Investing in U.S. Cropland

September 2011

BOTTOM LINE

American cropland is a $1 trillion+ asset class with less than 1% institutional ownership.[1] Over the past decade, U.S. cropland has produced average annual returns of nearly 13%, with roughly one third of that coming from current income. More importantly, the long-term supply and demand fundamentals of agricultural production worldwide are extremely compelling. Global crop inventories are at historic lows, population growth continues unabated across the developing economies, and rising incomes, particularly in China and India, are causing rapid shifts in consumption patterns. With heightened and seemingly unending financial market volatility, renewed fears of a double-dip recession and U.S. monetary

policy increasing the risk of inflation down the road, we believe that investors should consider investments in real assets broadly. Specifically, U.S. cropland[2] is attractive for several reasons:

- **Attractive Risk-Adjusted Returns.** U.S. cropland has delivered total returns of 10%-13% over the past 20 years with very low volatility by virtue of significant current income return (typically 4%-5%).[3] In other words, U.S. cropland has delivered small-cap returns with Treasury-like volatility.

- **Inflation Protection.** For the last 20 years, the National Council of Real Estate Investment Fiduciaries (NCREIF) annual cropland index has had a positive 0.26 correlation with inflation.[4] Furthermore, seasonally-adjusted, the index has had a positive total return in every quarter since inception.

Cropland fundamentals are extremely compelling: global crop inventories are at historic lows, population growth continues unabated across the developing economies, and rising incomes, particularly in China and India, are causing rapid shifts in consumption patterns.

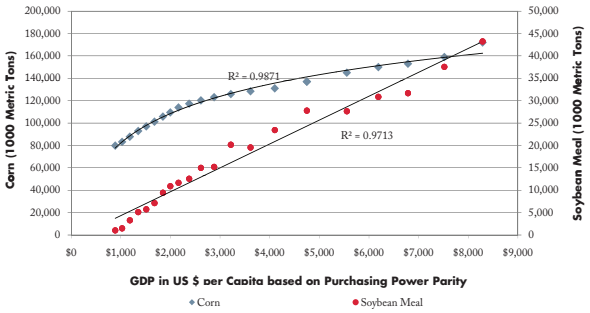
[1]According to the U.S. Department of Agriculture 2011 Agricultural Resource Management Survey, there are approximately 365 million cropland acres with an average value of $3,030 per acre. HighQuest Partners estimates institutional ownership at approximately $3-$5 billion.
[2]By cropland we refer specifically to land used for production of major grains (wheat, corn, rice, etc.), oilseeds (soy, canola, etc.) and other so-called row- or broadacre- crops. These are distinct from permanent crops which include orchards, vineyards, etc.
[3]Source: USDA ERS, NCREIF
[4]Trailing 4 Quarters, Inflation as measured by CPI-U

AEW

Why Invest in U.S. Cropland?

- **Leading Producer/Exporter** U.S. is the leading producer / exporter of major agricultural commodities.
- **Comparative Advantages** U.S. farmers enjoy significant comparative advantages.
- **Structural Transformation** U.S. farming is undergoing a major transformation as the industry consolidates and becomes more professional.
- **Untapped Asset Class** Institutional ownership is less than 1% of over $1 trillion in asset value.
- **Increasing Economic Profits** Over the past five years, profit-per-acre has been three to four times historical averages.

Figure 1: Chinese Corn & Soybean Meal Consumption vs. GDP Per Capita



Source: USDA Foreign Agricultural Service, IMF, AEW Research

- **Uncorrelated Returns.** U.S. cropland returns have had low or negative correlation with other major asset classes.
- **Strong Fundamentals.** Growing global demand for agricultural commodities and limited land to expand capacity globally should sustain the current supply/demand imbalance for the foreseeable future.
- **Farming Profits.** U.S. farmers today are three to four times more profitable than they have been historically.[5] As farmers compete to expand their operations on a fixed supply of acres, we expect these profits will be capitalized into land values.

In many ways, investing in cropland is analogous to investing in more traditional real estate assets. The investor owns the physical asset (land), and leases to a tenant who assumes the operating (farming) risk. Investment returns are generated from the combination of current income from the lease payments (which may be cash or participating leases) and appreciation on the underlying asset.

Importantly, investing in *farmland* is not investing in *farming*. Farming is a highly complex economic activity. Farmers buy volatile commodity inputs; make a myriad of field-level decisions ranging from the type of crop and the type of seed variety to grow, when to plant and when to harvest; and then sell a volatile commodity. The cropland investor simply collects rent. Additionally, exogenous events such as weather are a significant determinant of farming returns. In contrast, the institutional owner of the land is largely insulated from the variability of annual production through the lease structure. Prudent portfolio management further mitigates these risks through diversification and avoiding areas with high probability of drought.

Investments in cropland are also more liquid than generally perceived. Cropland is a productive asset with an intrinsic value. While liquidity varies by market and region, there is generally a long line of buyers (both investors and farmers) when property becomes available.

SUPPLY/DEMAND IMBALANCE

Globally, there has been a supply/demand imbalance in major agricultural commodities since the middle of the last decade. With demand growth outpacing productivity (yield) improvements, and significant constraints to expanding global capacity (acreage), we expect this imbalance to remain for the foreseeable future.

Demand

Demand growth for agricultural commodities is being driven by three factors: rising incomes in the developing world, especially China and India; population growth; and biofuels.

[5] Refers to a historical average, 1975-2005

Rising Incomes. Rising incomes in the developing world is the major demand driver for the foreseeable future. As incomes rise, people's diets improve and shift from cereal (wheat and rice) to increasing levels of protein (poultry, fish, pork, dairy, beef). There is a strong and widely recognized relationship between GDP per capita in a country and protein consumption. The relationship between income and protein consumption, however, is particularly strong when examining the time series consumption data for countries on an individual basis. Furthermore, this relationship extends to the feed grains, especially corn and soybeans, which are the major input to animal protein[6].

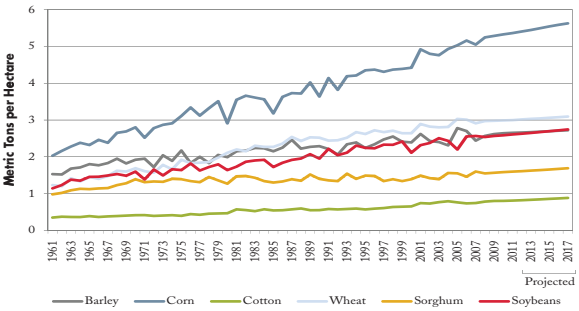
China has been the largest single driver of demand for agricultural commodities over the past decade, accounting for 18.2% of global demand growth for corn and 56% for soybeans. India is poised to follow China's trajectory, although with different dietary customs.

Population. Population growth is an important factor driving demand for agricultural commodities. According to the U.N., the world population is expected to increase by nearly 2.5 billion over the next forty years, rising from the current level of 6.8 billion in 2010 to 9.3 billion in 2050.[7] Population growth alone, at approximately 0.8% per year, is less than projected productivity improvements. However, the population is growing fastest within the developing world, which multiplies the effect of rising incomes.

Biofuels. Biofuels represent significant incremental demand for key crops including corn (used to produce ethanol in the U.S.), soybeans and other oilseeds (vegetable oil is used to produce biodiesel).[8] Driven by federal mandates,[9] over the past decade U.S. ethanol production has increased from 1.6 billion gallons in 2000 to 13.2 billion gallons in 2010; this represents 14.5% of incremental global demand for major agricultural commodities[10] (by comparison, China accounted for 26%). Going forward, ethanol production is expected to play a smaller role in the demand picture as the U.S. mandates top out at 15.0 billion gallons in 2014.

Rising incomes in the developing world, population growth and demand for biofuels are forecasted to drive demand growth of approximately 2-3% per year for major crops.[11] This brings us to the supply side of the equation. The only way to accommodate the rapid and continuing growth in demand is by increasing productivity (yield) and/or adding capacity (acreage).

Figure 2: Major Crop Yields



Source: USDA Foreign Agricultural Service

Supply

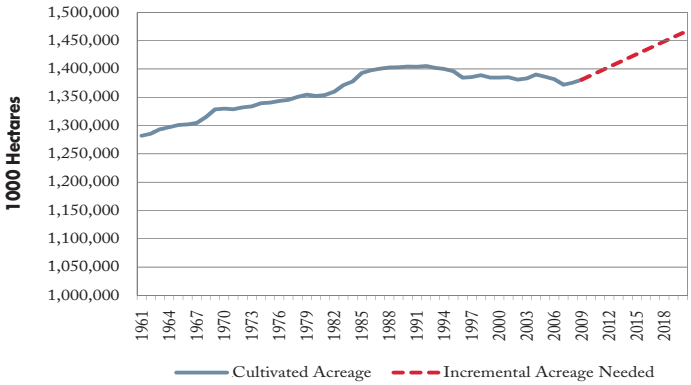
Improvements in productivity. Yield (production per acre) has been steadily improving for decades, albeit at a slowing rate. These productivity im-

[6]Producing a pound of beef requires ~ 7-8 pounds of feed, pork ~3-4 pounds, poultry ~2 pounds.
[7]United Nations, Department of Economic and Social Affairs, Population Division. "World Population Prospects, The 2010 Revision".
[8]Biofuels also play an important but complex role in price setting for agricultural commodities. While a thorough treatment is beyond the present scope, we believe that through the conversion economics of biofuels production, the global price of crude petroleum will set the floor price for many agricultural commodities in the future.
[9]U.S. Biofuels policy includes two major components: subsidies paid to the gasoline refiner/blender in the form of tax credits, and mandates for the level of ethanol on average which must be blended.
[10]HighQuest Partners, includes rice, corn, wheat, barley, sorghum, rye, soybeans, rapeseed, peanuts, and cotton
[11]HighQuest Partners, AEW Research, Food and Agriculture Organization of the United Nations (FAO)

provements have been driven by a variety of factors from improved farming techniques to improved seed varieties. Most recently, biotech seeds (genetically modified organisms or GMOs) have had a major effect on yield. We anticipate that yields will continue to improve, driven largely by the introduction and adoption of new seeds that are currently in the pipelines of biotech companies such as Monsanto, Syngenta, Pioneer and Bayer Crop Science. While there will be regional variability (e.g., we expect U.S. soybean yield improvements to accelerate, Indian cotton yield improvements to decelerate), globally we anticipate yield improvements for major crops will be in line with historical levels.

Added Capacity. Without significant new capacity, i.e. additional acreage, productivity improvements alone cannot meet global demand over the coming decade. Even accounting for potential productivity improvements by crop and by growing region, current acreage is insufficient. To meet the anticipated demand for ten major crops would require an additional 65-85 million hectares over the next decade (160-210 million acres – equivalent to approximately 50% of all U.S. cropland).[12] While this seems like a small area compared to the 1,410 million hectares currently being farmed globally, each year, according to the Food and Agriculture Organization of the United Nations (FAO), the world needs to add approximately 10-12 million hectares globally just to replace those lost to urbanization and desertification. Consequently, global acreage has been holding steady for the past 20 years despite strong price signals over the past 5-6 years. Adding another 65-85 million hectares in a decade is not realistic.

Figure 3: Global Cultivated Acreage Historical and Required



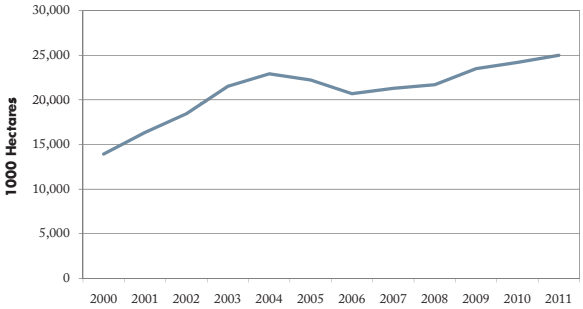
Source: Food & Agriculture Organization, UN; HighQuest Partners; AEW Research

There is not a shortage of land in the world. There are approximately 550 million hectares of potential rain-fed cropland globally, excluding forests, protected and urban areas, with 75% in Africa and Latin America.[13] However, a strong price signal would be required in order for that land to be developed and converted to crop production. Even then, it is unlikely that the supply response can catch up to demand given practical constraints, such as infrastructure, capital, property rights, farming expertise, etc.

[12] HighQuest Partners, AEW Research, FAO
[13] FAO

Generally speaking, the most economical place for large scale expansion of row crop acreage globally is Brazil, where there are sizeable reserves of uncultivated land in the form of both cleared pasture for cattle grazing and uncleared cerrado (scrub). Typically, soybeans are grown on these newly cleared lands.

Figure 4: Brazilian Soybean Harvested Acreage



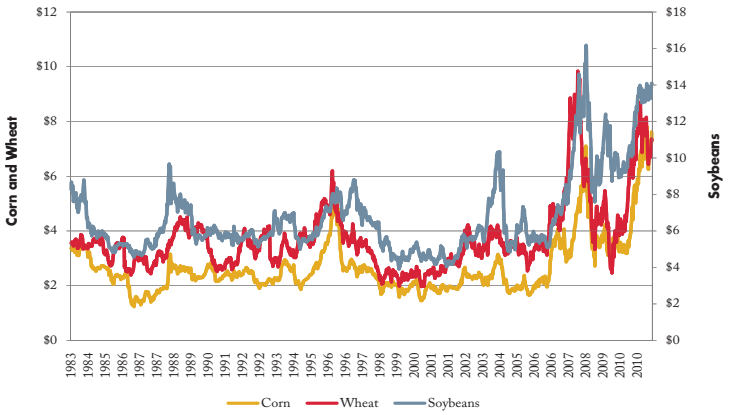
Source: USDA Foreign Agricultural Service

However, there are three economic hurdles to developing this land for crops. First, it requires a significant investment to clear the land and improve the highly acidic soil – a process that takes up to three years. Second, the new areas for agricultural expansion are more than 1,000 kilometers from the ports and often only accessible via dirt roads. The expense of transporting a crop of soybeans grown in Mato Grosso to market is 45% more than in Iowa.[14] Third, Brazil's rising currency has partially offset rising dollar-denominated soybeans. Consequently, there has been very little recent expansion of Brazilian soybean acreage. Absent a significant supply response (i.e., increased acreage), agricultural commodity supplies will remain tight, and prices will remain high and volatile.

THE NEW NORMAL: HIGH (AND VOLATILE) PRICES

In the middle of the last decade, there was a fundamental change in the agricultural commodity markets. For 30 years, from 1975 to 2005, major agricultural commodity prices were stable around a long-run equilibrium, based on the marginal cost of production. Any weather-induced supply disruptions were followed by swift mean-reversion as the price signal induced a short-term supply response. Before 2005, if there was a poor crop (e.g., due to weather) in a particular commodity, demand could be met by drawing down buffer inventories. Prices increased as the market sent a signal to "buy" more acreage for that particular commodity in the next planting season in order to replenish inventories. Typically, a year or two of average crops would replenish stocks. Since 2005, however, agricultural commodity prices have not followed this pattern. Prices have moved dramatically higher, and volatility has increased.

Figure 5: Soybean and Corn Price Histories
(Dollars per Bushel)

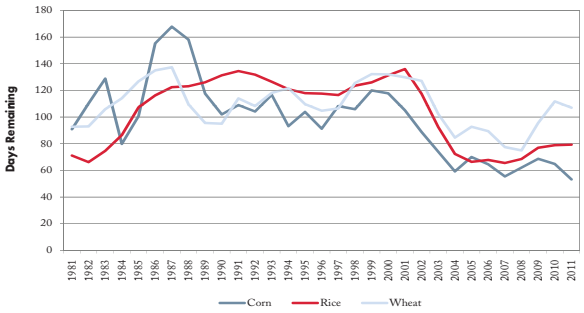


Source: CME Group

[14]USDA Agricultural Marketing Service, Average of 2009-10

So what has changed in the agricultural commodity markets that caused this shift? In the face of rapid demand growth, global stocks of key crops have been depleted to the point where there is no longer any practical buffer. Globally, stocks of coarse grains and oilseeds have been at historically low levels for the past five to six years. After 2005, if there was a poor crop (or even just an average one), someone somewhere in the world simply did not obtain that commodity. In short, in order to balance supply and demand, demand has to be rationed, and the only way this occurs is through pricing. This is new territory for the markets because the marginal consumer at any moment remains unknown, much less that consumer's reservation price, i.e. the highest price they are willing to pay. As a result, the market ricochets on every piece of news, creating unprecedented volatility.

Figure 6: Global Ending Stocks



Source: USDA Foreign Agricultural Service, AEW Research

HISTORICAL PERFORMANCE OF U.S. CROPLAND INVESTMENT

Historically, cropland has delivered attractive risk-adjusted returns through a combination of current income and appreciation of the underlying asset, with total returns in the 10-13% range. Because a significant portion of the return comes from current income, there is exceptionally low volatility. Cropland returns have generally outperformed the NCREIF Property Index, although over the last year performance has not been as strong as the NPI. This may reflect the fact that U.S. cropland has seen a steady rate of appreciation while the commercial property sectors saw significant valuation declines in 2009 and 2010, and therefore does not have as much room to make up.

Figure 7: NCREIF Annual Cropland Historic Returns

NCREIF Annual Cropland Historic Returns (%)			
	Total Return	Appreciation Return	Income Return
1 year	11.18%	6.66%	4.31%
3 year	9.97%	5.53%	4.27%
5 year	12.48%	7.96%	4.27%
10 year	12.70%	7.81%	4.62%
20 year	10.63%	5.24%	5.20%

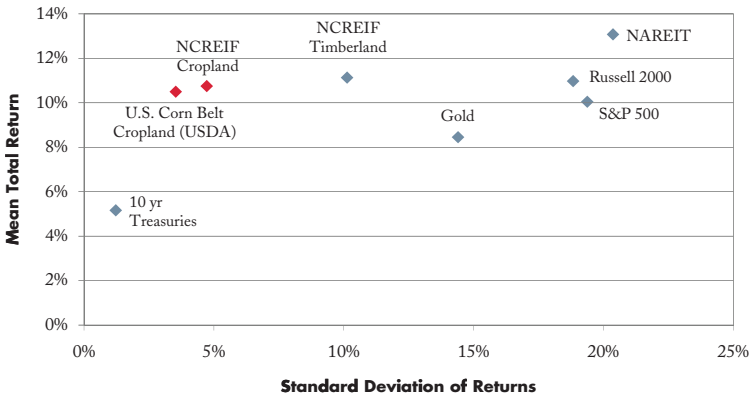
Source: NCREIF

Figure 8: NCREIF Property Index vs. Annual Cropland

NCREIF Property Index vs. Annual Cropland (%)			
	NPI	NCREIF Cropland	Over(under) Performance
1 year	16.73%	11.18%	(555) bps
3 year	(2.56%)	9.97%	1253 bps
5 year	3.45%	12.48%	903 bps
10 year	7.64%	12.70%	506 bps
20 year	7.43%	10.63%	320 bps

Source: NCREIF

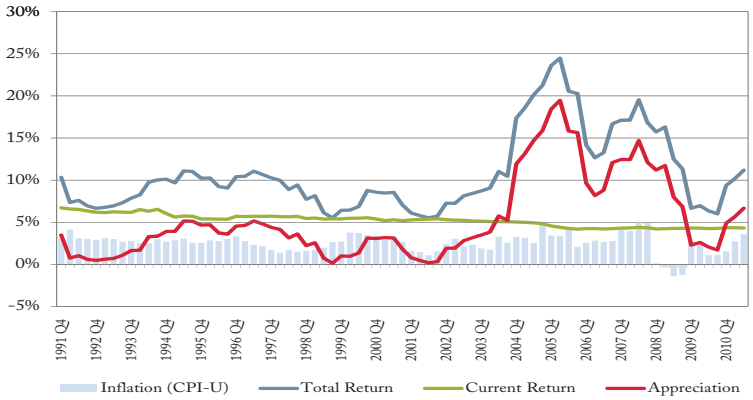
Figure 9: Mean Real Return vs. Standard Deviation



Source: Moody's Analytics, Bloomberg, NCREIF, USDA, AEW Research

U.S. cropland has provided a strong inflation hedge over the past 20 years, and, by virtue of the relative price inelasticity of food globally, can be expected to continue to perform well in inflationary environments. Finally, cropland returns have been uncorrelated with other major asset classes. The NCREIF Cropland Index has been negatively correlated with the Russell 2000 (-31.7%), the S&P 500 (-13.2%), & the NAREIT Equity Index (-12.8%) since inception (1991).[15]

Figure 10: NCREIF Return vs. Inflation

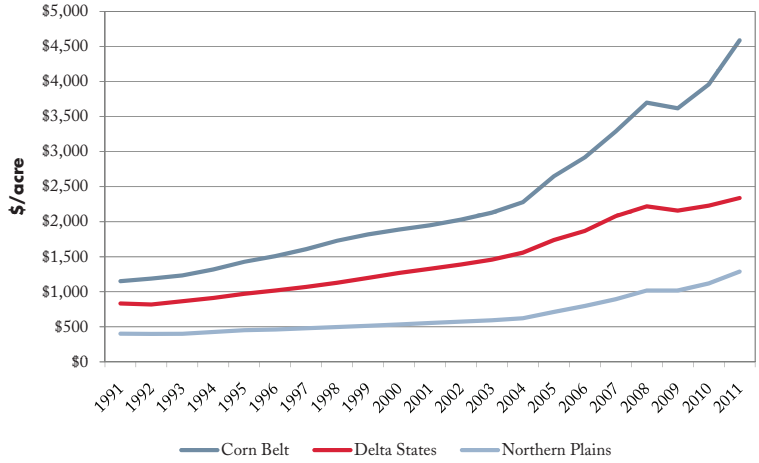


Source: NCREIF, Moody's Analytics

WHY U.S. CROPLAND NOW

Although cropland values have risen dramatically in the last decade, AEW believes the compelling long-term fundamentals support further increases in both current income and appreciation over the long term.

Figure 12: Historic U.S. Cropland Values by Region



Source: USDA Foreign Agricultural Service

U.S. cropland offers investors attractive risk-adjusted returns, strong current income and protection against inflation. We believe there are several important reasons for investing in cropland in the U.S.

[15]Source: NCREIF, Bloomberg

Figure 11: U.S. Exports by Crop, Rank and %

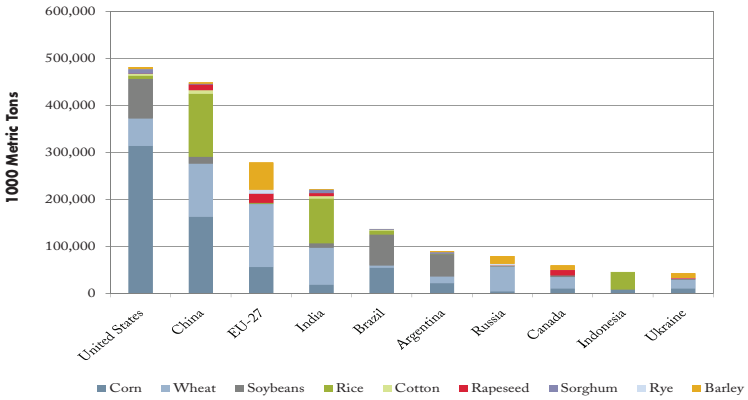
US Exports By Crop, Rank & % of World Total		
Crop	**World Rank**	**% of World Exports**
Corn	1	54.6%
Cotton	1	36.6%
Soybean	1	42.6%
Wheat	1	22.8%
Rice	4	10.4%

Source: USDA Foreign Agricultural Service

U.S. is the #1 Producer/Exporter

The U.S. is the number one producer and exporter of major grains and oilseeds globally, and is a low-cost producer across a wide spectrum of agricultural commodities. The U.S. produces 39% of the world's supply of corn, the second largest global crop by value, and accounts for 54% of exports.[16]

Figure 13: Grains & Oilseeds Production by Top 10 Producers



Source: USDA Foreign Agricultural Service

Comparative Advantages

U.S. farmers have several comparative advantages over other countries including:

- *Fertile Soil.* The U.S. has some of the most fertile ground in the world and historically has had among the highest productivity of any agricultural producer. For example, the U.S., as the world's largest corn producer yields, on average, 9.70 bushels per hectare, in contrast China, the world's second largest corn producer, yields 5.31 bushels per hectare and the global average yield of 5.06.[17]

- *Efficient Transportation and Logistics.* The U.S. has the most comprehensive and developed river system serving agricultural markets globally, which allows for the efficient and low cost movement of grains to port. This river system is augmented by an extensive rail and road system. The Port of New Orleans at the mouth of the Mississippi River exports more grain by volume than any other port in the world.[18]

- *Strong Property Rights.* Investors in U.S. cropland have the same property right protections as investors in any other real estate in the U.S. Equally important is intellectual property protection. Because of the strong protection for intellectual property, new technologies (especially biotech seeds) are typically introduced in the U.S. first, and the resulting improvement in crop yields drive farming profits and land values even higher.

- *Subsidized Crop Insurance.* The U.S. government subsidizes crop insurance for 85% of historical crop yield and 85% of historical price – substantially mitigating the downside risk for U.S. farmers. While elements of the Farm Bill package of farm subsidies are expected to

[16]USDA Foreign Agricultural Service
[17]USDA Foreign Agricultural Service, based on five-year average
[18]Port of New Orleans exported 56 million metric tons of corn, wheat and soybeans in 2010. Rosario, AR, exported 14.9 million metric tons of corn, wheat, soybeans, including soybean meal and oil. USDA Agricultural Marketing Service and Ministry of Agriculture, Argentina.

be significantly curtailed in the future, the general expectation based on the goals of the farm lobby, is that support for crop insurance will remain or be increased.

Structural Transformation

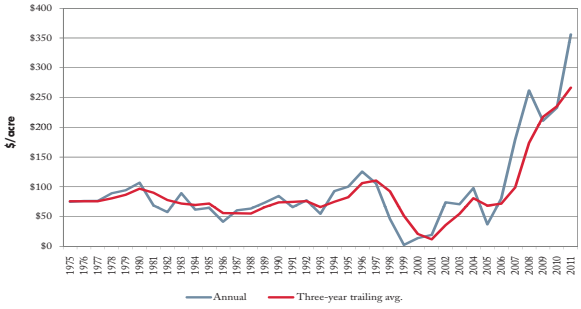
U.S. farming is undergoing a major transformation as the industry becomes more professional and consolidates.[19] This consolidation is being driven by a combination of demographics, with over 60% of U.S. farmers 60 years of age or older[20], and by increasing economies of scale. As farmers age and retire, there will simply be fewer in the next generation to farm the same acreage. The generational turnover creates opportunity for the more sophisticated and better capitalized farmers to expand their operations. Large scale farmers enjoy significant savings in input purchasing and overhead absorption, in addition to support for more sophisticated office functions. Equipment is also driving the scale of farming. There has been a major trend to develop more efficient farming equipment, which eliminates labor and improves crop yield. However, the most efficient equipment also caters to the largest scale. For example, a new state of the art cotton picker costs $550,000 and is scaled to approximately 2,500 acres of cotton. Assuming a two-year crop rotation, this equates to a minimum 5,000-acre farming operation.

Typically, these larger farmers are growing on leased land as it is a more efficient use of their capital. Production farmers maximize their returns by using their capital to support operations: providing equity for financing the crop (buying inputs) and for purchasing/leasing equipment.

Untapped Asset Class

As mentioned previously, institutional ownership of U.S. cropland is less than one percent, so there is tremendous capacity for institutional investors to deploy capital. There has been some individual/family office investment, but this is also limited (less than or equal to the institutional ownership). While approximately 33%[21] of U.S. farms are leased (i.e., owned by a third party), the typical farm owner is either the widow or non-farming descendant(s) of a farmer.

Figure 14: Midwest Farmer Profitability



Source: USDA Economic Research Service

Increasing Profits

Perhaps the most compelling factor for investing in U.S. cropland is the fact that due to high commodity prices over the past five years, U.S. farmers are experiencing unprecedented profitability, with profits per acre that are three to four times the historical average. For over 30 years, from 1975 to 2006, farmers in the Midwest averaged approximately $70 per acre per year (assuming a corn-soy crop rotation). Since 2006, despite significant increases in the cost of inputs (+47%) and rents (+70%), profit per acre has averaged approximately

[19]The raw data understate the consolidation because farmers tend to have multiple smaller entities to fall below income testing limits for direct payments under the Farm Bill. There is little doubt, however, that there is a high degree of consolidation and of professionalization in farming.
[20]USDA Census of Agriculture 2007, AEW Research
[21]This estimate based on USDA 2007 Census of Agriculture data on operators whose primary occupation is farming.

$250 and is forecast to be over $300 in 2011.[22] AEW expects that farmers will remain highly profitable relative to pre-2007 levels going forward [see The New Normal discussion above]. AEW further expects these profits will be capitalized into land values as farmers compete for land – either to buy or to lease. In the recent past, record prices have been paid for land – by farmers. Moreover, brokers report a significant increase in farmers interested in leasing ground.

RISK FACTORS

There are several risks to the cropland investment thesis which investors should consider.

Weather. Weather is a major risk factor for farmers and for cropland investors who are taking on operating exposure. Investors can largely avoid weather risk through appropriate lease structures/terms and diversification.

Step-Change in Productivity. A major step-change in global productivity could increase supply to the point where agricultural commodity prices could revert to historic levels. However, while we do anticipate continued incremental improvements in productivity, based on the pipelines of the major seed technology companies, we do not foresee such a step change.

Slowing Growth in China and the Developing World. China is the most important single factor in the demand equation, accounting for 26% of global incremental demand for major grain and oilseed crops in the past decade. Income growth is almost synonymous with improving diets, as a significant portion of each incremental dollar is spent on food. If growth in China were to slow significantly, this would ease global demand growth.

Substitute Technologies. Technologies such as algae and micro-organisms have the potential to substitute for traditional crops both as biofuels inputs, and as sources of protein and fat in the food chain. To date, however, these technologies remain far from commercialization.

Ethanol. Ethanol represents approximately one third of demand for U.S. corn. We believe the federal ethanol subsidies will be eliminated or significantly reduced in the near future, but this should not have a major effect on the corn market because of the other factors cited above regarding supply/demand market fundamentals. Reduction or elimination of the federal ethanol mandates would have a greater effect, more closely linking crop prices to petroleum markets. However, we believe this unlikely as the subsidies, and not the mandates, are more politically unpopular.

Government Subsidies. The U.S. Farm Bill provides three primary supports for U.S. farmers: direct payments, price floors, and subsidized crop insurance. It is widely anticipated by the farm lobby that the direct payments will be eliminated in the next Farm Bill (the current bill expires in 2012). Prices have

[22]Farming profit per acre consists of the gross value of production (yield times farm gate price) less operating costs (seed, chemicals, fertilizer, purchased irrigation water, energy costs, repairs) and opportunity cost of land (rent). This is an average of the USDA Heartland Region, corn and soybeans returns and costs data. Source: USDA Economic Research Service

been well above the floors for years (e.g., the corn floor is $1.90 per bushel versus the current price of over $7.00). Crop insurance is the most important component for farmers and cropland investors as it significantly reduces the operating risk of farming. We anticipate that crop insurance subsidies will remain in place at current or higher levels.

Real Interest Rates. As with any asset class, increasing real interest rates will put downward pressure on valuations. However, we expect cropland to perform as well as, or better than, most other financial assets under this scenario.

CONCLUSION

We believe U.S. cropland can provide investors attractive risk-adjusted returns over the coming decade. As demand outstripped supply in the middle of the last decade, crop prices increased dramatically, and AEW expects high prices and volatility for the foreseeable future. These higher prices have led to unprecedented economic profits for U.S. farmers. AEW anticipates that these profits will be capitalized into land values, driving substantial continued appreciation over the coming decades.

Prepared by AEW Research, September 2011

This material is intended for information purposes only and does not constitute investment advice or a recommendation. The information and opinions contained in the material have been compiled or arrived at based upon information obtained from sources believed to be reliable, but we do not guarantee its accuracy, completeness or fairness. Opinions expressed reflect prevailing market conditions and are subject to change. Neither this material, nor any of its contents, may be used for any purpose without the consent and knowledge of AEW.

AEW

Two Seaport Lane
Boston, MA 02210
+1 617 261 9000
www.aew.com