and t-1, respectively.

The annual total investment yield to farmland ownership, or total return on investment, is the sum of the income and capital gain yields, calculated as follows

$$ROI_t = \frac{IR_t}{V_{t-1}} + \frac{V_t - V_{t-1}}{V_{t-1}} \quad (6)$$

## Discussion of Results

Data for this study were derived from a number of sources, including federal and provincial government agricultural departments and agencies, national statistics bureaus, central banks, and Morgan Stanley Capital International. The government agricultural departments provided the farm financial statistics, the central

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<sup>5</sup> The value of farmland includes the value of farm buildings which means that building depreciation is an expense associated with farmland ownership.

banks and statistics bureaus provided interest rates, and Morgan Stanley Capital International provided stock market indices for the selected countries.

Table 1 provides average annual investment yields for the choice set of assets. The risk and return characteristics of Canadian farmland investments show similarities with stock markets in that income yields and risk on farmland are higher but somewhat similar to dividend yields and risk on stock markets. However, capital gain yields and risk on farmland are lower than for stocks, putting total yields and risk on farmland in between bonds and stocks. The investment attraction of farmland appears to be reasonable investment yields with growth potential and relatively low risk, as indicated by the lower coefficients of variation (risk per unit of return) on farmland than on stocks.

**Table 1: Average Annual Investment Yields for T-bills, Long Bonds, Farmland and Stock Markets (1990 – 2007)**

	<u>Income/Div Yield</u>		<u>Cap Gain Yield</u>		<u>Total Yield</u>		<u>Coefficient Of Variation</u>
	<u>Avg Yield</u>	<u>Std Dev</u>	<u>Avg Yield</u>	<u>Std Dev</u>	<u>Avg Yield</u>	<u>Std Dev</u>	
T-bills	N/A	N/A	N/A	N/A	5.0%	0.0%	0.00
Long Bonds	N/A	N/A	N/A	N/A	6.6%	2.0%	0.30
Borrowing	N/A	N/A	N/A	N/A	8.0%	0.0%	0.00
<b>Farmland:</b>							
Canada	4.6%	0.3%	3.7%	2.9%	8.3%	3.1%	0.37
<b>Stock Markets:</b>							
Canada	1.8%	0.5%	9.1%	21.6%	10.9%	21.8%	2.00
Australia	3.0%	0.8%	8.4%	18.5%	11.4%	19.0%	1.67
New Zealand	4.1%	1.3%	3.1%	26.4%	7.1%	27.2%	3.83
United States	1.6%	0.6%	8.4%	17.1%	10.0%	17.4%	1.74
Nordic	1.7%	0.7%	11.0%	28.8%	12.7%	29.2%	2.30
Europe	2.5%	0.7%	8.2%	16.9%	10.7%	17.4%	1.63
World	1.7%	0.4%	5.9%	16.1%	7.6%	16.4%	2.16
Hong Kong	4.2%	1.4%	11.1%	35.0%	15.1%	36.1%	2.39



The other attraction of farmland investment is its low and/or negative correlation with bonds and stocks, which gives it significant diversification advantages for an investment portfolio<sup>6</sup>. Table 2 illustrates the correlation coefficients between the choice assets. Canadian farmland has low correlation with bonds and most of the stock markets but has positive correlation with US stock markets.

The combination of reasonable return, low total risk and low correlation makes farmland attractive for an internationally diversified investment portfolio. Applying the E-V model to the choice set of assets produces the efficient portfolios and Capital Market Line (CML). Figure 2 illustrates the two kinked CML's and shows that there would have been significant improvement in portfolio performance over the study period had farmland been included. The CML (farmland included) shows that at every level of risk, higher returns could have been achieved with farmland as part of the portfolio.

**Table 2: Correlation Matrix for the Choice Set of Assets (1990 – 2007)**

	T-b	L B	C-F	Ca	Au	NZ	US	No	Eu	Wo	HK	Bo
T-bills	1.0											
L Bonds	.84	1.0										
Cda F	.18	.22	1.0									
Cda	-.34	-.39	-.05	1.0								
Aus	-.34	-.33	-.36	.70	1.0							
NZ	-.42	-.16	-.31	.47	.79	1.0						
US	.03	.09	.28	.53	.40	.18	1.0					
Nordic	-.26	-.27	.04	.84	.63	.44	.62	1.0				
Europe	-.21	-.21	.07	.68	.67	.43	.81	.78	1.0			
World	-.25	-.21	.00	.74	.72	.49	.86	.86	.94	1.0		
HK	.10	.10	-.38	.52	.65	.62	.33	.56	.51	.53	1.0	
Borr	1.0	.84	.18	-.34	-.34	-.42	.03	-.26	-.21	-.25	.10	1.0

<sup>6</sup> It is important to note that the low risk and negative correlation is based on a portfolio of farmland from across Canada and does not represent the risk and correlation of individual farmland assets.

**Figure 2: The Capital Market Line with and without Farmland Included (1990 – 2007)**

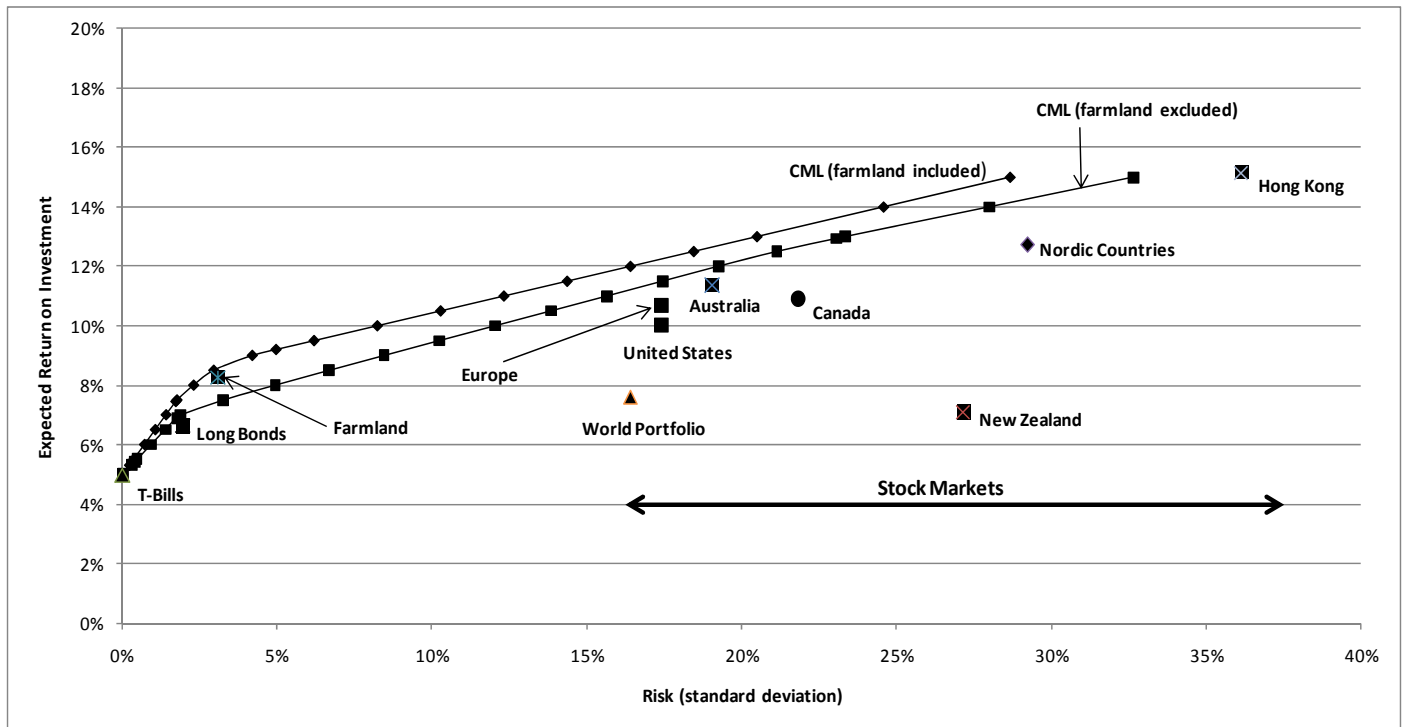


Table 3 provides a comparison of the portfolio compositions between the two CML's. In the low risk category (risk-free rate of return up to 7.0% - 7.5% return) T-bills and long bonds dominate because they are the lowest risk assets. As the return and risk levels are increased (up to the lending tangency portfolio) the T-bills are gradually replaced with long bonds and farmland, as opposed to stocks. The reason for this is that farmland performs better than stocks in the low risk section of the CML. This can be seen in the comparison of risk and return for the tangency portfolios, where the inclusion of farmland provides a higher return and lower risk level at the point of lending tangency. The medium risk category is the section of the CML that is part of the efficient frontier, where there is neither lending nor borrowing. The difference in portfolio performance is large when farmland is included. For example, for a portfolio return of 8.5%, if farmland is included the risk is 2.9% but if farmland is excluded the risk is much greater at 6.7%. In the high risk section of the CML farmland is not as important. To achieve a 14% return, if farmland is included the risk is 24.6% but if farmland is excluded the risk is greater at 28.0%.

**Table 3: Comparison of Portfolio Compositions when Farmland is Included and Excluded (1990 – 2007)**

<b>Low Risk Optimum Portfolios with Farmland Included</b>			
<b>Asset</b>	<b>Asset %</b>		
	<b>Min Risk</b>	<b>Mid level</b>	<b>Lending Tangency</b>
T-bills	100.0%	58.4%	0.0%
Long Bonds	0.0%	23.4%	54.6%
Canada Farmland	0.0%	16.4%	41.1%
Canada Stocks	0.0%	1.3%	3.1%
NZ Stocks	0.0%	0.5%	1.2%
<b>Portfolio Return</b>	<b>5.0%</b>	<b>6.0%</b>	<b>7.5%</b>
<b>Portfolio Risk</b>	<b>0.0%</b>	<b>0.7%</b>	<b>1.7%</b>
<b>Low Risk Optimum Portfolios with Farmland Excluded</b>			
<b>Asset</b>	<b>Asset %</b>		
	<b>Min Risk</b>	<b>Mid level</b>	<b>Lending Tangency</b>
T-bills	100.0%	46.9%	0.0%
Long Bonds	0.0%	49.9%	93.8%
Canada Stocks	0.0%	2.4%	4.5%
Europe Stocks	0.0%	0.8%	1.7%
<b>Portfolio Return</b>	<b>5.0%</b>	<b>6.0%</b>	<b>6.9%</b>
<b>Portfolio Risk</b>	<b>0.0%</b>	<b>0.9%</b>	<b>1.7%</b>

**Table 3 continued: Comparison of Portfolio Compositions when Farmland is Included and Excluded**

<b>Medium Risk Optimum Portfolios with Farmland Included</b>			
<b>Asset %</b>			
<b>Asset</b>	<b>Low End</b>	<b>Mid Level</b>	<b>High End</b>
Long Bonds	51.5%	3.4%	0.0%
Canada Farmland	44.1%	91.5%	86.4%
Canada Stocks	3.1%	1.5%	0.0%
NZ Stocks	1.3%	0.0%	0.0%
Europe Stocks	0.0%	0.2%	4.7%
Hong Kong Stocks	0.0%	3.4%	8.9%
<b>Portfolio Return</b>	<b>7.5%</b>	<b>8.5%</b>	<b>9.0%</b>
<b>Portfolio Risk</b>	<b>1.8%</b>	<b>2.9%</b>	<b>4.2%</b>
<b>Medium Risk Optimum Portfolios with Farmland Excluded</b>			
<b>Asset %</b>			
<b>Asset</b>	<b>Low End</b>	<b>Mid Level</b>	<b>High End</b>
Long Bonds	82.2%	64.6%	55.8%
Canada Stocks	5.0%	4.1%	3.7%
Europe Stocks	10.0%	21.9%	27.8%
Hong Kong Stocks	2.8%	9.4%	12.7%
<b>Portfolio Return</b>	<b>7.5%</b>	<b>8.5%</b>	<b>9.0%</b>
<b>Portfolio Risk</b>	<b>3.3%</b>	<b>6.7%</b>	<b>8.4%</b>

*Table 3 continued: Comparison of Portfolio Compositions when Farmland is Included and Excluded*

<b>High Risk Optimum Portfolios with Farmland Included</b>			
<b>Asset %</b>			
<b>Asset</b>	<b>Borrowing Tangency</b>	<b>Mid Level</b>	<b>High End</b>
Cdn Farmland	82.4%	401.4%	534.9%
Europe Stocks	6.5%	32.3%	43.0%
Hong Kong Stocks	11.2%	55.6%	74.1%
Borrowing	0.0%	-389.3%	-552.1%
<b>Portfolio Return</b>	<b>9.2%</b>	<b>14.0%</b>	<b>16.0%</b>
<b>Portfolio Risk</b>	<b>5.0%</b>	<b>24.6%</b>	<b>32.8%</b>
<b>High Risk Optimum Portfolios with Farmland Excluded</b>			
<b>Asset %</b>			
<b>Asset</b>	<b>Borrowing Tangency</b>	<b>Mid Level</b>	<b>High End</b>
Europe Stocks	49.5%	59.7%	79.6%
Hong Kong Stocks	50.5%	61.5%	81.9%
Borrowing	0.0%	-21.2%	-61.5%
<b>Portfolio Return</b>	<b>12.9%</b>	<b>14.0%</b>	<b>16.0%</b>
<b>Portfolio Risk</b>	<b>23.1%</b>	<b>28.0%</b>	<b>37.3%</b>

## Conclusions

Can investors improve financial performance by adding farmland to their internationally diversified investment portfolios? This study shows that for the period 1990 – 2007, financial performance was significantly improved with the addition of Canadian farmland. A diversified portfolio of Canadian farmland is considered relatively low risk, enters the efficient portfolios at low risk levels and adds the most financial improvement to low and medium risk portfolios. Compared to T-bills and long bonds, farmland has higher risk and yield, but lower risk than stocks. Compared with stocks, farmland has income yields and risk that are similar or better than dividend yields and risk on stocks while farmland has capital gain yields and risk that

are usually lower, on average, than stocks. The low and negative correlation of farmland yields with stocks and bonds make it a good candidate for portfolio diversification benefits.

What are the implications for investors? For farmers, it implies that they should consider owning stocks and bonds to complement their farmland holdings, leasing instead of buying more farmland when they expand. For non-farmers, it implies that they should consider outright purchase of farmland or seek a farmland investment vehicle. Outright purchase of farmland has some drawbacks such as having to manage the lease, less liquidity than financial assets and lumpiness of the asset units (usually in Canada farmland is sold in parcels of 80 or 160 acres, making the total purchase price quite high). Farmland trusts and mutual funds are beginning to appear<sup>7</sup> that provide management, asset divisibility and liquidity, which makes investing in farmland for non-farmers much easier. Farmland trusts inject equity into the agriculture market by purchasing land from retiring farmers and leasing to farmers who want to expand.

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<sup>7</sup> An example is Agriculture Development Corporation in Canada, which has launched a series of limited partnerships to facilitate investments in diversified portfolios of Saskatchewan farmland.

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