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What's the ticker symbol for farmland?

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Abstract

Purpose – Relatively high recent returns to farmland investments have led to substantially elevated interest in farmland investments. Absent, however, is a well-functioning equity market in farmland real estate, or well-developed indexes of farmland returns that might contribute to the development of tradable shares tied to farmland returns, or to methods to hedge the value of owned agricultural assets. The purpose of this study is to empirically present relevant measures related to farmland returns and other financial assets to provide a broad context for evaluation of farmland investments in a portfolio context. Issues related to the development of a farmland fund and index construction are discussed along with major risk and transactional factors that are somewhat unique to the asset class.

Design/methodology/approach – Returns data from a broad set of financial categories and broad set of agricultural returns measures are developed and presented in multiple frameworks to convey temporal persistence, relatedness, and portfolio considerations related to farmland. Issues related to the construction of claims based on agricultural assets are discussed.

Findings – Agricultural real estate investments have performed well compared to most other financial assets on most traditional measures of risk adjusted performance. However, the difficulties in direct investment remain and the need to develop securitized conduit exposures to farmland returns is identified.

Originality/value – The study presents a unique set of farmland returns measures and examines the stability of the statistics used to describe these through time. Novel characterizations of the data compared to traditional assets helps investors and asset owners accurately understand the exposure to farmland returns.

Keywords Farmland, Investment performance, Portfolio, Correlation, Returns, Farms, Investments, Portfolio investment

Paper type Research paper

Introduction

Farmland investments have been the subject of academic investigations for decades, both as an investment in isolation as well as in the context of a portfolio of other investments. Studies of the determinants of farmland value have focused on attributes that contribute to the fundamental value of farmland, like commodity prices,

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government program payments, and productivity measures (Klinefelter, 1973; Duncan, 1977; Huang *et al.*, 2006). Present value models formalized the theory behind these intuitive determinants, providing a theoretical link between the stream of income generated through cash rent and the value of the farmland itself. However, such studies often revealed a "puzzle" in that farmland values could not consistently be attributed to the stream of future cash rent payments (Falk, 1991; Falk and Lee, 1998; Moss, 1997). Expanding on earlier work that compared the returns to investment in farmland to the returns of common stock and other alternative investments (Kost, 1968; Gertel and Lewis, 1980), Barry (1980) formalized the notion of farmland as an investment class in an equilibrium capital market. Specifically, Barry and others (Irwin *et al.*, 1988; Moss and Katchova, 2005) formalized the treatment of farmland as an investment and applied traditional financial theory to evaluate the returns in a portfolio context, and within CAPM and its extensions. Others have improved conventions related to the measurement and treatment of land returns and values with examinations of income expectations, discounting techniques, non-pecuniary contributions to value, role of government programs, impacts of market conditions, and so forth; and have done so against a broad set of alternative investments across differing time periods, and by agricultural typology. In virtually every case across the majority of periods examined, and under the bulk of the characterizations of returns, the summary message has been that farmland compares favorably with most other common asset classes both in actual returns measures, relative risk, and in terms of the diversification benefits offered by its low correlation with other financial assets and its inflation hedging potential.

The implications of the findings of superior returns are then difficult to square against empirics in several ways, unless there are additional market, or institutional frictions that prevent low-cost investment. For example, efficient frontiers calculated against typical asset groupings show "optimal" holdings of farmland to be far greater than empirically observed. Common caveats include that property specific returns are simply too difficult to capture in a diversified manner, or the lumpiness of the investment makes rebalancing costly and so forth. Additionally, transactions costs are higher with real assets, holding periods tend to be longer, but tax management of capital gains in particular is simpler with real assets. The data periods matter to some degree as the period of the early 1980s was particularly poor for farmland, but with reasonable length intervals, most other assets have at least one similar period and thus, for at least the past decade, farmland appreciation rates are relatively high and stable. In particular, the period from the post 2000 *dot com* bubble witnessed a large resurgence in interest by institutional investors and by individuals whose comparable financial investments retreated precipitously. Many agricultural economists again noted the relatively superior performance of farmland investments in the abstract and often aggregate sense, with little direct advice for how to capture these, and the requisite caution against interpreting the results as direct advice to invest in farmland even if it were possible due to market frictions and liquidity issues. Commonly cited "new" explanations added to explain continued "excess" returns include the ethanol influence, world food demand increases, emergence of new middle classes in previously less developed parts of the world, and so on.

Beginning in early 2008, the financial and real markets experience unprecedented turmoil, with swings in returns and market values many orders of magnitude greater than at any point in time in the available direct memories of most investors. What is now often

simply referred to as "the financial crisis" has its origins typically attributed to declining housing prices and resulting increases in subprime mortgage delinquencies and the cascading effects through securitized credit exposure and highly leveraged funding conduits through undercapitalized investment banking channels (see Paulson and Sherrick, 2009; Ellinger and Tirupattur, 2009 for more extensive discussions of linkages to agriculture). The direct default experiences of firms peaked shortly thereafter, yet we are still experiencing remnants of the associated recession, and there is no obvious way to describe or forecast the ultimate duration of the related effects. In response to the crisis, the role of the federal government apparently forever changed, both in terms of direct intervention and investment, and in terms of regulatory design and active oversight of financial firms. The historic distinctions among investment banks, brokerage houses, and traditional banking channels are largely gone. The actual and *de facto* government takeovers of government sponsored enterprises as well as the use of direct (though perhaps temporary) government equity stakes in private companies has been argued to have fundamentally and permanently altered the relationship between fixed-income and equity investment returns. These events have led to significant reconsiderations of many of the long-held tenets of modern portfolio and investment theories.

The previously axiomatic "equity premium" is difficult to discuss in serious terms in light of the past four years; the "buy and hold" strategies that dominated thinking by many efficient market economists are being reconsidered; and questions about structural realignments between risk and return under assumptions of complete market efficiency seem potentially relevant to question as well.

What seems to have survived this adjustment period relatively unscathed has been the agricultural sector investments. Farmland values have experienced double digit annual gains across the corn belt for several years, and farm income numbers have continued to increase as well. Interestingly, even in the face of the worst drought in decades, USDA forecasts farm income, inclusive of insurance, to again set a record in 2012. What is also unchanged, is that there is no well-functioning equity market for farmland investments. With over $2 trillion in domestic value alone, it is perhaps the single largest asset class that has not had a fundamental securitization model emerge to allow investor exposure, short of direct ownership and management.

Questions about acquisitions, how to develop "tradable shares" in agricultural real estate, and other efforts to create meaningful holdings by large long term money managers have flooded in over the past few years and questions also raised about revaluation pressures and risks that often follow what was increasingly being viewed as unsustainable returns. In light of these issues, and the simple need to re-evaluate empirical issues every so often, it seems useful to again examine the performance of farmland investments, and to put them into context against their own histories, and in a more diversified portfolio of holdings as well. The ultimate goal is to help contribute to a continued maturation of the farmland markets, and improve the information available for informed investment management.

The questions that have motivated prior examinations are still relevant including:

- how should returns to agricultural real estate be measured;
- how variable are the returns;
- how does an investment impact the total risk/return profile in conjunction with holdings of other assets; and

- what are the institutional and market differences in real investments compared to financial investments.

Answers to these questions, along with investor preferences may provide useful guidance in evaluating potential farmland investments relative to a wide variety of other financial assets for the future.

In what follows, Illinois farm real estate investments are emphasized, although the results are largely unchanged regardless of the location examined in the Midwest. Data are taken from USDA and ERS survey sources, but have also been validated repeatedly against the Illinois Farm Business Farm Management record keeping association and found to be reliable (though generally lower in value compared to large-scale commercial farms that would be expected to be part of any indexing effort). To provide a meaningful backdrop for comparison, historic returns data were also compiled for alternative real estate investments, traditional equity investments, corporate bond and fixed income alternatives, and default-risk free treasury investments. Data came from the national association of real estate investment trusts (NAREIT) on all publicly traded real estate investment trusts (REITs), as well as mortgage REITs to provide alternative real estate benchmarks. For equity markets, returns data were collected on the Dow Jones Industrial index and the broader S&P 500 index as well as regional indices maintained by MSCI for the USA, North America in total, EAFE, and developing markets. Returns on corporate bonds rated Aaa to Baa, as well as commercial paper rates, CDs, and municipal bonds were collected to provide representative corporate debt investments. Various treasury series were compiled including yields on three-month, one-year, five-year, ten-year, and longer term constant maturity (CM) series published by the Federal Reserve. Inflation indicators of the consumer price index (CPI) and producer price index (PPI) were taken from the bureau of labor statistics to measure inflation hedging potential and the correlation of returns with items representing constant purchasing power[1]. Finally, gold prices and a few individual blue chip stocks were collected as alternative investment options.

Farmland returns are calculated from the perspective of an Illinois farmland owner whose returns are in the form of cash rent and capital gains, less property taxes. Data from 1970 to 2011 were collected on cropland rental rates, cropland values, and the total value of farmland per acre[2]. To construct the returns measure, state-level data from ERS on the ratio of cropland rental rates to crop land values were used to create the current income series, and the capital gains rate was calculated from changes in the base land values. Estimates of average property taxes were subtracted from the sum of current income and capital gains. The returns are then converted to a geometrically compounded annual rate of return that allows a measure of the accumulated returns through time to be consistently compared to alternate investments.

Figure 1 shows a historic view of the price pattern through time and the average rate of capital appreciation from 1970 to the present. As shown in the figure, the capital gains rate in Illinois has averaged 5.8 percent per year with a long and relatively stable pattern with only one period during the 1980s that had sustained declining farmland prices. Other states' patterns are remarkably similar, but vary on the price scale somewhat.

Figure 2 shows components of US average farmland return through time for the top 32 states based on acreage in production (also available is a simple average of all

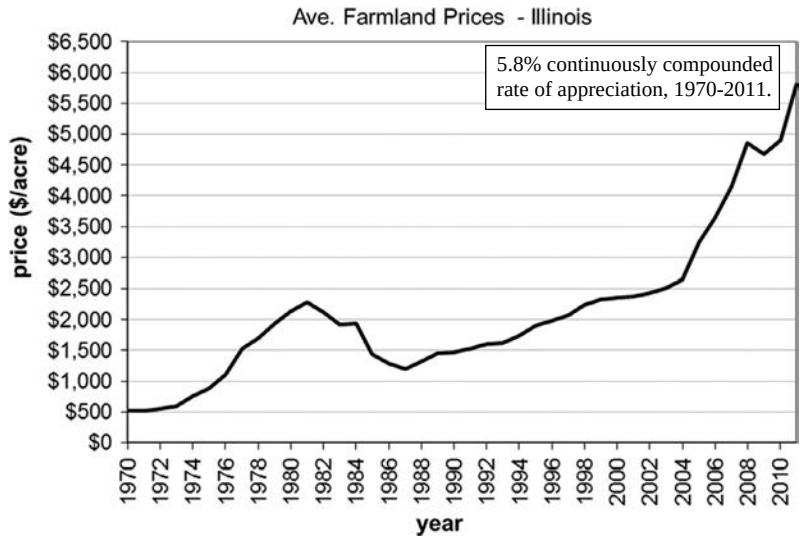

Figure 1.
Average value of Illinois farmland, 1970-2011

Source: *USDA*

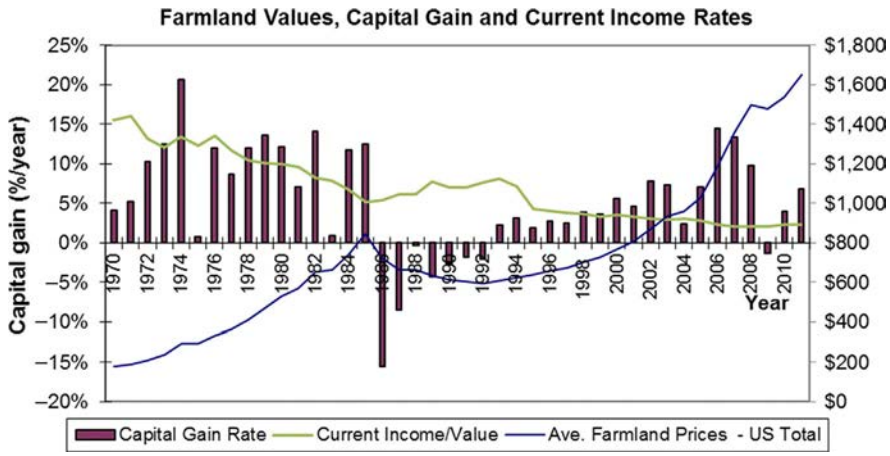

Figure 2.
Components of US average farmland returns

states, and weighted by value of production – all are very similar). Notable features are that the current income component has been remarkably stable, though declining slightly through time as a share of value, while the capital gains have been positive except for a period in the 1980s when farmland responded to an export crisis that was accelerated through lending market stresses, and a minor blip in 2009 that many see as driven by tax uncertainty related concerns. The slightly lower current returns near the end of the sample period are primarily due to an increase in asset values prior to a full adjustment in rental rates, though cash levels of income have remained stable to higher through time.

Table I provides summary statistics for returns by asset class for farmland and the competing asset classes considered for the complete period 1970-2011 and for a period covering the past 20 years (providing both a more recent perspective, and eliminating the only period of decline in farmland values from the mid-1980s). All returns are calculated ignoring any transactions cost ignoring capital gains taxes, and income taxes; and assuming an unleveled, or zero debt position in all investments. Another important caveat – Illinois farmland, like the case in most regions, is fairly thinly traded, and may present a challenge to adjusting holdings as a result. It is also generally a "lumpy" asset and often requires large-scale holdings to achieve similar results.

The annual average return provides the most commonly reported feature of returns along with standard deviation to represents the amount of uncertainty about that average – or the riskiness of the returns. The risk per unit of return or coefficient of variation (CV) is also provided for comparison. Against this presentation, Illinois farmland has performed very well relative to most equity categories and fixed income alternatives, across both sub-periods examined. Except for farmland, the general pattern in financial and fixed income assets over the longer period confirms that higher returns are accompanied by higher risk. However, in the case of farmland, there is also likely a "smoothing bias" from use of aggregated and average returns data from ERS, but from related examinations of property-level returns data, the number of separate farmland parcels needed to approach the stability of the state or US average is generally low (in the neighborhood of 30 properties). Thus, it is hard to imagine that the results are due solely to the methods used to construct the data series[3].

In addition to the smoothing from aggregation for the real asset series, there is also a complicated periodicity issue that may generate favorable appearance to farmland returns. Most financials trade in near-real time and have prices that can be readily observed. Income cycles are also nearly constant, and at minimum, reported quarterly for publicly tradable positions. Debt instruments are trackable with near-real time

	1970-2011			1990-2011		
Asset/ index	Annual ave. return (%)	Standard deviation (%)	Coefficient of variation	Annual ave. return (%)	Standard deviation (%)	Coefficient of variation
US Ave1	11.06	6.81	0.616	9.73	3.44	0.353
Illinois	10.63	9.88	0.929	10.61	4.93	0.465
Dow Jones	6.49	15.92	2.454	6.77	15.68	2.315
Europe	6.05	20.90	3.455	4.08	21.89	5.366
EAFE	6.34	21.39	3.374	1.36	21.62	15.926
Gold	8.98	23.04	2.565	6.12	13.13	2.147
All REITS	8.81	21.08	2.391	9.37	20.27	2.163
TBSM3M	5.40	3.06	0.567	3.44	2.05	0.597
TCM10Y	7.10	2.65	0.373	5.33	1.52	0.285
BBALibor	4.68	2.44	0.521	4.12	2.19	0.531
AAA	8.15	2.31	0.283	6.66	1.26	0.190
BAA	9.26	2.54	0.274	7.62	1.18	0.15
CP3M	3.09	2.12	0.685	3.09	2.12	0.685
CPI	4.27	2.84	0.664	2.67	1.13	0.422
PPI	4.06	4.89	1.204	2.59	3.92	1.513

Table I. Asset return characteristics

information as well. Farmland, however, has a basic annual returns cycle, and thus is difficult to assess more frequently. Moreover, the fundamentals that affect farmland returns may have an even longer periodicity (or stickiness in time as seen with rental arrangements) resulting in returns patterns that may display positive returns more likely to be followed by positive returns, and negative returns associated in time with other negative returns even with an annual production cycle. The holding period is thus particularly important to control when comparing to other assets, and the sample period effects may be difficult to eliminate with relatively short data sets. To give a sense of the potential importance of this issue, both annual returns and the total holding period returns for each asset class were calculated under alternative holding period definitions as though the investment had been made in each year from 1970 on, and held until present (ending in 2011 for uniformity). Figure 3 shows a graphical summary of the results showing (top panel) the average annual return and (bottom panel) the annualized holding period on a held until present basis for a selected set of investments assumed. Most remarkable is that US farmland performs favorably for virtually the entire final 20 years of the sample period with far less variability than the equity indexes in particular. After the fact, it is easy to find the time period during which it would not have been as attractive to have initiated an investment – in each of the asset classes, not just with farmland in the 1980s.

Another way to compare relative returns is to examine rolling investment windows of different lengths – essentially allowing the sampling distribution to be identified. The figures presented below are meant to provide a quick visualization tool for understanding the relative levels of returns through time, variability in returns and how quickly returns "average out", and how the start and end of any particular sample period examined would have influenced measured performance in the data. The figures are created with the intent to show patterns in returns and relative risk in a number of related ways. Figure 4 shows the results for Illinois farmland. In the top portion of the figure, the triangular area contains color coded returns based on purchase at the beginning of the year on the vertical axis and held through the end of the year listed across the top. The inset three dimensional graph shows the same information, but in a manner that allows a sense of the number of "excess" good and bad periods to be quickly grasped. The shading is standardized at the mean of the overall period (top right cell) with the lowest returns shown as darkest red in the upper triangular region regardless of value, but standardized around zero in the 3-D graph. The complementary information shows both levels and when in the sample period returns were at their maximums and minimums.

To better understand the information contained in the figures, a few descriptions of the Illinois case are provided. The first set of boxes down the diagonal of the shaded triangle diagonal simply contains the single year returns data. The 3-D version can be thought of as "walking over the surface" one unit of time away from the diagonal from left to right. The dark green areas show particularly high returns periods and the red spike downward through the floor of the returns set occurs in the early 1980s when land values plummeted by more than the annual income earned resulting in negative total returns. As the length of the holding period increases, two types of effects are notable. Moving from left to right in the upper triangular section gives a sense of how long any period "lasts" or how long it takes to smooth out. In the 1980s for example, the periods influenced by the (red) low returns of the 1980s last for roughly five to

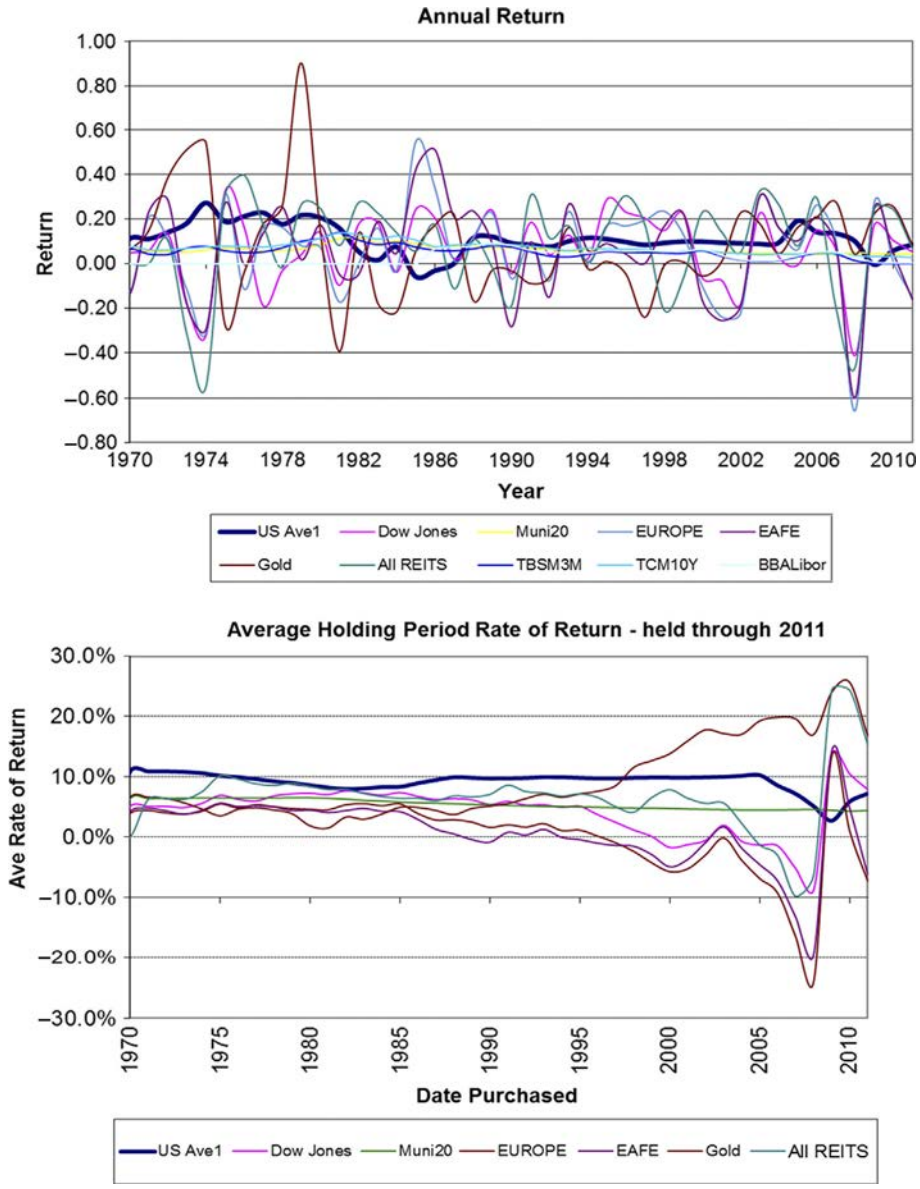

Figure 3.
Average returns, and annualized if held until end of 2011

eight years depending on the starting date. In general, the patterns turn rather bland fairly quickly as one moves to longer holding periods, regardless of the starting date. In the 3-D insert, different length holding periods are different distances away from the diagonal flat line toward the front of the graph. One can interpret the degree of up and down as a "smoothing out" rate of the return series. For example, if Illinois land were purchased in 1985 (darkest red box) then after five years, the surface is

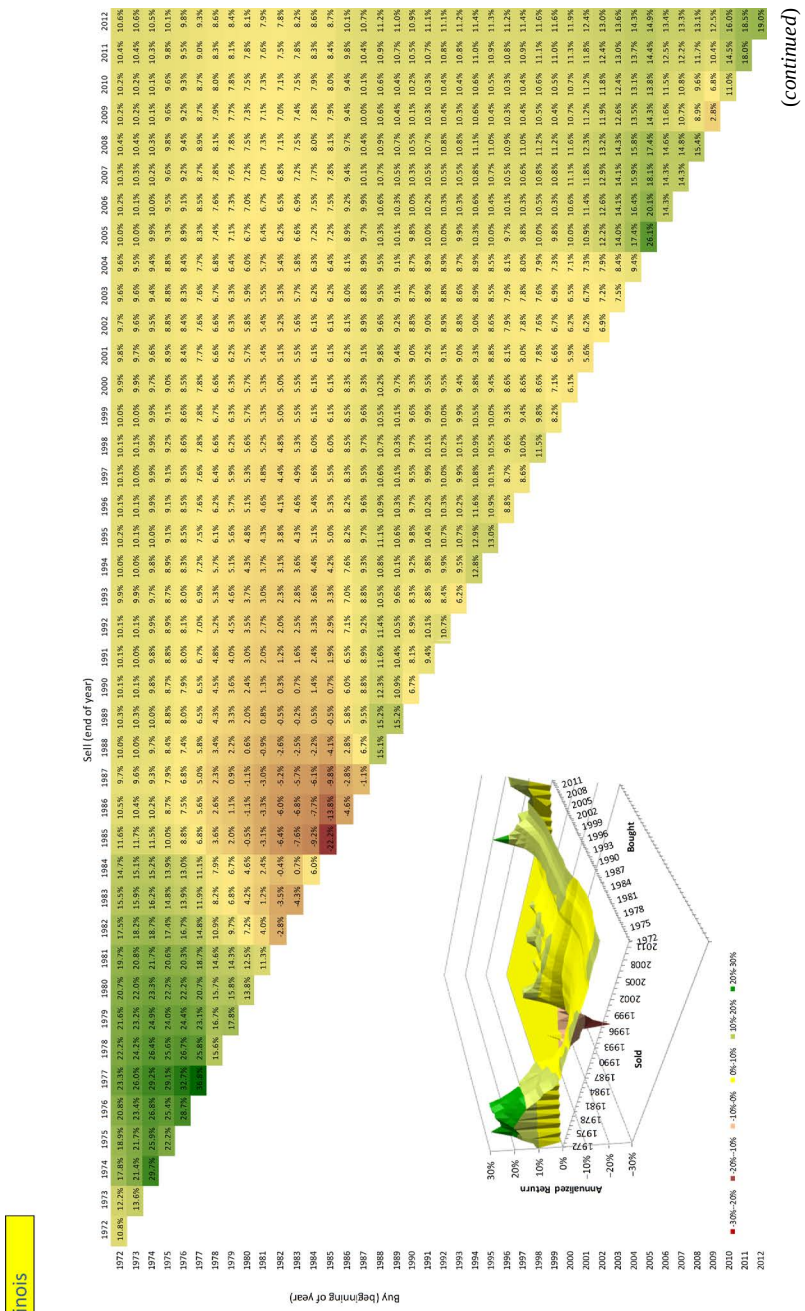

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Figure 4.
Illinois farmland returns profiles through time and by holding period

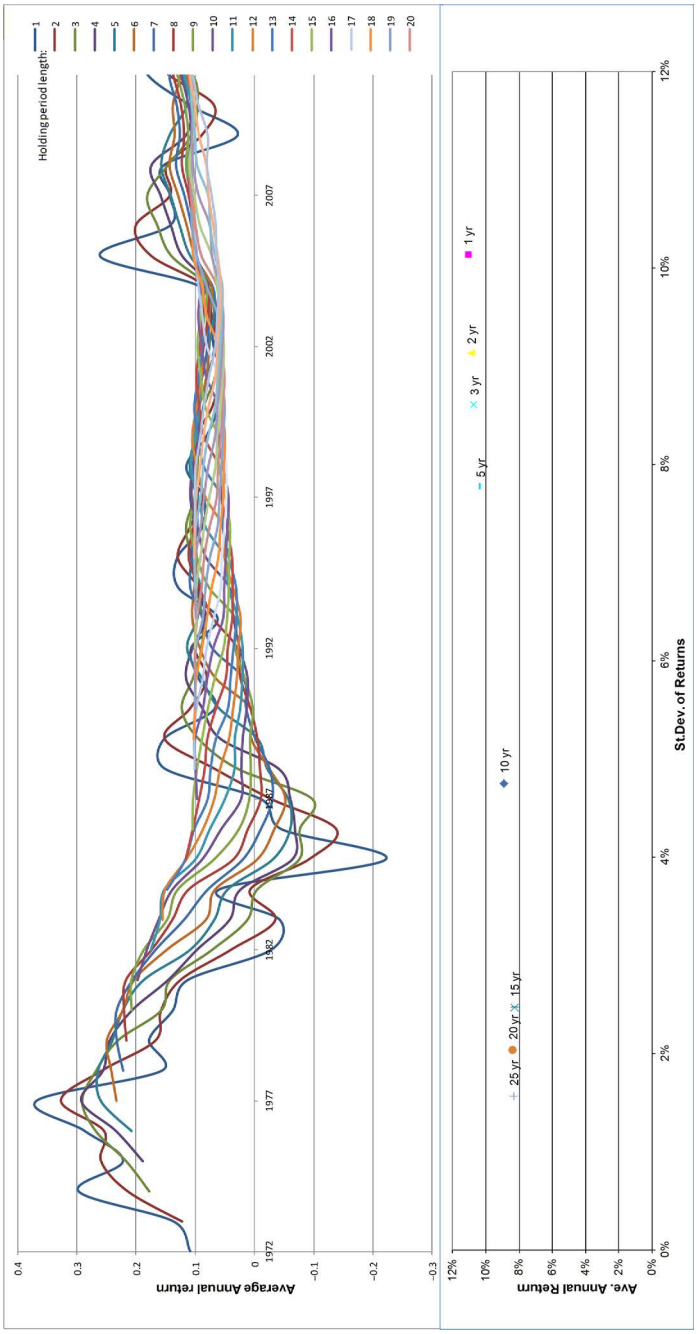

Figure 4.

back above 0. If instead land had been purchased in 1981, there would have been initial positive returns, but then it would have taken seven total years to get back above zero. The front right face of the 3-D graph is analogous to the "held until present" information provided earlier, and "slices" at different previous disposition dates can be viewed in terms of units of time toward the left axis. This perspective helps avoid the possibility of selectively presenting particularly good or bad results due to sample period issues. The middle panel helps further display the rate at which returns measures converge on more stable ranges, and on the width of the ranges. In that presentation, the various possible holding periods from one year to 20 years are provided as annualized values. Starting from the left, the one year returns (blue line) is followed by the two year line (red) and three year (green) and so forth. In this case, as the holding period increases, the returns stabilize fairly quickly and form a narrow "cone" of possible returns over possible time periods and holding durations. The lower panel contains a plot of the sample average and standard deviation. The natural pattern would be for the average to remain relatively constant across time, but the standard deviation to shrink at a rate proportional to the square root of the sample period. As there are limitations on the number of holding periods of various length that can be constructed, the single period average has more of the areas represented as dark green above and is thus slightly higher than longer for longer periods. The longest sample period is often all that is provided in empirical studies – in this case, the single point in the top right corner of the shaded triangle, or the single front most corner point in the 3-D graph. The extent to which sampling variability impacts this measure as an accurate summary of other length holding periods is evident in the figures.

Figure 5 shows identically formatted information for the Dow Jones returns series. Several interesting contrasts are evident. It is obviously strikingly more volatile, and far more frequent, but shorter lived, penetrations through the "floor" of zero. There is also a generally elevated period in the mid-1990s that was effectively removed for all holding periods after the start of the 2000s. Using the surface analogy to physical topography, the hills and valleys are more pronounced further from the diagonal in the 3-D presentation, corresponding to more volatility over longer holding periods than existed with Illinois farmland. Figure 6 shows the EAFE markets, viewed by some as an important source of diversification, and perhaps as a region with emerging positive prospects. The returns surface, and the slow convergence of the measured standard deviation are consistent with the occasional extremes as well. Gold is shown in Figure 7. Gold has been an asset of particular interest post-crash and in light of suggestions of its stable value under uncertain inflation prospects. It does look particularly favorable in the recent decade or so, but perhaps more intriguing is its somewhat opposite pattern relative to equities. Finally, a CM ten-year treasury is shown in Figure 8 which helps show the long general decline in rates at that point on the yield curve, moving through time.

There is virtually no volatility in this series, and ends near its overall lowest value in the period examined. These comparisons are provided mainly to give a more complete sense of the periods of data prior to developing measures at a portfolio level across multiple combined assets. Importantly, we hope to avoid criticisms of selective sample period issues, or of treating first stage estimates as though they contain no sampling variability when used in later portfolio applications.

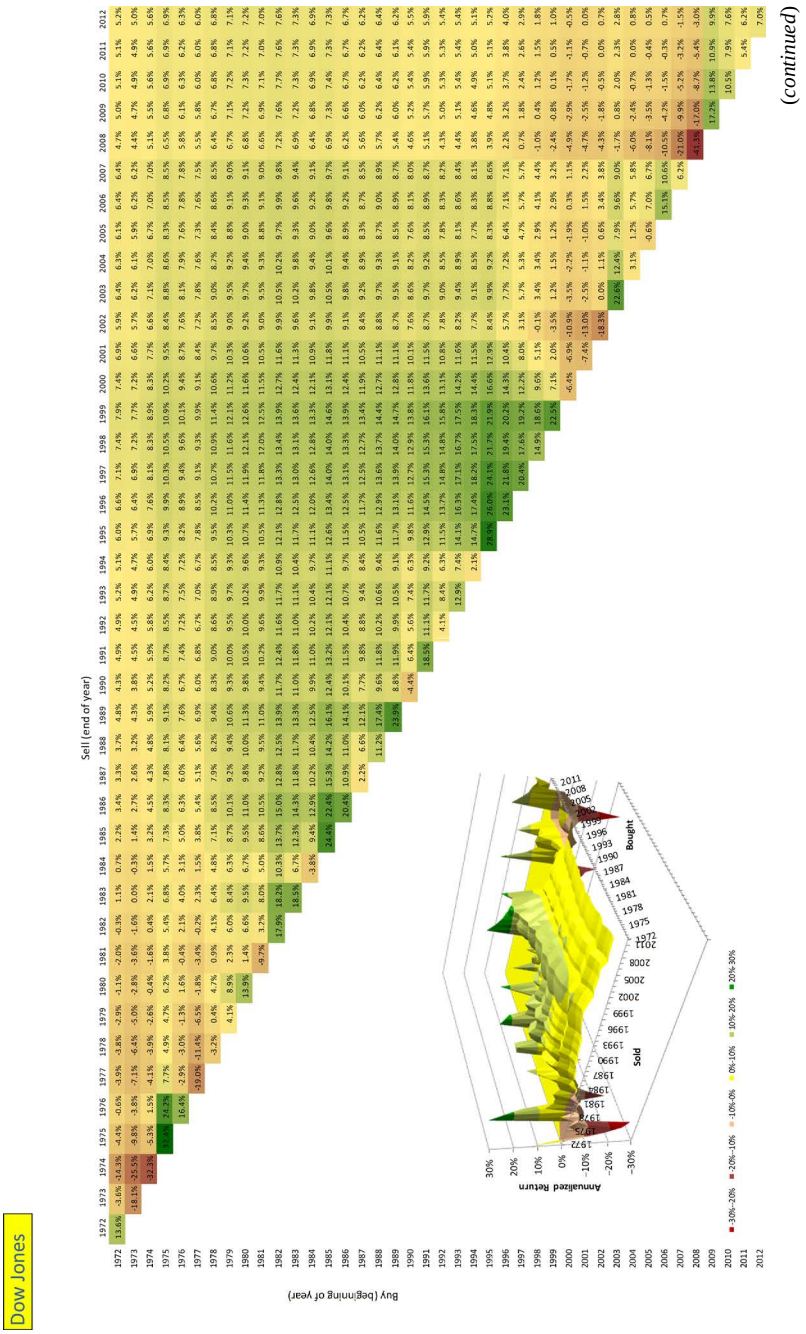

Figure 5.
Dow Jones index returns profiles through time and by holding period

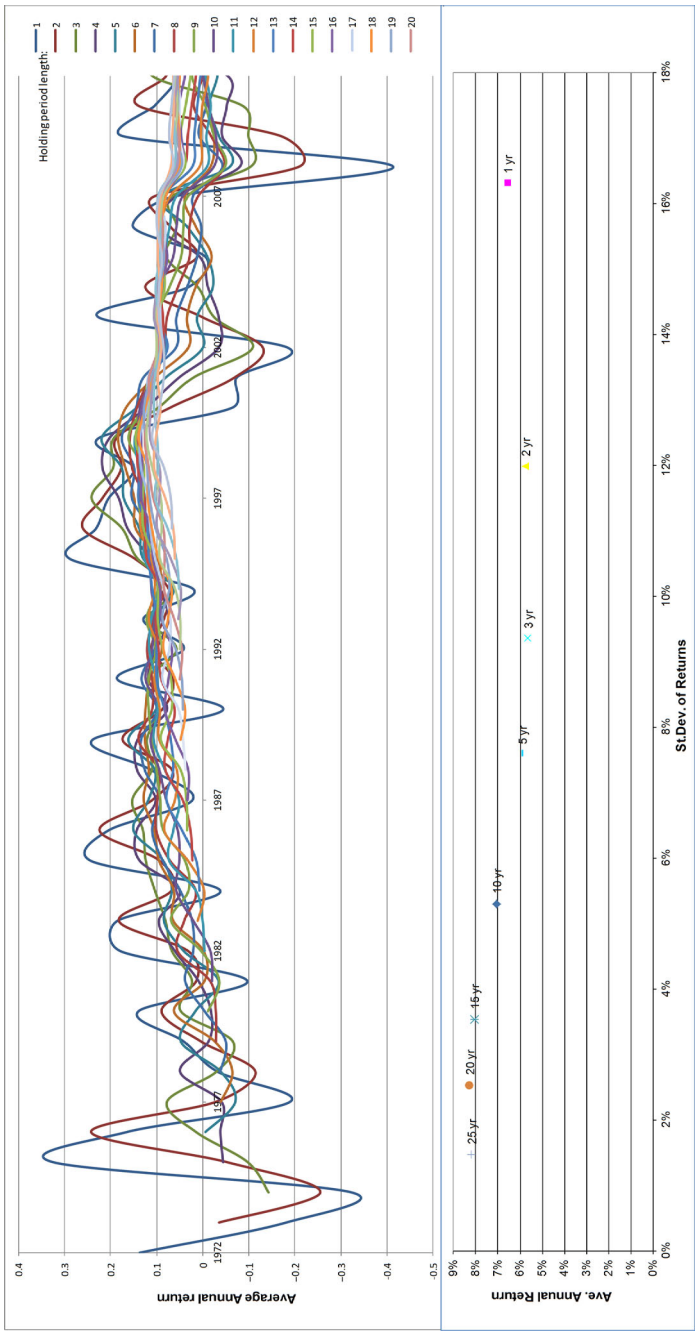

Figure 5.

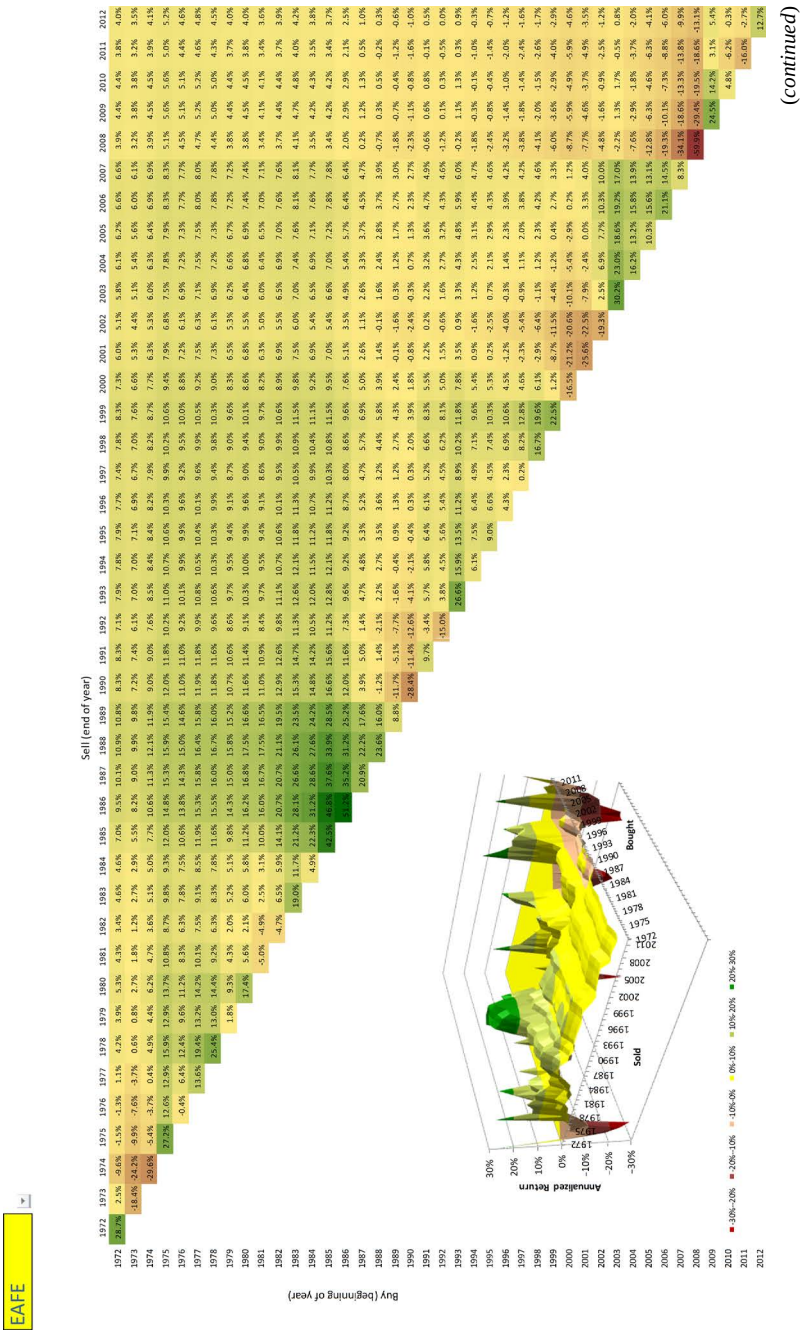

Figure 6.
EAFE returns profiles through time and by holding period

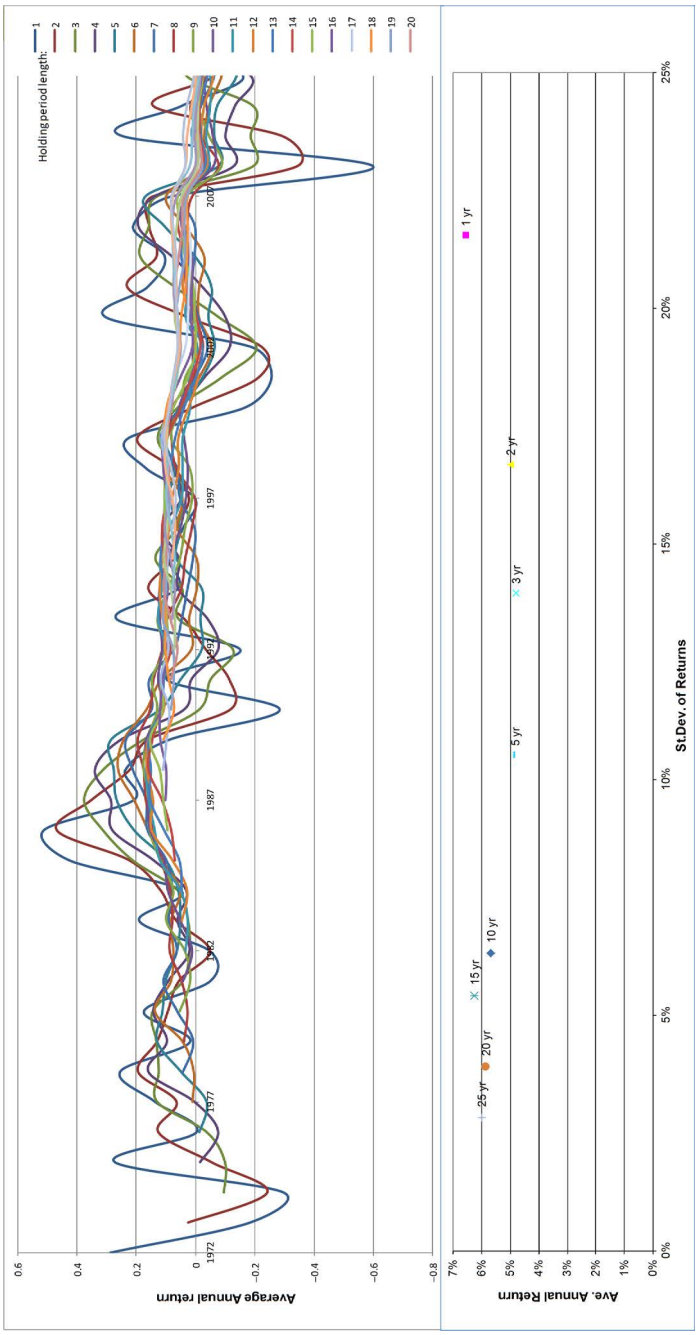

Figure 6.

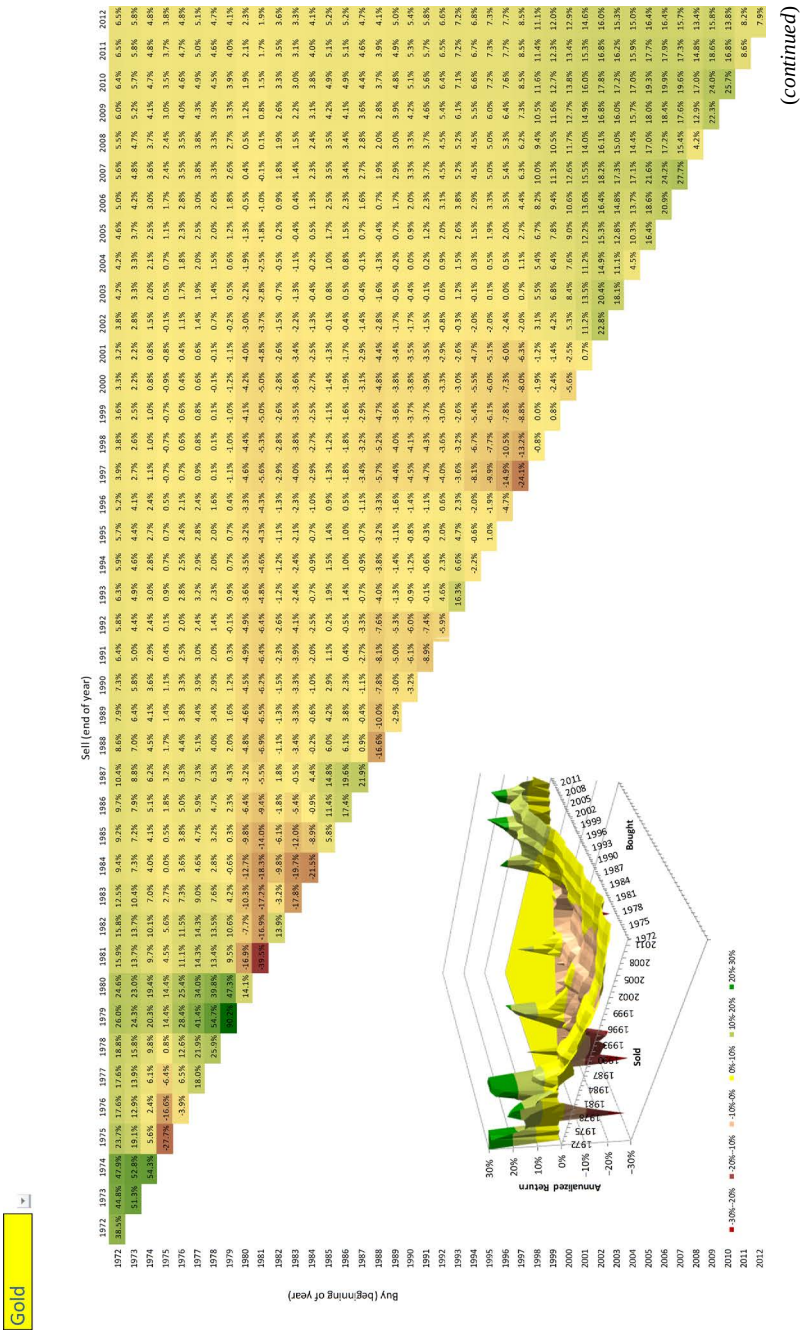

Figure 7.
Gold returns profiles through time and by holding period

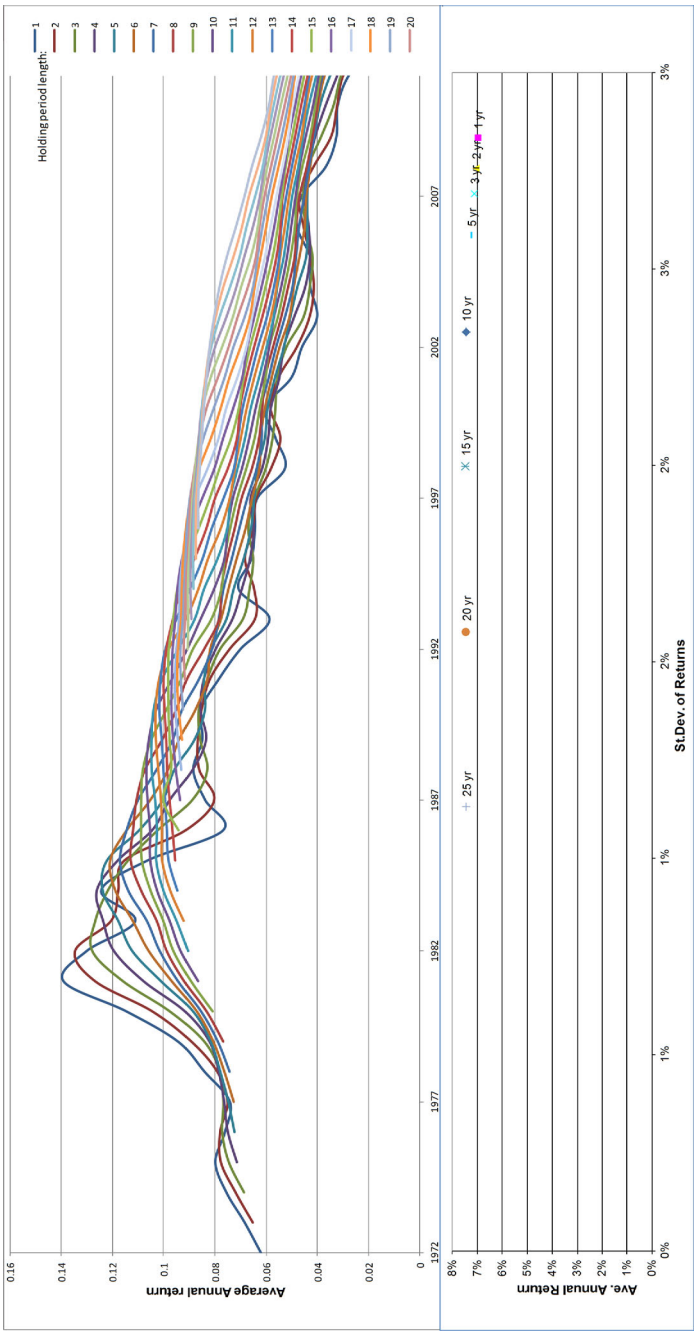

Figure 7.

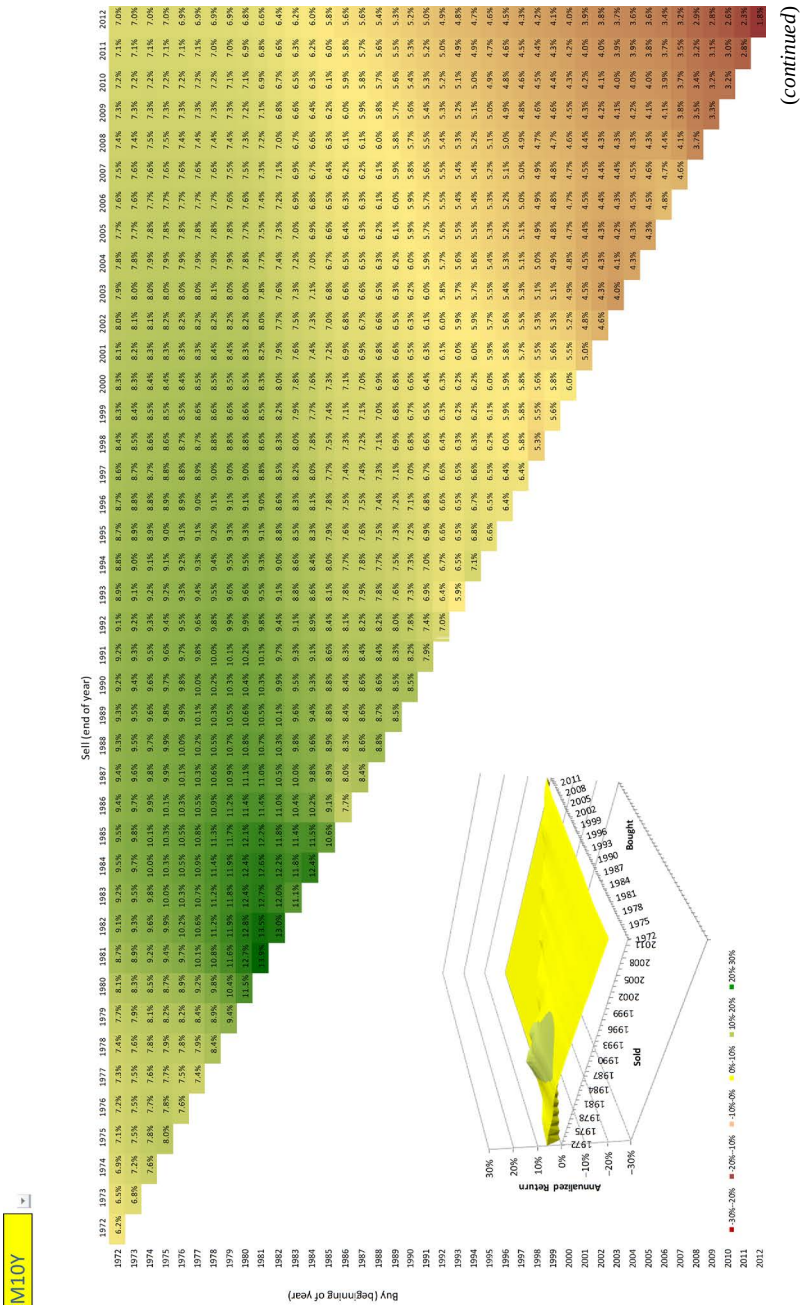

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Figure 8.
Ten-year CM treasury returns profiles through time and by holding period

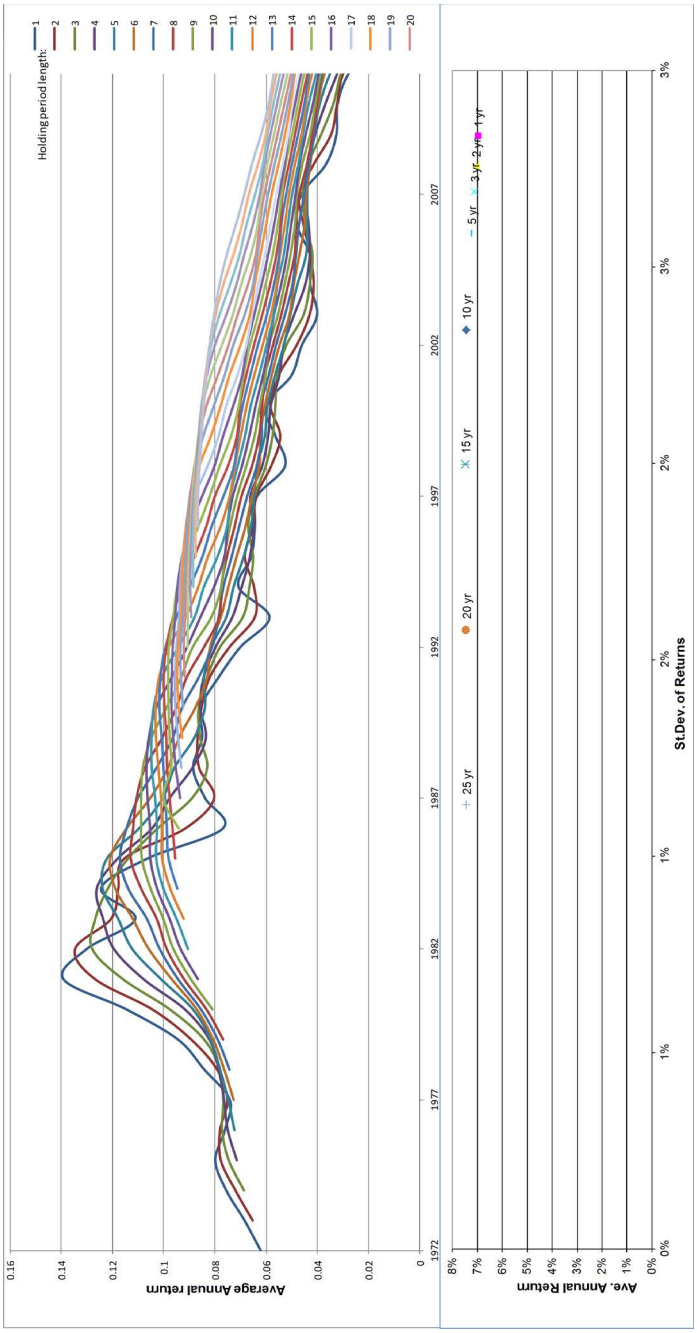

Figure 8.

Portfolio considerations

When evaluating the investment performance of an asset, it is important to not only assess its own performance in isolation, and relative to the sample period available, but to also understand its role in the diversification of a portfolio, and its relationship to inflation and other factors that affect future purchasing power. Measures of correlation provide summary means to describe the degree to which returns move together, and hence the degree of diversification benefit is attainable from holding them together. Negative correlations in investment returns are often viewed as desirable because they allow for the reduction in portfolio risk by holding assets whose movements in returns tend to offset each other – and smooth out the total portfolio return series. Positive correlation with inflation is likewise viewed as desirable in many cases as it provides a greater hedge against the erosion of purchasing power.

Figure 9 shows an interesting feature of farmland returns. The time period chosen does affect the magnitude of the results, sometimes substantially, but the general story is that farmland has shown low or negative correlation with traditional equity investments while maintaining a positive correlation with inflation and the PPI. For comparison, the Dow and the S&P series have about a 0.96 correlation with each other and approximately − 0.20 on average with inflation as measured by the CPI. The results are shown for Illinois, but the pattern is very stable across most sections of the USA, and for the average overall as well (other cases available from authors on request).

Next, a simple risk-return plot is shown in Figure 10 prior to forming efficient investment portfolios that helps convey the role expected for farmland in a portfolio. The set of low risk returns are largely fixed income or debt positions, and the higher risk items are equities, REITs and gold. The attractive characteristics shown for farmland may be difficult for individuals to capture, and thus may not be relevant for some forms of portfolio optimization. Nonetheless, we begin by simply optimizing combinations (maximize return for each level of risk by solving for weights) of this set

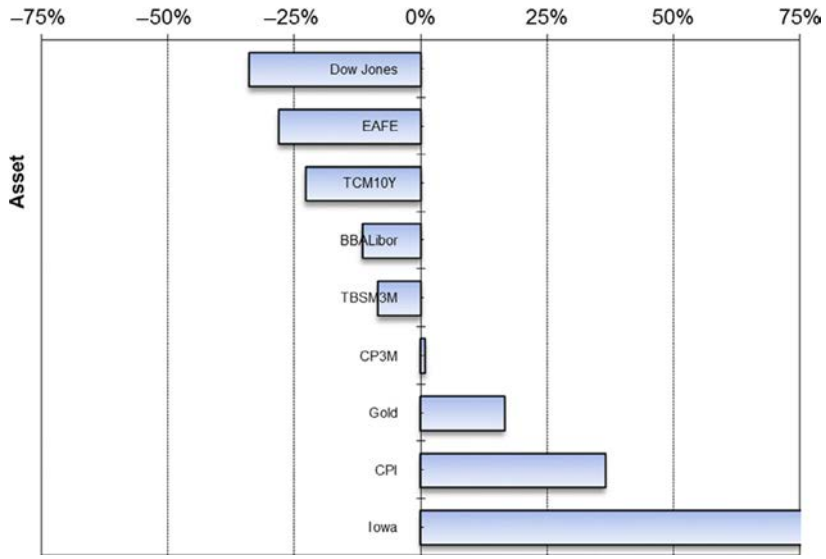

Figure 9.
Correlation of asset returns by class with Illinois farmland returns

Figure 10.
Risk-return profiles of alternative assets, 1970-2011

of candidate investments with non-negative restrictions. The resulting risk efficient or "E-V" frontier is shown in the top panel of Figure 11. The shares of each investment across levels of risk are provided in the lower panel of the graph. In the unrestricted case, the typical results hold that at low risk levels, the portfolio is comprised primarily of fixed income assets and as risk and return increase, the portfolio increasingly becomes weighted toward equities and other riskier assets. If unrestricted farmland is included in the allowable assets, the remarkable feature is that the risk-efficient portfolio contains over 50 percent farmland at roughly the middle range of the feasible risk range. As the portfolio proceeds to the higher and higher return- risk combinations, farmland becomes the majority asset. This general result has been noted in prior work, and is typically explained away as "not easily adjusted" holdings, or due to omitted higher transactions costs, or unfeasibly long holding periods. It remains remarkable, however, that farmland returns measured in aggregate generate this result at all, regardless of the source of the deviation from empirical shares actually held, except perhaps by farmers.

To begin to assess the impact of restricted portfolio holdings, the exercise is repeated but with maximums of 33.33 percent by class, insuring that at least three assets enter at each point in the restricted set. Interestingly, Figure 12 shows the feature that the restriction actually increases the optimal holdings of farmland relative to fixed income assets, and gold and other real estate also enter in larger proportions. What might at first seem counterintuitive given the unrestricted portfolio results simply reflects the fact that farmland's returns are measured to have low volatility and hence substitute for the treasury securities at low risk levels on the E-V curve. The primary impact of the restriction is to lower the overall attainable returns profile.

Next, to consider the impact of market frictions, we next shock the farmland returns by reducing their levels by 1 percent each period (to reflect transactions costs, management, etc.) and by multiplying the variance by 120 percent of its sample value.

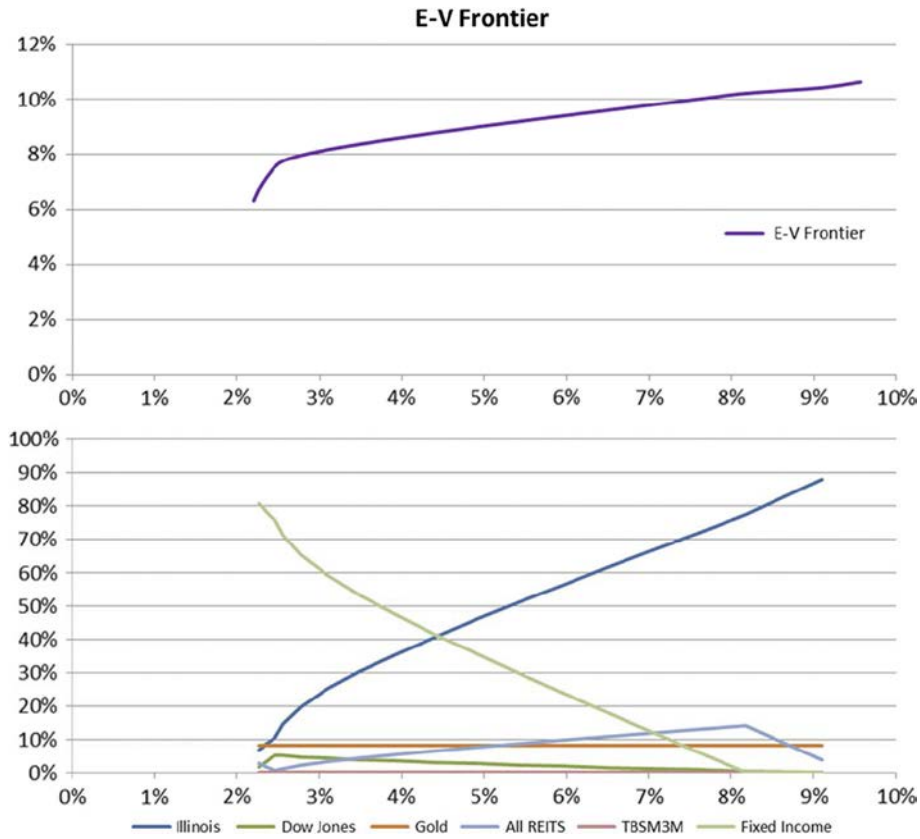

Figure 11.
E-V frontier and asset shares by risk level – unrestricted

Covariances remain as estimated, and the E-V frontier re-solved. Importantly, there is little effect as farmland still enters the efficient frontier are relatively high levels throughout, though reduced from the unrestricted set, shown in Figure 13. The main impacts again are on the achievable E-V set – with the changes to the farmland series of a 1 percent reduction in annual return and a 120 percent multiple on its own variance, the achievable E-V frontier is moved to the right (higher risk) but the holding patterns are remarkably stable.

Some implications for solving the equity puzzle

The evidence from a wide range of perspectives identifies farmland as an asset with favorable characteristics for holding in portfolio. The characteristics of farmland include stable relative income returns, stable total returns, strong correlation to traditional inflation statistics, relative negative correlation to other forms of financial assets and an investment periodicity which is unrelated to traditional financial asset classes. Investors have been increasingly motivated to explore agricultural investments as a result, and the recent elevated interest in the asset class has resulted.

However, direct divisible securitized conduits for investing in farmland have not been established – the essence of the equity puzzle. Unlike traditional financial assets

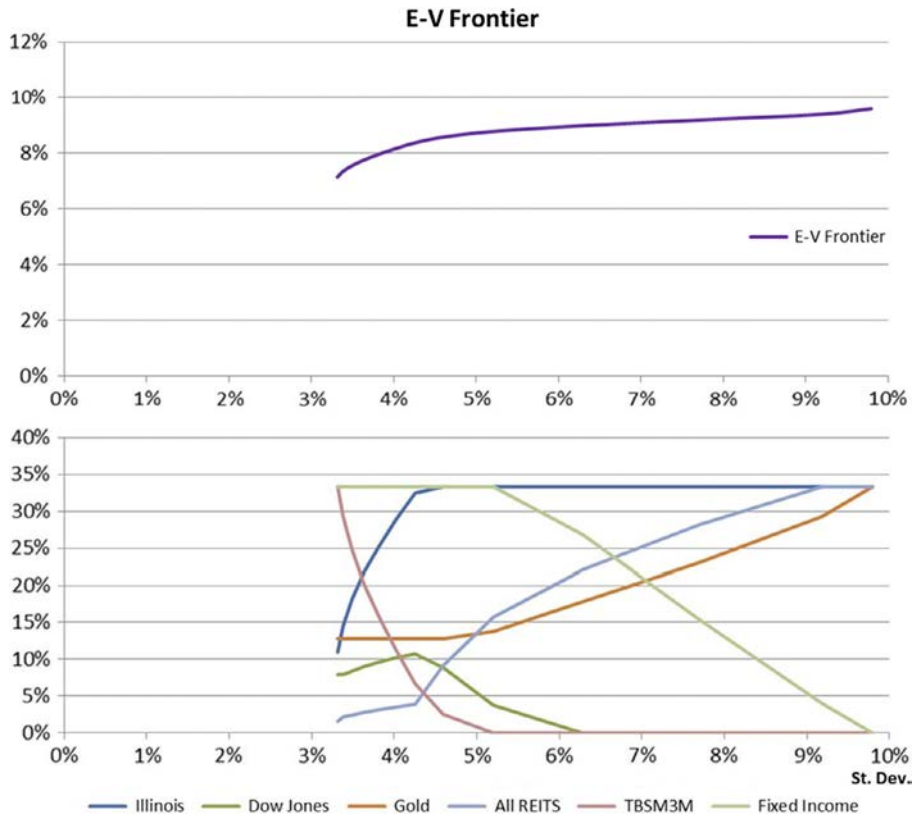

Figure 12.
E-V frontier and asset shares by risk level – maximum 33.3 percent shares

there is no agreed upon and tradable unit of farmland, nor a way to standardize across specific parcels or to fully homogenize shares. Thus, short of becoming a farmer or hiring a farm management company, there does not exist a means for an investor without prior exposure or knowledge of this asset class to gain exposure to a position that mimic returns to that set of activities. This is the situation that also faced commercial real estate investors several decades earlier, and eventually REIT type investments, and NCREIF-NPI like indexes, and other tradable indexing systems emerged including specific class indexes like case Shiller and S&P analogs. REITs do not seem suited for non-depreciable assets however, and scale and liquidity issues are cited by historically large investors as limitation in developing tradable securities tied to farmland assets. A first step might be to develop simple independent indexing methods and allow the basis risk issues to be absorbed by market participants (as happens with housing indexes). Or a large set of institutional investors might be able to agree on standards for reporting holdings and have NCREIF or related organization house the data and report an aggregate index (currently operational, but even at its current scale, difficult to convert to market instruments). Perhaps the problem is simply that a fund with sufficient scale has not matured to the point that it can be viewed as the bulge bracket issuer of agricultural returns shares with background liquidity. In other words, to establish such a fund short of having only secondary

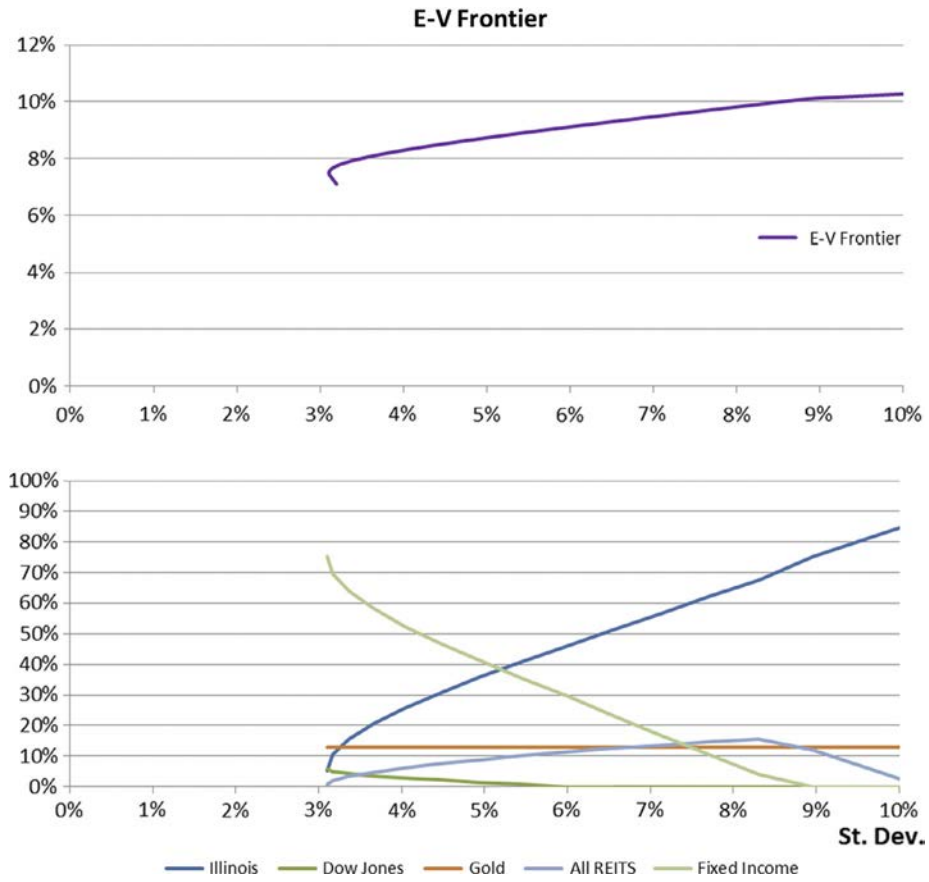

Figure 13.
E-V frontier augmented

Note: 1 percent annual return reduction, 120 percent variance for farmland

market (SM) options after issuance, the fund would have to include a large enough pool of cash available to exchange shares with no meaningful risk of requiring actual underlying assets to be purchased or sold as a result of normal flow of buy and sell. The natural evolution of such a fund might begin with only a specific set of assets as a share of the total portfolio held to be used for the indexing (i.e. a Midwest row crop basket) and add features and options as the fund's holding expand.

Summary

The information about farmland investments presented above amplifies the message from the previous analysis and much past academic research – farmland returns have been relatively strong and display low systematic risk, high inflation hedging potential, and good diversification benefits. The recent few years have (again) witnessed rates of capital gain that are (again) relatively high by historical standards, and as a result, have generated (renewed) high interest in farmland investments by non-operator investors, institutional investors, and by owner-operators seeking to expand. In virtually all cases,

the evidence suggests that the investment class has performed well whether viewed in isolation, or as a complement to other investment holdings and should be considered when evaluating any mixed-asset investment set. Returning to the opening questions, the returns from capital gains and current income less current property taxes provides one measure of the investment performance that is somewhat comparable to an equity investment that pays dividends and also experiences capital gains/losses. Farmland has done well in this regard. The variability of returns to farmland investments demonstrates exceptional "risk efficiency" with reasonably low risk per unit of return. Acquiring and managing real investments does require greater expertise than that for most financial assets, but it is hard to imagine that transaction costs, or asset specific knowledge has caused the relative performance to remain so attractive. The correlations of returns are low or negative with most other investments that might accompany farmland in a portfolio, and perhaps most importantly, farmland returns have shown positive correlation with inflation measures. The options to develop tradable shares and begin to solve the equity puzzle in agriculture are likely to continue to attract intense attention from investors as a result. As always, one must be careful when interpreting the past as a projection of the future, but as an asset class, the returns performance has been remarkable in both levels and in measures of stability.

Notes

1. Data on the equity indexes were obtained from MSCI and Dow-Jones, REIT returns data from the NAREIT data warehouse, treasury instrument data from the Federal Reserve h.15 release, and corporate debt rates from Moody's investor services. Gold prices were taken from the gold.org data, US series.
2. Data from ERS on both cropland and total farm real estate were collected. Property tax rates were estimated at state levels from ERS sources on total farmland property taxes paid divided by total farmland values, excluding operator dwellings. In addition to Illinois data, similar series were created for 42 other states. The results are qualitatively similar across the remainder of the Midwest region, and the other major crop producing regions of the US as well.
3. The Dow Jones series is strictly an index based calculation and does not reflecting changing composition or treatment of divisor issues. The Muni20 is an aggregated index of 20 year municipal bond rates; the Europe index is MSCI's aggregate European equity return index; EAFE is MSCI's East Asian and Far East aggregate. The treasuries (T) and treasury bills (TB) series are identifiable as CM or SM based followed by term and unit (Month-M and Year-Y). Libor rates from British Bankers Association. Commercial paper rates on three month issuances and corporate bond rates are from the Federal Reserve. CPI and PPI data are from the Bureau of Labor Statistics.

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