

Equity financing and investment opportunities in Canadian primary agriculture

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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 with 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 to 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.

Keywords: Investment portfolio, risk management, diversification, farmland, Canada.

Introduction

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 recognise that it is very costly over the long run because of very low interest rates and high tax rates associated with interest income[1]. 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 and not be subject to huge swings in value, such as recent stock market fluctuations or housing prices?

During the past 25 years, mutual funds have become the choice investment vehicle 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; 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 they 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 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 maximise 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. With the inclusion of borrowing and lending, the efficiency frontier becomes ABCD in Figure 1. Selection of a particular point on this frontier would be as a result of the individual investor's risk-return preferences. A portfolio between B and C is a standard diversified portfolio without borrowing or lending. Between A and B is where the investor reduces the size of the standard portfolio and transfers some funds into a risk-free deposit. Between C and D the investor expands the standard portfolio by borrowing (taking on debt).

A number of studies have been done that assess the risk level and portfolio investment quality of farmland. 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 favourable 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 et al. (1987), as well as Lins et al. (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 et al. (2004 a; 2004 b) 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.

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 minimise 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 minimising investment risk (variance), subject to expected return and wealth constraints.

Minimise $\Sigma X' Q X$ (1)

subject to:

$R_p = C' X$

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, $Cov(r_i, r_j)$;

R_p = portfolio return on investment;

C = Nx1 vector of expected return on investment for N choice assets.

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. The available assets also include fixed interest borrowing and lending.

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 a World Stock Market Portfolio[2]. 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 database.

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[3]. The method used in this study is based on the standard crop share approach, where the landowner receives a percentage of the gross revenues produced (20% of total revenue is used to calculate the gross lease revenue to the farmland owner[4]). 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:

$$IR_t = LR_t - PT_t - BD_t \qquad (2)$$

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);

PT_t = property taxes per hectare in year t;

BD_t = building depreciation[5] per hectare in year t.

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

$$IY_t = \frac{IR_t}{V_{t-1}} \qquad (3)$$

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.

$$CGY_t = \frac{V_t - V_{t-1}}{V_{t-1}} \qquad (4)$$

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:

$$ROI_t = \frac{IR_t}{V_{t-1}} + \frac{V_t - V_{t-1}}{V_{t-1}} \qquad (5)$$

Results and discussion

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 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 combined 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.

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[6]. 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 CMLs and shows that there would have been significant improvement in portfolio performance during 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 3 provides a comparison of the portfolio compositions between the two CMLs. In the low risk category (risk-free rate of return up to 7.0–7.5%) 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%.

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 with 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[7] 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.

References

Bank of Canada, National Financial Statistics. (http://www.bank-banque-canada.ca/en/index.html).

Barry PJ 1980, 'Capital Asset Pricing and Farm Real Estate' *American Journal of Agricultural Economics,* 62: 549–63.

Bigge HM and Langemeier MR 2004, 'Relative Profitability and Risk of Kansas Farms and the S&P 500', *Journal of the American Society of Farm Managers and Rural Appraisers.* American Society of Farm Managers and Rural Appraisers (2004 Journal of ASFMRA), 57–63.

Eves C 2005, Developing a NSW Rural Property Investment Performance Index. *Australian Property Journal*. Vol 38, No. 6, 427–432.

Kaplan HM 1985, 'Farmland as a Portfolio Investment', *The Journal of Portfolio Management,* 11: 73–79.

Libbin JD, Kohler JD and Hawkes JM 2004a, 'Financial and Real Estate Investments in Mixed-Asset Agricultural Portfolios', *Journal of the American Society of Farm Managers and Rural Appraisers.* American Society of Farm Managers and Rural Appraisers (2004 Journal of ASFMRA), 97–107.

Libbin JD, Kohler JD and Hawkes JM 2004b, 'Does Modern Portfolio Theory Apply to Agricultural Land Ownership? Concepts for Farmers and Farm Managers', *Journal of the American Society of Farm Managers and Rural Appraisers.* American Society of Farm Managers and Rural Appraisers (2004 Journal of ASFMRA), 85–96.

Lins D, Kowalski A and Hoffman C 1992, 'Institutional Investment Diversification: Foreign Stocks vs U.S. Farmland', In Proceedings of Regional Research Committee NC-161, Department of Agricultural Economics, Kansas State University, Manhatten, Kansas. February.

Markowitz HM 1959, *Portfolio Selection: Efficient Diversification of Investment*. New York: John Wiley and Sons.

Morgan Stanley Capital International 2008, International Stock Indices. San Francisco, California.

Moss CB, Featherstone AM and Baker TG 1987, 'Agricultural Assets in an Efficient Multi-Period Investment Portfolio', *Agricultural Finance Review,* 47: 82–94.

Newell G and Eves C 2007, The Role of US Farmland in Real Estate Portfolios. *American Real Estate Society Conference*. San Francisco. April, 2007.

Painter MJ 2000, 'Should Saskatchewan Farmland be Part of Your Investment Portfolio?', *Canadian Journal of Agricultural Economics*, Canadian Agricultural Economics and Farm Management Society. 48: 39–50, April 2000.

Painter MJ 2005, 'Returns to Farmland and Farm Labour and Management in Western Canada', *Journal of Farm Management*. Journal of the Institute of Agricultural Management. Volume 12, No. 3. 123–141. University of Reading, United Kingdom. January 2005.

Painter MJ 2006, 'The Financial Benefits of a Canadian Farmland Mutual Fund', *Journal of the American Society of Farm Managers and Rural Appraisers.* American Society of Farm Managers and Rural Appraisers. Vol. 69, No. 1, 40–48. October 2006.

Ruebens J and Webb J 1995, Farmland as an Inflation Hedge. *Real Estate Research Issues*, No. 2, 129–134.

Tobin J 1958, 'Liquidity Preference as Behavior Toward Risk', *Review of Economic Studies*, XXVI, February, 65–86.

Treynor J 1961, 'Towards a Theory of the Market Value of Risky Assets', unpublished manuscript.

Endnotes

[1]At time of writing annual interest rates on government debt securities were less than 2% in Canada and less than 1% in the United States.

[2]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.

[3]Canadian farmland returns are an average of the returns in the five major agriculture provinces: Alberta, Saskatchewan, Manitoba, Ontario and Quebec.

[4]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.

[5]The value of farmland includes the value of farm buildings, which means that building depreciation is an expense associated with farmland ownership.

[6]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.

[7]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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Appendix

Table 1. Average annual investment yields for t-bills, long bonds, farmland and stock markets (1990–2007)

	Income/Div Yield		Cap Gain Yield		Total Yield		Coefficient
	Avg Yield	Std Dev	Avg Yield	Std Dev	Avg Yield	Std Dev	Of Variation
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
Farmland:							
Canada	4.6%	0.3%	3.7%	2.9%	8.3%	3.1%	0.37
Stock Markets:							
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

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

Table 3. Comparison of portfolio compositions when farmland is included and excluded (1990–2007)

Low risk optimum portfolios with farmland included

		Asset %	
Asset	**Min Risk**	**Mid level**	**Lending Tangency**
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%
Portfolio Return	**5.0%**	**6.0%**	**7.5%**
Portfolio Risk	**0.0%**	**0.7%**	**1.7%**

Low risk optimum portfolios with farmland excluded

		Asset %	
Asset	**Min Risk**	**Mid level**	**Lending Tangency**
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%
Portfolio Return	**5.0%**	**6.0%**	**6.9%**
Portfolio Risk	**0.0%**	**0.9%**	**1.7%**

Medium risk optimum portfolios with farmland included

		Asset %	
Asset	**Low End**	**Mid Level**	**High End**
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%
Portfolio Return	**7.5%**	**8.5%**	**9.0%**
Portfolio Risk	**1.8%**	**2.9%**	**4.2%**

Table 3 continued. Comparison of portfolio compositions when farmland is included and excluded

Medium risk optimum portfolios with farmland excluded

		Asset %	
Asset	**Low End**	**Mid Level**	**High End**
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%
Portfolio Return	**7.5%**	**8.5%**	**9.0%**
Portfolio Risk	**3.3%**	**6.7%**	**8.4%**

High risk optimum portfolios with farmland included

		Asset %	
Asset	**Borrowing Tangency**	**Mid Level**	**High End**
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%
Portfolio Return	**9.2%**	**14.0%**	**16.0%**
Portfolio Risk	**5.0%**	**24.6%**	**32.8%**

High risk optimum portfolios with farmland excluded

		Asset %	
Asset	**Borrowing Tangency**	**Mid Level**	**High End**
Europe Stocks	49.5%	59.7%	79.6%
Hong Kong Stocks	50.5%	61.5%	81.9%
Borrowing	0.0%	-21.2%	-61.5%
Portfolio Return	**12.9%**	**14.0%**	**16.0%**
Portfolio Risk	**23.1%**	**28.0%**	**37.3%**

Figure 1. Efficient investment and the capital market line

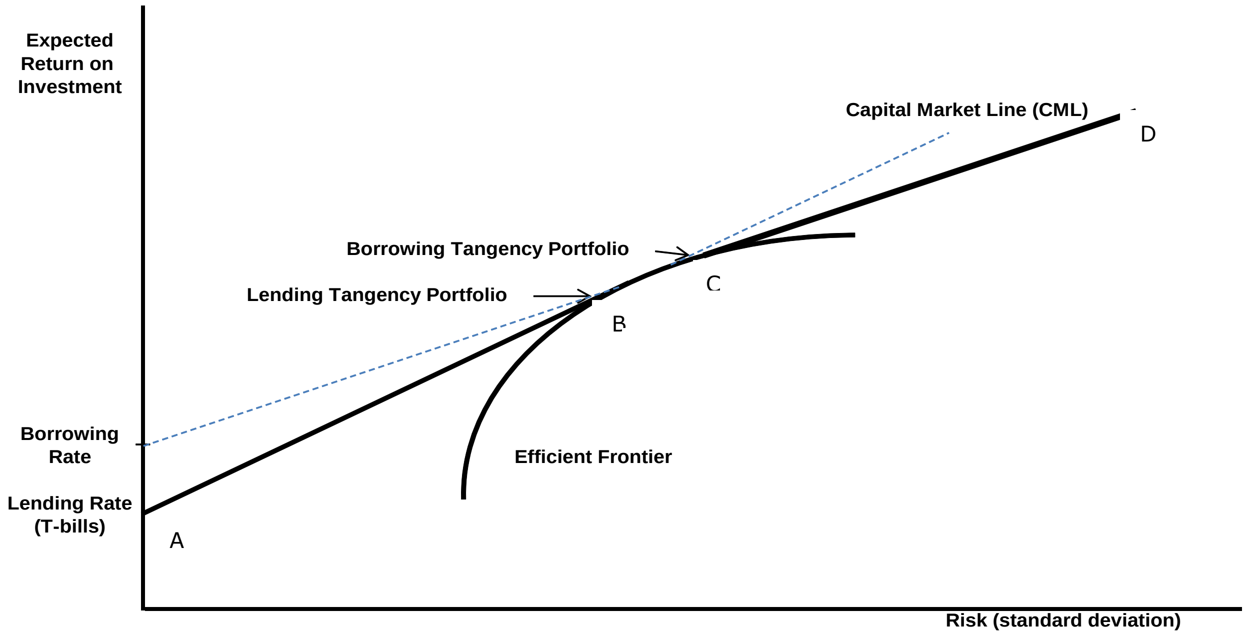

Figure 2. The capital market line with and without farmland included (1990–2007)