

Mixed Asset Portfolio Implications of Agricultural Real Estate

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Mixed Asset Portfolio Implications of Agricultural Real Estate Overview

As U.S. pension funds have become more familiar with conventional equity real estate, they have begun to consider other forms of real estate investing such as mortgages and non-traditional property types. Until recently, pension funds have rarely strayed beyond "institutional grade" office, retail, industrial, apartment and hotel properties. However, their growing understanding of real estate, coupled with a desire to achieve better portfolio diversification and higher risk adjusted returns has developed an appetite for a wider array of real estate based products and manager styles. Niche funds are now available for myriad products and styles including development, renovation, second tier markets, economically targeted investing, mortgages, timberland and agricultural land.

Agricultural land is currently of particular interest because the fundamentals for the property type are solid. Agricultural investments suffered a severe depression during the mid-1980s

due to a variety of reasons including overleveraging, high interest rates on floating rate mortgages, stagnant demand and weak exports as a result of a strong dollar. However, starting in 1987 the industry began to regain its footing, with debt loads greatly reduced, interest rates down and the dollar considerably weakened. This would appear to be a good time to consider agricultural land for pension fund investment.

Of course, the worth of an investment class to a pension fund is not solely a function of the return potential of the investment. More importantly, one must consider the impact that the addition of the new asset class will have on the overall level and volatility of the entire mixed asset portfolio. In this paper we discuss some of the

results of our ongoing research into the potential contribution of agricultural land to mixed asset portfolios using historical data.

Methodology and Results

Annual total return data, obtained from Ibbotson Associates, were examined for the period from 1960 through 1990 for the S&P 500, long term corporate bonds, long term government bonds, Treasury bills, equity real estate and agricultural land. On a compound basis, agricultural land achieved an average annual return of 11.1% over this 31 year period, which was the highest of the asset classes studied (see Exhibit I). The next closest asset class in terms of annual total return was the S&P 500 at 9.8%. In addition, agricultural land's

8.0% standard deviation was lower than all but T-bills and equity real estate which results in a highly competitive "risk-adjusted" return (return divided by standard deviation) of 1.39 for agricultural land.

As noted, the real question to be asked is not how agricultural land has performed in isolation, but **instead, how it might** impact a mixed asset

Exhibit I Mixed Asset Performance 1960 to 1990			
Asset Class	Total Return	Standard Deviation	Risk Adjusted Return
S&P 500	9.8%	15.8%	0.62%
LT Corporate Bonds	6.9%	11.1%	0.62%
LT Government Bonds	6.4%	10.9%	0.59%
30 Day Treasury Bills	6.4%	2.9%	2.22%
Equity Real Estate	8.5%	5.0%	1.70%
Agricultural Land	11.1%	8.0%	1.39%
Inflation	5.9%	3.4%	1.48%

portfolio in terms of diversification. A key input for this analysis is the cross-correlation of returns between asset classes. By combining two or more assets with imperfectly correlated returns, one can reduce overall portfolio volatility at any given level of return.

Exhibit II shows the correlations of returns between agricultural land and the above mentioned asset classes from 1960 to 1990. Agricultural land offered significant diversification benefits over

Exhibit III is a graph of four efficient frontiers for portfolios constructed with the 1960 to 1990 data for the S&P 500, corporate bonds, government bonds, Treasury bills, equity real estate and agricultural land. In this exhibit, each efficient frontier line represents a different level of constraint on the agriculture allocation, ranging from 0% to 10%. None of the other asset classes are constrained. Note that there is a significant shift in

the efficient frontier lines toward the upper left corner as the allocation to agricultural land is increased. This implies that agricultural land would have made a positive contribution to a mixed asset portfolio over the 1960 to 1990 period. For example, at a 10% expected portfolio standard deviation, each 1% increase in the agricultural land allocation added approximately 3 basis points to the overall efficient portfolio return.

Exhibit IV is similar to Exhibit III

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Exhibit II
Mixed Asset Correlations
1960 to 1990

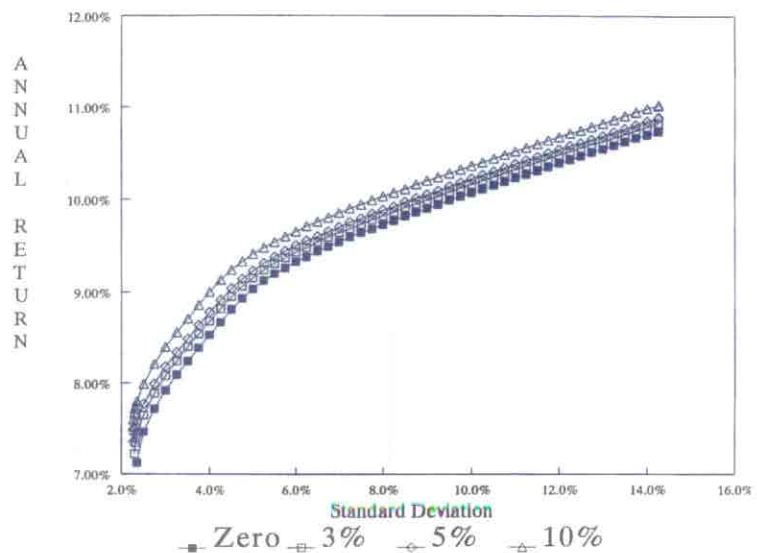
	S&P	Corp Bnd	Gov Bnd	TBills	Real Est	Agr. Land	Inflation
S&P 500	100.0%						
LT Corporate bonds	39.4%	100.0%					
LT Government bonds	27.9%	95.8%	100.0%				
30 Day Treasury Bills	-1.4%	11.3%	15.5%	100.0%			
Equity Real Estate	14.5%	-6.1%	-5.3%	67.4%	100.0%		
Agricultural Land	-19.0%	-52.6%	-55.7%	-26.0%	6.2%	100.0%	
Inflation	-22.6%	-33.7%	-29.4%	66.3%	64.2%	42.9%	100.0%

this time period, as evidenced by a 19% correlation with stocks, 53% with corporate bonds, and 56% with government bonds. Additionally, agricultural land provided some inflation protection with a 43% correlation with inflation.

The actual impact of agricultural real estate on a mixed asset portfolio can be quantified by creating "efficient portfolios." In an efficient portfolio, asset classes are weighted in such a manner that expected portfolio returns are maximized at a given level of expected portfolio volatility or, conversely, expected portfolio volatility is minimized at a given level of expected portfolio return. The spectrum of available efficient portfolios for a set of asset classes can be arrayed graphically along an "efficient frontier" line with expected returns on the Y axis, and standard deviation of returns (volatility) on the X axis.

Exhibit III

Mixed Asset Efficient Frontiers
With Only Agricultural Land Constrained
1960 to 1990



Mixed Asset Portfolio Continued from page 15

except that the upper constraints are set for all the other asset classes as follows: S&P 500, 75%; corporate bonds, 50%; government bonds, 40%; Treasury bills, 20%; real estate, 20%. These constraints are more representative of those that a pension fund might set and thus, Exhibit IV is more realistic than Exhibit III. Note that the incremental increase in the agricultural land allocation has an even greater portfolio impact than seen previously. For example, at a 10% efficient portfolio standard deviation, the portfolio return ranges from 9.84% at a 0% agricultural land allocation to a 10.27% return at a 10% allocation. That is, each 1% increase in the agricultural land allocation added an average of 4.3 basis points to the overall portfolio risk adjusted return.

Conclusion

Obviously, historical performance is not necessarily indicative of future performance and should only be used as an input for developing expected future asset class returns and volatilities. At the same time, one cannot ignore history, and the past performance of agricultural land in both absolute and relative terms was very competitive. This is particularly apparent when agricultural land's impact on the overall portfolio is considered.

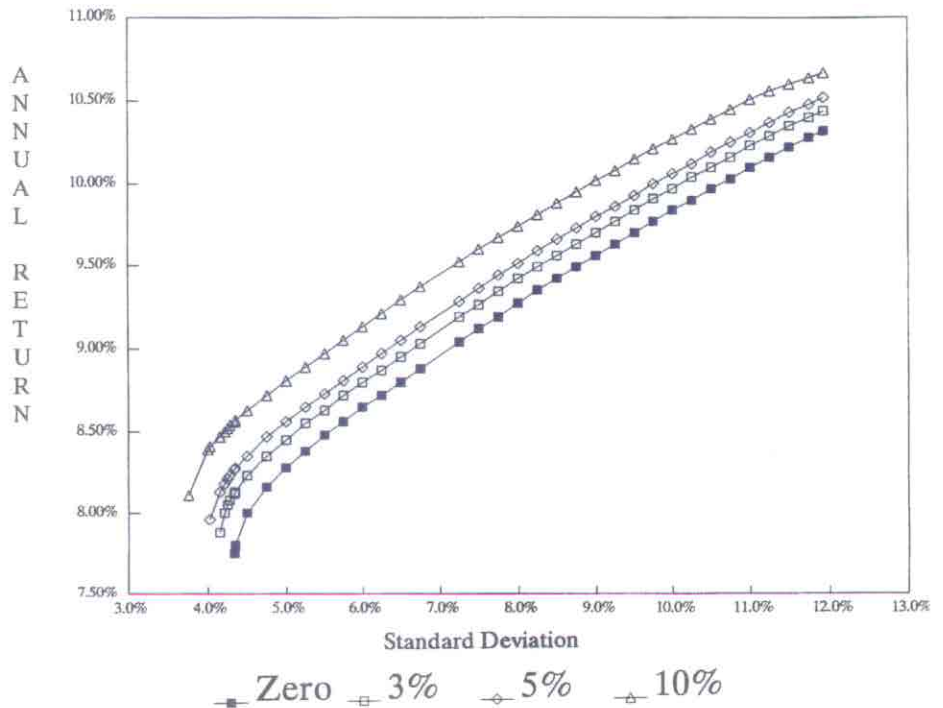
Like equity real estate, agricultural land benefits from being an inefficient asset class in terms of market information. This creates the

potential for savvy investors to capture above normal profits from a return/risk perspective. Although an increased level of investor appetite for agricultural

land will make the market somewhat more efficient, it should remain an attractive asset class for experienced participants. ■

Exhibit IV

Mixed Asset Efficient Frontiers With All Asset Classes Constrained 1960 to 1990



Asset Class Constraints:

- S&P 500 - 75%
- Corporate Bonds - 50%
- Government - 40%
- TBills - 20%
- Real Estate - 20%
- Agriculture - see legend, above.

Source: Ibbotson Associates