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Issue Report

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Farmland Ownership: Trends and Future Implications

Farm Foundation®

Introduction

Farm real estate represents the vast majority of the value of all assets in the U.S. agricultural sector with a value of nearly $2.6 trillion, representing just over 83% of the $3.1 trillion total. Farmland is owned in various ways including by individuals who also farm their own land, by absentee owners who rent to an operator, or by investors other than individuals whose view of farmland may be described to some degree as a financial asset. Farmland markets have historically provided relatively steady returns in both current income and capital appreciation, and in most cases have provided returns that satisfy the needs of a broad set of ownership interests. In recent years, however, declining commodity prices and more normal world stocks of grains have created downward pressures on farm incomes and, in turn, on rental rates and asset values including farmland.

Through the same periods, farms have continued a general pattern of consolidation with an attendant reduction in the number of farms, though certain farm types have maintained their numbers to some degree against these trends. Interestingly, the share of land rented to non-owner operators has increased, but not at as rapid a pace as might have been expected as farm ownership numbers declined; this means operators have purchased and leased more nearly constant shares of their added land as the sector has consolidated.

Interest by farmland investors, including institutional investors and publicly traded REITS attempting to help develop retail or equity markets in agricultural investments, has also been extremely high in the past decade. Measures of relative performance of farmland assets have been very attractive in both

Paper Explanation

In 2016, Farm Foundation and USDA's Economic Research Service hosted a conference on the changing dynamics in farm ownership and agricultural finance. As part of that discussion Farm Foundation commissioned two papers: on trends in farmland ownership and factors that could impact the structure of agricultural asset markets in the future, authored here by Bruce J. Sherrick of the University of Illinois and on federal farm policies, authored by Jonathan Coppess of the University of Illinois. Farm Foundation gratefully acknowledges support from Bank of America for this project.

stand-alone, and in long-duration portfolio holdings. Further impacting evaluations of the desirability of farmland investments has been the unprecedented period of low interest rates since the onset of the housing crisis in 2008, and the secular decline in available "cap rates" provided through traditional financial markets.

Despite these facts, the aggregate leverage in the sector is startlingly low, and the distribution of debt supporting the assets in the sector is very uneven. On top of each of these trends and macro influences, it has been repeatedly reported that the aging ownership of agricultural land carries the possibility of leading to rapid, or at least historically unprecedented rates of land turnover in the relatively near term future. (U.S. Farmland Ownership, Tenure, and Transfer, EIB-161 August 2016).

The confluence of these forces and the implications of potentially different ownership structures for farmland in the future lead to several interesting questions that this paper attempts to articulate and provide context for evaluation. Included are:

- How should farmland markets be evaluated? Are they like other financial markets, or more like housing with an element of consumption? Or, are they completely different and unique from other investments?
- Will farmland markets undergo "financialization" as occurred in commercial real estate markets in the past?
- Does farmland ownership and operation need to remain as tightly linked as in the past, or can operation and ownership interests become more distinct?
- What are the likely long-term trends in farm size? What is the likely impact of technical innovations, including big data, biotech, and other agricultural technology advancements)?
- What are some implications of consumer trends and demand for specific attributes, e.g., gluten free, and what will be the impacts on production systems?
- How will/should agricultural policy shape or respond to the forces for efficient scale of operation, food safety, food security and risk management in agricultural operations?

Characteristics of the U.S. Farmland Market

Table 1 summarizes the Balance Sheet of the U.S. Agricultural Sector by decade since 1970, followed by the previous three years in the rightmost columns. (Downloadable utility available at: http://farmland.illinois.edu/content/tools-and-data U.S. Ag Sector Balance Sheet tool). Some key features of the farmland market are worth noting and comparing

TABLE 1. Selected Balance Sheet Characteristics of US Agricultural Sector (Source: USDA ERS)

	1970	1980	1990	2000	2010	2013	2015	2017
	($ millions, except ratios - source ERS-USDA)							
Farm Assets	**278,823**	**1,000,422**	**840,609**	**1,203,215**	**2,170,832**	***2,776,110***	***2,909,653***	***3,074,869***
Real Estate	202,418	782,820	619,149	946,428	1,660,114	*2,251,002*	*2,395,363*	*2,556,932*
Non Real Estate	76,405	217,602	221,459	256,787	510,718	*525,108*	*514,290*	*517,937*
Farm Debt	**48,501**	**162,432**	**131,116**	**163,930**	**278,931**	***315,332***	***356,738***	***389,965***
Real Estate	27,238	85,272	67,633	84,724	154,065	*185,161*	*208,769*	*242,418*
Non Real Estate	21,263	77,160	63,483	79,206	124,865	*130,172*	*147,969*	*147,547*
Equity	**230,322**	**837,990**	**709,493**	**1,039,285**	**1,891,902**	***2,460,777***	***2,552,915***	***2,684,904***
Selected Indicators								
Debt/Equity	21.1%	19.4%	18.5%	15.8%	14.7%	*12.8%*	*14.0%*	*14.5%*
Debt/Assets	17.4%	16.2%	15.6%	13.6%	12.8%	*11.4%*	*12.3%*	*12.7%*
Real Estate/Equity	87.9%	93.4%	87.3%	91.1%	87.7%	*91.5%*	*93.8%*	*95.2%*
Real Estate/Assets	72.6%	78.2%	73.7%	78.7%	76.5%	*81.1%*	*82.3%*	*83.2%*
Real Estate D/Total D	56.2%	52.5%	51.6%	51.7%	55.2%	*58.7%*	*58.5%*	*62.2%*

(Downloadable utility available at: http://farmland.illinois.edu/content/tools-and-data US Ag Sector Balance Sheet tool).

to other sectors. In total, the agricultural sector is comprised of assets whose combined values are approaching $3 trillion. For comparison, Apple's market capitalization in the summer of 2016 was around $500 billion, or about a sixth as large, and the U.S. GDP is about $18.4 trillion or just over six times as large. What is perhaps more notable is the concentration of the value in real estate (all land and attached buildings) which represents more than 80% of the total. The sector has relatively little debt at less than 13%, and thus about 87% equity of owners. By contrast, total debt as a share of the balance sheet for publicly traded companies in the United States is about two-thirds of total assets.

From a related perspective though, farm real estate is even less leveraged than the sector in total. While farm real estate makes up more than 80% of the total assets, it represents only 56% of the total debt. This feature has actually led to additional interest by many investors in adding a level of debt that might be viewed as more "rational" given the returns characteristics, especially as interest rates available to re-leverage the sector are perceived as low.

More will be discussed later in the paper about additional pressures for "financialization" of the sector and the implications for patterns in ownership—one of which is the relative degree of leverage in the sector. But many investors see farmland as an asset that could provide favorable returns and one that could support additional financial leverage. This fact is one of the explanations for the increased interest by funds in developing REIT-like structures for comingled farmland investments, which could materially impact the ownership structures of farmland over the long run. It may take some time to get to the point that individuals can simply buy a share of farmland in the same way that exchange traded equities are routinely traded, but there are the beginning signs of movement toward structures that allow direct equity investing in agriculture (For more discussion of the potential development path, see "What's the Ticker Symbol for Farmland?", Sherrick, Mallory, Hopper, 2013).

It is also important to recognize that the majority of the change in the equity through time has resulted from appreciation of the farmland. From 1970-2015, farmland has experienced an asset growth rate or capital gains rate of more than 5% per year on a continuously compounded annual growth rate (CAGR). The temporal patterns in farmland valuation have been presented in many places and forms, but the general pattern has been a long period of appreciation with only one historic period of substantial decline in the early 1980s, and a recent pullback in 2015 and 2016. The latter has led many to question if another substantial adjustment period

FIGURE 1. Farmland Values through time, selected states. (source: USDA-ERS)

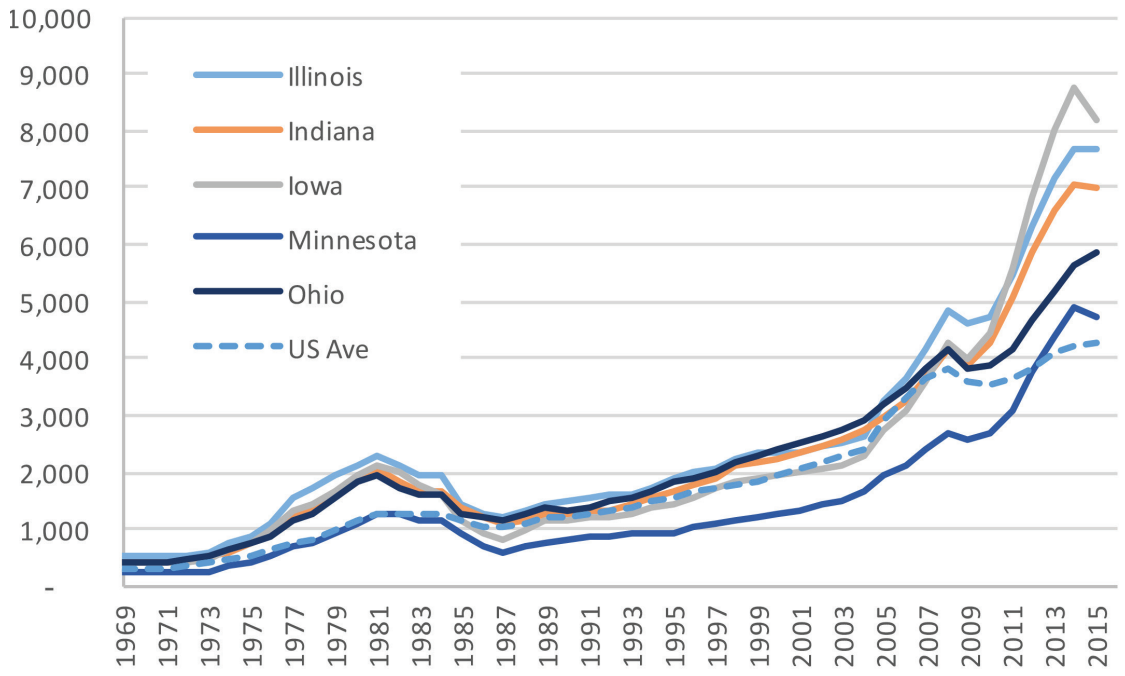


TABLE 2. Asset Return Characteristics

Asset/Index	Annual Ave. Return	Standard Deviation	Coefficient of Variation	Correlation
		1990 - 2015		
US Ave Farm (all)	9.27%	3.70%	0.399	1
S&P500	6.75%	17.55%	2.599	-0.155
NASDAQ	9.23%	27.44%	2.974	-0.185
NCREIFTotal Farmland	12.04%	6.72%	0.558	0.601
EAFE	1.90%	20.36%	10.728	0.038
TCM1Y	3.27%	2.35%	0.718	0.331
TCM10Y	4.85%	1.80%	0.371	0.155
AAA	6.25%	1.51%	0.242	0.035
BAA	7.21%	1.44%	0.200	-0.075
Muni20	5.11%	0.91%	0.178	-0.034
Mort30F	6.50%	1.70%	0.262	0.148
Gold	3.76%	14.54%	3.866	0.023
All REITS	9.77%	19.04%	1.948	-0.135
PPI	1.91%	4.08%	2.137	0.121
CPI	2.44%	1.13%	0.464	0.184

is beginning in which turnover rates might accelerate and result in an opportunity for ownership patterns to change more rapidly in the process.

To add further context, Figure 1 shows historic values of cropland for major Midwest states and the average of all reported farmland in the United States from 1970 to 2015. The patterns are largely the same by location with the main difference being related to the differences in yield or productivity by region. One feature of note is that farmland prices in Iowa appreciated more rapidly in the period prior to 2015 than others, and has experienced a greater percentage reduction in value since 2014. Some have argued that anti-corporate farming laws have prevented institutional buyers from buoying the market when local farmer demand softened, but there is no strong evidence on any side of this particular issue beyond anecdotes.

It does raise an important question about the influence of restrictive farm ownership laws on future patterns of ownership, and whether impacts would show up in asset values via restrictions in market adjustments or via preferential demand in protected cases. In any case, varying restrictions do still exist in several states that represent an important share of the agricultural production in the upper Midwest and Cornbelt, including North Dakota, South Dakota, Oklahoma, Iowa, Minnesota, Wisconsin, Nebraska, Missouri and Kansas. (For further discussion, see http://nationalaglawcenter.org/overview/corporatefarminglaws/.)

Table 2 provides additional information on rates of return to farmland investments compared to other investments and rate indices for 1990 to 2015, with the indexes simply taken as percentage change in their levels. This result holds surprisingly well across other sample periods. For farmland returns, the annualized rates are computed as the rental income plus capital gain, less property taxes divided by initial value. Returns are expresses in geometric form in each case. All interest rate values are in geometric form, and the equity indexes have returns expressed as geometric index relatives including membership change adjustments as would be earned by buying holding long positions only in index instruments like SPDRs, for example. The correlations are provided against the first row element, in this case the average return across reported farmland in the United States.

The information in the table helps to understand the high degree of interest in farmland investments, and the potential impact on ownership structures that could occur if farmland markets eventually moved toward standardized investment structures similar to commercial real estate. A notable feature is that farmland has had a very high rate of return. Importantly, the average for all U.S. farmland includes all types and ownership structures, including hobby and small farms that are primarily in "lifestyle" holdings.

The standard deviation of the annual rate of return is somewhat artificially low in comparing the average to the other individual investments, but in related studies (http://farmland.illinois.edu/content/research-reports-and-briefs Farmland Markets report) it is the case that the relative risk measures are fairly robust to measurement interval and technique. The NCREIF Total farmland return is of farmland owned and managed by institutional investors under fiduciary

responsibility to investors. Its return is generally a couple of percentage points greater than U.S. average farmland, but its scale is still only a few billion dollars and the results are still not available directly to retail investors.

Relative to equities, farmland returns are reasonably high, have low relative risk and show low or negative correlations. Furthermore, the correlation between farmland returns and inflation is positive—again a result that is very important to institutional investors, particularly those with long duration inflation sensitive liabilities like pension funds or insurance companies. In total, the returns performance of farmland as an investment has led to increased interest by both investors and those seeking to expand the scale of their operations. But operationalizing these has been difficult due to the historic low turnover and fragmented market structure that still defines the agricultural sector.

Farmland ownership demographics and trends

Two of the long-term trends in farmland markets are the declining numbers of farms and the increasing acreage per farm. At the same time, the total area farmed in the United States has slowly declined due to use conversions that are largely irreversible. Figures 2, 3 and 4 summarize these features through time and provide a backdrop to further understand the distribution of farms by size and ownership classification.

As can be seen in Figure 2, the total number of farms is just more than 2 million, down from nearly 4 million in 1960. Of course, it is important to consider the definition of what constitutes a farm. What might be needed to be considered a commercial-scale farm has changed through time, as well. The current USDA definition of a farm is a unit that would normally produce and sell at least $1,000 of products in a typical year—a very low threshold resulting in a far larger number of farms than would be considered commercial scale. (Note that the slight "kinks" in the figure generally correspond to points in time at which adjustments were made to the definition of a farm unit, or to the survey process rather than starkly different single period of changes in farm numbers under a constant definition).

Figure 3 shows the decline in acres in farms in the United States declined from 966 million acres in 1993 to 912 million acres in 2015. Interestingly, FAO reports that on a world basis, arable land in production

FIGURE 2. US Farm numbers through time (source: USDA-ERS)

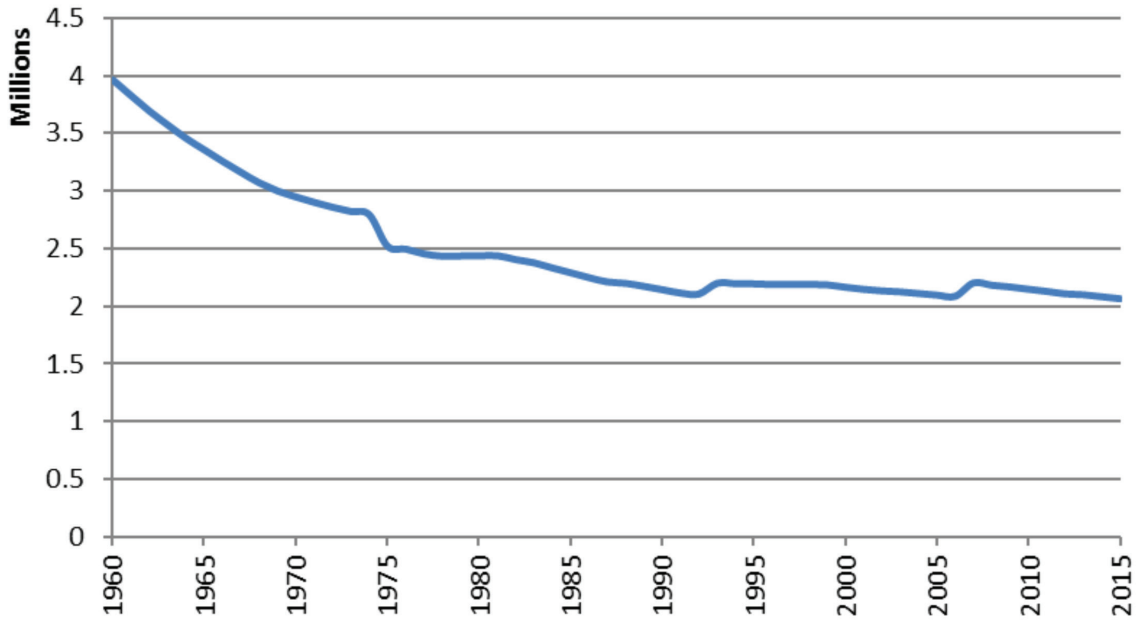
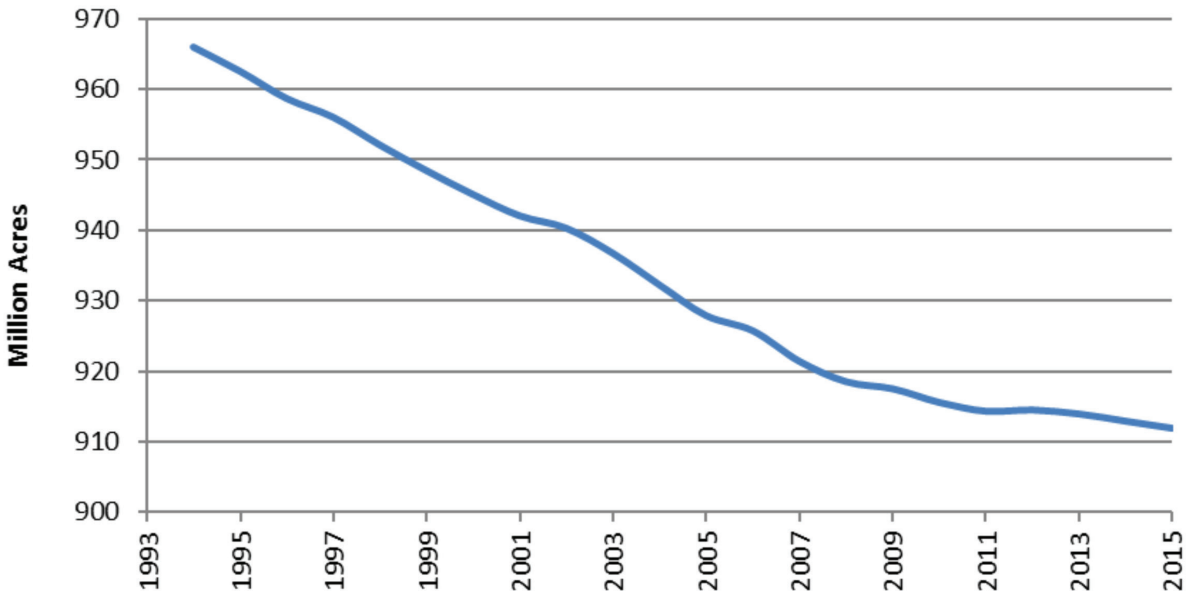


FIGURE 3. Acres of Farmland - US Total (source: USDA-ERS)



increased from about 1.29 billion hectares in 1960 to 1.40 billion hectares in 2013, more than making up for the declines in the United States and Europe over the same period.

Figure 4 combines the information on acreage and number of farms over a more recent period to highlight the rate at which average farm size is increasing while total farmland and number of farms decline. As will be shown in more detail later, the averages understate the growth rates at the larger commercial-scale end of the spectrum and thus the consolidation in practical terms is proceeding even more rapidly than the averaged data in the graph suggest.

To better understand the distribution of farms within the totals provided, is it instructive to classify farms by some measure of scale. USDA released a comprehensive tabulation from the Tenure Ownership and Transition of Land (TOTAL) (http://www.ers.usda.gov/topics/farm-economy/land-use,-land-value-tenure/farmland-ownership-and-tenure.aspx). That, along with data from USDA's 2016 Farms and Land in Farm Summary (http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-18-2016.pdf), and historic Census of Agriculture data allow a fairly clear depiction of the current distribution of farms by sales class.

The concentration of production resources in larger-scale farms and trend in ownership are better understood by focusing on the relatively small numbers of farms that account for the majority of production. Table 3 provides this information against commonly used sales class categories, and highlights the changes from 2014 to 2015, which are indicative of the current trends and are likely to continue. Among the key takeaways:

- The smallest category, including farms with sales less than $10,000 annually, includes 50% of the farms by count, but less than 10% of the farmland.
- The number of farms and acreage at this low end are declining, having fallen by 20,000 farms and almost 3 million acres from 2014-15 alone.
- The top two categories combined represent about 8% of the total number of farms but control more than 42% of the acreage in production. Acreage serves as a relatively good proxy for value of production, as well.

Figure 5 provides a summary of the 2015 data by sales class. It shows the percentage distribution of farms and farmland by sales class, highlighting the concentration of production. Roughly 20% of the farms control 70% of the acreage.

Judging by popular and fringe press headlines, there seems to be some impression that a large number

FIGURE 4. Farm Numbers and Scale, 2007-2015. (Source: USDA-ERS)

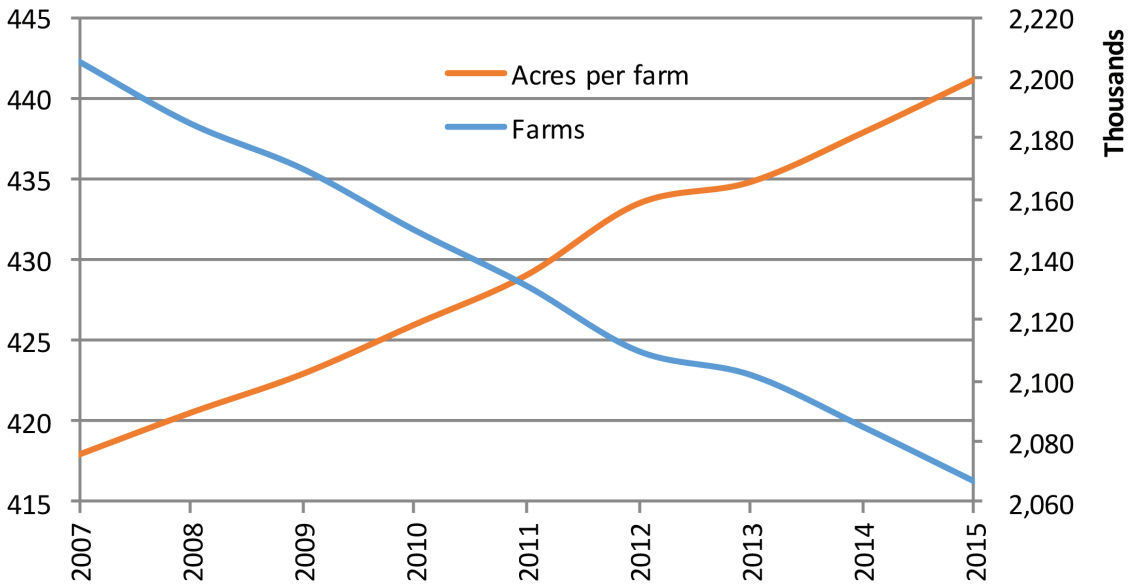


TABLE 3. Farm Numbers and Acres in farms by Sales Class, 2014 to 2015

					- - Million Acres - -		Ave Farm	
Sales from	up to	2015 Farms (000s)	Change from 2014	% Farms	Farmland	Δ'15-'14	Size Ac.	% Farmland
1,000	10,000	1,004	-20,000	50.1%	87.9	-2.92	85	9.6%
10,000	100,000	623	400	30.1%	191.5	-2.35	307	21.0%
100,000	250,000	145	300	7.0%	130.8	1.85	901	14.3%
250,000	500,000	98	800	4.7%	125.8	0.52	1,285	13.8%
500,000	1,000,000	83	300	4.0%	156.4	0.33	1,882	17.1%
1,000,000	>1,000,000	83	300	4.0%	219.6	1.57	2,662	24.1%
	Total or ave.	2,036	-17,900	1	912	-1 million	441	1.0%

of non-family corporate farms somehow increasingly control farmland, with public press references to factory farms and the like. For example, the website of the American Society for the Prevention of Cruelty to Animals has an untenable statement that: *"A factory farm is a large, industrial operation that raises large numbers of animals for food. Over 99% of farm animals in the U.S. are raised in factory farms, which focus on profit and efficiency at the expense of animal welfare."* Others have pointed to the fact that "96.4 percent of U.S. crop farms are 'family farms'," or "ones in which the principal operator, and people related to the principal operator by blood or marriage, own more than half." (Example http://www.motherjones.com/tom-philpott/2013/09/does-corporate-farming-exist-barely).

Additionally, tabulations of market shares of corporations that control certain channels, especially in the livestock sector, often proxy the final market shares for production organizations that fail to account for contract production with individual farmers—which blurs the distinction and perhaps requires a different classification of ownership altogether. In any case, this manuscript does not intend to offer any value judgements on the form of asset ownership, but instead simply tries to illuminate actual empirical trends in ownership by presenting major categorical information and discussion about the likely implications for future organization of farmland markets and agricultural asset ownership.

FIGURE 5. Farm Distribution by Count and Sales class (source: USDA-ERS EIB 146)

To further highlight this issue, USDA provides a farm typology that more nearly associates with farms that use farming either as a primary income source, or primarily for other reasons, along with non-family based farm operations. This provides one of the most objective views of the ownership issue without the confusion that sometimes follows the form of ownership, as most corporate farms are family corporations and family farms. It is likely that the term "corporate" may be the culprit in public misunderstanding that confuses ownership structure with terms that proxy for other features in other contexts. (This type of miscast term usage results in equally uninformative results—comparable to the fact that surveys can find that 80% of Americans do not want DNA in their food! http://reason.com/blog/2016/05/24/80-percent-of-americans-want-to-label-fo). A "corporate farm" simply does not provide a meaningful distinct categorization to the general public for ownership given that the vast majority are also family farms.

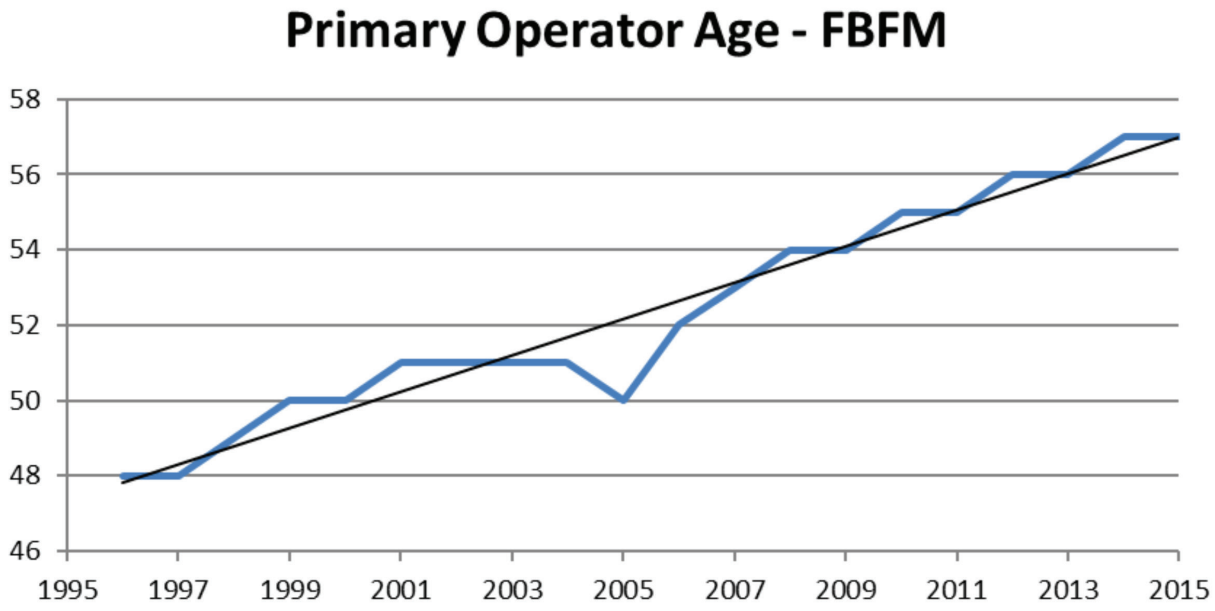
As noted earlier, a more informative sense of the nature of ownership is provided be USDA's Economic Research Service (ERS) in a very comprehensive tabulation of the actual distribution of ownership, including use of corporate structures by family farms. (See U.S. Farmland Ownership, Tenure, and Transfer, EIB-161 August 2016). Another view of the distribution of farms is provided by classifying farms by whether farming is intended as the primary source of income for their family unit. Table 4 contains summary data from USDA EIB 146, "America's Diverse Family Farms." It provides another view of the distribution of farms and shares of production when separated by levels of gross cash farm income (GFCI) that more nearly agree

TABLE 4. Distribution of Family and Non-Family by GFCI

	% of farms	% acres	% Production	# Farms
Small Family	**89.40%**	45.30%	21.5%	1,856,318
MidSize Family	6.10%	23.40%	20.5%	125,760
Large Scale Family	3.40%	27.50%	47.6%	70,930
Non-Family	1.10%	3.80%	10.4%	23,266

Small	# Farms	% of farms
Retirement	281,622	13.6
Off-Farm	942,978	45.4
Farming <$150k	522,080	25.1
Farming<$350k	109,638	5.3
Total Small	**1,856,318**	**89.4**

FIGURE 6. Average Age of Primary Operator, FBFM Farms (source: FBFM University of Illinois)



with lifestyle and commercial distinctions. In the top portion of the table, small farms (less than $350,000 in GCFI), midsize (less than $1 million), and large scale (more than $1 million) are tabulated along with non-family farm production units. The lower portion of the table further refines the information in the small farm only category. Small farms are further separated into retirement farms, those reporting a majority of off-farm income as their primary source, as well as those reporting primary reliance on farm income into categories less than $150,000 and from $150,000 to $350,000.

Many individuals are surprised that 89% of farms by count would be classified as small, and that of those, more than half do not rely on farm income for primary support. In this classification, mid-sized and large farms account for about 51% of the farms and 68% of the production. Finally, non-family farms account for only 1.1% of the farms and about 10% of production. A summary point is that the scale continuum is not uniform, and continued consolidation is actually quite concentrated in a relatively small fraction of farms which control a relatively large share of the production resources.

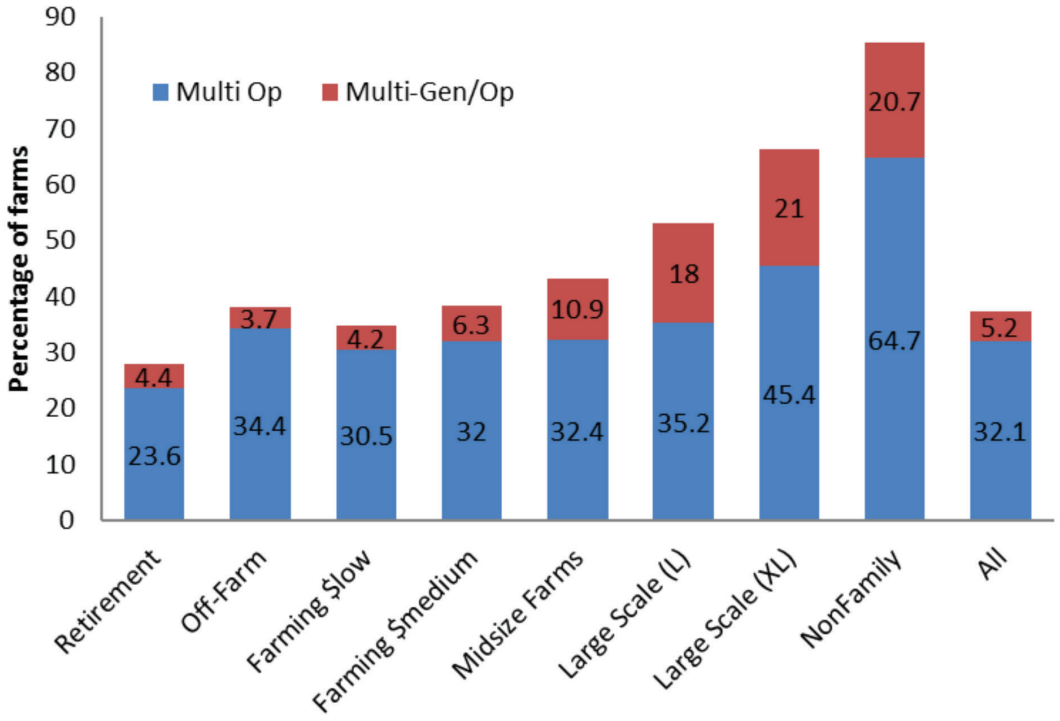
Continued consolidation of farm is actually quite concentrated in a relatively small fraction of farms which control a relatively large share of the production resources.

Aging farm owners

It has also been widely reported that the average age of farmers has been increasing dramatically, causing some to conclude that there is likely to be higher future turnover in the near future. However, the dynamics of this proposition are quite complicated, and not well-borne out in historic experience. One possible explanation is that the age of an operator was historically a good proxy for the ownership of the agricultural assets, but is less informative in today's environment. As operations become larger and more complex, single operator ownership structures are proportionally less common. Additionally, there are many cases of in-family transfer where the share of management and labor in a multi-generation unit move through time toward younger members of the family or management team, but asset ownership does not due to tax incentives, or sibling divisibility needs. In these cases, the age of the primary operator or farmer has less to do with effective age of *all* of the operators.

Two graphical presentations will help convey this issue a bit more directly. Figure 6 shows the primary age of operators enrolled in Illinois' Farm Business Farm

FIGURE 7. Multiple operator farm types and shares with multiple operators or multi generation operators (Source: USDA-ERS)



Management (FBFM) record keeping system. If there were no change in size or number of farmers/farms, then some simple features related to age would occur. If there were no turnover at all, the average age would increase at a rate of 1 year per year. If there were a steady state of selling at the attainment of a constant age to an incoming cohort of a constant age, the average would be unchanged. According to FBFM data, the average retirement age has been increasing in farming at a rate of 0.48 years per year, and the turnover rate at arm's length for farmland in Illinois has been remarkably steady at around 1% per year (http://farmdocdaily.illinois.edu/2012/11/farmland-turnover-in-illinois.html). So there must be other explanations.

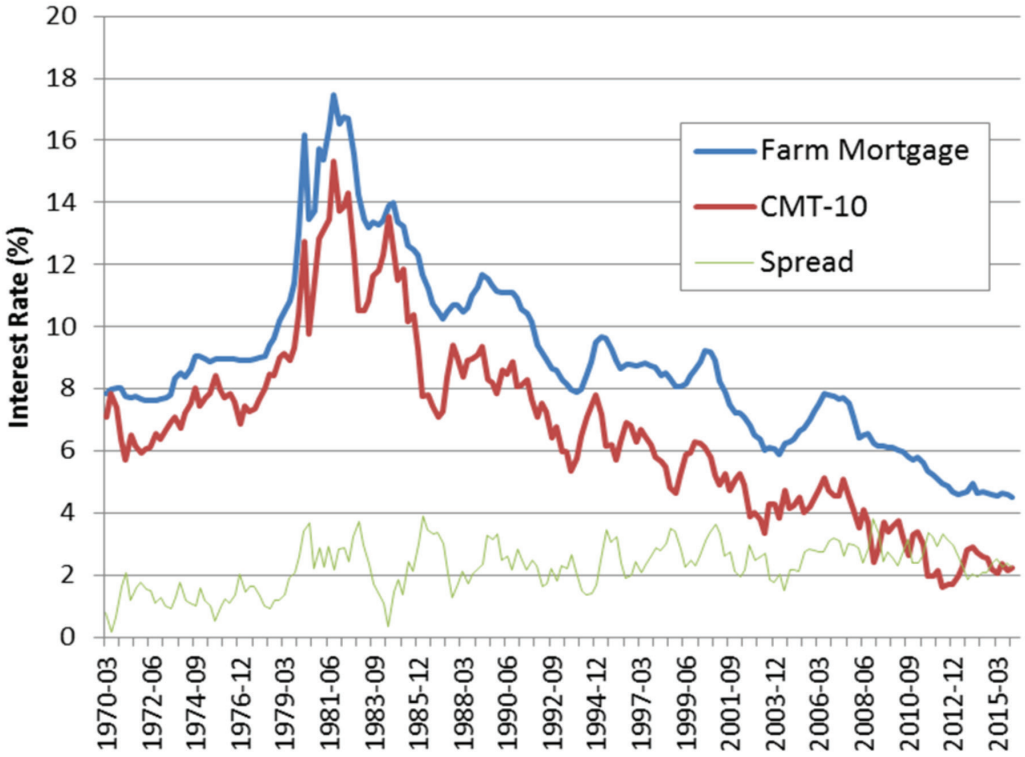
Figure 7 provides some insight into this dynamic. In simple terms, as farms get larger, the requirements for multiple operators increase. For example, 43% of midsized farms have multiple operators, most of whom are family members. Two thirds of the *XL Large scale family farms* (sales greater than $5 million) have multiple operators. In each case with multiple operators, an increasing age of the primary operator would not necessarily translate into an increased likelihood for selling the farmland and, in fact, might result in the opposite effect where bringing in another family member obviates the need for a recordable complete title transfer to keep the operation intact.

Issues affecting future farmland ownership/trends

The preceding materials were meant to provide a reasonably broad context from which to discuss trends and factors affecting the structure of farmland ownership in the future. In the following materials, several of the more important factors are discussed, as well as some possible implications. The list is by no means exhaustive, but does represent many of the issues reported in popular and academic press alike with a bias toward new factors and influences impacting farmland markets in the future.

First and foremost, the farmland market experienced nearly a decade of stellar income and asset values moved correspondingly. The current period of lower commodity prices and lower farm income has led many to ask if there is the potential for a more rapid correction—or perhaps a bubble—to dramatically and rapidly affect asset values. In many cases, the current price dynamic is compared to the start of the 1980s, both by visual technicians, and by reference to factors

FIGURE 8. Farm Mortgage Interest Rates and Credit Spreads (source: Federal Reserve and Ag Finance Databook)



from the housing crisis. In making these comparisons, it is also important to ask what factors differ, as well and if there are signs that favor a particular future path. Among the features worth examining are debt levels in the sector. As shown earlier, farm debt today is substantially lower as a share of assets compared to the early 1980s when it reached nearly 25%. A related set of ex post observations about the farm crisis in the 1980s also highlights the role of financial contracts and the pricing of debt and maximum leverage levels. Figure 8 shows an important difference from that period to today.

In the period prior to 1980, the average spread over the 10-year Treasury as a proxy for credit risk was 1.29%, but has since averaged 2.52% reflecting more capacity to stand for credit stress. Additionally, in the period of the crisis, it was possible to originate loans with 80% loan-to-value ratios, and amortization of 40 years. In rough terms, a 15% nominal interest rate in that case would require 12% of the asset value as an annual cash flow to service interest only. Contrast the typical loan case today in which the loan-to-value limit is commonly 50-60% and nominal interest rates hover near 5% on amortization periods that are closer to 20 years on average. As a result, there is less vulnerability today for a lender- or loan-term induced flow of land to market. There are clearly stresses in the market today, especially as working capital has eroded and prospects for a prolonged period of lower income becomes more likely. The point is simply that the financial structure under the asset base is better positioned to withstand these stresses, compared to the last period of substantial stress in agriculture.

A second major difference from the 1980s is the widespread usage of crop insurance. Virtually all the commercially important crop acreage in the United States is now covered by subsidized federal crop insurance. (See http://farmdocdaily.illinois.edu, select Crop Insurance Category.) Moreover, most of that coverage is in the form of revenue insurance at higher elected coverage levels. The downside risk is simply not the same as in periods where crop insurance was largely absent or covered only low fractions of yield. This is not to say that the current income risk is not significant, but only that the nature of the exposure is not as likely as in the 1980s to induce a large transition of ownership through immediate stress that leads to asset sales.

It was mentioned earlier that the characteristics of the returns patterns to farmland ownership have resulted in burgeoning interest by institutional investors in the asset class. However, unlike commercial real estate—which largely underwent its "financialization" after the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) recognized it as an acceptable asset for many investors—farmland markets are simply not moving that direction as quickly. The lack of a well-functioning equity market does represent a major impediment to routinized land transactions, and more broadly distributed ownership. There have been some very notable movements by farmland REITs (i.e., FPI, Gladstone, and American Farmland most notably) and by major institutional players (TIAA, Prudential, and a few others of similar scale. But in total these still represent a very small fraction of the total today, often estimated to be around 1%.

The low historic turnover of farmland limits the pace at which alternate ownership structures can be developed at scale sufficient to materially change ownership patterns. In the majority of row crop regions, land turnover at arm's length runs somewhere around only 1% per year. Thus REITs, as an example of a structure that might allow a routine purchase or sale of assets in agriculture, will still take a long period of time to become as mainstream as commercial real estate. In addition to the low turnover, the existence of the restrictive farmland ownership laws in the upper Midwest also hold the potential to limit the development of more accessible equity instruments in agricultural land markets. This fact also could exacerbate land value swings if segmented market demand cannot routinely access land in arbitrary geopolitical bounded areas.

Farm policy also holds the potential to substantially alter farmland ownership and use structures through time. A related Farm Foundation Issue Report, Reconciling Farm Commodity Policy, authored by Jonathan Coppess of the University of Illinois, treats the historic and contemporary factors affecting farm bill developments through time. Suffice it to say that increasingly, public interest in farmland-related policies has shifted away from direct income support for farmers toward policies intended to satisfy sustainability and related use-influence outcomes. It is likely that farm policy will increasingly target conservation and nutrient management rather than direct commodity price support, and that more efforts to develop policies that are truly counter cyclical will dominate future farm bill debates.

What are some possible paths and channels of influence in the near and medium term, and what might be the impacts on farmland markets? At minimum, it is likely that cash rent markets will continue to adjust as a first-stage response. Farmland markets are in simplest form like other financial markets in that the purchasers are buying access to future income relative to other sources and relative to the cost of capital supporting that purchase. This story presents a mixed implication for farmland—incomes are lower than recent levels but relative to other assets, the returns patterns have also been reasonably favorable and low risk. The capitalization rate for real assets has dropped with the yield curve and with productivity declines in general, so that higher multiples are paid for income. Farmland is no exception. It is, however, a long-duration asset and thus if interest rates and associated capitalization rates were to increase dramatically, farmland could move relatively dramatically. In this sense, U.S. monetary policy probably represents a larger risk to farmland markets than U.S. farm policy.

Institutional interest and ownership models that allow continued separation of ownership and operations will continue, though at a pace constrained by turnover, growth rates in farm operations, and investors' understanding of this emerging financial asset class. There are always distributional questions, as well as local winners and losers. However, the continued movement toward better functioning equity markets holds perhaps the greatest promise for increasing the efficiency of ownership and transactional efficiency, and allowing leverage decisions to be separated from the comingled operator-owner personal financial structure. A similar maturation of markets has been experienced in commercial real estate, but time will have to tell whether the idiosyncrasies and specific asset nature of farming prevent or provide for the same to happen in farmland.

Finally, no discussion of factors influencing farmland markets would be complete without noting the role of changing technology and the advent of decision tools in agriculture that have been fundamentally reshaping management of the farming operation. The ultimate impact of big data and related technologies will take time to fully understand. But already the use of high resolution imagery, in-field GPS, specific input placement and management, better seed technologies, and increasing coordination of logistics and field management have begun to allow further separation of ownership and management of agricultural production.

Some examples of new developments targeting the development of "Zillow for Agriculture," for example, hold the promise to rapidly reduce the informational costs associated with locating land and assessing productivity and related factors, as well as for many of the factors considered in appraisal or valuation models (e.g., AcreValue.com). These emerging technologies also permit more direct transmission of consumer demand signals back through the production channels in ways likely to influence production more directly and with shorter time lags than in the past. While these technologies are likely to favor scale and specialization, they may also permit individuals to begin to "buy" a share of farming without holding farmland.

In any case, capital supporting agricultural assets and related activities is not immune to the forces affecting other asset markets—and the attendant ownership patterns and trends that result are the outcomes of these complex market factors. Hopefully the preceding materials provide useful context in understanding these markets, and allow an informed discussion of future implications.

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