



THE SHIFTING **NEXUS** OF
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Closing Session:

The Business Climate for Agriculture

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The Shifting Nexus of Global Agriculture

A Synopsis (Paper)

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Introduction

A key theme underlying the discussions and presentations at the 2013 Kansas City Federal Reserve Bank Agricultural Symposium - - the Shifting Nexus of Global Agriculture - - was the uncertainty the industry is facing in many dimensions: unpredictable global demand resulting from uncertainty in economic growth around the world; uncertain global supplies because of variability in climatic and weather conditions combined with expanded tillable acres and use of new technology in new production regions; changing public policies concerning biofuels and energy production, international trade and export restrictions, fiscal and monetary stimulus to foster economic growth; funding and investment in the capacity and reliability of the transportation/distribution structure to efficiently and effectively move food and agricultural products from producers to end users/consumers, among others.

Given these increasingly complex and interconnected strategic uncertainties characterizing the industry, the admonition of Nassim Nicholas Taleb of Black Swan fame should be remembered - - “black swans” (highly unlikely but critically significant events) cannot be predicted, so the focus should be positioning for the unanticipated surprises with an emphasis on maintaining resiliency and reducing vulnerability rather than trying to predict the future. In that spirit this discussion will focus on the implications of the current and future uncertain market and financial conditions on the resiliency and vulnerability of the farming sector.

The Set-Up

Although the U.S. farming sector has exhibited very strong financial performance during the past 5-7 years in terms of income generation, cash flow and debt servicing capacity, and equity accumulation, that strong performance has been accompanied by increased volatility. This increased volatility is a result of wide fluctuations in crop and livestock product prices, input costs and product output (due to both more variable climatic conditions and

losses from increased pest/disease outbreaks) that has created more operational and financial risk for farm businesses. Even though the variability of prices as a percentage of the average price has not changed much compared to the past, higher costs and the fixed nature of some of these costs has increased the variability of both operating margins and net income on both an absolute and relative basis dramatically.

The amount of leverage (debt relative to equity capital) used in the industry has declined over the last two decades, suggesting that the debt servicing risk for the sector is less than it was, for example, in the 1980's. But industry averages may not accurately reflect the true financial risk for individual firms or even for the industry. Larger scale growing farmers who generate the majority of the agricultural output have leverage positions as reflected by the debt to asset ratio more than double the industry average of 10 percent (Hoppe, et al 2008). And “shadow bank” financing in the form of loans and leases from captive finance companies (for example Deere Financial Service) and merchant and dealer credit from input suppliers is not well documented and is likely under reported in the widely referenced USDA data.

Furthermore, interest rates on debt are at abnormally low levels, and when they rise will increase the debt servicing requirements for farmers who have not converted from variable to fixed rate loan terms. Operating credit lines have increased for many producers, and interest rates on these loans are reset at renewal, and thus will increase when market rates rise. Some farmers have signed longer term (3-5 year), high fixed rate cash rent leases to obtain control of land rather than purchase that land--these arrangements result in fixed cash flow commitments irrespective of productivity and prices much like a principal and interest payment on a mortgage. Farmers are also facing more strategic risks than they have in the past--disruptions in market access and supplier relationships including loss of a lender relationship or a landlord, regulatory and policy changes, food safety disruptions and reputation risk, etc.

U.S. agriculture is notorious for its boom and bust cycles and appears to be in the midst of another golden era. Strong global food demand and robust biofuels markets have strained the current production capabilities of global agriculture. The prospects of tight global supplies have spurred booming farm incomes. Historically low interest rates have quickly capitalized these burgeoning incomes into record high farmland values. But past golden eras in agriculture quickly faded – the most recent being the decline in the 1980s from the boom of

the 1970s. The promise of sustained global demand shifted with economic conditions, and capital investments in agriculture led to increased agricultural supplies that trimmed farm prices and incomes. At the same time, leaner farm incomes were unable to support the record-high farmland prices, especially at higher interest rates. As a result, many farmers that worked to seize the emerging opportunities were left empty-handed as market and financial conditions changed.

With current high farm net income (\$128.2 billion projected for 2013 (USDA, 2013)), far-sighted farmers, lenders, policy makers, and the academic world are asking many "what if" questions: What if commodity prices turn down? What if fertilizer prices continue to increase? What if farmland cash rent continues to increase? What if land values decline? With all the "what if" questions in mind, farmers and economists are concerned about the incidence and intensity of financial stress the farming sector might encounter in the future.

Analysis

To obtain some insight into these questions, the financial performance of illustrative Midwest grain farms with different scales, tenure status, and capital structures was examined under the shocks of volatile crop prices, yields, fertilizer prices, farmland value, and cash rent (Boehlje and Li 2013). Monte Carlo methods were used to generate simulated crop prices and yields, fertilizer prices, farmland value and cash rent for the period from 2012 to 2015. Illustrative farms of 550, 1200, and 2500 acres were constructed reflecting the production activity for these farms with three different farmland ownership structures (15%, 50%, and 85% of land owned) and two capital structures measured by debt-to-asset ratio (25% and 50%). Absolute measures and financial ratios were used to evaluate the income, cashflow, debt servicing and equity position of these illustrative farms.

Given a specific tenure status and capital structure, the percentage of farms that have a positive cash balance after meeting all the financial obligations and family living expense increases with farm size (Table 1). In fact, almost 75% of the smaller farms (550 acres) have a negative cash position by the end of the planning horizon. The percentage with greater than 10% rate of return on equity is also higher for larger acreage farms. Larger farms have better profitability measured by net income and operating profit margin ratio, as well as lower volatility (standard deviation) of these measures. At the end of the simulation period, larger farms have a higher average working capital to value of farm production (WC/VFP) ratio, and a higher percentage of farms with the WC/VFP ratio exceeding 35% (99.9% for the 2500 acre farms compared to only 43.0% for the 550 acre

farms). Repayment capacity is also higher for larger farms (87.9% for 2500 acre compared to 22.9% for the 550 acre farms). These results suggest that smaller farms with one-half or more of their farmland rented and even modest leverage (25% debt-to-asset ratio) as is typical with farmers early in their farming career, are very vulnerable to price, cost, yield and asset value shocks. Larger size farms with similar tenure and financial characteristics are much more financially resilient.

Table 1. Comparison of Farm Size with 50% Land Owned and 25% Debt-to-Asset Ratio

	Size of Farm (acres)		
	550	1200	2500
Annual Net Farm Income (Mean)	\$49,800	\$37,600	\$166,200
Change in Net Worth (3 year) – (Mean)	\$36,800	\$114,900	\$926,900
Working Capital/Value of Farm Production			
<i>Mean</i>	33.0%	45.5%	49.5%
Percent < 35%	57.0%	3.9%	0.1%
Debt-to-Asset Ratio			
<i>Mean</i>	21.5%	15.8%	13.0%
<i>Percent > 55%</i>	0.0%	0.0%	0.0%
Term Debt Coverage Ratio			
<i>Mean</i>	0.9	1.2	1.5
<i>Percent < 1.1</i>	73.1%	23.9%	2.1%
Percent Positive Cash	24.6%	83.8%	98.4%
Percent ROE > 10%	0.4%	7.6%	20.1%

Different land tenure arrangements have a dramatic impact on the vulnerability of the smaller (550 acre) farming operations (Table 2). Those 550 acre farms with 85% of the land they operate owned not only have substantially higher incomes than those who rent a higher proportion of their farmland, they are able to accumulate additional equity over the three year period (\$26,000), reduce their leverage position from 25% to 17.1% and have strong working capital and cash positions. In contrast, farms with only 15% of their acreage operated that is owned have negative net income (\$2,100), lose equity (\$130, 400), increase their leverage position from 25% to 32.6%, and have very weak term debt repayment capacity (an average TDRC of 0.6 with 99.5% less than 1.1). These farms that rent a large proportion of their land are very vulnerable to financial stress from price, cost, yield or asset value shocks even with crop insurance and hedging strategies in place.

**Table 2. Comparison of Land Tenure for 550 Acre Farms with
25% Debt-to-Asset Ratio**

	% of Land Owned		
	85%	50%	15%
Annual Net Farm Income (Mean)	\$98,900	\$49,800	-\$2,100
Change in Net Worth (3 year) (Mean)	\$76,000	-\$32,300	-\$130,400
Working Capital/Value Of Farm Production			
<i>Mean</i>	49.6%	32.9%	17.3%
<i>Percent < 35%</i>	9.2%	56.9%	99.5%
Debt to Asset Ratio			
<i>Mean</i>	17.1%	22.1%	32.6%
<i>Percent > 55%</i>	0.0%	0.0%	0.0%
Term Debt Coverage Ratio			
<i>Mean</i>	1.7%	0.9%	0.6%
<i>Percent < 1.1%</i>	16.2%	76.8%	99.5%
Percent Positive Cash	74.8%	24.3%	0.3%
Percent ROE > than 10%	11.7%	0.5%	0.1%

As expected, those operations with higher leverage are more vulnerable to price, cost, yield and asset value shocks (Table 3). For the larger farms of 2500 acres with 50% of their land owned, increasing the leverage position from 25% to 50% reduced income only modestly (from \$160,500 with a 25% debt-to-asset ratio to \$134,800 with a 50% debt-to-asset ratio); and equity accumulation even less (only \$15,800 less change in net worth). Thus, larger farms as characterized in this study have only modest vulnerability to higher leverage positions and more resilience to shocks in prices, costs, yields and asset values.

These “stress test” results suggest that the financial vulnerability and resiliency of Midwest grain farms to price, cost, yield and asset value shocks are, not surprisingly, dependent on their size, tenure and leverage positions. Farms with modest size (i.e. 550 acres) and a large proportion of their land rented are very vulnerable irrespective of their leverage positions. These same modest size farms are more financially resilient if they have a higher proportion of their acreage that is owned rather than rented. Large size farms with modest leverage (25% debt-to-asset ratio) that combine rental and ownership of the land they operate have strong financial performance and limited vulnerability to price, cost, yield and asset value shocks. And these farms can increase their leverage positions significantly (from 25% to 50% in this study) with only modest deterioration in their financial performance and a slight increase in their vulnerability. These results suggest that the

perspective that farmers are resilient to price, cost, yield and asset value shocks because of the current low use of debt in the industry (an average of approximately 10% debt-to-asset ratio for the farming sector) does not adequately recognize the financial vulnerable of many typical family farms to those shocks.

Table 3. Comparison of Debt-to Asset Ratio for 2500 Acre Farms with 50% of Land Owned

	Debt-to-Asset Ratio	
	25%	50%
Annual Net Farm Income (Mean)	\$160,500	\$134,800
Change In Net Worth (3 Year) (Mean)	\$459,100	\$474,900
Working Capital/Value of Farm Production		
<i>Mean</i>	49.5%	30.1%
<i>Percent < 35%</i>	0.1%	54.4%
<i>Debt-to-Asset Ratio</i>		
<i>Mean</i>	13.0%	35.6%
<i>Percent > 55%</i>	0.0%	0.0%
Term Debt Coverage Ratio		
<i>Mean</i>	1.5%	1.1%
<i>Percent < 1.1</i>	2.6%	38.2%
Percent Positive Cash	98.1%	53.7%
Percent ROE > 10%	21.1%	41.7%

The Insights

What insights does this “stress test” analysis provide concerning the current period of prosperity in agriculture and the prospects for a bust? How might future events evolve that would create a 1970's-80's boom- bust cycle?

Similar to past farm booms, today's low interest rates have fostered the capitalization of rising farm incomes into record high farmland values. Accommodative monetary policy by the Federal Reserve has pushed nominal interest rates to historic lows. The capitalization of incomes into farmland values has accelerated, with the average price of U.S. farmland rising 25 percent from 2004 to 2011. The surge in U.S. farmland prices has outpaced the rise in cash rents. In fact, the average farmland price-to-cash rent multiple, which is similar to a price-to-earnings ratio on a stock, has surged to a record high of almost 30 in various Corn Belt states (Baker, et al 2013).

As noted earlier U.S. farm debt accumulation has not accelerated as it did during the 1970s. But the financial markets do present a future risk to farm debt use and leverage. Higher interest rates could have two distinct impacts on U.S. agriculture (Henderson and Briggeman). Rising

interest rates may place upward pressure on the dollar, which could indirectly trim U.S. agricultural exports, farm profits, and farmland prices. In addition, higher interest rates also boost the capitalization rate, which weights further on farmland prices. The impacts are compounded in highly leveraged environments when higher interest rates raise debt service burdens, as the 1920s and 1980s demonstrated.

And the distribution of debt among farmers is important. Recent analysis of the financial condition of farmers indicates that those who are younger (less than 35 years of age) have significantly higher debt loads and debt to asset ratios than the industry average. (Briggeman 2011; Ellinger 2011). And as indicated earlier, larger and rapidly growing farmers are more highly leveraged than the industry average. A future risk is that farmers could be increasing their leverage just as export growth and farm profits begin to slow.

Where to From Here?

How might events evolve from here? Farmers are likely to continue to be aggressive in buying land and bidding up land prices to not only acquire the income stream from that land, but also to capture the wealth effect benefits of capital gains resulting from rising land values. And the wealth effect doesn't just show up in land purchases - - farmers are encouraged to continue to buy more machinery and facilities because of the wealth they have accumulated from rising land values. These purchases are most likely made by larger growth oriented farmers who have higher leverage positions. Even if they have sufficient cash to make sizeable down payments, these transactions change the structure of the balance sheet by reducing current assets while increasing non-current assets, and adding to current liabilities by the amount of the annual principal and interest debt servicing requirement. Thus, the liquidity position of the business as defined by working capital or the current asset/current liability ratio is reduced, making these firms more vulnerable to income shocks.

At the same time, farmers who are expanding rapidly have also been aggressive bidders in the land rental market -- fixed cash rental arrangements have become increasingly common and many of these agreements are for multiple years (3-5 years) at relatively high fixed rates. These high multi-year cash rents result in increased future fixed cash costs much like mortgage obligations on land debt. These "pseudo-debt" financial obligations are typically not reported on the balance sheet, but they are similar to capital lease obligations which increase the leverage and typically reduce the working capital/liquidity position of the business. Strong cash positions and concerns about high tax liabilities have also resulted in significant purchases of depreciable

machinery and equipment, which has again moved assets from the current to non-current category without restructuring the liabilities, thus creating an additional imbalance in the balance sheet. And the higher prices of fertilizer, seed, chemicals and fuel have resulted in larger operating lines, which increases the leverage and reduces the liquidity position further yet.

This increasingly misaligned balance sheet with a higher portion of current vs. non-current liabilities contrasted with a lower portion of current vs. non-current assets increases the vulnerability of the business to income shocks from lower prices, lower yields or higher costs. Such shocks would decrease margins and cash flows as well as inventory positions, and could quickly result in a working capital position below lender underwriting standards. A typical response of the lender in this situation is to suggest liquidating inventories and using the proceeds to reduce operating debt. But for farmers who file Schedule F tax returns, this could trigger significant tax obligations (the tax basis in raised grain and livestock for Schedule F taxfilers is zero, so the full proceeds at sale are taxed as ordinary income) which reduces the liquidity position even further.

An alternative lender response is to restructure the debt and move some of the current obligations to non-current using the appreciated value of farmland as security. This approach in essence results in leveraging the capital gain in farmland – the leverage effect of capital gains. Lenders who may have previously resisted increasing loan to value ratios on farmland purchases to limit increased debt utilization by farmers paying higher and higher prices for farmland will now be encouraged to monetize capital gains in land by extending additional credit based on the higher land values. Higher land values and resulting increased equity positions would appear to provide adequate security and secondary repayment capacity to support the larger debt load, but the debt per dollar of revenue generated from the land will be higher if the income shock is permanent rather than temporary. The business is now very vulnerable to further income shocks or asset value deterioration -- the working capital position has been destroyed and credit reserves have been fully used. Permanently lower incomes and/or higher interest rates will not only create debt servicing problems, but also reduce the discounted cash flow and thus weaken the demand for farmland. If debt servicing problems result in forfeitures or foreclosures in the farmland market, additional properties are likely to be offered to the market, and weakening demand and increased offerings (or forced sales) are likely to result in reduced farmland values.

Livestock producers may be even more vulnerable to income shocks than grain farmers. The significant losses suffered by both pork and dairy farmers in particular during the 2007-2009

period, substantially reduced the equity and working capital positions of many of these businesses. Some producers covered these losses with increased operating or term debt, thus increasing their leverage positions. Although profits improved significantly in 2010 and 2011, they have not been sufficient to rebuild equity and working capital positions. And asset values for specialized livestock facilities and breeding stock declined dramatically during the period of large losses, resulting in further deterioration of solvency and secondary repayment positions. These values have recovered only modestly from those distressed levels, so many livestock producers are very vulnerable to not meet lender liquidity/working capital as well as solvency underwriting standards even with modest price reductions or cost increases.

So What?

The sequence of events just described characterized the 1970's-80s for the U.S. farming sector, resulting in a strong boom and a dramatic bust in financial performance and land values. Today we appear to be in the late stages of the boom – incomes are moderating and the wealth effect as a driver of land purchases remains muted. If incomes strengthen and/or the "wealth effect" becomes stronger (or both), land prices and capital asset purchases could continue to rise rapidly resulting eventually in more serious liquidity and working capital problems if/when income shocks occur. Even though lenders may be conservative in their credit policies, liquidity/working capital pressures could result in increased refinancing of land debt -- the leverage effect. The end result would be a bust much like the 1980's. Mitigating this end result requires continued muting of the wealth effect, maintaining or rebuilding the working capital of farm businesses and preempting the leverage effect.

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A Synopsis (Transcript)

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Nathan Kauffman: Over the last two days, our distinguished speakers and panelists have guided us through a discussion of agricultural investments, policies, trade flows, and profits. This is a lot to process. We've seen a lot of information and heard very informative speeches. So we've asked our final speaker to help us out by considering everything we've covered and provide us with some final comments.

The person charged with providing us a 10,000-foot view, and who did a great job last year so was invited back this year to do this for our symposium, is Michael Boehlje. Michael Boehlje is a distinguished professor in the Department of Agricultural Economics at the Center for Food and Agricultural Business at Purdue University. He is involved in teaching, research, and executive education in agricultural finance, farm and business strategy and management, and structural changes in agricultural industries. The major theme of Dr. Boehlje's work is the importance of strategic planning and thinking, and positioning the firm for long-term success in a turbulent business climate. Please join me in welcoming Michael Boehlje.

Michael Boehlje: Thank you very much, Nathan. It is a real pleasure to be invited back. In my business, you know, return opportunity is always something you appreciate, so thank you very much for that invitation to be back here. I should possibly at least acknowledge that I was invited back prior to our raiding the Federal Reserve and getting Jason to come to Purdue University. Thank you, then, for not saying, "Okay, you're *not invited now!*" We've had a chance to work with Jason at a distance. Now we get a chance to work with him more closely,

so what we have done, we have a group at Perdue is involved in this area – The Center for Commercial Agriculture – trying to think about issues that are going on in agricultural financial conditions, land values, and those types of things. Jason has now been added to our team. Here is

what we're going to do today. We're going to make you go to work. I have my own observations. I have my own viewpoints. As you know, you'll get a chance to hear them. But what I'd like to hear from initially is from you.

I'm a university professor, I get by with this. *It's test time!* Take out a piece of paper. Hey, I'm serious about this now. Some of you are saying, "Gee, I'm still eating."

No, no, come on. You can write with one hand and eat with the other. Take out a piece of paper. I'd like you to write down the two A-ha's, the two "I didn't know that," or the two "boy, that's something" real takeaways. Write down the two takeaways that you picked up in the last two days. The problem is going to be sorting through 50 or whatever that you could write down. Write what are the two most important takeaways. This is a timed quiz. You have 60 seconds to do it. Then, you are going to get a chance to share them with us. Fifteen seconds left. Okay, time's up.

We can either use the volunteer style or the call-out style for you to report back to us. What we want you to do is give us one of the takeaways on your list. That will give more of us a chance to share. Let me also suggest to you, at this stage, that you don't put your pen down. What you do is you keep pen in hand, because there may be somebody that says something that you say, "Oh, I hadn't thought about that."

What we want you to do is we want you to go home and remember ten things from this session besides it was a good time, good food, and all such things. What are those things?

I actually have six here and, if you don't write anything down, I'll be able to add maybe six to your list. I want you to write down what you can learn from the others in this room. Who wants to volunteer first? Don't do like the students do on the campus and stay quiet.

_____ : So my first takeaway is that the demand growth story that we've heard over and over – population growth is maybe – and I stress the *maybe*, because I'm not fully convinced – less of a slam dunk than I thought. That is takeaway number one.

Michael Boehlje: Okay. I am sure you've got another one, but we're going to hold you up. Demand growth is not a slam dunk. A really interesting question. We are going to talk about that here in a second. Great. Somebody else.

_____ : Probably hearing the presentations from the folks that are directly involved in flowing capital into places like Ukraine and FSU heightened my awareness of how complex and challenging it is to flow capital to needed areas of the world and I didn't have quite that perspective coming in.

Michael Boehlje: So, the foreign capital markets maybe aren't quite as efficient, effective, and have the capabilities that we might have thought they had – maybe better than they might have been but certainly not what we're used to in the United States. Great.

_____ : That there is a much greater potential for global growth in supply of grains than I had previously thought.

Michael Boehlje: A much greater potential for global growth in grains than we might have thought. Let me give you a number. Write it down. In the last eight years, we have brought 147 million additional acres into production – in the last eight years, 147 million. To put it in context, how many acres of corn did we produce or plant here in the United States last year? How much did we plant this year? 95? We brought into production in the world 1½ times our entire acreage in corn crop. Is it producing at the same level as we have today? No.

What about ten years from today? Look at Brazil. What did we hear from the group? Yields that are as good and quality better with higher protein content because they have a longer growing season than we have in the United States.

Ain't making any more land, right? Maybe they ain't making any more of it, but they're certainly putting more under tillage when you've got the right incentives in place.

What else?

_____ : I would say, given the venue and the audience, I would have expected to come and hear people defend against the notion of there being a bubble in farmland. Both in the presentations and offline conversations there seems to be a consensus that a bubble may in fact exist.

Michael Boehlje: Let me make sure I understood. You thought that you would come here and hear there *wasn't* a bubble and you think now you hear it *is* a bubble?

_____ : Correct.

Michael Boehlje: I think it was pretty clear from President George's comments that she was really careful with the "bubble" word. What did she say? - creates distortions in the system. We've got to talk about that. Are we in a bubble? I'll give you my gut right now. Yes, the question is what the bust is going to look like. That's the issue. The issue ain't (pardon me), "Are we in a bubble?" The issue is, "What's the form of the bust?" That is an issue we'll talk about. I'll explain why I make that strong statement in a little bit.

What else?

_____ : I didn't know the Democratic Republic of Congo could be the next Brazil.

Michael Boehlje: Okay. That the Congo could be the next Brazil. We talk about the Black Sea and we talk about a whole bunch of places -- South Africa. How many had the Congo on our radar screen? Great point.

_____ : I guess I hadn't fully realized with the expansion of acreage around the world how the dynamics of the export markets have changed from the United States to other countries.

Michael Boehlje: Okay. So the expansion of production around the world has changed the dynamics of the export markets. How many of us would have believed we would actually be shipping grain from South America into the East Coast ports, rather than shipping it from the Midwest, which is happening? What? Mexico? South America shipping corn to us? An argument some people make is when that set of ports and systems is in place and they have the logistics put together, it isn't going to be easy to abandon it when U.S. corn prices go down. You may not have the same flow, but you still will have some flow. Very interesting. Shipments we'd never expected in the past occurring.

One more.

_____ : On the presentation about the incredible cost and timelines for improving the shipping infrastructure, I had no concept that there were that many moving parts and the timelines going out to 2080 to get these projects done.

Michael Boehlje: Okay. The long delays associated with the timeline which we never seem to be able to comply with anyway to get improvements in the transportation distribution system. 2080 seems a long ways out there. That is a little bit beyond the 2050 issue we keep talking about in terms of the number of people. We aren't even going to be *ready* for the 2050 people with our transportation system. Good.

Does anybody else have a burning one? How many do we have? Six, seven. Let's get one more on the list.

_____ : I was surprised to hear two people this morning say that repealing the RFS wouldn't have a major impact on corn prices.

Michael Boehlje: Okay. Given where we are today, repealing the RFS wouldn't have a major impact on corn prices. We wouldn't see that market collapse. Given that we've built the infrastructure there, that demand is probably going to be relatively solid – not grow so much necessarily – but relatively solid. Okay.

I'm sure you had some more. Let me give you my list of – I think I have – six. Each of these has 17 subparts, but that's okay. [laughter]

Number one. When you say nexus, what do you think of? Nexus implies centrality. What did you hear? That there is tremendous dispersion in demand. We didn't even talk about nutraceuticals. We didn't talk about industrial uses of bio material. We didn't talk about a whole broad spectrum of other end uses that some people think will be part of the industry. So it's increasingly dispersed in terms of end-use markets that we are going to, as well as geographies. Tremendous dispersion in demand and significant dispersion in supply and production. It used to be, if you understood what was going on in the United States, a little bit about Brazil, and maybe play around a little bit with Western Europe, you had it.

Now we're talking about parts of Africa that have potential, let alone what we heard in terms of the Black Sea area and what is going on in Argentina, Brazil, what's going on in China, what has the potential to happen in India, and a whole lot of other geographies. So dispersion of production. What that implies is much more importance of the trade, logistics, supply chain structures, and so forth. If you have more dispersion of demand, more dispersion of production, you do a lot more work to get those mixed up.

On top of that, you had this weird thing going on in Iowa. What was said about the State of Iowa? How much Iowa corn is now shipped out? None? So at the same time you get this dispersion, you also have demand, which has grown significantly internally, at least in a couple or three points which have even more profound implications with the transportation distribution system. They don't need rail. They don't need water. They need what? Better roads. I'll tell you about roads in my part of Iowa where I farm in a little bit.

Number one, you might want to say, "Look, it is a *dispersed* global agriculture."

That has really, really significant implications in one other dimension. You heard this morning that we – the United States – are increasingly less important in global agriculture than we used to be, whether it be in terms of trade, whether it be in terms of policy, whether it be in terms of almost any and all dimensions. The number one soybean producer in the world today is who? Brazil.

We're increasingly finding in the United States that we no longer set the rules and get to say how the game is going to be played. This dispersion issue is really, really critical in terms of policy, critical in terms of business structures, critical in terms of the importance of transportation distribution, and so forth.

Number two. We heard a lot of discussion about the politically correct term being “distortions” – about booms and busts. We heard today two different arguments. One argument was that we have to feed and fuel the world. Feeding and fueling the world is going to press our resources dramatically. This is all a good-news story. There is really, really phenomenal opportunity, driven heavily by the “at least 9 billion people” argument.

Then we heard another story this morning that seemed to be pretty reflective of the surplus argument. Those two speakers followed each other. It was interesting to say, “Whoa, we’re going to be on this side of the ledger over here. And then all of a sudden we’re on this side of the ledger.”

Somebody said it. I wonder which one is right? I’ll come back to that in a second. But let me make a couple of comments about the “9 billion people” argument and the “feed and fuel the world” argument. First, is that population growth is not unimportant, but it isn’t the driver. Some of you heard me say this, so I’ll try not to be too critical but every agribusiness executive, and I’ve heard four CEOs of four of the biggest agribusiness companies in the last two weeks at a conference, says exactly the same thing, “Nine billion people have to be fed.”

You know what my question is? Who says we have to feed them? What if they don’t have any money? We’d have 9 billion people, who are going to create one heckuva big social welfare problem.

It’s not a demand problem. The issue is NOT population growth. It is what? Income growth. China has had a lot of people for a long time. Close to a billion. Why has their demand increased so significantly in the last 10 to 15 years? Not because of more people, but because of more income. Let me also remind you that, if you want to think about the uncertainty of the future here, recognize that population growth is relatively predictable. Demographers – they say, “We can predict this stuff pretty easily. We can’t predict diseases, but we can predict – within reasonable numbers and parameters – birth rates, death rates, and those sorts of things.” This isn’t a highly unpredictable activity.

However, income growth is very unpredictable. So what bothers me in the “9 billion people” argument is 1) I think we’re focused on the wrong driver and 2) where is it? When we focus on the income driver, we have a lot more uncertainty about what that’s going to be. Let me tell you what I tell farmers. I am optimistic about the long-run future of agriculture. I worry about the bumps in the road, getting from here to there. And I don’t want you to be roadkill in that process. That says something about strategy, which we will talk about here in a second.

Don't forget you heard from the podium more than one person talk about corn prices that didn't have the first number above four. He needs some pretty good logic why we should not ignore potential. How recently have we had \$3 corn? I am talking about \$3 corn, not high \$3s, \$3 corn? We said \$2.06. Let me tell you, on my farms in northern Iowa, in 2009 I was worried about \$3 corn going the wrong way, not up through it but down through it. It is not such a historic phenomenon to have that kind of price.

Do I believe it will stay at those low prices? No, but that's the point. We've got to position ourselves to handle that potential kind of problem.

Just so you know, I checked – because I'm always in the process of trying to figure out how much additional corn to sell from our operations – my local price for new crop corn in northern Iowa was \$4.77 and new crop soybeans was \$12.22. If I want to cover full cost of production, I need somewhere around \$4.60 to \$4.70. I'm right at breakeven for full cost of production. I'll come back and talk about that. So we are in a pretty vulnerable position, it seems to me, in these markets.

Let me take that another notch, because this helps us think about this boom-bust issue a little bit more. This wasn't talked about here, but let me leverage the work we've done, along with Jason, Nathan, and others, as well as colleagues at Perdue, and talk about how this has the potential to unfold. We've been saying that low leverage saves us from a bust. What is the leverage in agriculture? Can anybody tell me – as an industry? 10 to 11 percent. Back in the 1980s, when we had the previous boom and then bust – that's not the only one we've had in the last 100 years, by the way – we had a leverage position of at least double that if not about 23 or 24 percent. ***But it is not the average leverage that counts.***

How many of you have heard of a guy by the name of Taleb? Black Swan? What does Taleb argue, "The tails of the distribution count. That's what drives events."

We plan our businesses on the means, the averages, the typicals, and it's the tails that count. That's why you have to do scenario analysis. You have to do three projections of the picture, not just one – at least three. We'll talk about that in a little bit.

If you were at last year's symposium, what did Allen Featherstone tell you? Farm record data from Kansas State University suggest that we have as many, if not more, people in that high-leveraged tail as we did in the 1980s. Does anybody remember that? Go back and read his speeches again from last year's symposium.

Here is how this potential vulnerability, which we call it, spins out. Here is the sequence: First, lower incomes reduce working capital. But what else do we hear? Farmers hate cash and

paying taxes. They can solve both problems by doing what? Buying machinery. You would think we'd have a lot of cash-flush farmers. Oh, I don't know, maybe we do. I'm not sure. I can tell you that an awful lot of iron has been bought. And everybody says that a lot of farmland has been bought with cash. A lot of lenders say, "We're going to protect ourselves by not allowing them to borrow more than 50 percent of the value of the land, or \$6,000 per acre if they want to pay \$12,000, we're protected."

You just helped them destroy the working capital. What's their first line of defense against financial stress? Working capital. Then what happens? If we destroy the working capital ... Oh, by the way, I heard a new phrase on this. We always worry about farmers having "new paint disease." How many new shops have gone up lately? I went on a farm tour this year where we had two shops that were huge investments. I had a banker coming to me who said, "I was worried about "new paint disease" now I'm worried about "new shop disease." Farmers are buying everything they can get their hands on. So, if you destroy the working capital, then the next cycle is, "Well, things aren't as good as we'd like and income hasn't improved, so I tell you what we've going to do, we're going to refinance on that land."

Does this sound familiar? As long as you have some relatively strong land values, you might be able to restructure the debt and refinance that land, if you don't have a person who is already highly leveraged. Those that are already highly leveraged find it more difficult to do.

Then the next sequence of events that happens is low prices or prices that have not recovered, combined with higher costs and rents that don't adjust down. So we have a lot of operating risk and operating leverage. How many of you know the operating leverage in your farm-operating portfolio or in your farmers' business? That's the fixed-cost structure associated with multiple-year fixed high cash rents. That looks a lot like death in its cash-flow implications.

Typically, multiple-year fixed cash rents don't adjust down very rapidly. So what happens is that we now have a second cycle of working capital problems, because our prices haven't recovered enough to cover those high costs that we still have. They don't adjust down very rapidly, so we try to refinance again.

In the 1970s, most lenders or many lenders were willing to do a second refinancing. Did any of you live through that period of time? How many of you are willing to do it a second time this time around? Now, when we try to do that second refinancing, we don't have the capacity to be able to convince the lender to do it. So we have to start unwinding assets, particularly land, in a market that has no risk appetite and there is not too much interest in buying an asset when the

fundamentals of income, interest rates, cash flows, and so forth, are disconnected with that value. That's what creates a bust. That's the 1980s. That's the housing market. To some degree, that's the dotcom bubble, and that's the question of what's going to happen here.

There are two takeaways here. What is the canary in the coalmine on this? We do have a disconnect between prices and incomes and interest rates in terms of future prices and incomes, future interest rates, land values, and the growth in income. The drivers of any asset value are prices or incomes or interest rates or the growth in income. Land is a growth stock. You use growth in income. Growth in income in agriculture is growing about 4 percent per year. Do you think income is going to grow off of our current level at 4 percent per year for the next five to seven years? I doubt it. It isn't going to be plus. It's going to be negative.

You use a growth stock valuation model that raises your capitalization rate. We haven't even talked about risk. That ought to raise your cap rate, let alone interest rates going up. That ought to raise your cap rate. What does that mean for asset values? Well, it's not good news. We're having a significant disconnect between the fundamentals and asset valuation.

The key issue is what happens to the supply side of the market and we have no clue. By that I mean, if we start getting into financial stress, how much property will have to clear the market? It's a function of leverage positions. Today's leverage position may not be as important as the leverage position in 2014 and 2015, if the events I described take place.

I'm not worried about 2013. I'm not worried about 2014. You start getting nervous about 2015 and 2016, unless for some reason we get a significant recovery in incomes. We don't know. Will the land market go into pause mode? Will realtors sit on their hands and sellers say, "We don't need to sell. Can we just stay on the side for a while?"

If that is possible, we could have a soft landing. But it's pretty tough to have a soft landing when you have a supply curve shift with an increasing number of properties that can't clear the market like happened in the 1980s. We just don't understand that very well.

Let me remind you that agriculture is characterized by booms, followed by adjustments. You look at the last 100 years of agriculture and – again, this is work published here at the Kansas City Fed – you will find that we have experienced four booms in agriculture in the last 100 years. Four booms. I am not a believer in cycles necessarily. I believe in things where there are fundamental economic forces moving this up and down.

We've experienced four booms. Those have been followed in two cases by busts – the bust of the 1930s, where we bailed out of that bust with the growth in demand of World War II, and the

bust of the 1980s, which again we grew out of that from export demand and lower interest rates. A soft landing out of the boom associated with World War II where we just kind of came down and floated for about 10 or 15 years. So we can have a soft landing. It will be interesting to see whether we have a soft landing this time or something that mimics what happened in the 1930s or 1980s.

Agriculture, if you look at it based on outlook, is also characterized typically by what we call a short peak-long trough phenomenon. Most booms are relatively short-lived. This boom is longer-lived than most booms have been in agriculture because the drought pulled back production. But typically we get faster supply response than this one experienced. This boom has a duration of somewhere around seven years.

Most of them are five to seven years, followed by what I call a long trough. Agriculture is characterized by short peak-long trough phenomena. These are economic phenomena. This is not cyclical behavior. This isn't associated with some technical trading idea or anything like that. It's fundamental economics. Because once you get land in production, once that approximately 150 million acres in the rest of the world comes into production and prices come down, what's going to happen? We'll do what a smart farmer does, shut down the plant.

No, agriculture is characterized as a high fixed-cost industry. On my farm in Iowa, I will finally decide to quit planting corn if I have to take some \$3 prices, because I will lose less money by not planting corn. Minimize my losses. It isn't any different than in any other part of the world.

What happens, however, is when you build up this production capacity, you rarely shut it back down. It's just fundamental economics. With the cost structure of the industry, a lot rides on us having a very, very nonresponsive supply curve when prices come down. It's what you call an irreversible supply curve. It's a well-documented phenomenon.

In fact, what happens in many cases, farmers who are under pressure try to increase their yield and productivity. More fertilizer. You just confound the problem and then forget it. This is an important issue. And what I'm also going to tell you, is that we don't know for sure which of those futures is going to happen – “feed and fuel the world” or surpluses.

I'll give you a sense. In the short run, we probably have more risk on the surplus side. In the long run, I think the “feed and fuel the world” has legs. Let me remind you what I said. What I worry about is surviving the short run to benefit from the long run. We have to position ourselves to do that.

Number three. Somebody already said it, but let me just leverage it a little further. I want to make an argument. I would argue that the U.S. strategic competitive advantage in the global markets

has not been what happens on the farm. I think the numbers will show that cost of production, variable cost of production particularly in Brazilian soybeans, is not all that different than ours. In fact, some people will say it is less.

It isn't what happens at the farm gate. It's what happens between the farm gate and the ultimate consumer. It's the logistics. It's the distribution system. It's the storage system. It's the ability to be able to protect the quality, and so forth. What would you conclude based on what you heard? Of our relative comparative advantage in infrastructure, logistics, and distribution compared to what's happening in Brazil, what's happening in Argentina, and what's happening in the Black Sea area? I'm not talking about where they are or where we are now. I said to fast forward ten years. What did you hear?

Our comparative advantage is under attack. They're investing in infrastructure and what did you hear today? Even the projections take the U.S. out to 2080 in terms of modernizing. Did you say "building new infrastructure?" No, just maintaining *what we've GOT!* I think this is a huge issue. In addition to my day job as a university professor, I'm involved in farming operations and I want to do the best job I can on my farm. No question about that. I want to dabble in new technology. But if I were able to choose, I'm sorry to say, where we *should* put money in terms of helping the competitive position of farmers, it would be in *infrastructure*.

I'll be very blunt with you, the stimulus package had for the first time in modern history a bunch of money put on the stump for infrastructure – building infrastructure – in this country. What did agriculture ask for? *Broadband*. I'm sorry, but I've got to ship stock. Not talk to people. Sure we need broadband. But is it the top infrastructure need we have? I don't believe so. I think we need to up the bar, up the expectation. And I'm going to argue with you. Why weren't we at the table when those decisions were made saying, "We need at least \$5 billion for roads and for water. We have problems here and, yes, we'd like to talk to people, but we really, really, really need it to move our product."

I think we have a problem because agriculture doesn't drive infrastructure. In fact, it wasn't said here, but I've heard it in other settings. Some of the transportation industry doesn't like us. We've talked to the people in rail. They tolerate us at best. They have other constituencies they are trying to satisfy. They ship other stuff and agriculture isn't necessarily their prime focal point.

I don't know what the solution is here. I don't think we've been as creative in how we fund water. In rails, there is a lot of private-sector funding. We're still looking at who will fund water. The federal government, right? How long have we been trying to get money for water? Decades.

Maybe federal funding of water is broken. Maybe what we need to do is think about a new funding possibility. I don't know.

Municipalities, when they want to fund projects, they sell revenue bonds. Can we learn something from that? What about a revenue bond approach to fund a lot of our waterway activity? Would the market have an interest? I don't know. All I'm saying is that continuing to bang our head against the desk of the federal government to get money is not, I think, going to fare well for us in terms of funding that activity. I worry that ten years from now we'll be no further along than we are. Whether a revenue bond approach is reasonable, I don't know.

I am not saying this in the right sequence. Not some public-private venture, but some private-public venture. I think the private sector needs to take the lead here and figure out how we're going to do this, just like we've seen happen in rail. Some of you might find that a useful challenge to take a look at. I think that was number three.

Number four. Capital markets in some of the rest of the world aren't as efficient as they are here. In Brazil, you don't have a particularly good capital market for farmers, so they have gone to a classic barter system. When you want to buy fertilizer, you sign a contract to deliver so many bags of seed. That's their finance. You get the fertilizer and you're going to give them back the seed. That sounds to me like a barter. Particularly in some of the countries we talked about, generally the capital markets are better than they used to be. So we're getting some improvement in terms of the institutional structure.

You heard there was increased interest on the part of outside investors in logistics, in storage, and in distribution. I don't know how many picked that up. It wasn't, "Oh, we ought to go buy some more farmland."

We need to think about how to invest in the distribution systems in other countries to facilitate the flow, recognizing the fact that we are in this dispersion environment. So maybe there's more and, by the way, maybe there are also shorter payback periods. Maybe there's less concern about expropriation or political instability resulting in major problems, although that may not be true if you're in Colombia or Venezuela. The point is that we are broadening our interest in capital flows besides buying foreign land in "you name the country."

Now what you heard were discussions about other parts of the distribution channel. And you also heard discussions about farmland that I think are really valuable. It isn't buying the land, it's improving the land – drainage, irrigation, building storage to facilitate being able to market the product.

I can tell you from our own experience, our biggest, highest payoff investments in our farming operations have not been buying the most productive farmland. It has been buying farmland that was discounted in the market because people did not recognize that if you clear those trees, tile that property, and put some terraces over here, you can take that land and make it into as productive as the Class A. Not all, you have to make sure it has the soil types and right things to go with it. Investments in land improvements may be as important, if not more important. That is what I think we heard from two of the internationalists; that it is land improvements that may be more profitable than land is. Where is livestock in this whole discussion? The demand is for what? Animal proteins. The question is, Who's going to produce the animal proteins? And where? The Chinese have said long-term they want to be what? Self-sufficient. And they have historically had about a 95 percent orientation to self-sufficiency. They can't get there on the grains, because they don't have the climatic conditions and soil types to do that.

But can they not get there on livestock production? We're building our whole U.S. agriculture on exporting animal proteins to China when, in fact, it could be that 20 years from now China produces enough of its own animal proteins. That's an uncertainty we hadn't thought about. It's more of a question of the long-term future of U.S. livestock industry.

The catalyst – you cannot move land around. You can move livestock anywhere it needs to go. Have you tried to build a livestock barn in the United States lately? Our U.S. livestock industry was built on cheap feed and no regulation. Both of those have gone away. If you don't think that's a problem, just talk to people who are under more pressure than any of the livestock industries, let alone pork and poultry. We really have to think about where this livestock industry is going to go. By the way, who is going to own it? Who is the largest global beef player today? A U.S. company? No, JBS a Brazilian company that just announced they want to buy Smithfield, a Chinese company. It could be that livestock goes offshore increasingly. And it's not even owned by U.S. companies. That's an interesting play. I don't know.

All I'm saying is you'd better think about that, if you are going to be investing in livestock facilities or loaning on livestock facilities. I am not worried, by the way, about the next cycle of investment in livestock facilities in next 10 to 12 years.

Then, we had a fair amount of discussion on supply chain dimensions of global trade. Notice what we heard. We heard today that the issue here is that we have been so focused on commodity trade, but where is the growth in value in terms of trade? It's in the value-added space.

And, if we follow other industries, it's going to be worrying about the full supply chain associated with moving products geographically around the world as a function of private-sector activity. What does Wal-Mart want? It's going to be private-sector activity being driven to a large degree and the issue that was raised is, Will government stay out of the way? Or will government impede the problem, like they have in Argentina? What will government do in terms of these issues?

We have to worry about growing trade in intermediate products. The argument was made – interesting, I hadn't heard it before – that the United States probably has a comparative advantage in supply chain management because our farmers, our producers, and our businessmen in this country understand those negotiating relationships maybe better than in some other parts of the world.

So now maybe our trade advantage is associated with our supply chain capacity, intellectual property, how we go about designing contracting arrangements, as well as logistics and not what is happening “at production on the farm.” You also heard that we need policy to recognize value-shading concepts. You also heard that there is more associated with these than price issues. That nonprice issues are important in these negotiations.

One last point. You won't be surprised that I can't stop without talking about risk. Our historical focus in this industry has been risk in terms of prices and yields, things we can manage with crop insurance and other types of instruments – marketing strategies. What you heard is that we need to be increasingly focused on uncertainty.

And risk is different than uncertainty. With risk, you at least have some insight into probability distributions. Maybe they are not as accurate as you like, but some sense. With uncertainty, you have no clue. One of the key uncertainties you heard identified was what? Policy uncertainty. Changes in policy. Changes in policy in China. Changes in policy in the EU. Huge uncertainty, now what's going to happen in the EU and how does that impact us? We don't ship a lot of stuff to the EU. How does it impact China, if 25 percent of Chinese exports go to the EU? If the EU stays in recession or goes deeper in recession or has a financial problem in the capital markets, which is a possibility because banks own most of the public sector and the sovereign debt in the EU.

It's not widely dispersed like it is here in the United States. If you have a currency problem in the EU, the banking industry is hit profoundly. That impacts China. That impacts the United States in terms of export markets.

Uncertainty – I mentioned Taleb before – these are the black swans. Taleb makes two or three critical points that I'm going to reinforce. Taleb says, “People don't understand what I tried to

say in my first book on black swans. You cannot predict them. You waste your time trying to predict these highly uncertain events.” So he said, “I’m going to have to write another book to help people understand this.”

Has anybody read his recent book, *Antifragile*? It actually provides more insight as to what to do than his *Black Swan* book does or even in his *Foiled by Randomness* book does. “Antifragile,” he made that word up. Why he didn’t call it resiliency, I don’t know. What Taleb says – let me give you a three-word synopsis, so if you decide not to read *Antifragile* at least you’ve got the concept – you cannot predict and so what you have to do is you have to position for resiliency. Don’t predict; position for resiliency. You heard that. You have to be disciplined. We didn’t talk about scenario analysis and stress testing.

But we have to think about the fact that we do have more uncertainties not related to price, not related to yield. There are a whole bunch of things – regulatory uncertainties, policy uncertainties, competitor uncertainties, supply-demand uncertainties – a whole bunch of stuff that we don’t include in our analysis.

Oh, climate-change uncertainty. The biggest issue about climate change and everybody seems to agree – whether you agree on what is causing it or not – is that we have more variability in temperatures and rainfall? What’s causing it is debatable. But there is increasing convergence that we are in a more variable environment in terms of climate.

Let me just take this towards a close and show you some things we’ve done to look at this issue of uncertainty. Before I do, just let me mention one other thing that you heard this morning. Crop insurance is under attack. If you were a lender, most of you make a large proportion of your agricultural loans predicated on what risk management tool? Crop insurance. What I think you heard Joe say – he was pretty careful about this – is crop insurance has a big red bull’s eye on it for the next cycle of policy debates. If they either limit the subsidy, or worse yet, restrict the indemnities. Because even in debate, they said, “okay, you can buy crop insurance, but can only get paid indemnities on a typical family farm acre size”, which in Washington, DC is 300 acres.

What does that mean in terms of that fundamental risk management tool you’ve been counting on so much as a lender and the farmers have been counting on it? That’s an uncertainty you should be thinking about.

So let’s think about this in terms of income shocks, land prices, and cross-competitiveness. I’m going to show you three charts really quickly to close this off. This is a variation of what you saw from Allen Featherstone, if you were here last year.

I want you to look at some of the financial metrics we've tried to put together on this chart in terms of some of the things that you ought to be worried about, so you can see what's happened as function of the size of farm income. Notice what happens to that working capital. We are set on working capital at less than 35 percent. As you go up to a three-year projection, farms with 50 percent of land owned, 25 percent debt-to-asset ratio.

Table 1. Comparison of Farm Size with 50% Land Owned and 25% Debt-to-Asset Ratio

	Size of Farm (acres)		
	550	1200	2500
Annual Net Farm Income (Mean)	\$49,800	\$37,600	\$166,200
Change in Net Worth (3 year) – (Mean)	\$36,800	\$114,900	\$926,900
Working Capital/Value of Farm Production			
<i>Mean</i>	33.0%	45.5%	49.5%
<i>Percent < 35%</i>	57.0%	3.9%	0.1%
Debt-to-Asset Ratio			
<i>Mean</i>	21.5%	15.8%	13.0%
<i>Percent > 55%</i>	0.0%	0.0%	0.0%
Term Debt Coverage Ratio			
<i>Mean</i>	0.9	1.2	1.5
<i>Percent < 1.1</i>	73.1%	23.9%	2.1%
Percent Positive Cash	24.6%	83.8%	98.4%
Percent ROE > 10%	0.4%	7.6%	20.1%

On the smaller farms, there is greater than a 50 percent chance of having working capital less than 35 percent of gross revenue. Look at that term debt coverage ratio – a mean of 0.9 percent. That's the mean. How many of you lenders like to have a current debt coverage ratio of 0.9 percent? And at less than 1.1 percent, 73 percent can't meet that service coverage ratio.

What else? Here are different land ownerships. Just look at those same numbers. Look for a 15 percent land, heavily owned or heavily rented. For a 550-acre farm, term debt coverage ratio has a mean of 0.6 percent, with a 99.5 percent probably of not meeting 1.1. That ought to be a little bit of a concern.

**Table 2. Comparison of Land Tenure for 550 Acre Farms with
25% Debt-to-Asset Ratio**

	% of Land Owned		
	85%	50%	15%
Annual Net Farm Income (Mean)	\$98,900	\$49,800	-\$2,100
Change in Net Worth (3 year) (Mean)	\$76,000	-\$32,300	-\$130,400
Working Capital/Value Of Farm Production			
<i>Mean</i>	49.6%	32.9%	17.3%
<i>Percent < 35%</i>	9.2%	56.9%	99.5%
Debt to Asset Ratio			
<i>Mean</i>	17.1%	22.1%	32.6%
<i>Percent > 55%</i>	0.0%	0.0%	0.0%
Term Debt Coverage Ratio			
<i>Mean</i>	1.7%	0.9%	0.6%
<i>Percent < 1.1%</i>	16.2%	76.8%	99.5%
Percent Positive Cash	74.8%	24.3%	0.3%
Percent ROE > than 10%	11.7%	0.5%	0.1%

We also then said, “What about debt-to-asset ratio?”

So here is the 2,500-acre farm with different debt-to-asset ratios. Mean debt-to-risk coverage ratio is 1.5 with 25 percent, down to 1.1 with 50 percent. What’s the takeaway here? Maybe the issue isn’t leverage, maybe the issue is how much of your land you are renting and rents lag in the adjustment process. Operating leverage, which most of us don’t spend hardly any time thinking about. This is important, this financial leverage.

Table 3. Comparison of Debt-to Asset Ratio for 2500 Acre Farms with 50% of Land Owned

	Debt-to-Asset Ratio	
	25%	50%
Annual Net Farm Income (Mean)	\$160,500	\$134,800
Change In Net Worth (3 Year) (Mean)	\$459,100	\$474,900
Working Capital/Value of Farm Production		
<i>Mean</i>	49.5%	30.1%
<i>Percent < 35%</i>	0.1%	54.4%
Debt-to-Asset Ratio		
<i>Mean</i>	13.0%	35.6%
<i>Percent > 55%</i>	0.0%	0.0%
Term Debt Coverage Ratio		
<i>Mean</i>	1.5%	1.1%
<i>Percent < 1.1</i>	2.6%	38.2%
Percent Positive Cash	98.1%	53.7%
Percent ROE > 10%	21.1%	41.7%

What about asset values? Here is what happened to farmland asset values. You have a price-to-earnings (PE) ratio on farmland exceeding 30, which is where we are in farmland today – and I’m talking about average cash rents as a measure of earnings. I’m talking about average values of farmland for Indiana, which are somewhere in the \$8,000 to \$8,500 range (I’m not talking about the \$10,000 plus.).

We’ve got PE ratios of 30. What’s the PE ratio on the financial markets? 18, generally running longer term. What’s the PE ratio typically in farmland? Something closer to 18 to 20. That ought to give us pause for where we are in this land market. Can we sustain long-term PE ratios of 30+ on land? Help me understand why I’m willing to pay \$30 per dollar invested in land, when I could take the same money, invest it in some stock or in an index fund, and buy almost twice the earnings for that same amount of money. Why would I want to do that? Is that long-term sustainable?

Another way to look at that is with this chart and then we’ll close with this. Here is a conversation I try to have with farmers. Let’s assume we have 200 bushel per acre farmland (the line at the bottom part of this chart). Let’s assume I want a 5 percent return out of my money and I pay \$10,000 per acre for that piece of farmland. So the intersection that you’re interested is on your return is under 5 percent (down at the bottom), 200 bushel at the bottom part of the table across from \$10,000 per acre, and you have a number there that is 2.5.

Table 4. Per Bushel costs at Differing Land Values and Land Return Percentages

200/bu/acre Yield		Return		
		4%	5%	6%
Land Value (\$/acre)	8,000	1.60	2.00	2.40
	10,000	2.00	2.50	3.00
	12,000	2.40	3.00	3.60
	15,000	3.00	3.75	4.50

What’s that number? That is the cost per bushel of corn that you have locked in. If you paid \$10,000 – I don’t care whether you borrow a dime – you just want 5 percent on your money. You’re not willing to give your money away. You have locked in \$2.50 per bushel on your corn. Historically, corn or land costs have run 30 to 35 percent of the revenue stream. You heard that from Michael yesterday. So, if you have \$5 corn and you take 35 percent of that, you should not be

thinking about more than about \$1.75 per bushel land cost. You just locked in \$2.50 for how long? *Forever.* You aren't in a commodity industry where the successful businessman will be a low-cost producer, you just guaranteed yourself to be a high-cost producer.

I'm not worried about the financial condition of whether they borrow money. I'm worried about long-term sustainability in an increasingly globally competitive market. Paying \$10,000 per acre puts us behind the eight ball, unless we are going to give our money away.

Hopefully, those are some useful takeaways. Thank you. [applause]

Nathan Kauffman: Thank you, Dr. Boehlje, for providing those wrap-up comments and summarizing this year's symposium and the key takeaways.

Understanding agriculture is important to the Kansas City Fed. It shapes our district, it shapes our nation, and it shapes world economic activity. Here at the Kansas City Fed we remain committed to studying trends in agricultural and rural places from the farm gates to community banks and to Main Streets to across the globe.

I'd like to thank all of you for coming and for making the investment to come down here. We've appreciated having everybody's involvement. I think it has really contributed to the experience of having a lot of diverse perspectives, diverse backgrounds, and a lot of good questions as we think about what this means for agriculture – both here in the United States and on a global scale.

With that, thanks again for coming and safe travels. This symposium is adjourned.