AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

ABSTRACT

The years following the 2008 financial crisis have been marked by general economic malaise, yet the period has been relatively prosperous for the agricultural sector. As a result, many investors have recognized the potential for farmland as an investment alternative. This study compares farmland's risk and return to those of competing investment alternatives. Farmland is shown to be an attractive investment alternative with relatively high mean returns, low variability, low correlation with financial markets, and strength relative to other investments following the 2008 financial crisis.

Farmland versus Alternative Investments Before and After the 2008 Financial Crisis

By Todd H. Kuethe, Nicholas Walsh, and Jennifer Ifft

Introduction

Land is one of the most important resources in production agriculture. Farm real estate accounts for more than 80 percent of the total value of farm assets in the United States (Nickerson et al., 2012). In addition, farm real estate is the principal source of collateral for farm loans which enable farm operators to purchase additional inputs and to finance current operating expenses (Nickerson et al., 2012). In recent years, farmland values have increased at record rates in a number of areas throughout the country (Duffy, 2011). The rapid appreciation has garnered the attention of investors outside of the traditional agricultural sector (Ifft & Kuethe, 2011).

Todd H. Kuethe is an Economist at the Economic Research Service of the United States Department of Agriculture. Nicholas Walsh is an Economics Intern at the Economic Research Service and a student at George Washington University. Jennifer Ift is an Economist at the Economic Research Service.

The views expressed are those of the authors and should not be attributed to ERS or USDA.

Nontraditional investors are increasingly drawn to farmland as a result of the chaos in the financial markets following the 2008 recession (Nolan et al., 2011). The so called "Great Recession" had widespread impacts across the world's financial system. While most of the economy is still struggling to overcome the adverse effects of the recession, the agricultural sector has been relatively prosperous with rising farm incomes, high commodity prices, and increased export activity (Sundell and Shane, 2012). Economic theory suggests that as farm incomes increase (through high commodity prices and increased exports), farmland values rise.

This study demonstrates why farmland is such an attractive investment alternative in the wake of the recent financial crisis by comparing farmland's returns to those of alternative investments. The study examines the quarterly returns to farmland and competing investments in the wake of the 2008 financial crisis (2008-2011). For the purposes of comparison, we also examine returns in the four years leading up to the financial crisis (2004-2007).

Data

For the purposes of our analysis, farmland returns were measured using the National Council of Real Estate Investment Fiduciaries (NCREIF) Farmland Index. The NCREIF Farmland Index is a quarterly series of composite returns of a large pool of individual agricultural properties acquired, in part or in full, for investment purposes on behalf of tax-exempt institutional investors. It is important to note that the index represents a broad set of agricultural properties, and as a result, the index may not accurately reflect the risk and return of any individual parcel of farmland. Instead, it represents general price behavior of agricultural lands in aggregate. The return series includes both net operating income ("income return") and appreciation. In other words, the index represents both the change in asset value and rental income typically associated with farmland values. The NCREIF Farmland Index is freely available on the organization's website beginning in the first quarter of 1992. Hennings, Sherrick, and Barry (2005) employ NCREIF data to demonstrate that including farmland improves an investment portfolio's risk efficiency.

The composite returns of the NCREIF Farmland Index are compared to the returns of several competing investments. All of the quarterly series were obtained from the St. Louis Federal Reserve's Federal Reserve Economic Data (FRED) database. The three-month Treasury rate (or T-bill) is a debt financing instrument of the United States federal government. The T-bill is an attractive investment alternative because it offers limited risk exposure and offers fairly consistent, yet moderate, return. Gold is, in many ways, a perennial benchmark by which other (non-productive) assets are measured. Gold prices obtained by FRED were determined by the 3:00 p.m. gold fixing by the London Bullion Market Association. Two stock market indices were selected to represent the returns of investing in traditional financial markets. It is important to note that each index represents a relatively broad financial portfolio. As a result, the indices do not reflect the risk (or potential reward) of investing in individual stocks. The Dow Jones Industrial Average is a composite of 30 large, publicly owned

companies based in the United States, and Standard & Poor's S&P 500 index is an even broader composite of the common stock price of 500 top publicly traded American companies.

Analysis

The 2008 financial crisis caused widespread declines in much of the world's leading economies. In the United States, the consequences of the financial crisis were observed in most sectors of the economy. However, this period was relatively prosperous for the agricultural sector, and this period of relative prosperity is reflected in agricultural real estate values.

Comparing Returns

Quarterly farmland returns from 1992 through 2011 are depicted in Figure 1 (solid line). Two competing investments are also depicted: gold (dashed line) and the Dow Jones Industrial Average (dotted line). The figure shows that farmland returns have been comparatively stable and consistently positive since the start of the observation period. The figure also delineates the pre-crisis and post-crisis periods defined as the four years leading up to and the four years following the 2008 financial crisis. In the pre-crisis period farmland returns were often greater than those of the competing investments, yet the returns were also more variable than previously observed. Following the crisis, farmland returns appear to be more stable. They remain consistently positive, yet the spikes in returns did not reach the high returns available to active traders of gold or stocks.

Table 1 provides a comparison of the farmland index and the returns of the alternative investments. When one compares the returns across the entire observation period, farmland performs slightly better than gold, the Dow, and S&P 500. (The risk-free rate is used in a later section of the analysis and is outlined below.) The returns to farmland have a higher mean and a lower variance. However, the returns fared poorly compared to the three month treasury rate which offered the highest mean return *and* the lowest standard deviation.

Isolating just the post-crisis environment, the mean return to farmland at 2.78 percent was greater than that of all competing investments except gold at 5.15 percent. However, the farmland returns exhibited a much smaller standard deviation than gold (2.47% compared to 7.59%). Thus, to say that farmland is preferred to gold requires assumptions of the investor's risk preference. Farmland may be favored by risk-averse investors who wish to avoid highly variable returns, yet they do so at the expense of potentially higher mean returns. Farmland returns, however, were always positive, with a minimum return at 0.67 percent, where gold's minimum return was -8.82 percent. Thus, farmland offers a particularly safe investment when the investment horizon is unknown. The mean return for the Dow Jones was small but positive (0.03%), and the mean return for the S&P 500 was negative (-0.30%). In addition, both the Dow and S&P 500 had periods of extreme negative returns with minimum quarterly returns of -19.10 percent and -22.56 percent, respectively.

Farmland was the preferred investment in the four years leading up to the financial crisis with a mean return of 4.79 percent with a standard deviation of 5.56 percent. Figure 2 provides a visualization of

the mean and standard deviation of returns across the investment alternatives. In the years leading up to the financial crisis, farmland offered the highest mean return, yet the standard deviation was also higher than S&P 500 and the Dow. Following the financial crisis, mean farmland returns are only exceeded by the mean returns for gold. However, gold also carries a larger variability in mean returns.

The summary statistics suggest that the relative attractiveness of farmland following the 2008 financial crisis may be less a result of its merits and more attributable to the poor performance of other investment alternatives. Farmland may be strictly preferred in the pre-crisis period with high mean returns with low variance. However, the extremely risk-averse investor may still prefer to invest in T-Bills which offer extremely low variance returns.

Comparing Risk

In a marketplace, investors must be compensated for tolerating additional risk. The payment or risk premium is paid to investors to compensate for the probability that an asset's return differs from what is expected. A key element of successful risk management is understanding which portion of the variability of the returns to a particular asset could be mitigated by investing in a well-diversified portfolio. However, a certain amount of risk is unavoidable because widespread economic conditions may affect all asset classes.

Although variance provides an intuitive measure of how an asset's returns fluctuate over an investment horizon, it offers an incomplete measure of an asset's riskiness. Economists call the portion of the variability of an asset's returns that can be mitigated by investing in a well-diversified portfolio *diversifiable risk*. Part of the risk an investor faces by purchasing farmland cannot be avoided because of the common market forces that affect all asset classes. This is typically called the *non-diversifiable* risk.

The single index model (SIM) was developed by Sharpe (1963) to measure the risk and return of individual investments relative to a well-diversified portfolio. The model has been widely adopted by financial analysts, and has been applied to studies of the agricultural sector by Turvey, Driver, and Baker (1988), Gempesaw et al. (1988), and Baker, Kuethe, and Hubbs (2009).

The single index model takes the form:

$$r_{it} - r_f = \alpha_i + \beta_i (r_{mt} - r_f) + \varepsilon_{it}$$

where r_{it} is the return to asset i in period t, r_f is the risk free rate of return, and r_{mt} is the return to the market portfolio in period t. The asset's abnormal return is captured by alpha (α_i), and its responsiveness to the market return in measured by beta (β_i). The remaining portion of the excess return that cannot be explained by the model is captured in the regression residual (ε_{it}).

In an efficient market, alpha is expected to be zero, yet a positive (negative) alpha suggests the asset offers a return in excess of (below) the reward for the assumed risk of the market. Beta measures the portion of the asset's variance that cannot be removed through diversification. When beta is greater than zero, the asset's returns follow the market's returns, and when beta is less than zero,

the asset's returns move opposite of the market's returns. In addition, when beta is positive but less than one, it suggests that the expected return of the investment is less than that of the well-diversified portfolio, and a beta greater than one implies its returns are greater than those of the market.

For the purposes of our analysis, the market return is measured by the return of the S&P 500. The index is commonly believed to be the best representation of financial markets and a bellwether of the nation's economy. In addition, the risk free rate of return in measured by the one-month treasury rate obtained from Ibbotson and Associates, Inc.

Table 2 reports the estimates of alpha and beta through ordinary least squares. The results suggest that in the four years following the 2008 financial crisis, farmland (as measured by the NCREIF Farmland Index) exhibited statistically significant excess returns. In other words, the return was in excess of the reward for the assumed risk of investing. However, this relationship was not observed in the four years leading up to the financial crisis. In addition, the beta estimate is *not* statistically significant in either the pre- or post-crisis period. This implies that farmland returns are uncorrelated with those of the market (as measured by the S&P 500).

Following the 2008 financial crisis, both the three-month T-Bill and gold exhibited significant excess returns (significant and positive alpha) and were uncorrelated with excess market returns. The Dow Jones Industrial Average, however, did not exhibit excess returns (insignificant alpha) and it was correlated with market returns at a statistically significant level. The correlation is expected because both indexes measure changes in company stocks. The estimated beta coefficient is less than one which suggests that the Dow's returns were less than those of the market, as defined by the S&P 500.

The SIM results for the pre-crisis period closely follow those of the post-crisis environment. The notable exception is the farmland index returns. In the pre-crisis environment, both alpha and beta were not statistically significant. Farmland failed to earn a significant excess return, yet the returns were uncorrelated with those of the market.

There are two important caveats for comparing the returns suggested by the NCREIF Farmland Index and the other investment alternatives. First, as previously mentioned, the index represents a broad set of agricultural properties, and as a result, the index may not accurately reflect the risk and return of any individual parcel of farmland. It is difficult for most investors to own a diversified pool of land assets. Second, the returns reported by NCREIF include both net operating income and appreciation. The returns of the other investments include only appreciation, and as a result, the returns to farmland may appear higher because of the two sources of return.

Conclusions

Farmland plays a critical role in the financial health of the agricultural sector. Farm real estate accounts for more than 80 percent of the total value of farm assets in the United States, and it is the principal

source of collateral for farm loans (Nickerson et al., 2012). The record appreciation rates observed in recent years, combined with the general malaise across many of the other sectors in the economy, have led to increased attention from investors outside of the traditional agricultural sector (Ifft & Kuethe, 2011).

Previous studies have shown that farmland has a low correlation with other assets and may serve as a hedge against inflation (Hennings, Sherrick, and Barry, 2005). As a result, farmland may play a favorable role within an investment portfolio (Noland et al., 2011).

Our analysis compares the returns to farmland with those of several competing investments. The results demonstrate that farmland offers a relatively high mean return with limited variability. In addition, risk analysis demonstrates that farmland offers returns in excess of the assumed risk, and farmland returns are uncorrelated with those of the market. This relationship has only strengthened following the 2008 financial crisis. The only asset class examined which offered a higher mean return is gold, yet it also bares a much higher variability in returns. As a result, farmland would be the preferred investment for risk-averse investors who seek opportunities with low variability in returns. This preference is strengthened by the observations that, in every quarter following the start of the financial crisis, farmland has offered a positive return.

It is important to note that during both the pre-crisis and post-crisis periods, farmland returns were positive and farmland values were generally increasing (Figure 1). However, as anyone who lived through 1980s farm crisis can attest, farmland values are not guaranteed to increase forever, and a number of conditions could lead to a decrease in agricultural land values. The literature demonstrates that farmland values are determined by a complex set of factors including agricultural returns, urban influence, and government programs (Nickerson et al., 2012), and as economic and policy conditions change, farmland values are likely to respond. The 2012 drought, for example, accompanied a slower appreciation in agricultural land values in the Midwest even though aggregate values continued to rise (Oppedahl, 2012). There is also a great deal of uncertainty for policies that have been shown to affect agricultural land values including the farm safety net (Ifft et al., 2012), the ethanol mandate (Towe & Tra, 2012), and tax policy (Dillard et al., 2013). As a result, many economists warn that the unprecedented rate of return cannot be expected to continue indefinitely.

References

Dillard, J.G., T.H. Kuethe, C. Dobbins, M. Boehlje, and R.J.G.M. Florax (2013) "The Impacts of the Tax-Deferred Exchange Provision on Farm Real Estate Values" *Land Economics*, forthcoming.

Duffy, M.D. (2011) "The Current Situation on Farmland Values and Ownership" *Choices* 26 (2).

Gempesaw, C.M., A.M. Tambe, R.M. Nayga, and U.C. Toensmeyer (1988) "The Single Index Market Model in Agriculture" *Northeast Journal of Agricultural and Resource Economics* 17 (2): 147-155.

Hennings, E., B.J. Sherrick, and P.J. Barry (2005) "Portfolio Diversification Using Farmland Investments" Selected Paper Prepared for Presentation at the American Agricultural Economics Association Annual Meeting. Providence, RI.

Hubbs, T., T.H. Kuethe, and T.G. Baker (2009) "Evaluating the Dynamic Nature of Market Risk" Proceeding of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, St. Louis, Missouri.

Ifft, J., C. Nickerson, T. Kuethe, and C. You (2012) "Potential Farm-Level Effects of Eliminating Direct Payments" *Economic Information Bulletin EIB-103*, USDA Economic Research Service.

Ifft, J. and T. Kuethe (2011) "Why Are Outside Investors Suddenly Interested in Farmland?" *Agricultural and Resource Economics Update* 15 (1): 9-11.

Nickerson, C., M. Morehart, T. Kuethe, J. Beckman, J. Ifft, and R. Williams (2012) "Trends in U.S. Farmland Values and Ownership" *Economic Information Bulletin EIB-92*, USDA Economic Research Service.

Noland, K., J. Norvell, N.D. Paulson, and G.D. Schnitkey (2011) "The Role of Farmland in an Investment Portfolio: Analysis of Illinois Endowment Farms" *Journal of the ASFMRA* 74 (1): 149-161.

Oppedahl, D.B. (2012) "Farmland Values and Credit Conditions" *AgLetter* No. 1958.

Sharpe, W.F. (1963) "A Simplified Model for Portfolio Analysis" *Management Science 9* (2): 277-293.

Sundell, P. and M. Shane (2012) "The 2008-2009 Recession and Recovery" *WRS-1201* USDA Economic Research Service.

Towe, C. and C.I. Tra (2012) "Vegetable Spirits and Energy Policy" *American Journal of Agricultural Economics* 95(1): 1-16.

Turvey, C.G., H.C. Driver, and T.G. Baker (1988) "Systematic and Nonsystematic Risk in Farm Portfolio Selection" *American Journal of Agricultural Economics* 70: 831-836.

Table 1. Quarterly Returns to Farmland and Alternative Investments through Three

	Mean	Standard Deviation	Minimum	Maximum
	Quarterly returns from 1992 – 2011			
Farmland	2.76	3.28	– 0.01	22.78
Treasury	3.14	1.94	0.01	6.02
Gold	2.11	5.86	– 8.82	17.62
Dow	2.01	7.86	– 19.10	17.10
S&P 500	1.73	8.28	– 22.56	20.87
Risk Free	0.78	0.49	0.00	1.57
	Quarterly returns from 2004 – 2007			
Farmland	4.79	5.56	0.74	22.78
Treasury	2.92	1.60	0.92	4.98
Gold	4.71	5.72	– 3.72	15.60
Dow	2.47	5.09	– 4.50	12.70
S&P 500	2.70	4.96	– 3.82	14.89
Risk Free	0.72	0.42	0.22	1.25
	Quarterly returns from 2008 – 2011			
Farmland	2.78	2.47	0.67	8.70
Treasury	0.43	0.65	0.01	2.04
Gold	5.15	7.59	– 8.82	17.62
Dow	0.03	10.60	– 19.10	15.00
S&P 500	– 0.30	11.72	– 22.56	15.22
Risk Free	0.12	0.19	0.00	0.53

Farmland values were obtained from the National Council of Real Estate Investment Fiduciaries (NCREIF) Farmland Index. All other series were obtained from the St. Louis Federal Reserve's Federal Reserve Economic Data (FRED) database.

Table 2. Single Index Model Results for Investment Alternatives Before and After the 2008 Financial Crisis

	Alpha		Beta	
	2004 – 2007			
Farmland	1.35		0.26	
	(0.01)		(0.50)	
Treasury	2.30	***	– 0.05	
	(0.29)		(0.05)	
Gold	4.57	***	– 0.29	
	(1.35)		(0.26)	
Dow	– 0.18		0.97	***
	(0.38)		(0.07)	
	2008 – 2011			
Farmland	2.66	***	0.00	
	(0.64)		(0.06)	
Treasury	0.30	**	– 0.01	
	(0.12)		(0.01)	
Gold	5.02	**	– 0.02	
	(1.97)		(0.17)	
Dow	0.28		0.89	***
	(0.56)		(0.05)	

*$\alpha \leq 0.10$, **$\alpha \leq 0.05$, ***$\alpha \leq 0.01$

Figure 1. Quarterly Returns from Farmland, Gold, and Dow Jones Stocks, U.S. 1992-2011

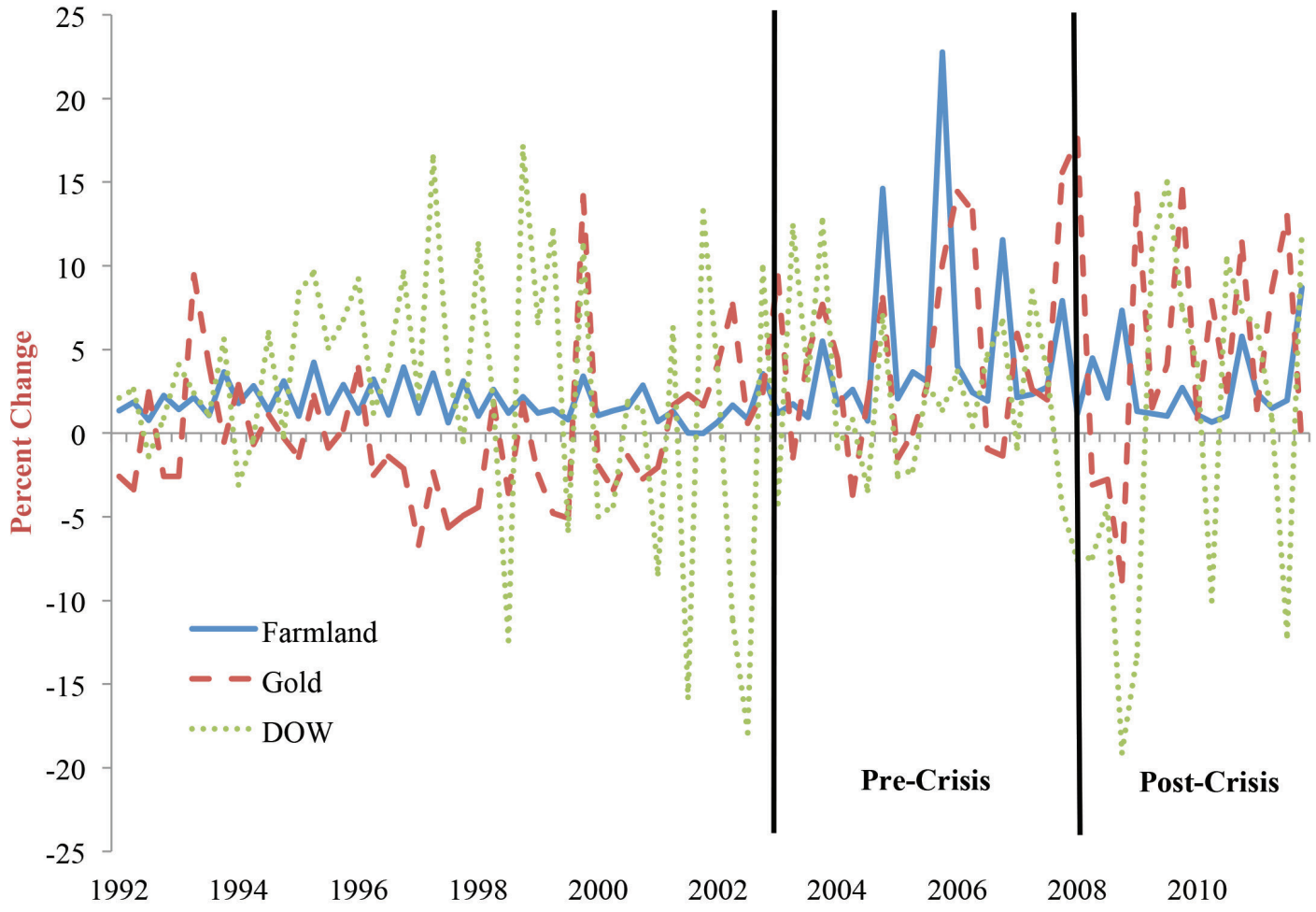
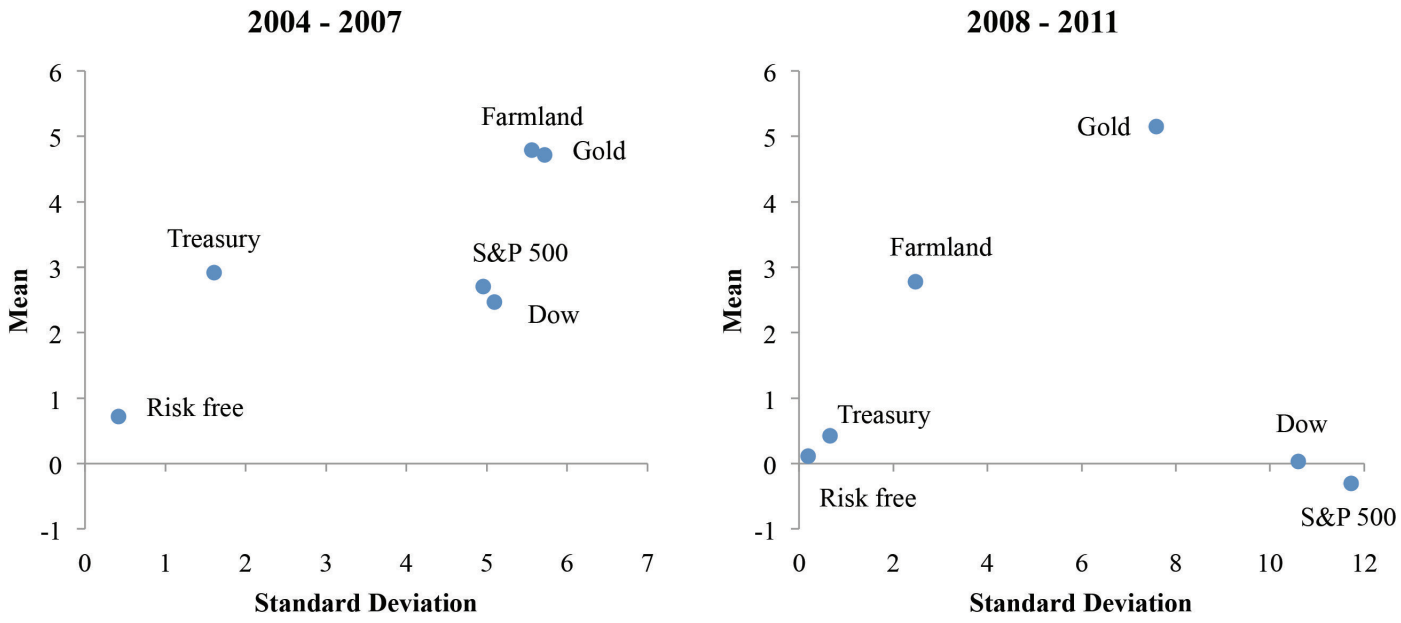
Figure 2. Mean and Standard Deviation of Quarterly Returns from Farmland and Alternative Investments Before and After the 2008 Financial Crisis