Farmland Bubbles and Risks to the Rural Economy[1]

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Executive Summary

There is growing concern that recent run-ups in farmland prices could represent a bubble that could cause widespread problems across not just the (rural) real economy, but also in the financial economy if the bubble were to burst. Further feeding such fears is that the rural farm economy has been on a decade-long boom supported by strong global demand for food and biofuels. One fear is that the farm economy cycle is due for at least a correction, which could trigger a deleveraging of the farm sector including sharp declines in farmland values. The worst-case scenario is a farm crisis that spills over into the nonfarm rural economy due to reduced demand for products and through the financial sector due to weakened bank balance sheets if farmers defaulted in large numbers. An example is the 1980s farm crisis in which rural America and the entire Farm Belt suffered through a challenging recession. Much of this was felt in the Tenth Federal Reserve District due to its high agricultural concentration. I set out to assess whether the recent fears surrounding a farm economy slow down are realistic.

In making this judgment, the paper first assesses the size of the farm economy in order to appraise its overall influence on the broader economy. Then I appraise whether there are indirect ways a farm economy recession affects the economy by asking whether the current run-up in

[1] The author thanks Barry Ward of The Ohio State University and Todd Kuethe of the University of Illinois for their helpful insights. I am responsible for any errors or omissions in the report.

farmland prices could pop, and in turn damage the financial sector much in the same way that a relatively small residential home sector helped trigger the Great Recession through causing a financial crisis. The following conclusions are drawn:

- The farm sector is now relatively small across the entire supply chain. Compared to the 1980s, the farm employment share today is about one-half the size, suggesting that the sector's direct effects are relatively small. Today, the vast majority of farm households rely on the nonfarm sector as their primary source of income, rather than the nonfarm sector depending on the farm sector.
- Though the farm sector is much smaller today, there are still places concentrated in the most rural portions of the Great Plains that are still quite dependent on the farm sector. There would be greater fallout in those locations, but the rest of rural America is much more diverse than even a generation ago.
- U.S. agricultural land represents about $2.4 trillion in assets, which is only about one-tenth the size of U.S. residential housing assets. Thus, if there was a farmland price crash, it is unlikely that there would widespread fallout across the financial sector because it is a much smaller asset class than residential housing.
- Since the holdings of farmland debt may be concentrated in certain rural banks, local financial problems cannot be entirely dismissed, but at worst, would be centered in those locales.
- The run-up in farmland prices appear to be greatly supported by market fundamentals such as the dramatic rise in farm commodity prices, high land rents, and lower long-term interest rates compared to ten years ago. Thus a crash is unlikely even if there is the chance of further price "correction."

- Even if farmland prices started to decline, farm balance sheets are quite healthy by historical standards, suggesting that there will not be large-scale fire sales as farmers try to gain liquidity. Without such fire sales, a market correction on farmland prices is unlikely to greatly overshoot on the downside, further suggesting that any price decline will not get out of hand.
- Based on these observations, I conclude that a potential farm economy recession would likely have no more than modest effects on the broader rural economy.

1. Introduction and Motivation.

There has been growing concern that recent run-ups in farmland prices could represent a bubble that could cause widespread problems across not just the (rural) real economy, but also in the financial economy. Further feeding such fears is the fact that the rural farm economy has been on a decade long boom supported by global demand and national policies that support biofuels. The fear is that the farm economy cycle is due for a correction (or crash) in the near future, which could further accelerate a deleveraging of the farm sector including sharp declines in farmland values. The worst case scenario is a farm crisis that spills over into the nonfarm rural economy due to reduced demand for products and through the financial sector due to weakened bank balance sheets. I set out to assess whether such fears are realistic.

In assessing this threat, I need to first appraise the size of the farm sector. Agriculture has played a substantial role in shaping the American economy. Much of the United States was originally settled for agricultural uses and the rise of American cities through the early 20th Century was largely to service the agricultural economy in supplying farmers and in helping deliver their products to customers. Likewise, the construction of the early American transportation system, whether it was rivers, rails, canals or early roads, was largely to facilitate the settlement of farmers and to improve the access of farmers to the entire agriculture supply chain including their markets. Of course, the 20th Century brought major changes to agriculture that in turned affected the broader rural economy. Some of these changes include rapid skill-based labor-saving technological change that released redundant farm labor to the nonfarm economy and transportation improvements that allow long-distance rural-to-urban commuting.

Early 21st Century rural America is no longer so dependent on agriculture. The U.S. Department of Agriculture, Economic Research Service (USDA, ERS) defines a county's

economy as being farm dependent if 15% of its employment in farm occupations or 15% of its earnings are derived from farming (see the notes to the Figure 2). Figure 1 shows the farm dependent *nonmetropolitan* counties in 1950. Virtually all of rural America was farm dependent in the middle of the 20th Century, in which a good share of the remaining rural counties were dependent on other natural resources such as forestry or mining.[2]

Figure 2 shows the *nonmetropolitan* and *metropolitan* farm dependent counties for the 1998-2000 period. It is apparent that the swath of farm dependent counties had greatly decreased in size. By the turn of the 21st Century, there are only 440 farm dependent metropolitan and nonmetropolitan counties, with 37 counties being metropolitan and 403 being nonmetropolitan. Using the 2003 U.S. Census Bureau metropolitan area definition, less than 20% of America's 2,052 nonmetropolitan (rural) counties are farm dependent. What is also apparent in Figure 2 is that farm dependent counties today are mostly represented by sparsely populated locations scattered down the Great Plains in the interior of the country. Of course, 140 of these are in the seven states that fully or partially compose the Kansas City Federal Reserve Bank jurisdiction (5 fall in New Mexico; 15 in Oklahoma; 15 in Colorado; 2 in Wyoming; 63 in Nebraska; 34 in Kansas; and 6 in Missouri). Indeed, the 10th District, like the rest of America, has seen large run-ups in farmland valuations that many argue are at risk of being a bubble that is about to burst.

The upshot is the 10th District is more exposed to gyrations to the farm economy than the U.S. as a whole. However, even in the 10th District, agriculture represents a relatively small portion of its economy and the potentially much larger risk is through a possible popping of the farmland "bubble." Such a price collapse could have larger implications for the financial sector, especially for more exposed institutions with relatively large agricultural land portfolios. For instance, though U.S. Bureau of Labor Statistics data shows that construction only represented

[2]I use the terms rural and nonmetropolitan interchangeably.

5.6% of U.S. nonfarm employment in 2006 (the eve of the housing crash), the popping of the housing bubble had serious ramifications for the health of the financial sector, which in turn was a major cause of the global Great Recession.

In what follows, I first provide a historical discussion of the relative size of the farm sector in the American economy. The discussion is not exhaustive but should make the point that agriculture's direct role in the U.S. rural economy is much smaller than a century ago and to make the case that in itself, a severe agriculture downturn would have limited effects on the broader economy and even the broader rural economy. However, as with the case of the housing sector "tail wagging" the broader economy, there are some reasons to be concerned about the run-up in agricultural land values. Thus, I will then discuss agriculture land values and describe whether I believe there is a risk of severe spillovers in the financial sector. While there has been a heady run-up in land values, I will argue that a major collapse in prices is unlikely and thus a major fallout in the broader nonfarm rural economy is low.

2. Agriculture and the Modern American Economy.

Farm and other natural resource extraction industries played a key role in the settlement of the United States. Yet, beginning in the late 19th Century, labor-saving technological progress through mechanization and then consolidation greatly reduced the demand for farm labor (Partridge and Olfert, 2009, 2011). Figure 3 shows farm employment as a share of the total labor force for 1900-2010. The farm share fell from nearly 39% in 1900 to just under 2% in 1990, after which it stabilized.[3]

To give focus on the farm-intensity for the 10th District and nonmetropolitan American, we use more detailed data from the Bureau of Economic Analysis (BEA) in Figure 4. The

[3]In April 2014, Bureau of Labor Statistics data from the Current Population Survey indicated that the farm share equaled 1.4%.

previous data in Figure 3 came from the U.S. Bureau of Labor Statistics and they are based on the "primary" occupation of the worker. So, a farmer whose primary employment is off-farm, would not have been counted as a farmer. The BEA employment data includes *all* jobs including any part-time or multiple jobs an individual may have (including very casual employment). So people are counted as having a "farm employment" even if they are only causally farming. Figure 4 shows that for nonmetropolitan American, the farm employment share was 26% of total jobs in 1969, falling to about 10% just after 2000, after which it stabilized. The overall U.S. farm employment share was just over 7% in 1969, falling to just over 2% in 2012. Not surprisingly, the farm share of total employment in metropolitan America is considerably lower, ranging from nearly 4% in 1969 to 1% in 2012. Conversely, illustrating the farm history in the 10th District, the share runs about double the corresponding U.S. shares. Yet, the overall farm share of the 10th District economy is relatively small, especially compared to its historical importance in driving the District's economy.

Even the farm-supply chain is considerably smaller than before, mostly due to productivity growth and changes in the farm sector itself. USDA data suggests that in 2002, about 0.5% of nonmetropolitan employment was in agricultural inputs such as chemicals and farm implement dealers compared to 1.2% in 1982 (Partridge, 2008). Likewise, only about 3% of nonmetropolitan employment in 2002 was in agriculture processing and marketing jobs like food processing, compared to just over 6% in 1981. Overall, even through the supply chain, rural economies are much less exposed to the agricultural business cycle than a generation ago.

The distribution of farms further suggests that agriculture's direct role on the rural economy is smaller today. Figure 5 shows the number of farms in the United States over the 1900 to 1997 period. The number of farms began declining after the early 1920s, stabilizing

around 1990 at about 2 million farms and even slightly increasing thereafter. However, most of these farms are about lifestyle, recreation, or a supplement to income from other sources. The vast majority of farms are very small and cannot produce nearly enough net-income to support a household. Figure 6 shows the distribution of farms by farm sales in terms of percentage of farms and by percentage of total sales in 2007. Farm sales of less than $250,000 could hardly support a family after deducting expenses. Yet, approximately 90% of farms have less than $250,000 in sales, accounting for only about 20% of total sales. That is, the largest 10% of farms account for about 80% of sales, meaning that at most, only about 200,000 farms represent the vast chuck of the farm economy. Illustrating the importance of the nonfarm economy to supporting the farm economy, *off-farm* income accounted for 82% of farm household income in 2013 and 59% of farm household income in 2012 (most recent year available) was derived from *earnings* from off-farm employment (mostly through commuting) (USDA, 2014a).

The conclusion is that while agriculture does not directly represent a large share of the American economy, it does play a critical a role in parts of nonmetropolitan America, especially in sparsely populated areas of the Great Plains. Likewise, the 10th District is considerably more exposed than the rest of the nation to gyrations in the farm economy. In terms of asking how rural America and the U.S. as a whole would fare if there was a farm crisis, it is worth noting that rural America and the 10th District are much less exposed than during the 1980s farm crisis. Specifically, in the early 1980s, the farm share of total jobs in nonmetropolitan America was about 20%, versus only 10% today, whereas for the 10th District as a whole, the overall (metropolitan and nonmetropolitan) share has declined from about 10% to about 5% today. Hence, even the most farm-intensive regions of nation are much less exposed to fluctuations in agriculture than a generation ago.

3. Farm Land Bubbles and the Rural Economy.

As indicated in Section 1, a collapsing farm land market could lead to different dynamics with possibly broader implications. Specifically, Section 2 made the case that a slumping farm economy in itself would directly have relatively small impacts across most of rural America. Yet, a popping of a farmland price "bubble" could lead to different dynamics if it spills over to the financial system. These dynamics would have larger ramifications if the rural banking sector is disproportionately affected because it could freeze up lending across a wide variety of rural business and personal uses.

At first pass, such a negative spiral is not unfathomable. Most specifically, even though the residential housing construction sector is relatively small, the early 2000s housing bubble helped precipitate a financial meltdown in 2008 that led to the Great Recession. One could see the negative feedback loop in which land prices start to fall, loans get called in, forcing more sales, and even more price declines. If such a spiral sufficiently damaged bank balance sheets, then bank lending could be curtailed, which would be exacerbated if there were greater uncertainty about the entire rural economy under financial distress. The question then is farmland a large enough asset class to cause significant financial sector problems if a "land bubble" popped?

According to USDA (2014b), there were $2.4 trillion dollars of U.S. farmland assets in 2013. By contrast, the Federal Reserve Board reports that households owned $19.4 trillion in housing real estate (Federal Reserve Board, 2014).[4] Thus, the size of the farm sector is considerably smaller than the residential home sector, suggesting a widespread financial meltdown is less likely. However, farmland debt is probably disproportionately held in rural

[4]The assets include: "All types of owner-occupied housing including farm houses and mobile homes, as well as second homes that are not rented, vacant homes for sale, and vacant land" (Federal Reserve Board, 2014, notes to Table B100, where the data originated).

areas—and in the 10th District in particular—so it is possible that there could be local or regional "hiccups" in the banking system if there were a systemic meltdown in farmland values.

What then is the probability of a crash in farmland values? It is true that land values have soared. For example, Iowa farm values were up 168% between 2004 and 2013 after adjusting for inflation and current (inflation adjusted) prices are well above the levels of the early 1980s, just before the subsequent farm crisis (Andrews, 2013). To assess whether this is a bubble, we need to first appraise how much of the current run-up is driven by market fundamentals. Namely, basic economic theory suggests that the price of any long-term asset such as farmland should equal the present discounted value of the net profit stream arising from that asset. This value is positively related to the price of the product and inversely associated with the long-term interest rate (adjusted for risk). Alternatively, the price of land should move in tandem with rental value of the land (discounted by the long-term interest rate).

Farm commodity prices have greatly soared for much of this decade. Long-run demand for farm commodities is being sustained by growth in developing countries such as China and India, as well as the demand for biofuels. The annual average price of corn increased by 340% in nominal terms between 2005 and 2012, though it fell back about 4% in 2013 (University of Illinois, 2014). So far in 2014, corn prices are running in the mid $4 range, or another 25% or so below the average 2013 levels. Thus, while corn prices are softening, they are still more than double the levels of a decade ago in nominal terms and there is reason to see that long-run prices will remain higher than in the early 2000s.

The rise in farm commodity prices is reflected in farm rental values. Figure 7 shows average farmland rental values and farmland values for the United States over the 2003-2013 period. What is apparent is that both series track each other fairly closely, though land rents

appear to have risen less than land values. Yet, any differences in the rise of land values versus land rents are made up in changes in long-term interest rates. For example, according to Federal Reserve Board data, the average federal thirty-year bond rate was 4.91% in 2006. The rate fell during the Great Recession and tepid recovery, before modestly rising to 3.45% in 2013 (which is about the range seen in the first half of 2014). Thus, in recent years, investors could borrow money more cheaply for farmland and the lower rates allow greater capitalized values of profits. Indeed, while the future outlook for long-term interest rates is cloudy with the apparent ending of the Federal Reserve's quantitative easing efforts, the stability of long-term rates in the last several months is suggestive that they are near their long-term levels.

Longer-term trends appear to further support high farmland values. For example, the Illinois farmland-rent-to-farmland-value ratio has consistently fallen since the early 1970s, which would support the high prices of today (Sherrick and Kuethe, 2013). Likewise, in the most recent years, Sherrick and Kuethe (2013) report that the capitalized value of rents has risen faster than land prices. All of this evidence suggests that the rapid rise in farmland prices is greatly sustained by very favorable market fundamentals on the demand side in commodity prices and land rents, as well as lower interest rates.

The upshot is that one could make a case that market fundamentals have largely driven the run-up in farmland prices, which greatly reduces the probability of a sharp decline in those prices. Nonetheless, markets do have a tendency to overshoot their equilibrium prices. Thus, with recent softness in commodity prices and some weakness in market rents, land prices could somewhat decline, especially if these market changes are unexpected. And any "modest" price decline could be exacerbated if the market overshoots. Indeed, one could see a scenario in that as prices decline, some farms have their "loans called in" and are forced to sell, further softening

the land market. Yet, farm balance sheets seem quite strong with recent debt-to-asset ratios in the range of 11%, which is well below the 20% level that is often held out as a danger threshold (USDA, 2014b; Henderson and Kauffman, 2013; Sherrick and Kuethe, 2013). By comparison, during the 1980s farm crisis, farm debt/asset ratios peaked out at just over 22% in 1985 and the debt/asset ratio was typically above 15% in the last third of the 20th Century. Hence, there does not seem to be the overhang of farm debt that helped precipitate previous agricultural deleveraging cycles.

The overall conclusion is that the probability of a farm crisis spilling over and triggering financial problems in the broader economy or in the broader rural economy seem rather small. First, the size of the overall farmland asset category is relatively small compared to other assets categories such as residential housing, the sector that triggered the housing bust and Great Recession, though it is possible there could be local problems if a region's banks are overextended in the farm sector. Second, market fundamentals appear to be primarily behind the run-up in farmland prices, which means there is less scope for a market collapse. Third, even in a "farmland market correction" scenario, farmer balance sheets are relatively strong, which means farmers will be less likely to find themselves in a forced sell situation that would feed land price declines.

4. Conclusion.

America's farmers have experienced a decade of prosperity, buoyed by high commodity prices, surging demand from developing countries, and subsidies and mandates that increase biofuel demand. Not surprisingly, with low interest rates helping to fuel a binge, farmland values have soared over the last decade. In the wake of the housing bubble whose popping helped

trigger the Great Recession, some have asked whether a potential farmland price bubble could cause widespread problems in the American economy, especially in rural America if the balance sheets of rural banks are especially hit. In particular, the issue is of local importance as the 10th District is much more agriculture intensive than the rest of the country.

To answer this question, I explored several avenues through which a farm economy crash could damage the broader nonfarm economy in somewhat of a worst-case scenario. First, I examined the relative size of the agriculture economy including its supply chain, concluding that the direct size of the agricultural sector is now considerably smaller than during the most recent farm crisis in the 1980s, on the order of one-half the size. Hence, the *direct* effects of a new farm crisis are not likely to have large spillovers except in the relatively few sparsely populated communities that are still farm dependent.

I next asked whether a farm economy crash could *indirectly* raise havoc by damaging the banking sector, assuming farmland values plunge. First, I observed that farmland assets are a considerably smaller asset category than residential housing, which was the category that helped spur the financial crisis at the beginning of the Great Recession. Thus, while it is possible that local banks could be strained if farmland prices sunk, it is unlikely to cause widespread problems across the broader rural economy. Second, I then asked whether a "bursting of the farmland price bubble" is a likely scenario. I concluded that most of the rapid run-up in farmland values can be justified by market fundamentals such as rising demand for farm commodities, lower long-term interest rates, and steadily rising farmland rents. Even the recent decline in farm commodity prices leaves them well above their levels of a decade ago and long-term interest rates appear to have stabilized at levels below their decade-ago rates. Thus, there appears to be long-term market features that will continue to support farmland prices. Even if individual farmers were forced to

sell into a declining market, the overall balance sheets of farmers are relatively healthy, suggesting that such forced sales will not turn into a tidal wave. The overall conclusion is that while there may be downward corrections and normal market overshooting in farmland values, a wholesale farmland price plunge is unlikely.

While a farm sector correction may seem overdue, the fallout should be limited with widespread spillovers only in very rural farm communities and in locales where a large share of the local banking sector invested heavily in farmland. However, most of rural America will escape most of the damage, illustrating that a positive feature of rural America today is that its economy is much more diverse than even a generation ago.

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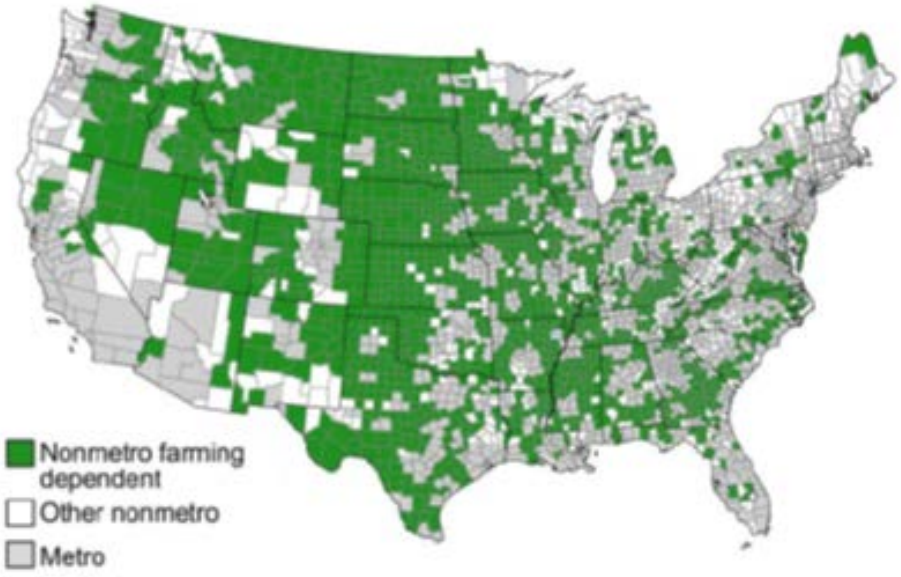
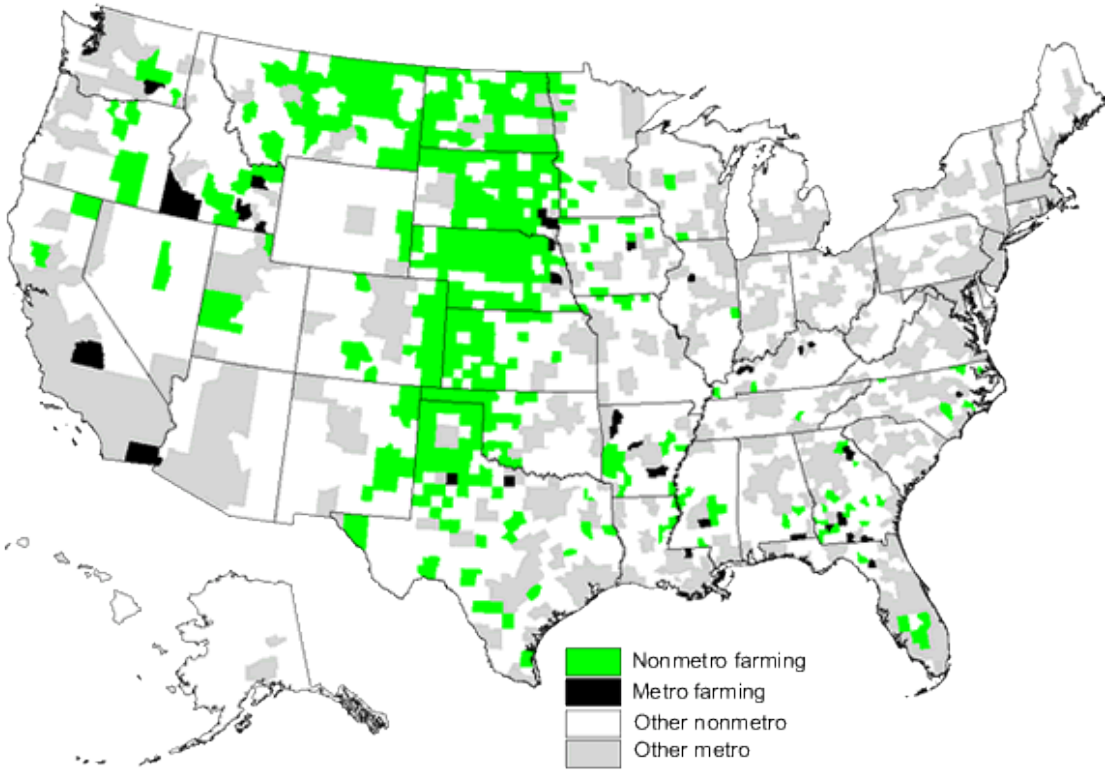
Figure 1: Nonmetropolitan Farming-Dependent Counties 1950



Source: Taken from U.S. Dept. of Agriculture, Economic Research Service, *2007 Farm Bill Theme Papers, Rural Development July 2006.* See the notes to Figure 2 for the definition of Farm Dependent.

Figure 2: Farm Dependent Metropolitan and Nonmetropolitan: 1998-2000

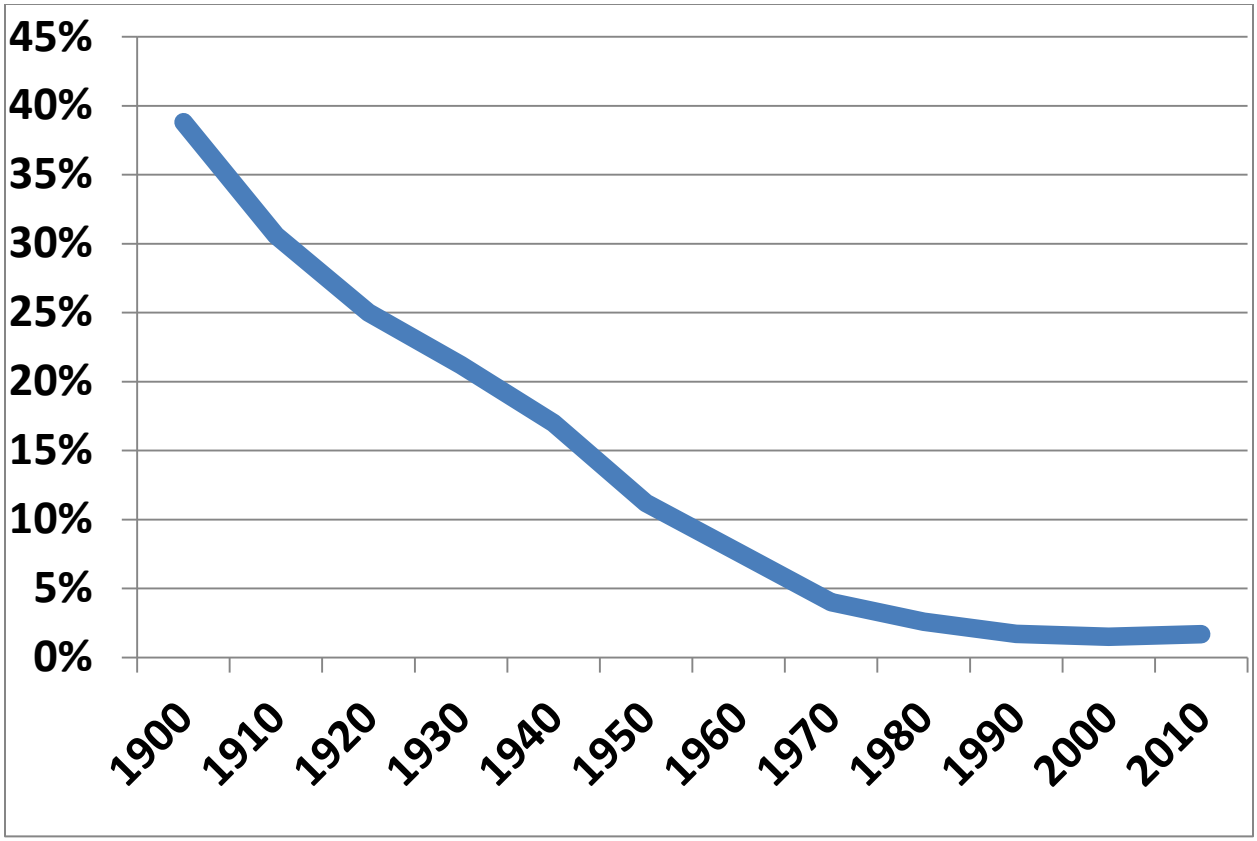


Farming-dependent counties–either an annual average of 15 percent or more total county earnings derived from farming during 1998-2000 or 15 percent or more of employed residents working in farm occupations in 2000.

Source: Economic Research Service, USDA.

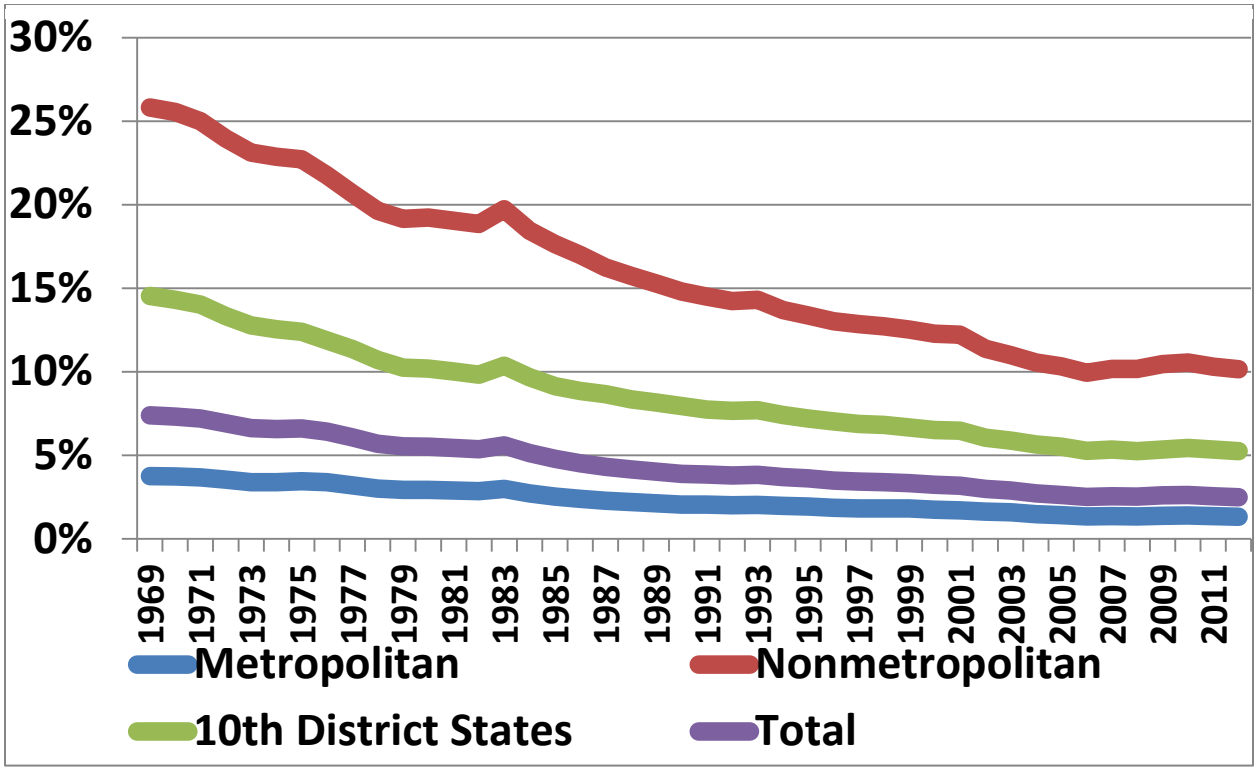
Taken from ERS website.

Figure 3: Percentage of Farm Employment as a share of the Labor Force: 1900-2010



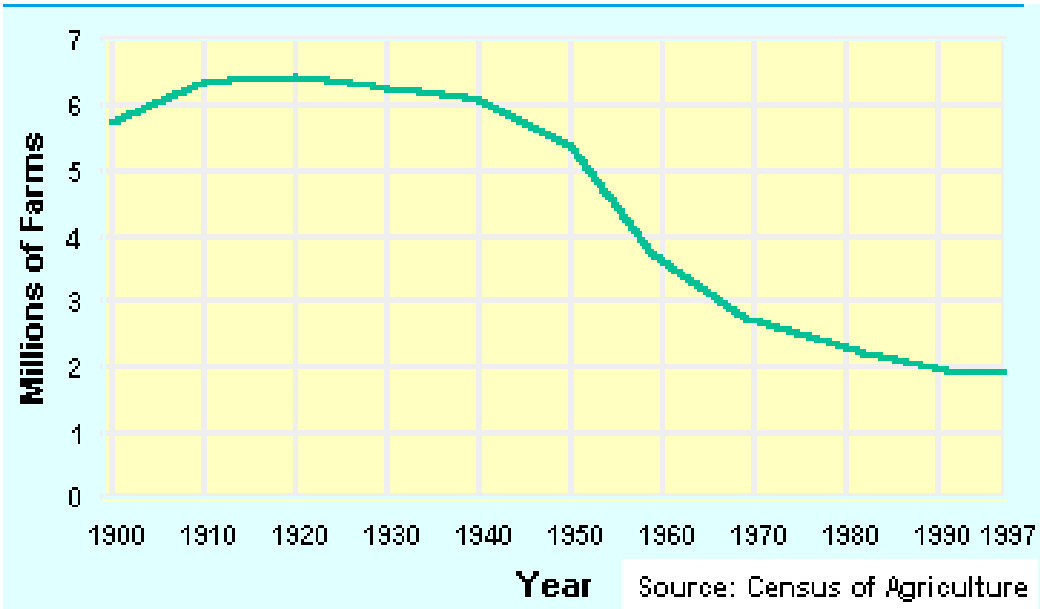
Source: Trends in U.S. Agriculture published by USDA-NASS (http://www.nass.usda.gov/Publications/Trends_in_U.S._Agriculture/Farm_Population/index.asp); U.S. Census Bureau, Census 2000; (for data in 2000), and the Bureau of Labor Statistics (for data in 2010).

Figure 4: Percentage of Total Jobs in Farming, BEA Definition: (1969 - 2012)



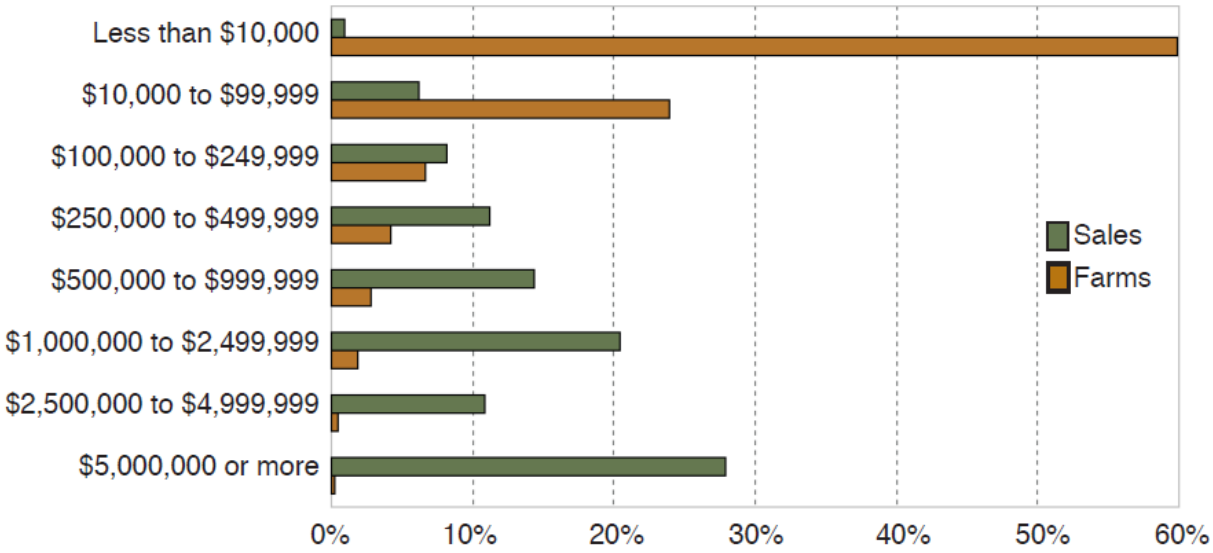
Source: Bureau of Economic Analysis and includes farm and nonfarm proprietor employment. BEA data include all jobs including casual employment and all of the jobs for multiple jobholders.
The 10th Federal Reserve District either fully or partially includes the following states: New Mexico; Oklahoma; Colorado; Wyoming; Nebraska; Kansas; and Missouri.

Figure 5: Number of Farms: 1990-1997*



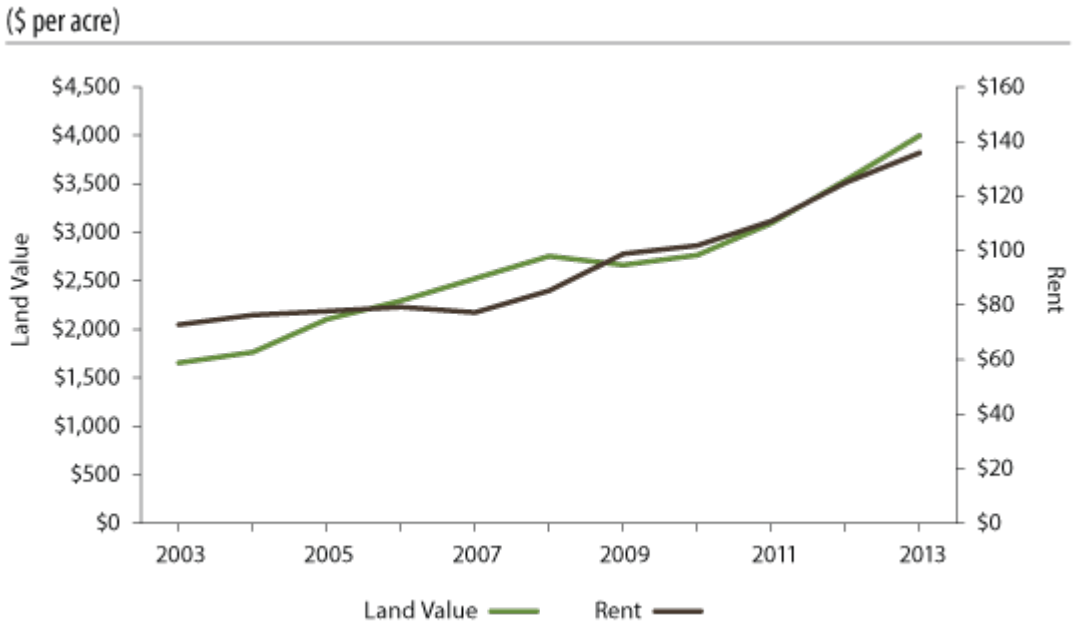
*Source: USDA, Economic Research Service, "Trends in U.S. Agriculture." Available at: http://www.nass.usda.gov/Publications/Trends_in_U.S._Agriculture/Farm_Numbers/index.asp, downloaded May 27, 2014.

Figure 6: Number of Farms and Sales: 2007 Percent of Total*



*Source: Taken USDA, NASS, "*2007 Census of Agriculture*." Downloaded from: http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/Farm_Numbers/farm_numbers.pdf. Downloaded May 27, 2014.

Figure 7: U.S. Farmland Values: 2003-2014*



*Source: taken from USDA, National Agriculture Statistics Service, Available at: http://www.nass.usda.gov/Publications/Highlights/2013_LandValues_CashRents/index.asp, downloaded May 27, 2014.