



**MacroGain Partners**  
*profit from what's next*

# ***Agriculture 3.0: Technology Convergence in Agriculture***

**2014 BHN World Conference  
Doubletree Hotel, Gilbert, AZ  
November 12<sup>th</sup>, 2014**

**Dr. Jim Budzynski, Managing Partner  
MacroGain Partners  
[www.macrogain.com](http://www.macrogain.com)**

# My Four Topics Today

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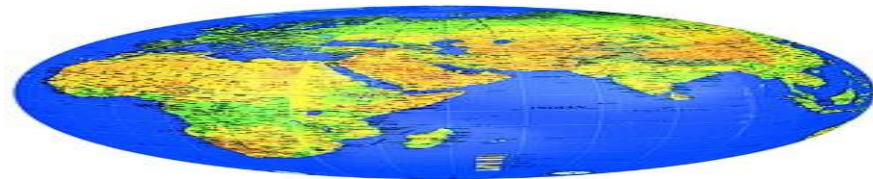
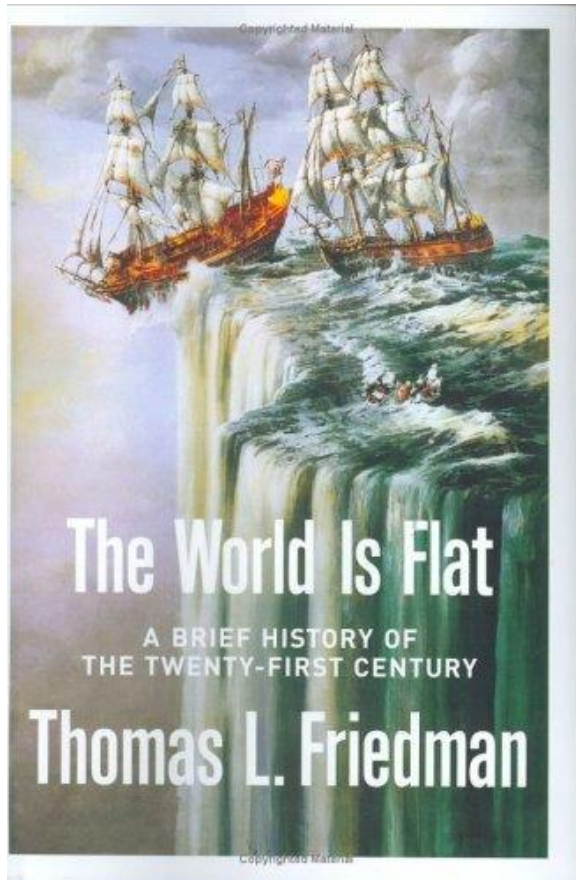


1. Macro Global (Ag) Economy
2. Ag 3.0 Paradigm
3. Technology Evolution and Industry Structure
4. Changing Production Economics

# Competing in a “Flat World”

*“The playing field is being leveled.”*

**Nandan Nilekani**  
**CEO, Infosys Technologies**  
**(Indian Technology Company)**



- World Used to Be Round
  - Now It Is Flat
- Primary “Flatteners:
  - Geopolitical
  - Technological
  - Business Strategy

# Thirteen Days That Flattened the World

<b>Date</b>	<b>Event</b>	<b>Trend</b>	<b>Implication</b>
August 12, 1981	IBM and Microsoft Launches the PC with MS-DOS	Standardization	Computers Worldwide Run Common Software (Eventually Windows) on Compatible Hardware
February 10 <sup>th</sup> , 1982	Intel 286 Chip Launched	Fast Computing	First Chip with Over 100 K Transistors; 2004 Itanium Chips Have 592 M Transistors
May 1, 1984	Michael Dell Forms Dell Computer	Cheap Computing	Focuses on Direct Sales of Wintel Computers; Millions of People Can Afford Personal Computers
February, 1988	David Glass Named Wal-Mart CEO	Supply Chaining	Glass Drove the Development of the Largest Retail Supply Chain in the World
November 9, 1989	Berlin Wall Falls	Capitalism	2 B People Join the Global Entrepreneurial Race
August 9 <sup>th</sup> , 1995	Netscape Goes Public	Web Surfing	Browser Enabled Everyone Globally to Easily Access Content from Any Computer Anywhere
June 22 <sup>nd</sup> , 1998	IBM Launches Apache Software Based Web Server	Open Sourcing	“Cost of Playing” in Technology Declines; Global Network Standardization Begins
December 31 <sup>st</sup> , 1999	Y2K “Meltdown” Averted	Outsourcing	Crunch Timeline Resulted in Outsourcing to India; Started Globalization of Technology Services
March 2 <sup>nd</sup> , 2001	UPS Buys Mail Boxes Etc.	Insourcing	Little Guys Can Go Global with 3 <sup>rd</sup> Party SCM
December 11 <sup>th</sup> , 2001	China Joins the WTO	Offshoring	Race by U.S. Companies to Relocation Production to China Goes to New Level
January 31, 2002	Global Crossing Files for Chapter 11	Cheap Global Bandwidth	Fiber Optic Network Built with Dot Com Cash Provides Others Fast, Cheap U.S. Access
August 18 <sup>th</sup> , 2004	Google Goes Public	Informing	Personalization and Ease of Finding Information
July 12 <sup>th</sup> , 2005	U.S. Cell Phones > Landlines	Mobility	FCC Reports That as of 2004 the U.S. Has More Cell Phones Than Landlines

Technology

Geopolitics

Business Practices

# Synergistic Flattening

## Geopolitics

**Capitalism**

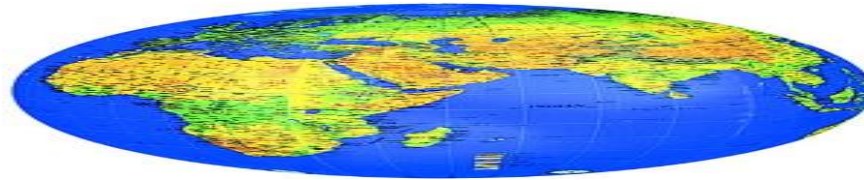
**Motive**

**Offshoring**

WWW Accessibility

Fast Computing

Mobility



Open Sourcing

Cheap Global  
Bandwidth

Cheap Computing

Standardization

**Means**

**Outsourcing**

**Infrastructure**

**Supply Chaining**

**Technology**

**Methods**

**Insourcing**

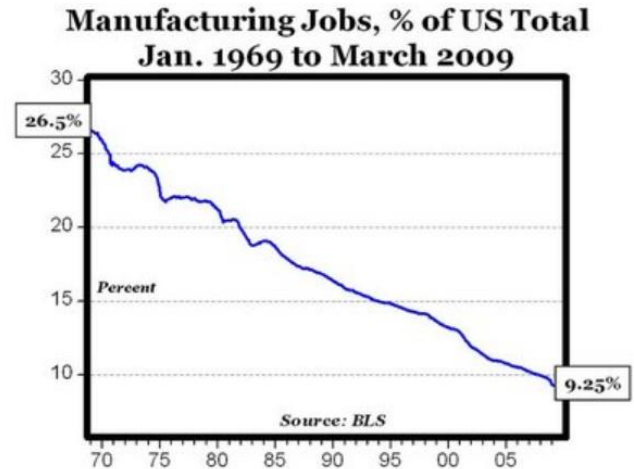
**Informing**

**Business Practices**

# What Happens in a Flat World

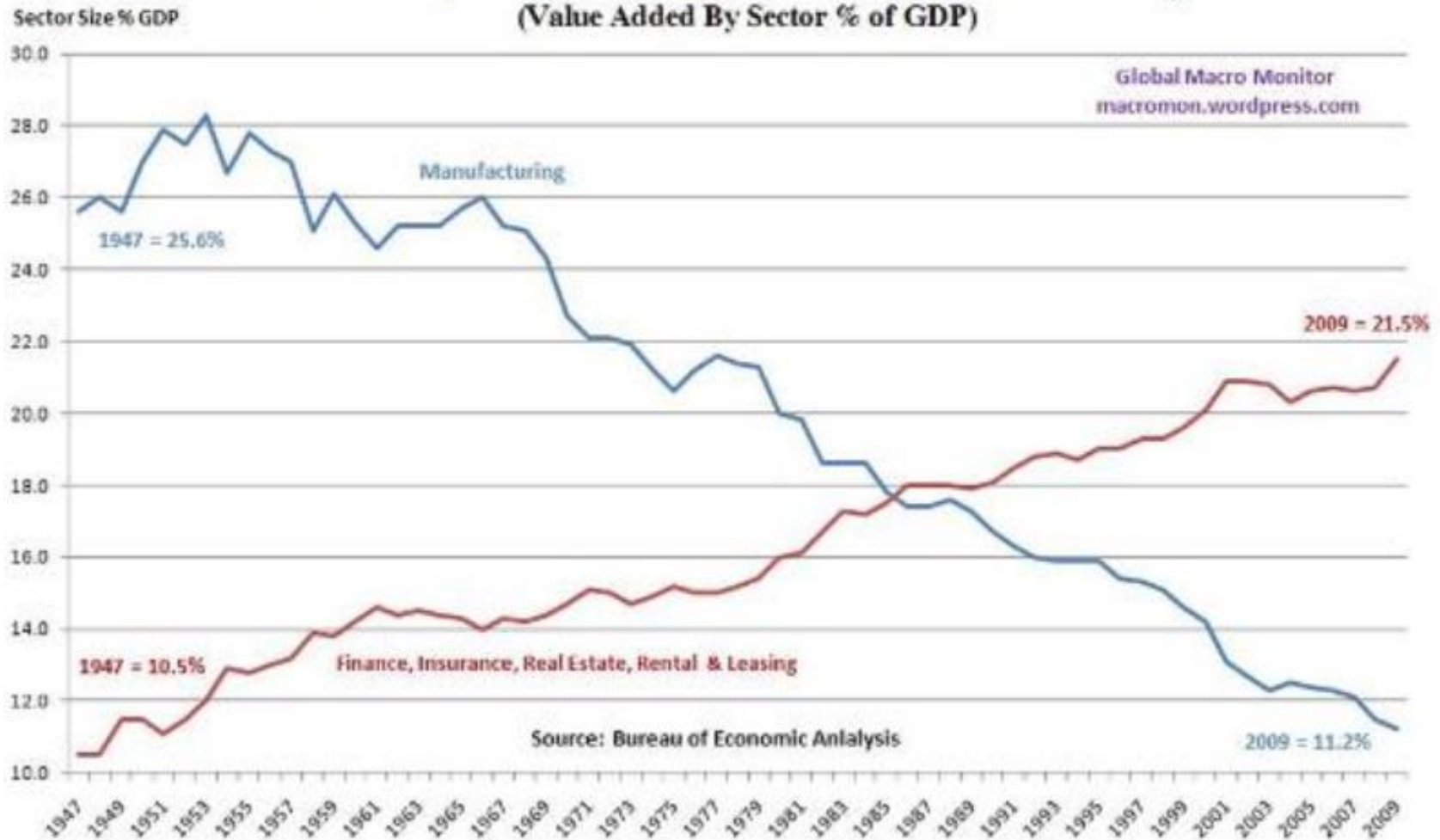
## Goods and Services Migration

- **Manufacturing Migration**
  - Manufacturing Is Rapidly Migrating to Countries with the Lowest Labor Cost and Highest Tax Breaks, Educational Incentives, and Subsidy Packages
  - China Driver; Malaysia, Thailand, Brazil, Ireland, Mexico, Vietnam, Eastern Europe Following
- **Digitization & Service Migration**
  - All Knowledge Work Is Being Digitized and Significant Amounts Are Migrating as Well
  - Interoperability, High Speed Connections Provide Infrastructure
  - Low Labor Costs for Highly Educated Workers Provide the Motivation

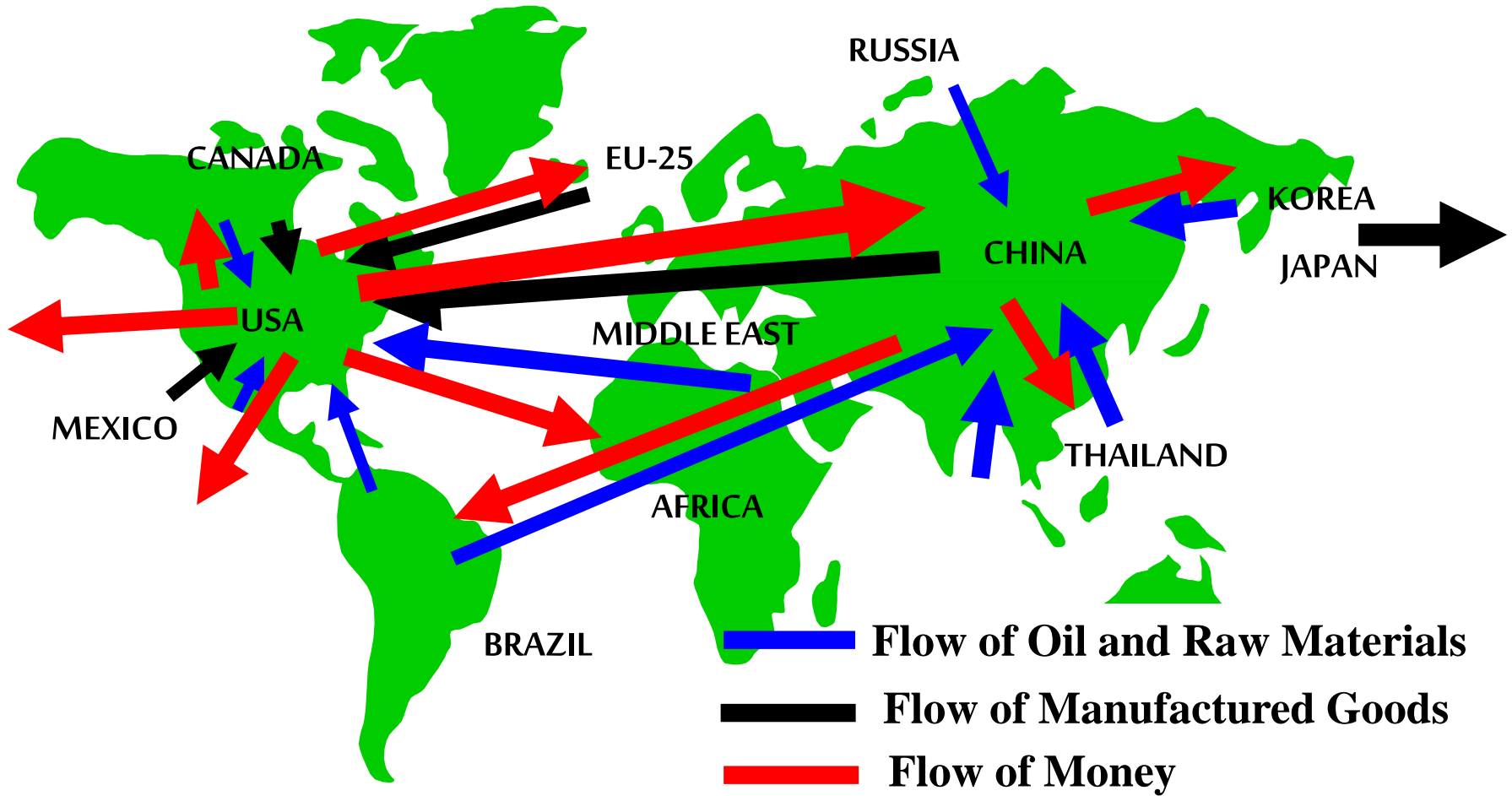


# US Economic Shift

## America's FIRE Economy Finance, Insurance, & Real Estate vs Manufacturing (Value Added By Sector % of GDP)



# Global Economic Imbalances





# Macro Ag Economy: Core Driver of Global Ag Demand

## Total Population

Billion people

2.0

■ Now ■ 2025

1.5

1.0

0.5

0 China India Iran Japan Russia Western Europe US



Germany 375.39 Euros  
or \$500.07/week



Mongolia 41,985.85 togrogs  
or \$40.02/week

*As the Developing World Becomes More Affluent,  
Food Demand Will Grow Dramatically*

**Population – Urbanization – Income - Diets**

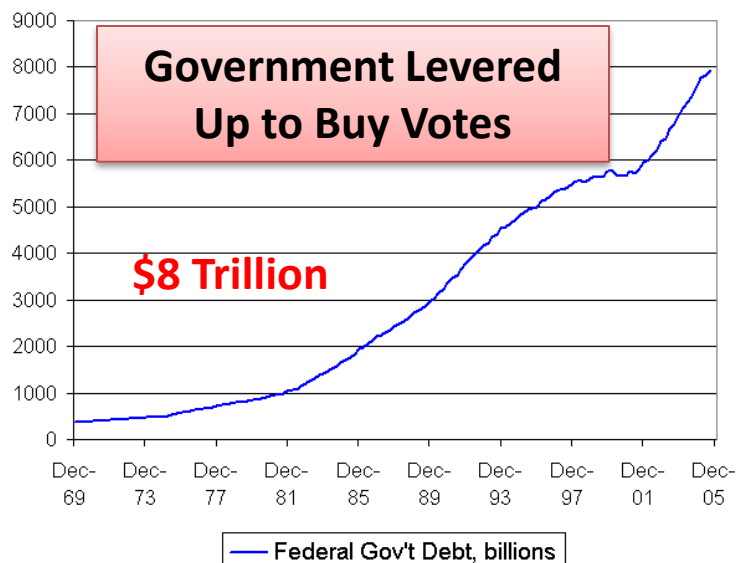
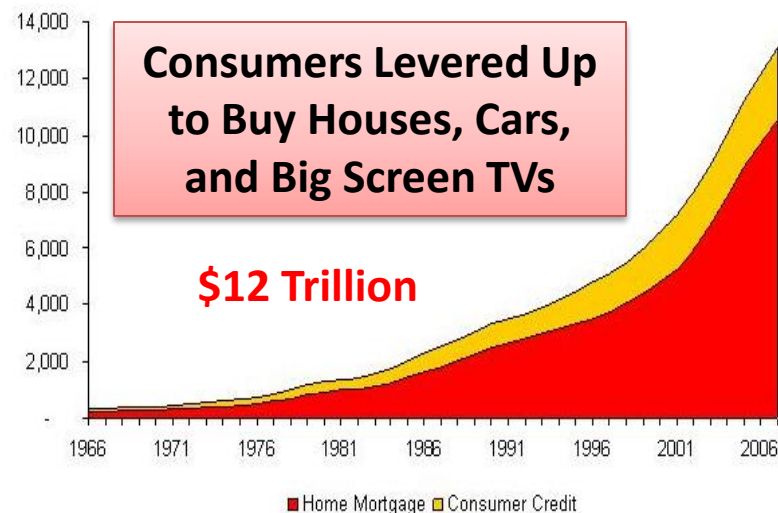
*Three Billion People Consuming More Calories and More Protein!*

# United States Loaded Up on Debt

Corporate Debt and Profits



Household Debt (Billion \$)



*During a Period of the Greatest Prosperity the World Has Ever Seen, the U.S. Built Up the Greatest Debt the World Has Ever Seen!*

# Financial Crisis

## THE WALL STREET JOURNAL

FRIDAY, SEPTEMBER 19, 2008 • VOL. CCLII NO. 38

\*\*\*\* \$1.00

SN 1282 6P 445.33 3.16 NASDAQ 12932 4.43 NYMEX 1249.3 7.21 50 SPXEX 91 264.45 1.18 50 NY TREAS 7102, yield 3.48% 48, 5478 48.57 481P 502.72 454.13 8000 \$1.435 YEN 135.42

### U.S. Drafts Sweeping Plan to Fight Crisis As Turmoil Worsens in Credit Markets

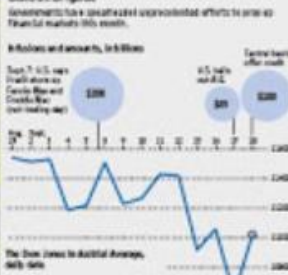
Paulson Briefs Congress on Idea to Buy Bad Assets From Banks, Insure Money-Market Funds; Stocks Rebound Sharply

By EDGAR SUAREZ AND DANIEL PALEY

**WASHINGTON**—The government will begin a sweeping package of programs that would reorganize the Fed, alter the way it regulates banks and other financial institutions, and create a new agency to oversee the nation's credit markets. The plan is a blueprint for what could take the form of a sweeping overhaul of the nation's financial system, one that would take the form of a sweeping overhaul of the nation's financial system, one that would take the form of a sweeping overhaul of the nation's financial system.



#### Rescue Plan



#### SEC Is Set To Issue Temporary Ban Against Short Selling

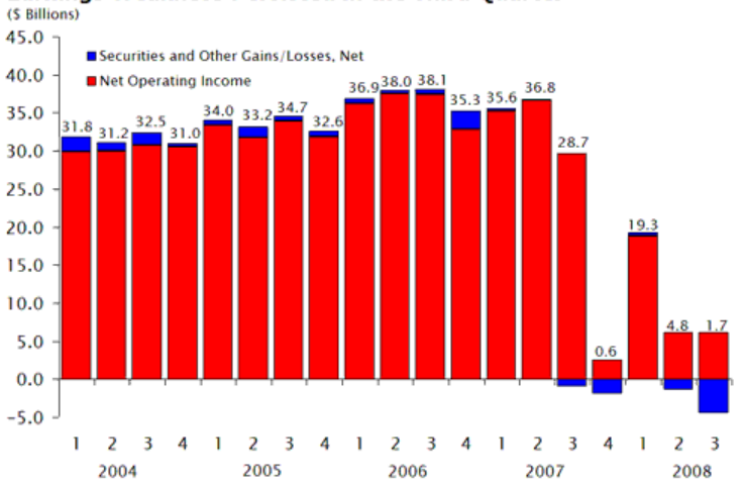
The Securities and Exchange Commission prepared an order

## THE WALL STREET JOURNAL

THURSDAY, SEPTEMBER 18, 2008 • VOL. CCLII NO. 37

\*\*\*\* \$1.00

### Earnings Weakness Persisted in the Third Quarter



### Mounting Fears Shake World Markets As Banking Giants Rush to Raise Capital

By TOM LAMBERT, for Businessweek and AMERICA'S MONEY

**PARIS**—Through the U.S. financial system on Wednesday, all eyes for a moment turned to the world's largest banks. The banks' stock prices fell, and some are now trading at a discount to their book value. The crisis in the U.S. has spread to other parts of the world, and the crisis in the U.S. has spread to other parts of the world.

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#### Morgan Stanley in Talks With Wachovia, Others

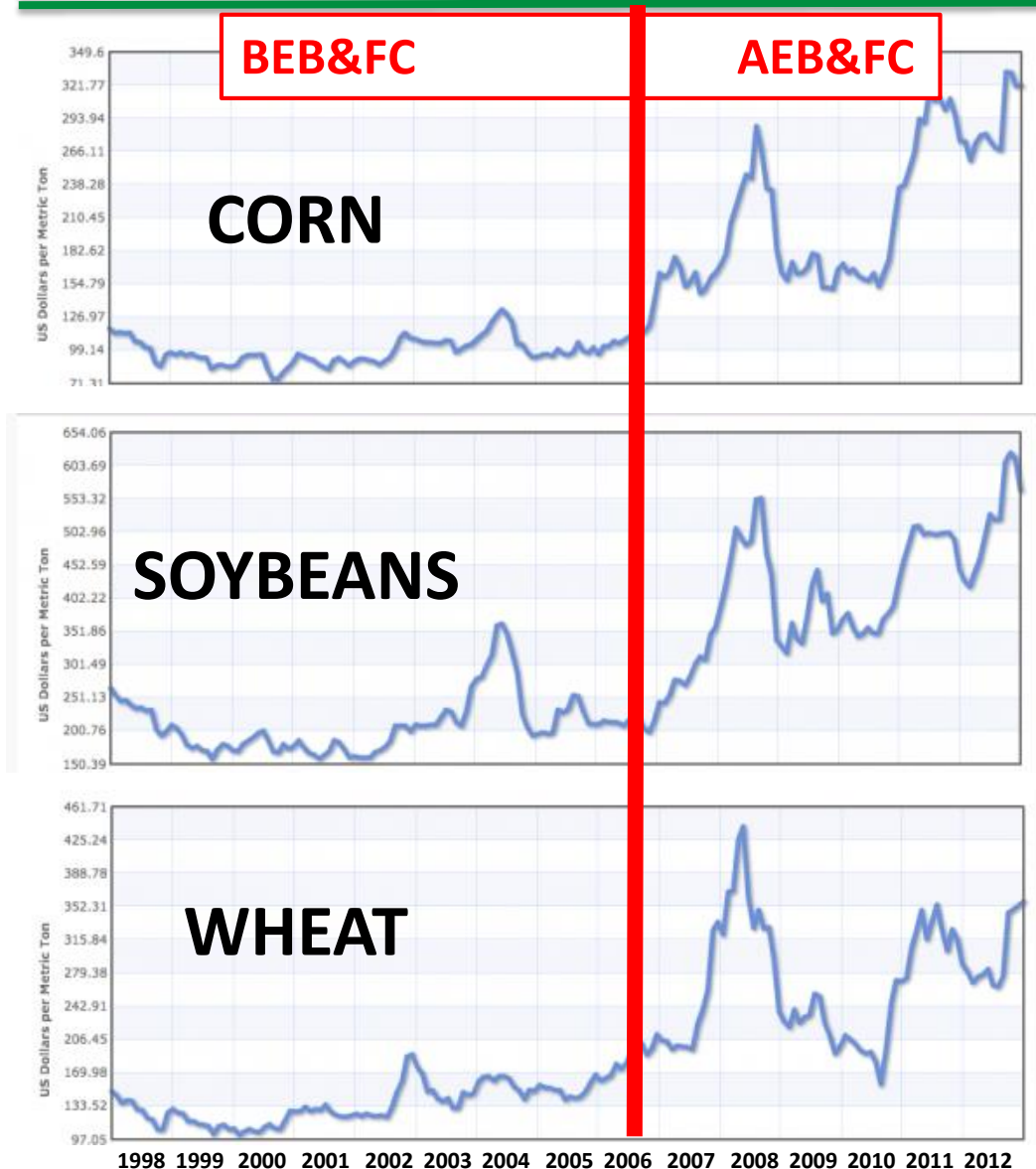
By ADAM LUSKOFF, for Businessweek and AMERICA'S MONEY

**MORGAN STANLEY** is in talks with Wachovia and other banks to raise capital. The crisis in the U.S. has spread to other parts of the world, and the crisis in the U.S. has spread to other parts of the world.



# Historical Commodity Prices

November 1997 to October 2012



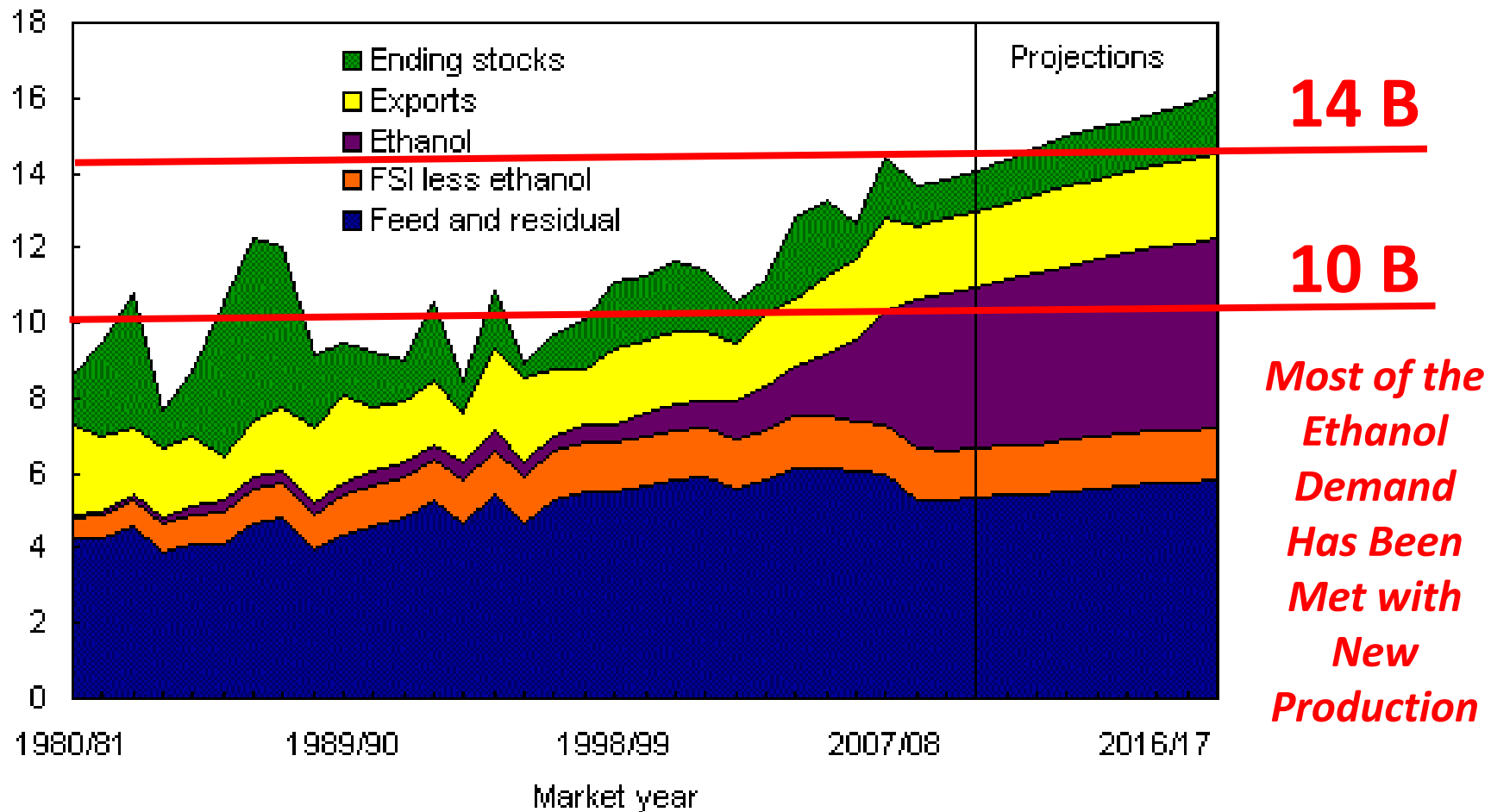
## Commodity Prices Fit Into Two Broad Periods

1. BEB&FC: Before Ethanol Boom and Financial Crisis
2. AEB&FC: After Ethanol Boom and Financial Crisis

*Prices Are Higher and Much More Volatile*

# Corn Utilization Ethanol Impact

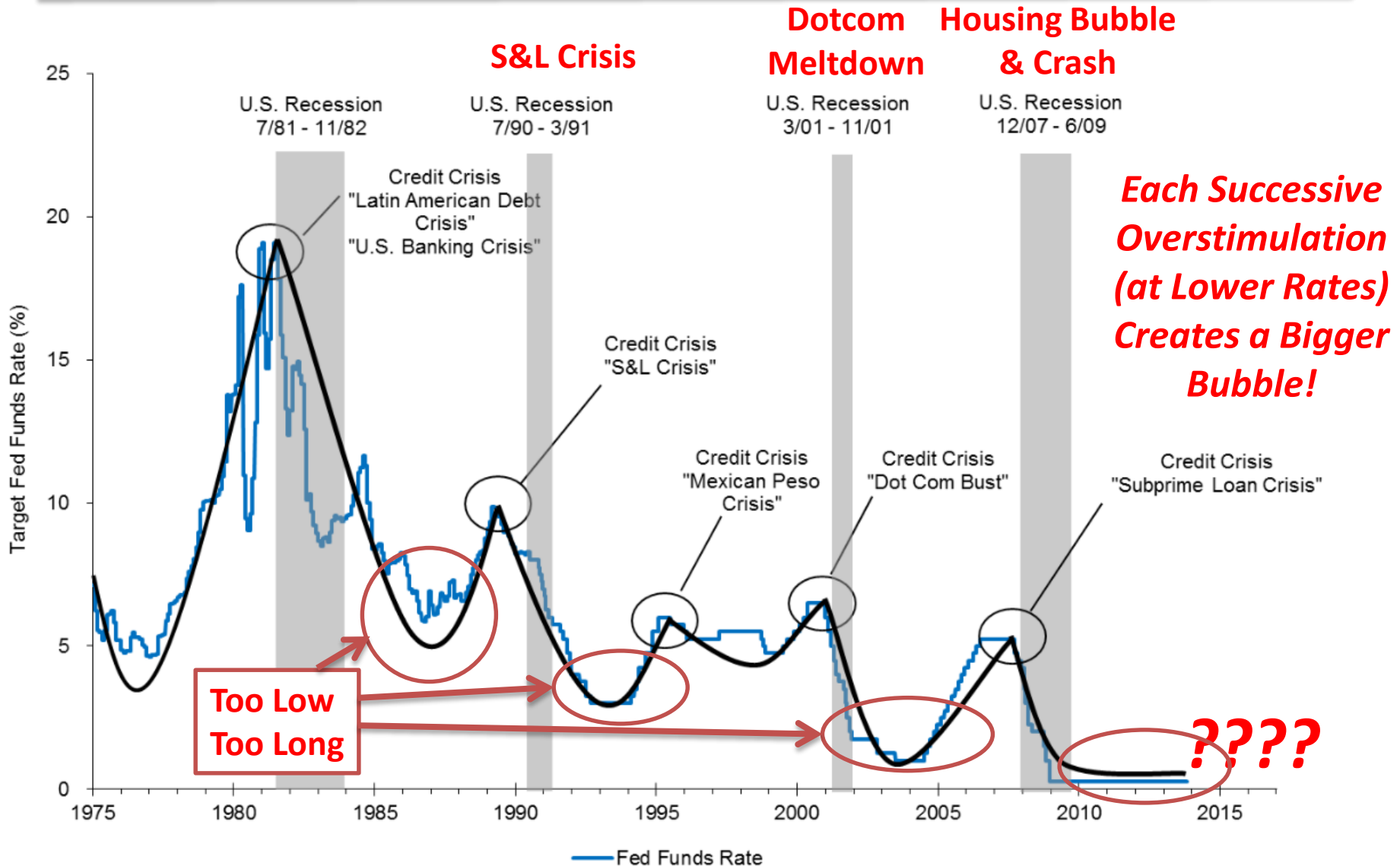
Billion bushels



Source: *USDA Agricultural Projections to 2018*, February 2009.  
USDA, Economic Research Service.

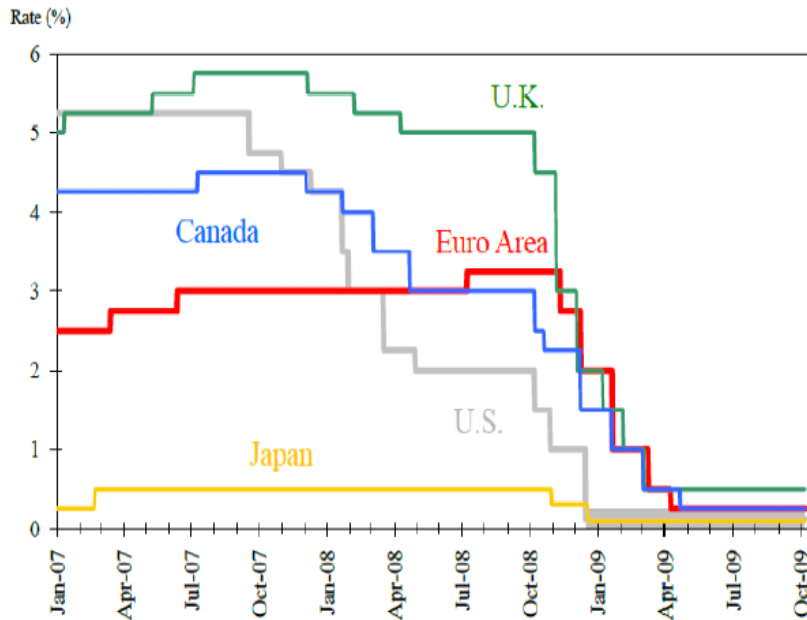
# Fed Funds Rates 1975-2014

## Moral Hazard Run Amok



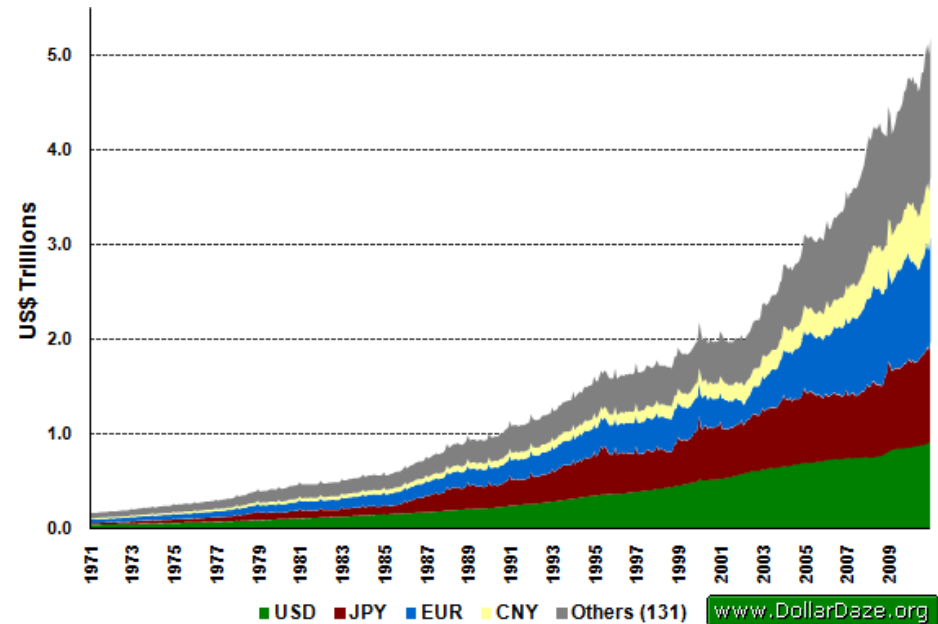
# Global ZIRP and \$5 Trillion in Currency

## NEAR-ZERO POLICY RATES GLOBALLY



James Bullard, Federal Reserve Bank of St. Louis, October 11, 2009

## Estimated Global Currency in Circulation (Jan 1971 - Dec 2010)

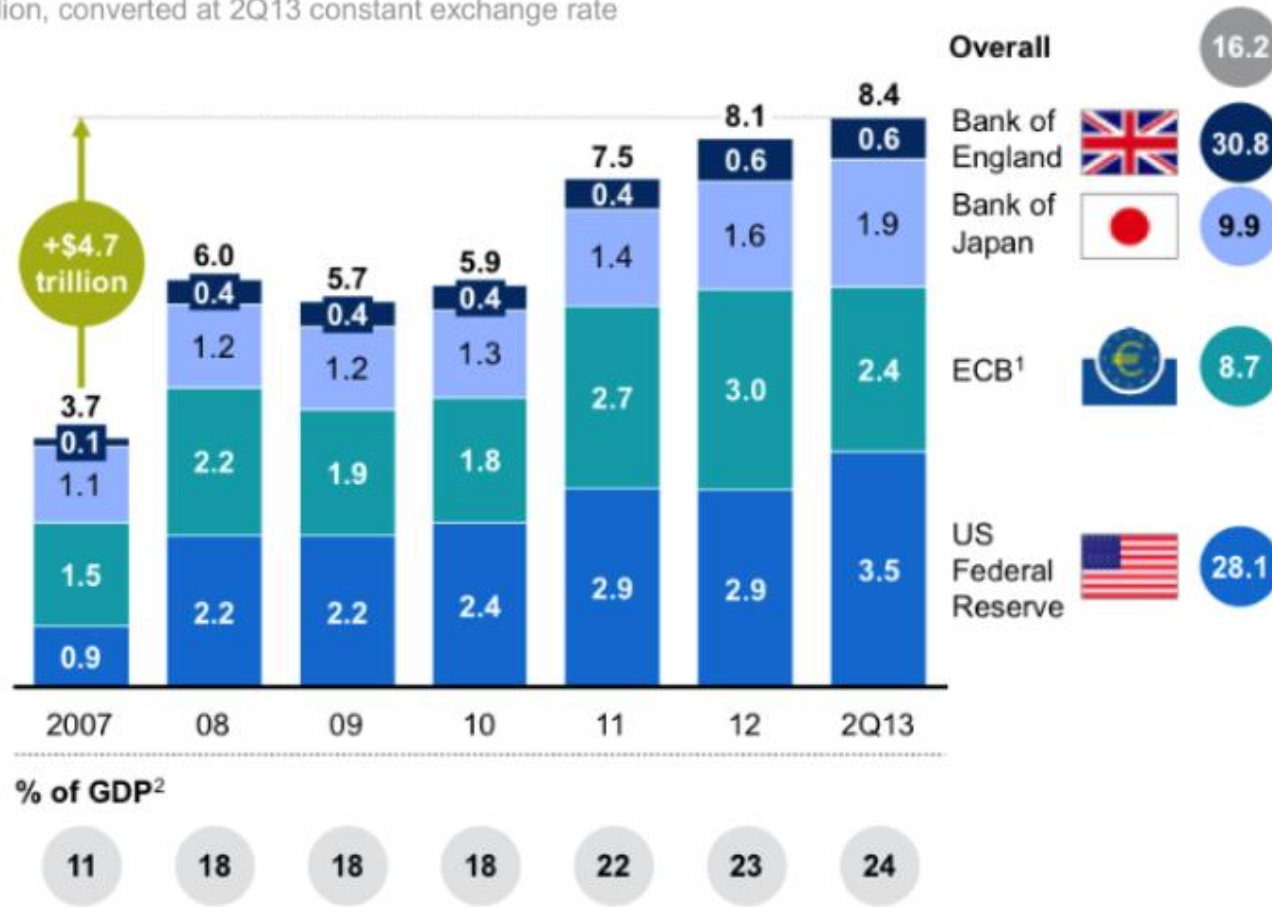


***How does this have a happy ending?***

# Central Banks Print \$5T in 5 Years!

Total assets on central bank balance sheets (end-of-period values)  
\$ trillion, converted at 2Q13 constant exchange rate

CAGR 2007-2013 %



1 European Central Bank; excludes gold and foreign currency.

2 Total assets as share of combined GDP.

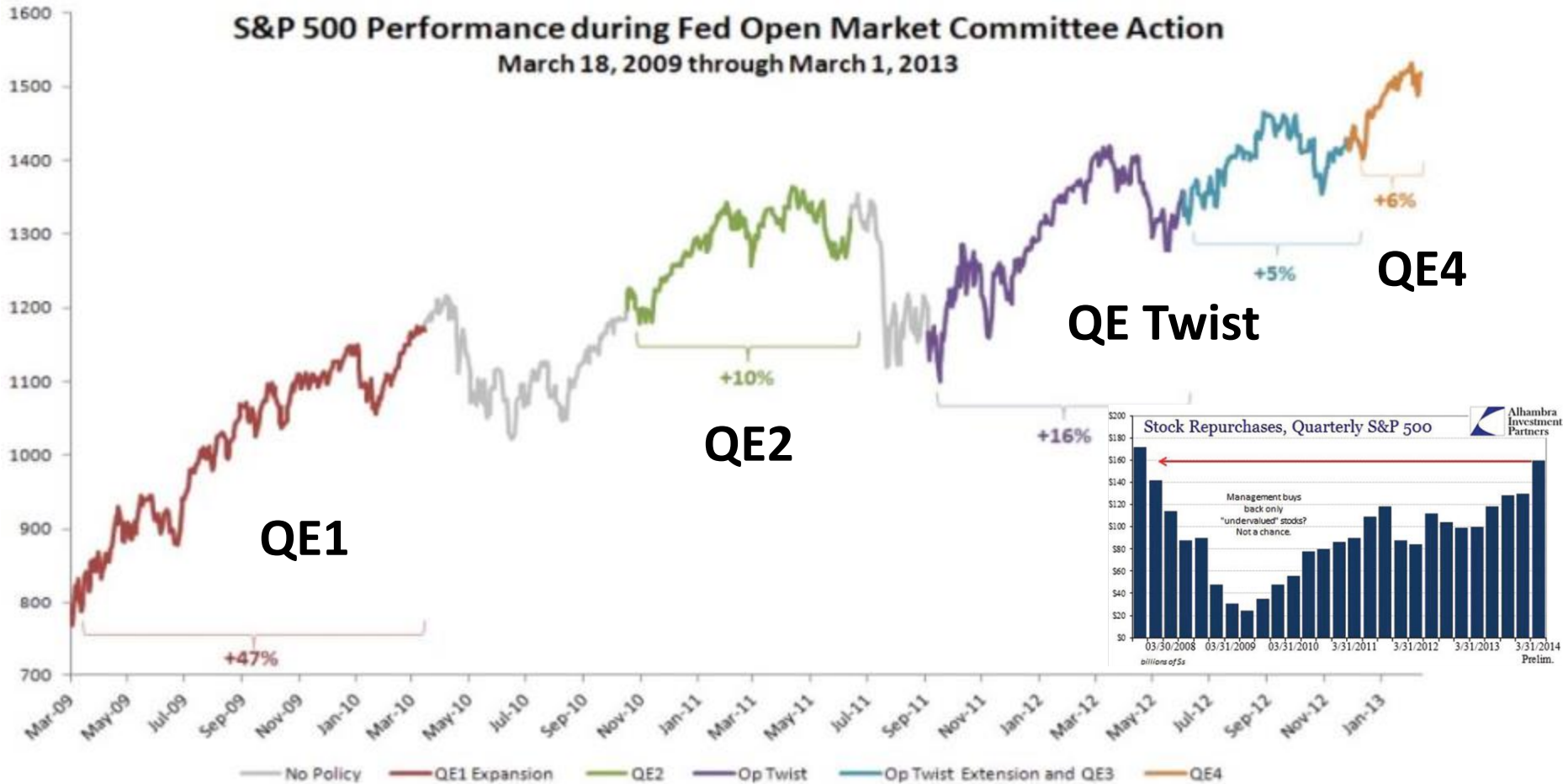
NOTE: Numbers may not sum due to rounding.

SOURCE: US Federal Reserve; European Central Bank; Bank of England; Bank of Japan; McKinsey Global Institute



# Asset Price Manipulation

## Keeping Wall Street Happy



***Our "Free" Markets are Largely Dependent on Government "Support" (Manipulation)***

# Impact of Slowing the Presses

## Huge Dollar Rally

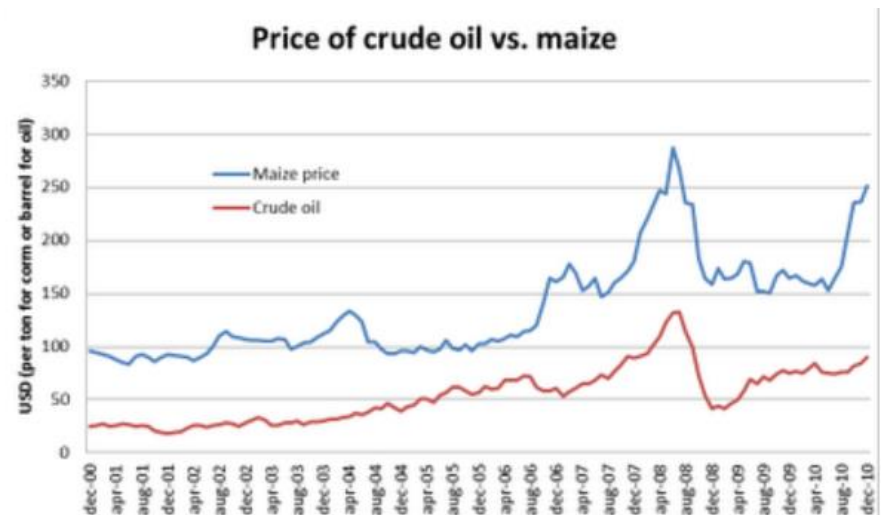


# Corn-Oil-Dollar Correlations

## Outside Capital Drives Ag

*“On a daily basis, **moves in commodities such as corn, soybeans, soybean oil, and wheat had correlations 60-70-80% with changes in the value of the dollar or the price of crude oil....for example, there is over a 90% correlation between the price of heating oil and soybean oil...**”*

William Lapp  
Advanced Economic Solutions



# Impacts of Ultra Low Interest Rates and Quantitative Easing

## 1. Asset Inflation

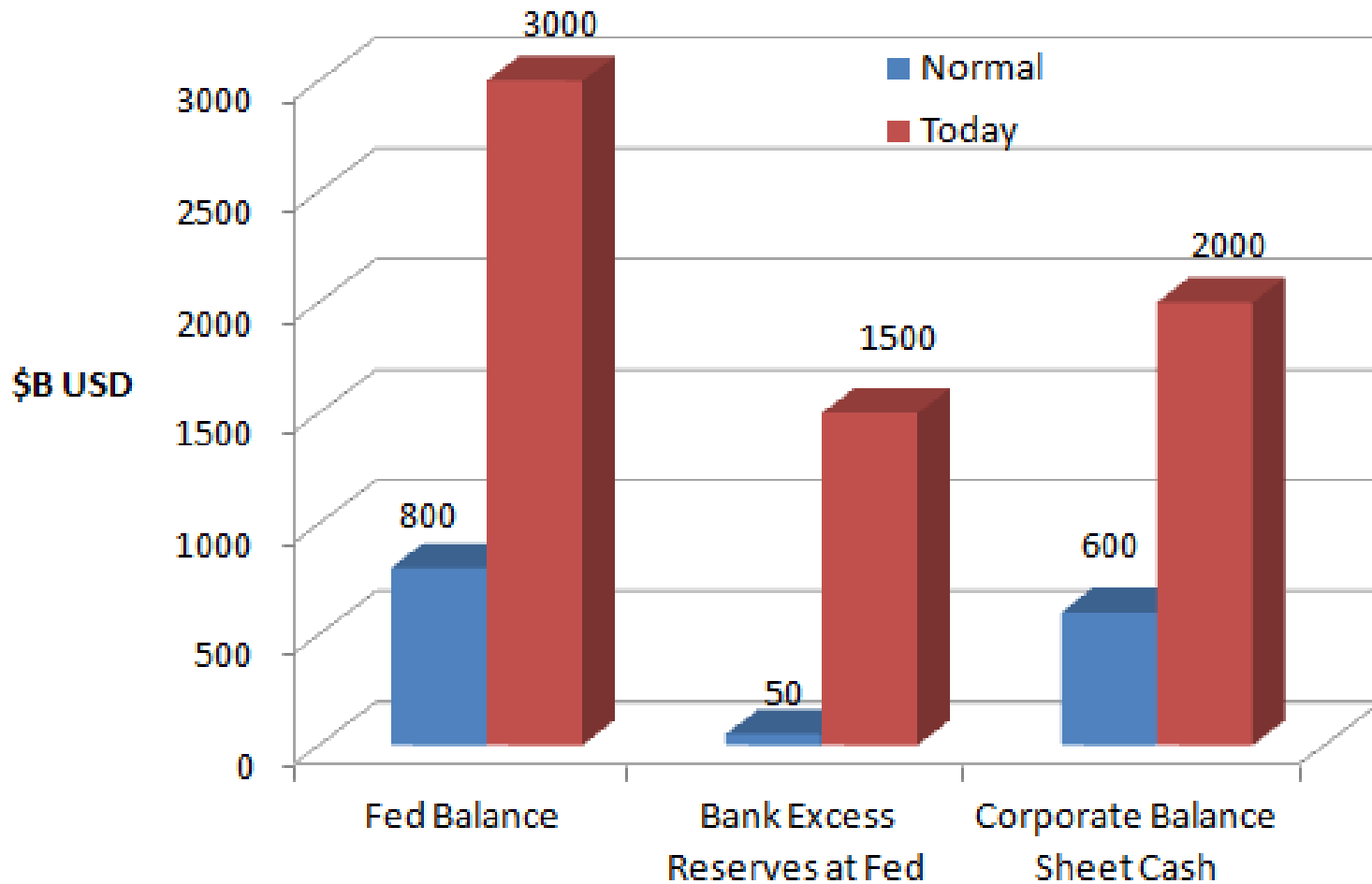
- Stocks, Bonds
- Housing
- Land
- Commodities

## 2. Speculative Bubbles

- Pushing Out the Risk Curve at 40 BPS
- Investment in PE, VC



# The Ocean of Liquidity



***What happens when we unwind this liquidity?***

# Potential Effects of Unwinding QE

## 1. Rise in Interest Rates

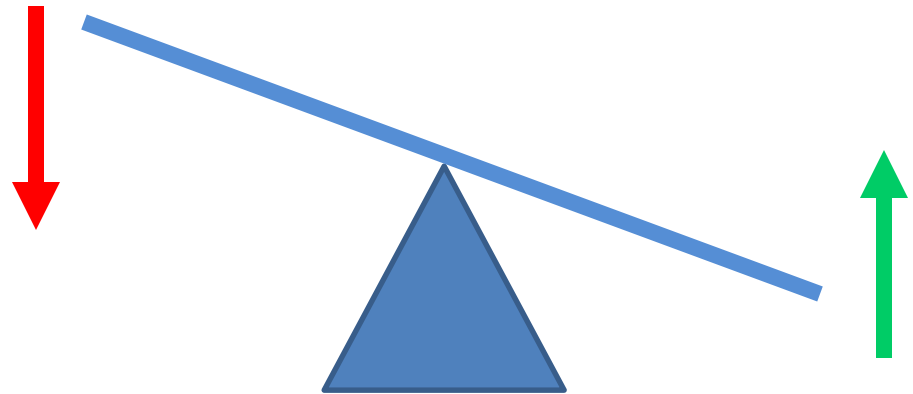
- Insufficient Demand to Maintain High Bond Prices

### **Deflationary Forces:**

- Higher Interest Rates
- Weak Demand
- Asset Deflation

## 2. Deflation

- Inflated Assets Deflate as Interest Rates Increase



## 3. Commodity Inflation

- 7 Year of Monetary Stimulus Put to Work

### **Inflationary Forces:**

- Low Interest Rates
- Growing Demand
- Liquidity Unwind

# Agriculture 3.0: A Paradigm Shift

## CropLife TECHNOLOGY

E-Business • PrecisionAg • Automation • Information Management

### Considering Agriculture 3.0

The ag industry has reached another evolutionary tipping point. Consultant Jim Budzynski believes that Agriculture 3.0 will be driven by economics, environmentalism, the incredible promise of synthetic biology and changing consumer demand, and retailers need to be ready for serious change.

BY DR. JIM BUDZYNSKI, MACROGAIN PARTNERS

I WAS digging through a file cabinet a few weeks ago and came across some pictures of my dad from the 1970s. We last did over 20 years ago, but I remember like yesterday how he fueled my passion for agriculture way back in the 1960s.

I was a wide-eyed 12-year-old running around Midwest corn and soybean fields taking soil samples with my little stainless steel soil probe. That was long before "grid sampling" and "precision ag" were common phrases,



Budzynski

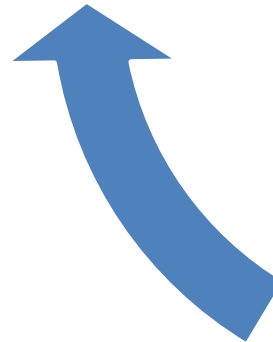
#### Structural

- Input Suppliers
- Production
- Processing
- Marketing
- Retailers



#### Macro

- Government
- Consumers
- Globalization



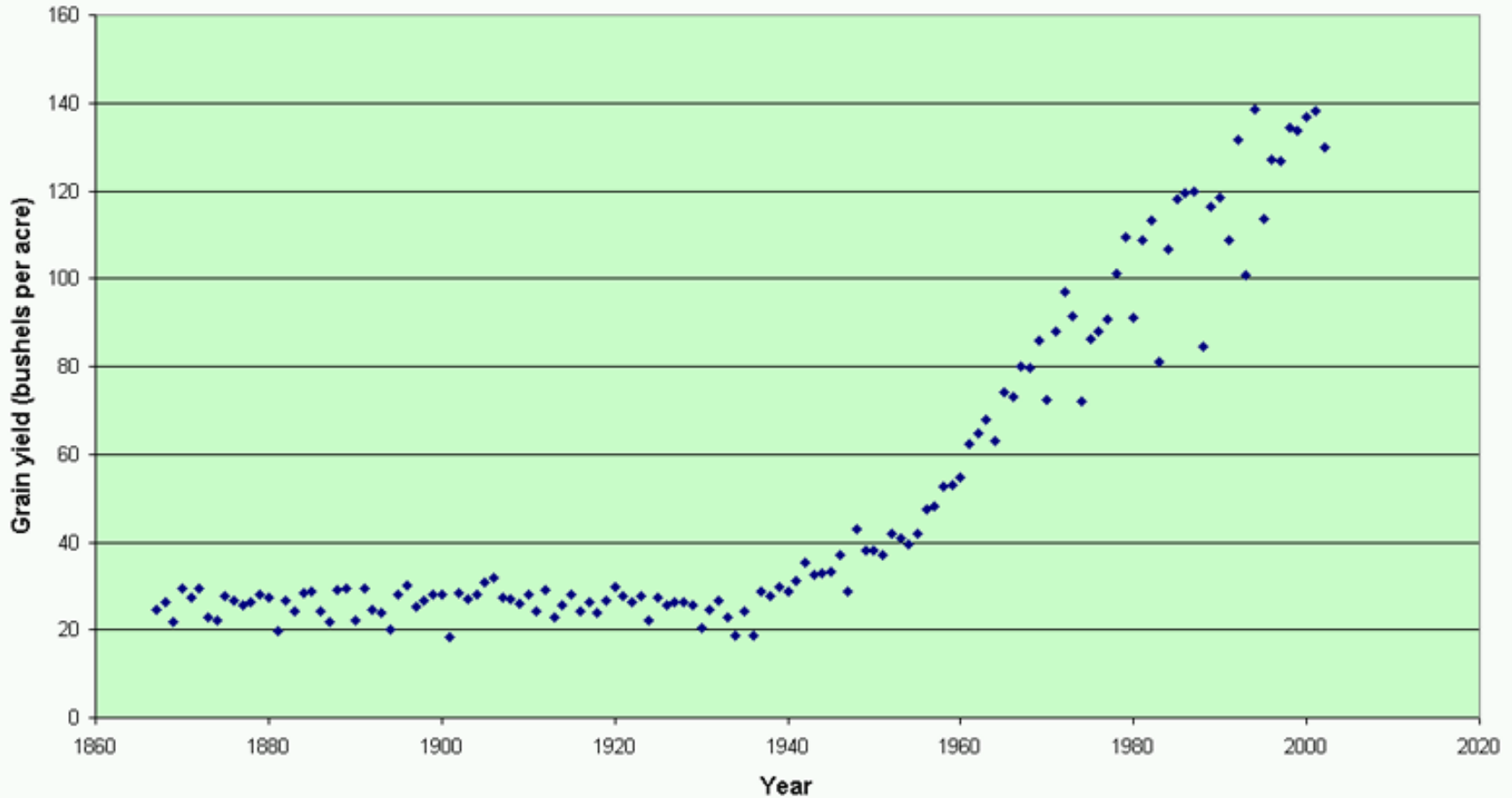
#### Technology

- Info Tech
- Patents/Generics
- Biotechnology



# Ag 3.0: Productivity

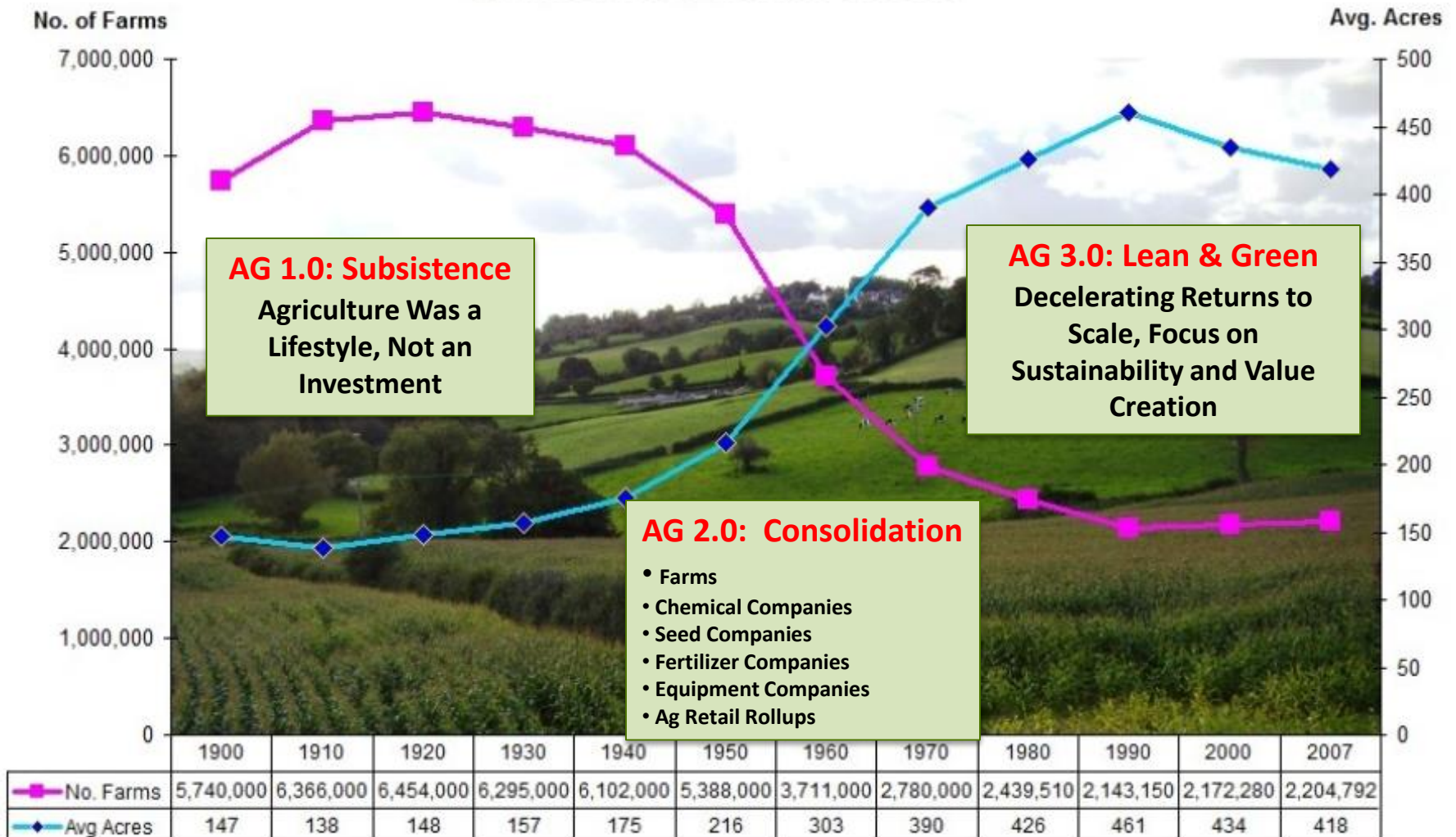
## US Average Corn Yields, 1863 to 2002





# Ag 3.0: U.S. Farm Consolidation Timeline

Number & Size of US Farms 1900-2007



**AG 1.0: Subsistence**

Agriculture Was a Lifestyle, Not an Investment

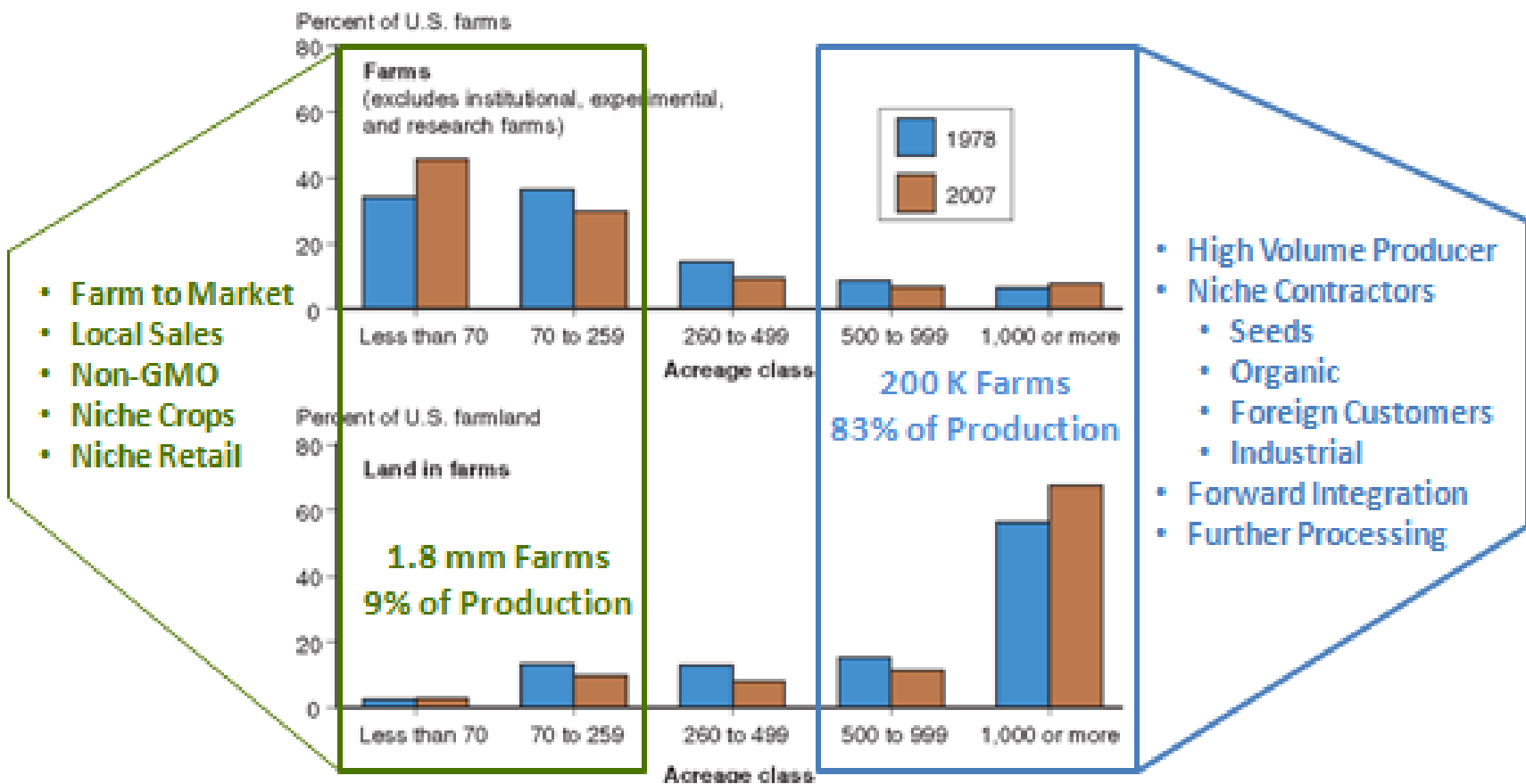
**AG 2.0: Consolidation**

- Farms
- Chemical Companies
- Seed Companies
- Fertilizer Companies
- Equipment Companies
- Ag Retail Rollups

**AG 3.0: Lean & Green**

Decelerating Returns to Scale, Focus on Sustainability and Value Creation

# U.S. Farm Bifurcation



**Old "Center of Universe":  
200-600 Ac Farms Producing #2YC**

# Ag 3.0: Lean & Green

“No Molecule Wasted”

## Crop Nutrition

### Seeds

- Best Seed
- Right Time
- Right Population
- Right Placement

- Optimize Rates
- Broadcast to Targeted
- Reduce Runoff, Volatilization
- 4R Practices

## Crop Protection

- Preventative to As Needed
- Broadcast to Targeted
- Synthetics to Biopesticides

- More Efficient Processes
- Supply Chain Management
- Enhanced Food Safety
- Reduced Waste

**Ag 3.0**

- Manure Management
- Natural Production
- No GPAs, Hormones
- Reduced Feed Waste

## Food Processing & Retailing

- More Efficient Processes
- Cheaper Feedstocks
- More Valuable Outputs
- Optimized Plant Size
- Reduced Waste

- Holistic Management
- Metadata Management
- Efficient Decisions

## Protein Production

## Bioenergy

## Precision Decisions

# What is the effect of high prices?



1. Induces New Technology into Agriculture
2. Induces New Land into Production
3. Rations Demand Among Existing Users
4. Increases Farm Income
5. Drives Input Sales – Seed, Chem, Equipment
6. Increases Ag Asset Prices
7. Stimulates Outside Investment n Agriculture

***These Impacts Create Short Term Euphoria  
But Ultimately Distort Prices and Valuations***

# Technology and Structural Evolution

- New Paradigm:
  - Higher Value Crops
  - More Expensive Inputs
  - Higher Crop Yields

	Old	New
<b>Technology Gain (bu)</b>	<b>4.5</b>	<b>4.5</b>
<b>Price Per Bushel</b>	<b>\$ 2.00</b>	<b>\$ 5.50</b>
<b>Value Created</b>	<b>\$ 9.00</b>	<b>\$ 24.75</b>
<b>Channel Margin (35%)</b>	<b>\$ 3.15</b>	<b>\$ 8.66</b>
<b>COGS/unit</b>	<b>\$ 5.00</b>	<b>\$ 8.00</b>
<b>Net Profit</b>	<b>\$ 0.85</b>	<b>\$ 8.09</b>

***“Niche” Technologies  
Migrating from High  
Value Crops to Midwest***

# Yield Maximization Hierarchy

Water Management  
Quality Management  
GPS/Precision Ag  
Scouting  
Soil Analysis  
Data Mgmt

## Maximizing Harvestability

- Harvest Aids
- PGRs

## Maximizing Real Time Nutrition & Reproductive Efficiency

- Macro Fertilizers
- Micro Fertilizers
- PGRS
- Foliar Feeds

## Managing Diseases and Insects

- Insecticides
- Fungicides
- SAR Enhancers

## Biologicals

## Establishing Strong Stand of Targeted Plants

- Seed Treatments
- Selective Herbicides
- Starter Fertilizers

## Maximizing Genetic Potential

# Seeds

# Limitation of Traditional GMOs

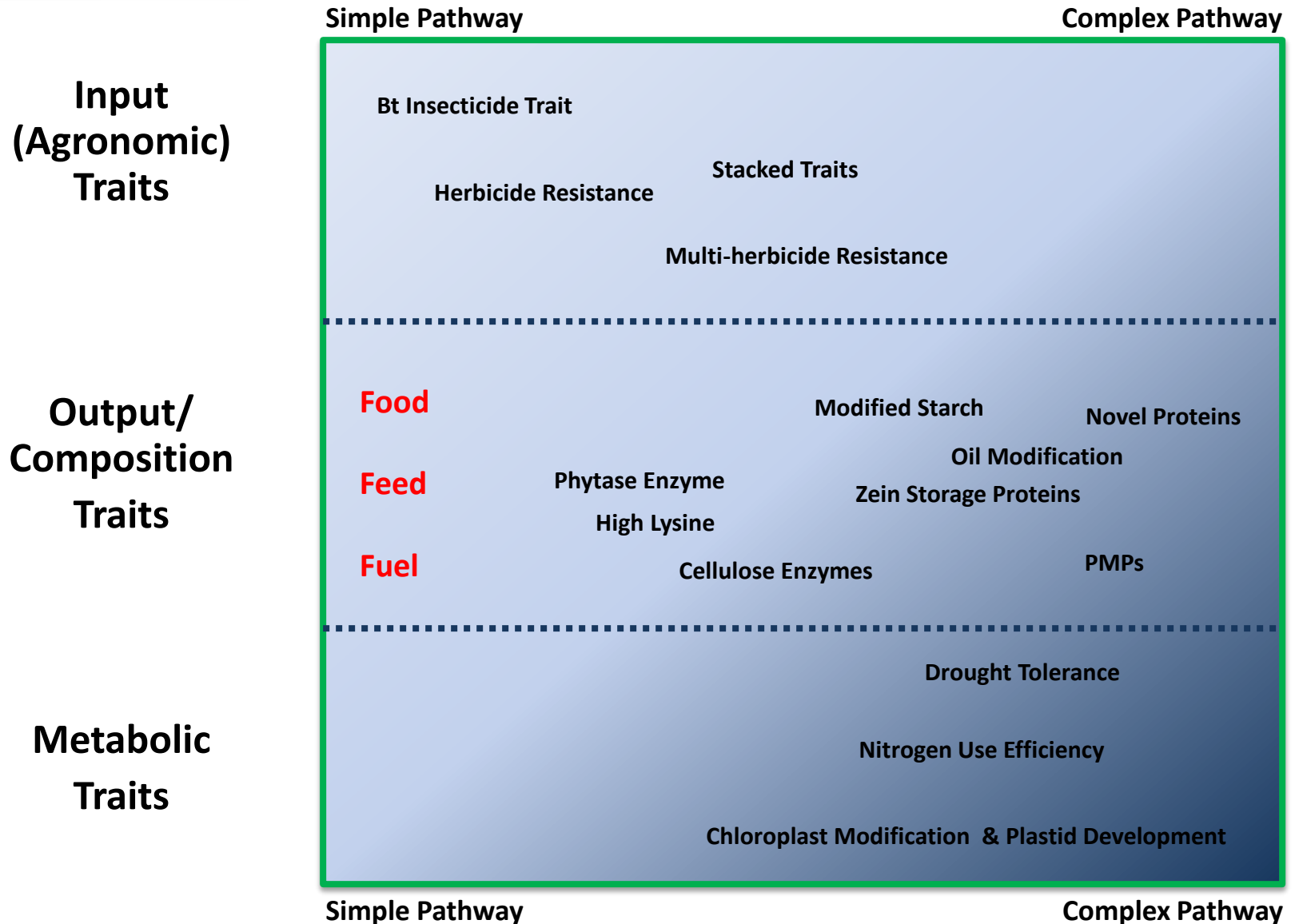


## Why?

- **Simple Traits (Single Gene)**
  - “Two Yards Off Right Tackle”
  - Cavalier on Refuge

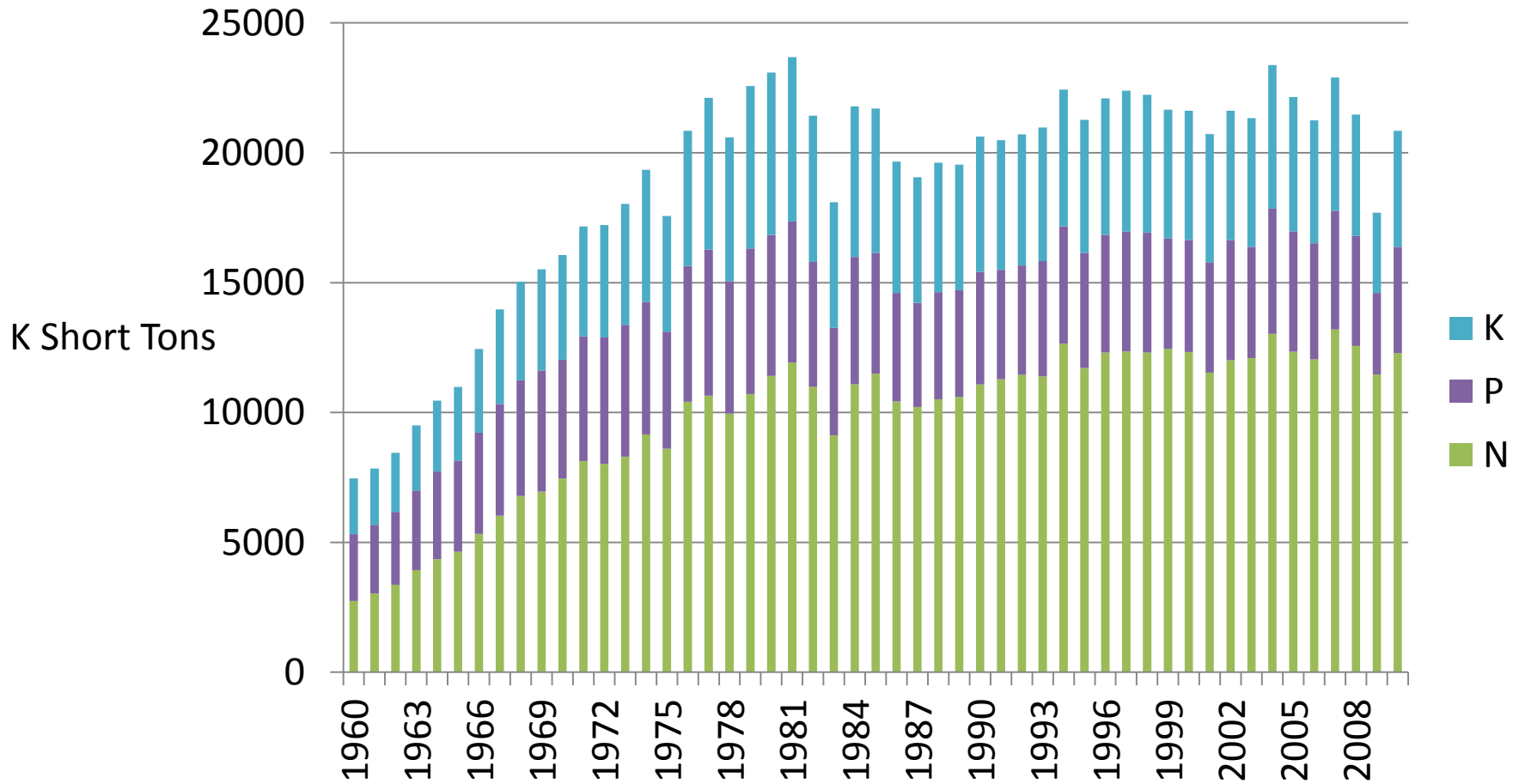
# Future of Biotech

## Corn Trait Example



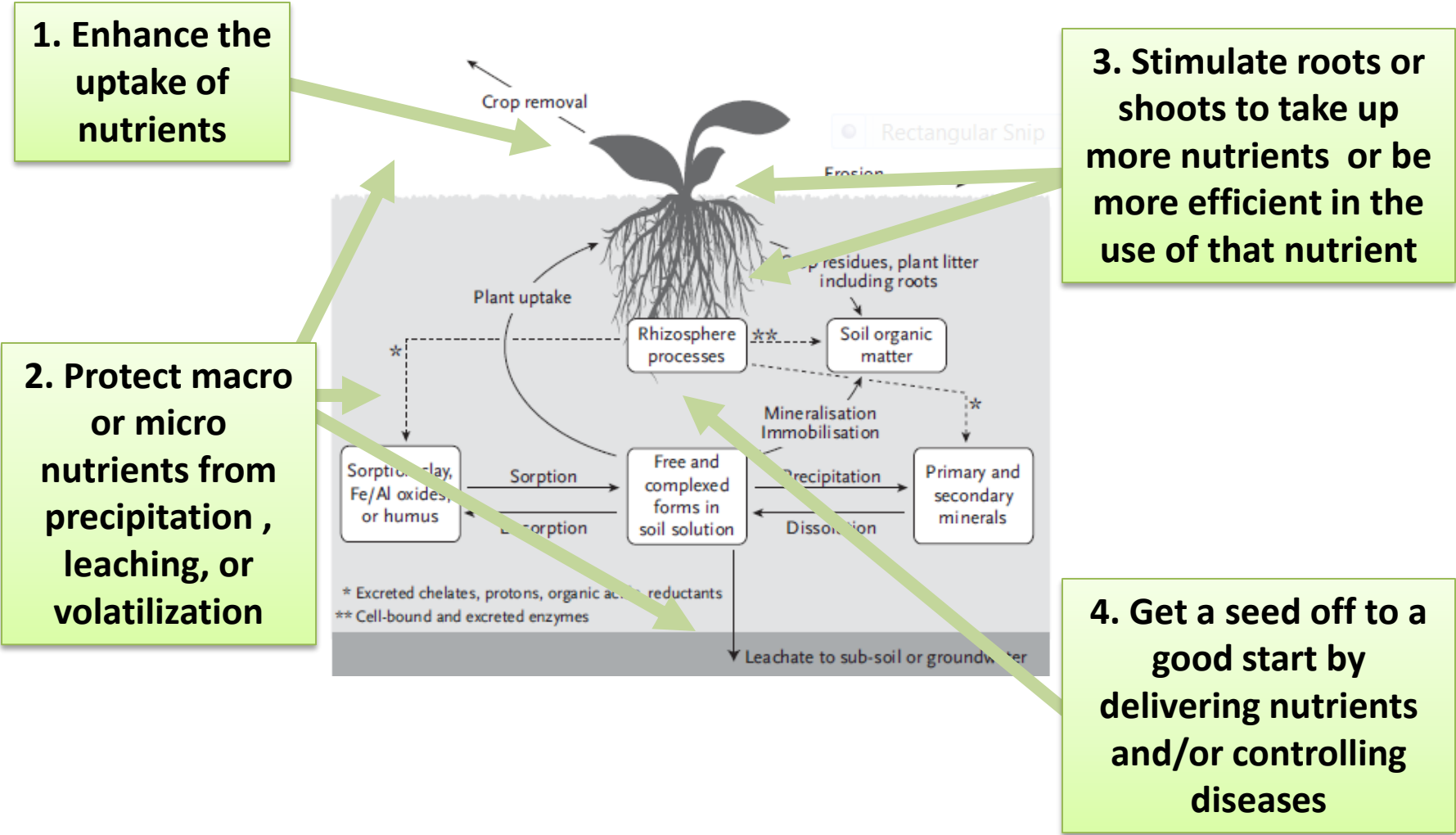


# Macronutrient Tonnage Flat in U.S.

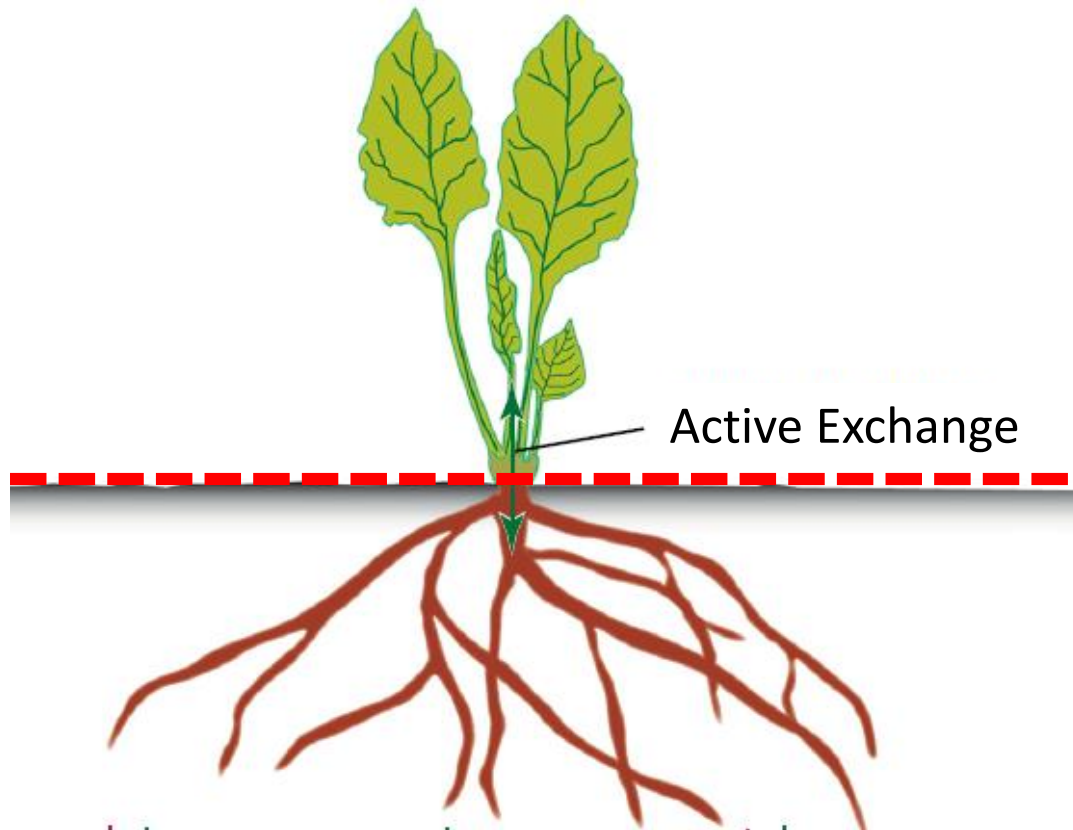


***How can yields continuously increase with flat nutrient tonnage?***

# Rationale Targets for “Micronutrition”



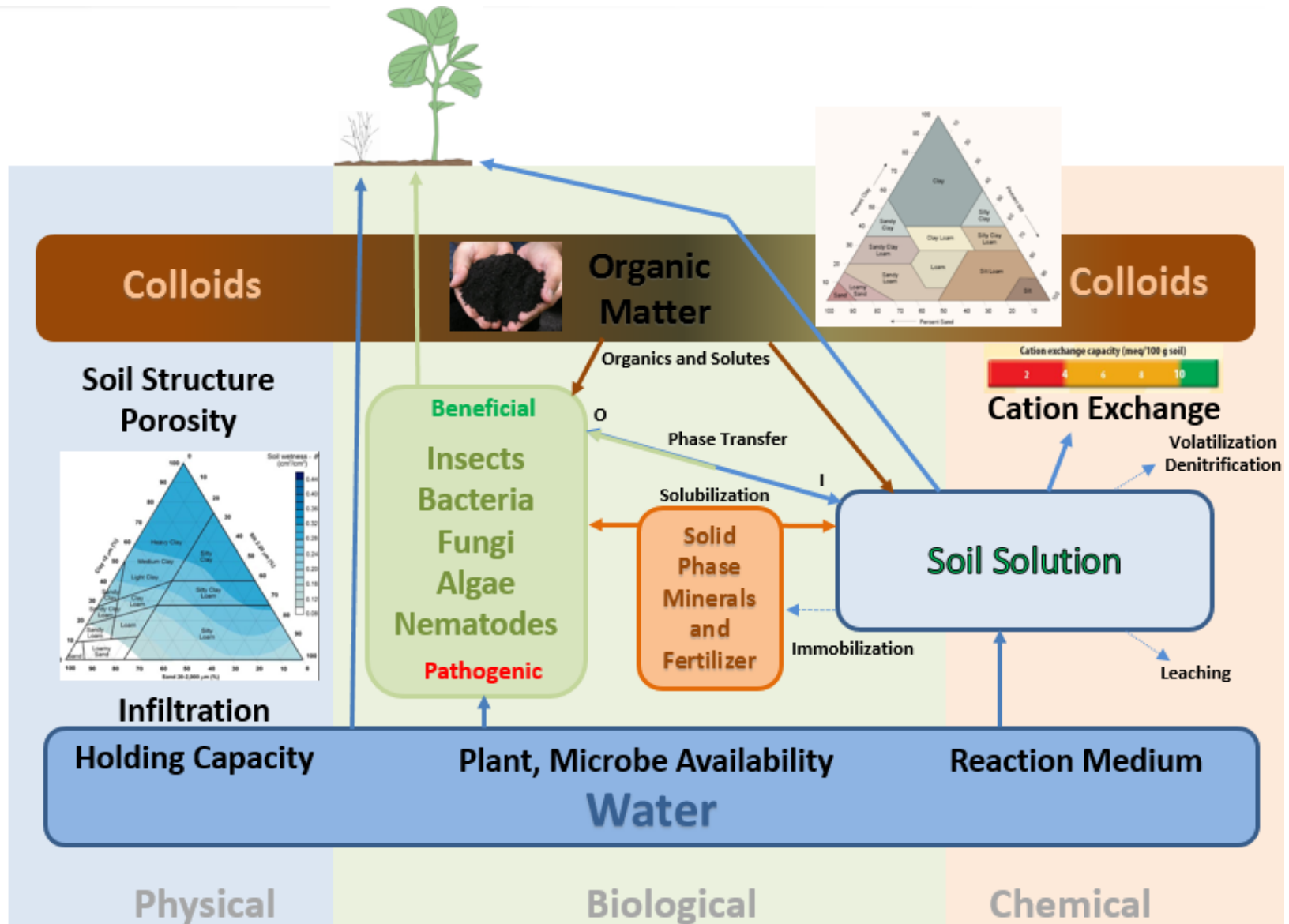
## Phyllosphere – Above Ground Biome



## Rhizosphere – Below Ground Biome

- Plant Growth Environment Can Be Separated into Two Spheres:
  - Phyllosphere, Above Ground
  - Rhizosphere, Below Ground
- Non-Plant Organisms Have Evolved to Co-Exist and Thrive with Plants
  - Bacteria, Fungi, Viruses
- Roles Only Now Being Understood:
  - Nutrient Availability
  - Plant Regulation
  - Disease Suppression
  - Interaction with Crop Genetics

# Rhizosphere Overview



# Phyllosphere Overview



## Spray Solution

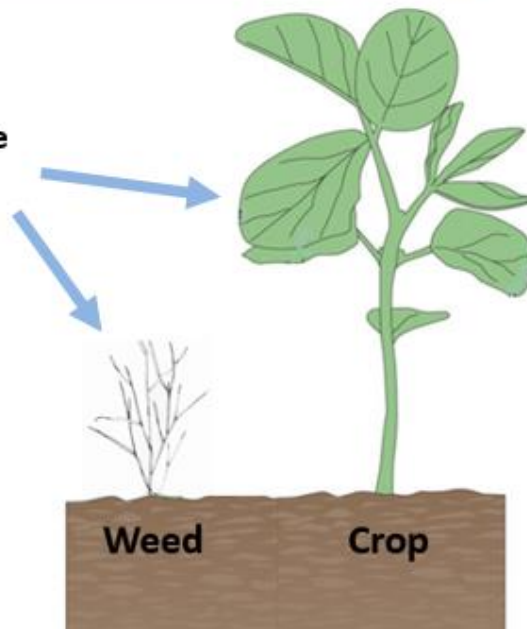
- Water
- Chemical Active Ingredients
- Fertilizers
- Surfactants/Adjuvants
- Drift Control Agents

## Spray Dynamics

- Dilution
- Nozzles and Pressure
- Droplet Size

## Drift & Volatilization

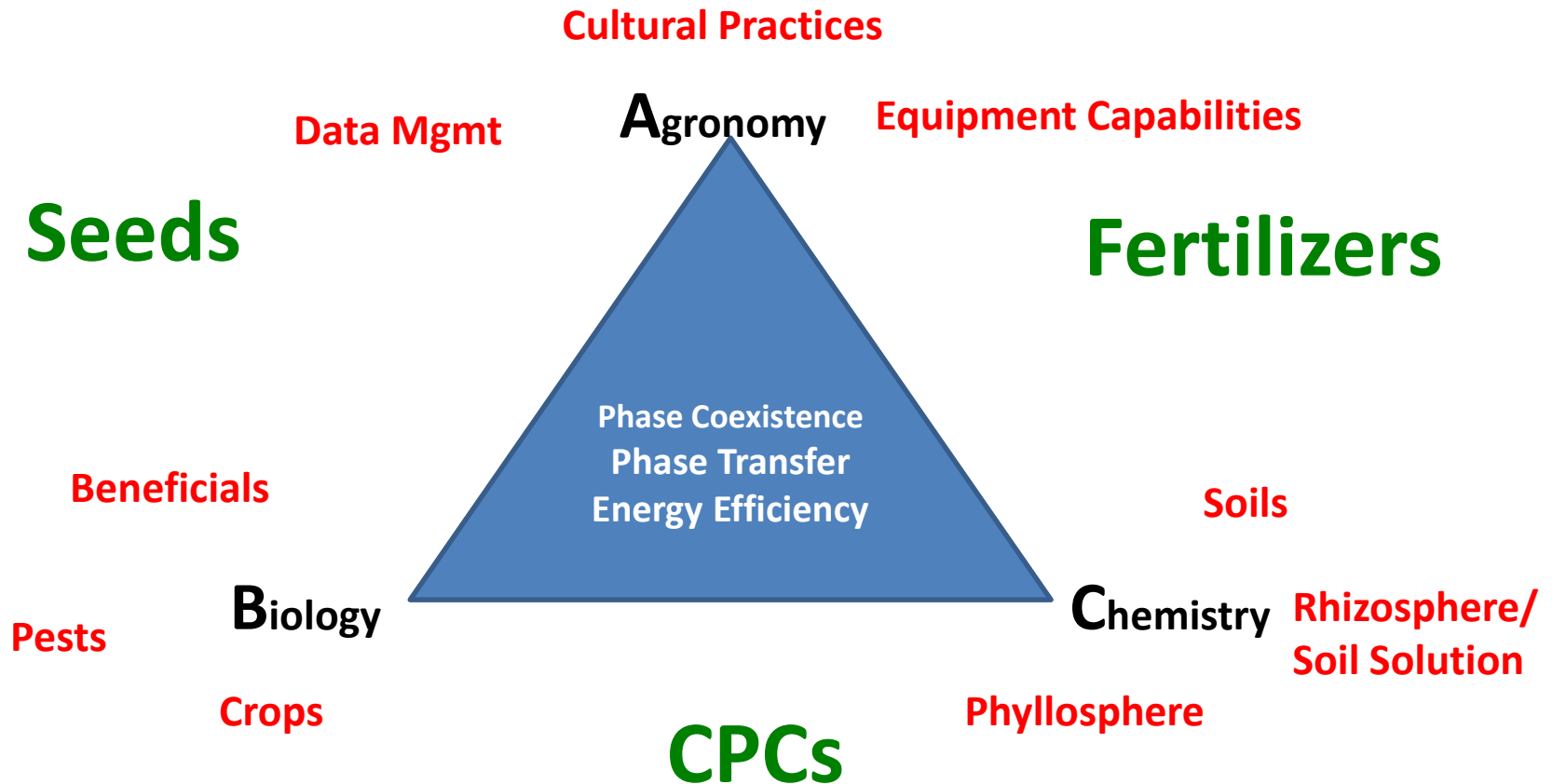
- Non-Target Effects
  - Foliar, Soil



## Crop and Weed Characteristics

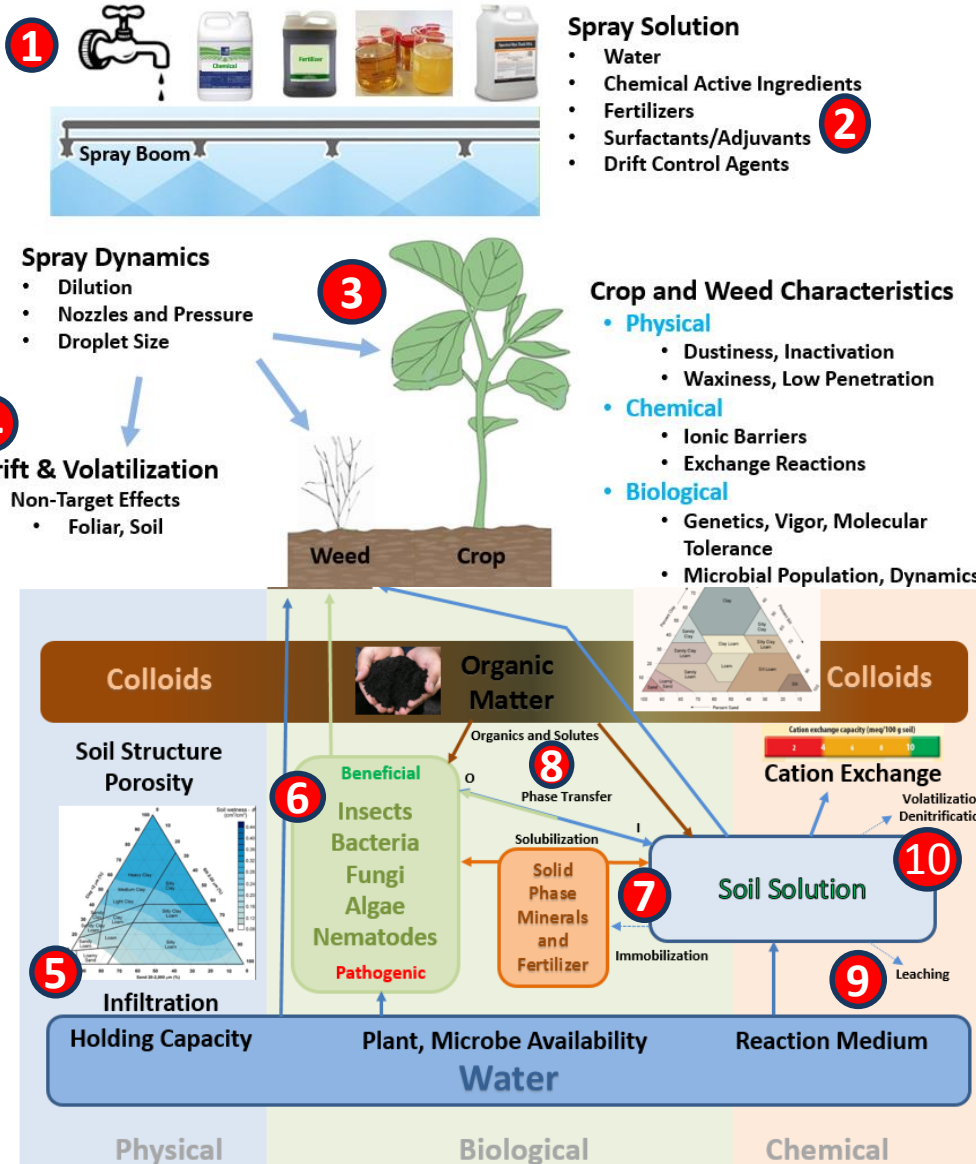
- **Physical**
  - Dustiness, Inactivation
  - Waxiness, Low Penetration
- **Chemical**
  - Ionic Barriers
  - Exchange Reactions
- **Biological**
  - Genetics, Vigor, Molecular Tolerance
  - Microbial Population, Dynamics

# Focus on the A, B, Cs



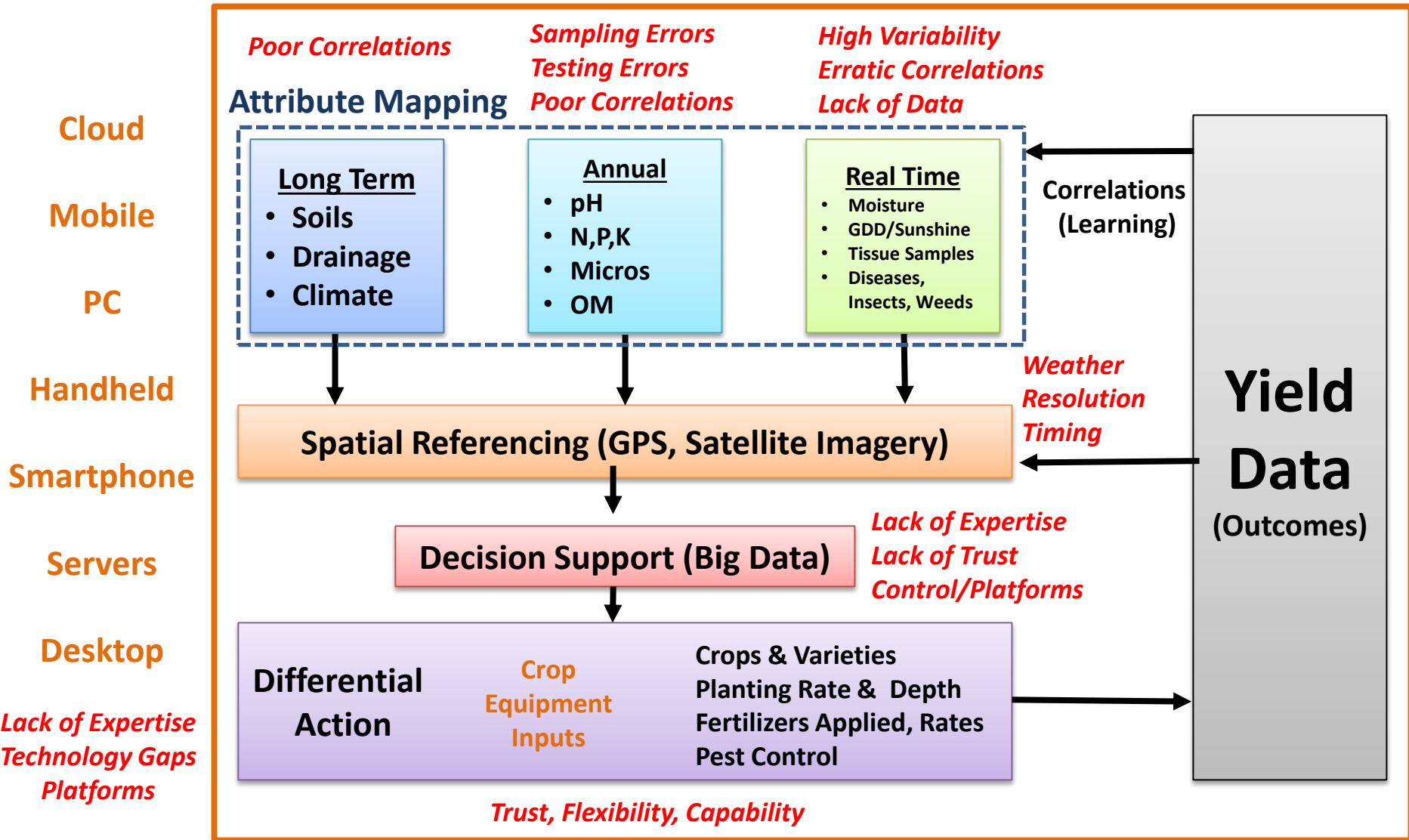
- Empirical, Not Mechanistic, Focus and Testing
- Interactions Poorly Understood
- Energy Balance Ignored

# “Top Ten” Targets for Productivity



1. Manage Water Quality
2. Multi-Chemical and Surfactant Interaction
3. Micronutrient Deficiency
4. Drift & Volatilization Control
5. Enhanced Water Infiltration and Holding Capacity
6. Enhanced Microbe Colonization
7. Nutrient Solubilization Technologies
8. Phase Transfer Catalysts
9. Nutrient Leaching Controls
10. Nitrogen Volatilization and Denitrification Control

# Precision Agriculture Challenges





# The Precision Ag Complexity Challenge

## Precision Ag Survey:

- 25% Felt Equipment Is Too Complex
- 40% Think There is Too Much Incompatibility
- 50% Think That Equipment Changes Too Quickly
- 25% Aren't Making Money on PA



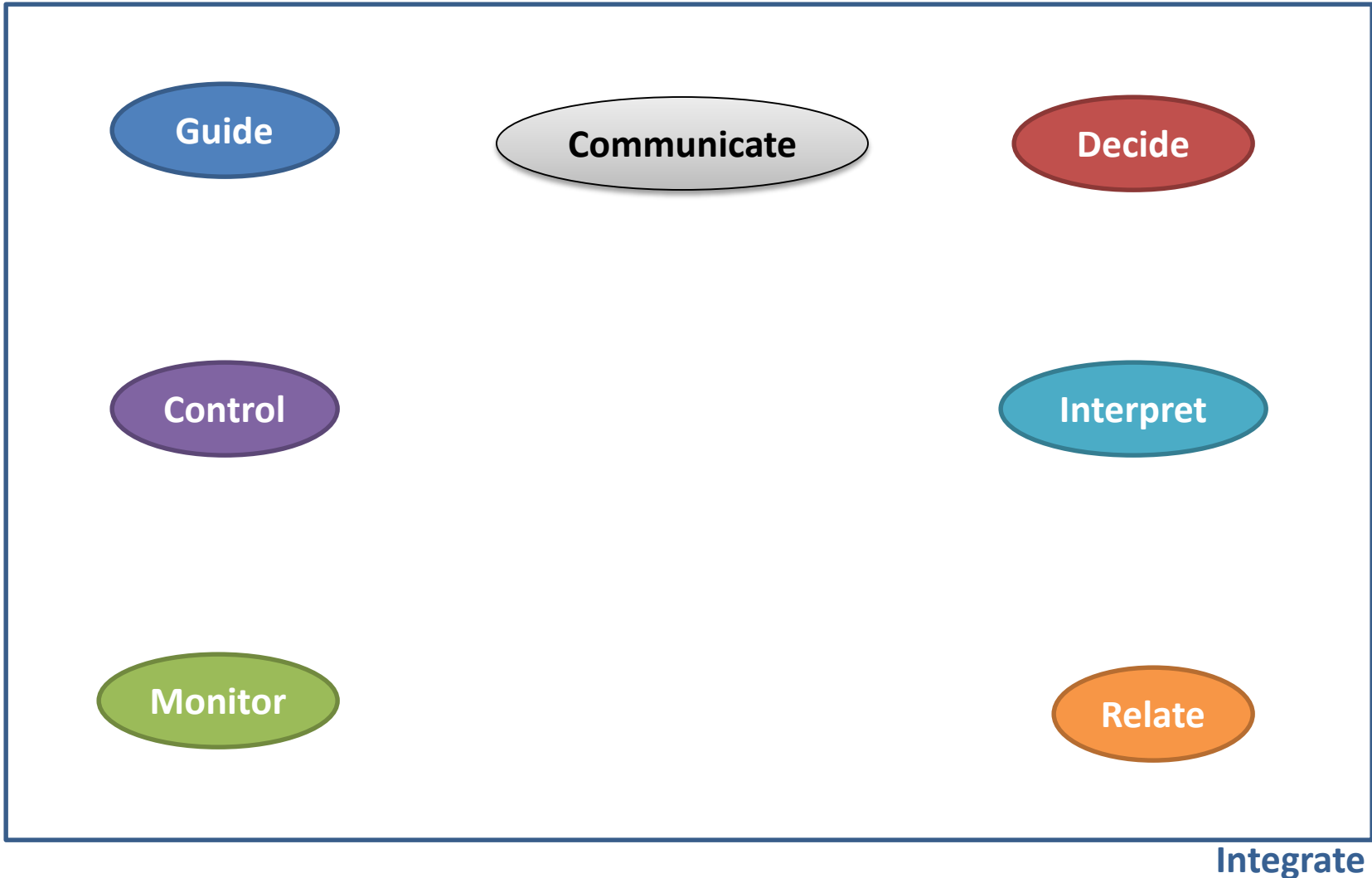
***“Houston, we  
have a problem”***

# The Seven Precision Ag “Systems”



Task	Examples
Guidance Systems	<ul style="list-style-type: none"><li>• GPS</li><li>• Autosteer</li></ul>
Control Systems	<ul style="list-style-type: none"><li>• VRT Planting and Population</li><li>• VRT Fertilizers, Lime, Pesticides</li><li>• Robotics</li></ul>
Monitoring Systems	<ul style="list-style-type: none"><li>• Yield and Quality Sensors</li><li>• Drones</li><li>• EC, Moisture and Nutrient Monitors</li><li>• Soil Samplers / Testing</li></ul>
Spatial Relationship Systems	<ul style="list-style-type: none"><li>• Satellite Imagery</li><li>• GIS Databases</li></ul>
Interpretation Systems	<ul style="list-style-type: none"><li>• Agronomic Response Curves</li><li>• Correlation Development</li><li>• Statistical Analysis</li></ul>
Decision Support Systems	<ul style="list-style-type: none"><li>• Recommendations:<ul style="list-style-type: none"><li>○ Crops/Population/Variety/Depth</li><li>○ Nutrient Rates/Timing/Forms</li><li>○ Crop Protection</li><li>○ Harvesting or Water Management</li></ul></li></ul>
Communication Systems	<ul style="list-style-type: none"><li>• Remote Access/Cloud Systems</li><li>• Smartphones and Apps</li><li>• Tablets and Apps</li><li>• Asset Tracking</li></ul>

# Task Model of Precision Ag



# Company Ecosystem



1. Intelligent
2. Intuitive
3. Integrated



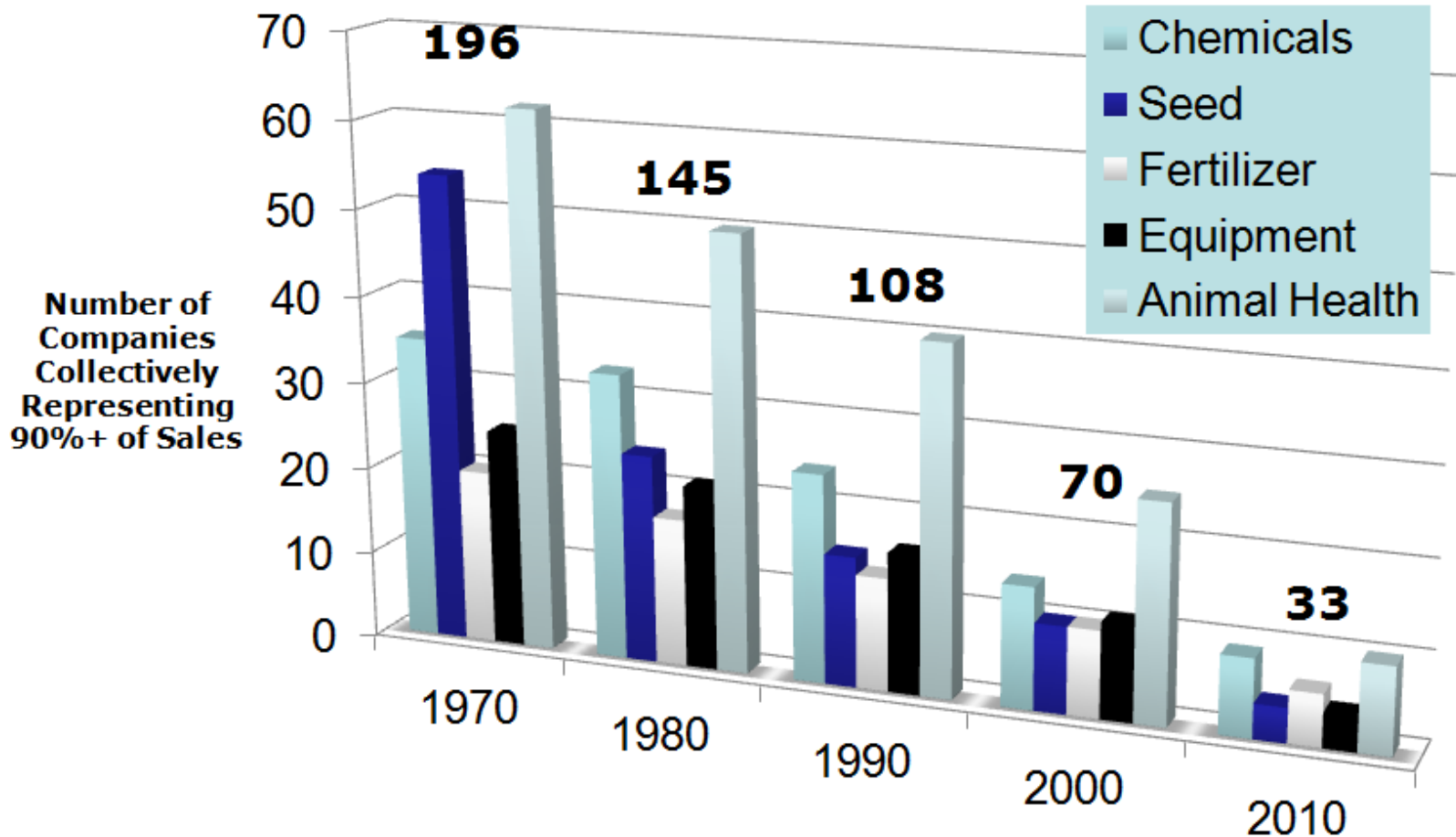
**GreenSeeker**



**Integrate**



# The “Ag Rollup” Is Largely Over



**Massive Consolidation at Input Supplier Level!**

# IT Platform Convergence



- Search
- Cloud
- Smartphone
- Tablets
- PCs
- Music

***Competition on Integrated Platform,  
Not Individual Products!***

[guardian.co.uk](http://guardian.co.uk), Friday 28 June 2013 11.41 EDT

## BlackBerry shares fall sharply after smartphone maker posts shock loss

Traders slash \$1.2bn from company's valuation after it reveals \$169m loss following poor sales of new Z10 and Q10 phones

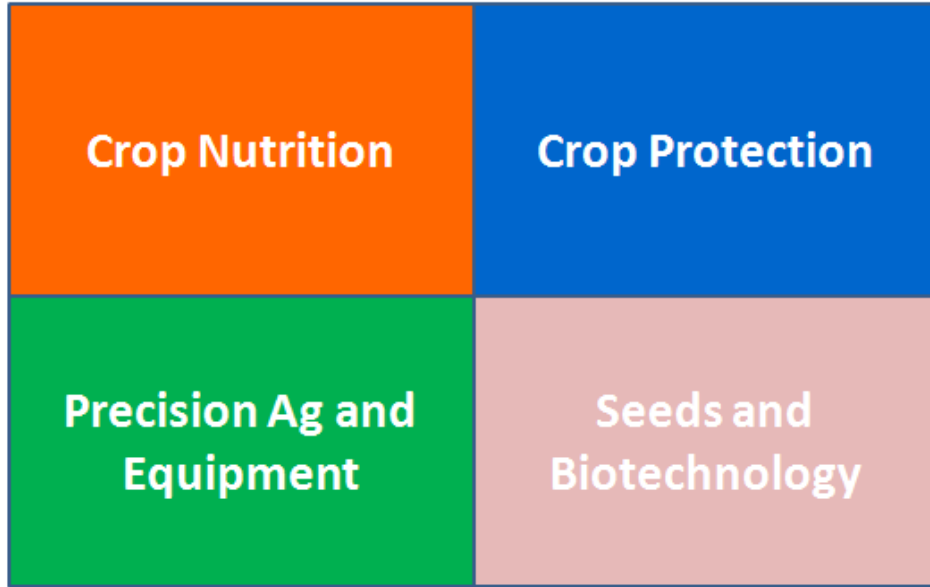


BlackBerry chief executive Thorsten Heins launches the Q10 smartphone in January.  
Photograph: Mark Lennihan/AP

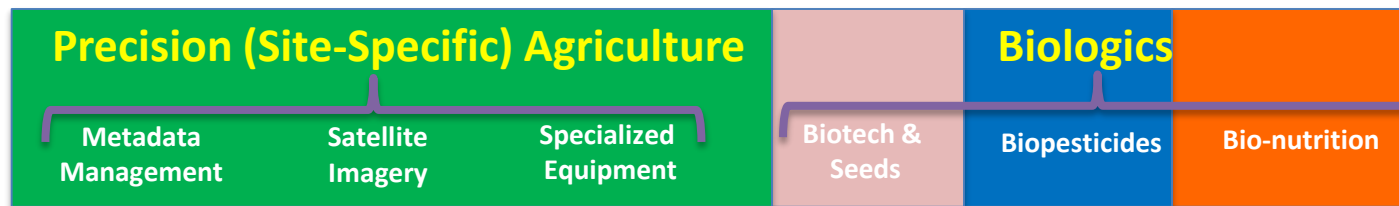
*"In terms of user traction **they are in crash mode**," said Pierre Ferragu at asset manager Alliance Bernstein. "They are **getting closer and closer to the ground at an accelerating pace**. You should never say never but it is probably too late for them to be acquired by anyone."*

More than \$2bn was wiped from the stock market value of smartphone maker BlackBerry on Friday after financial results suggested its bid to join the personal computing revolution had hit the wall.

# Disruptive Technology Meets a Mature U.S. Ag Industry



***Your Suppliers Will Now Play in Multiple Spaces!***

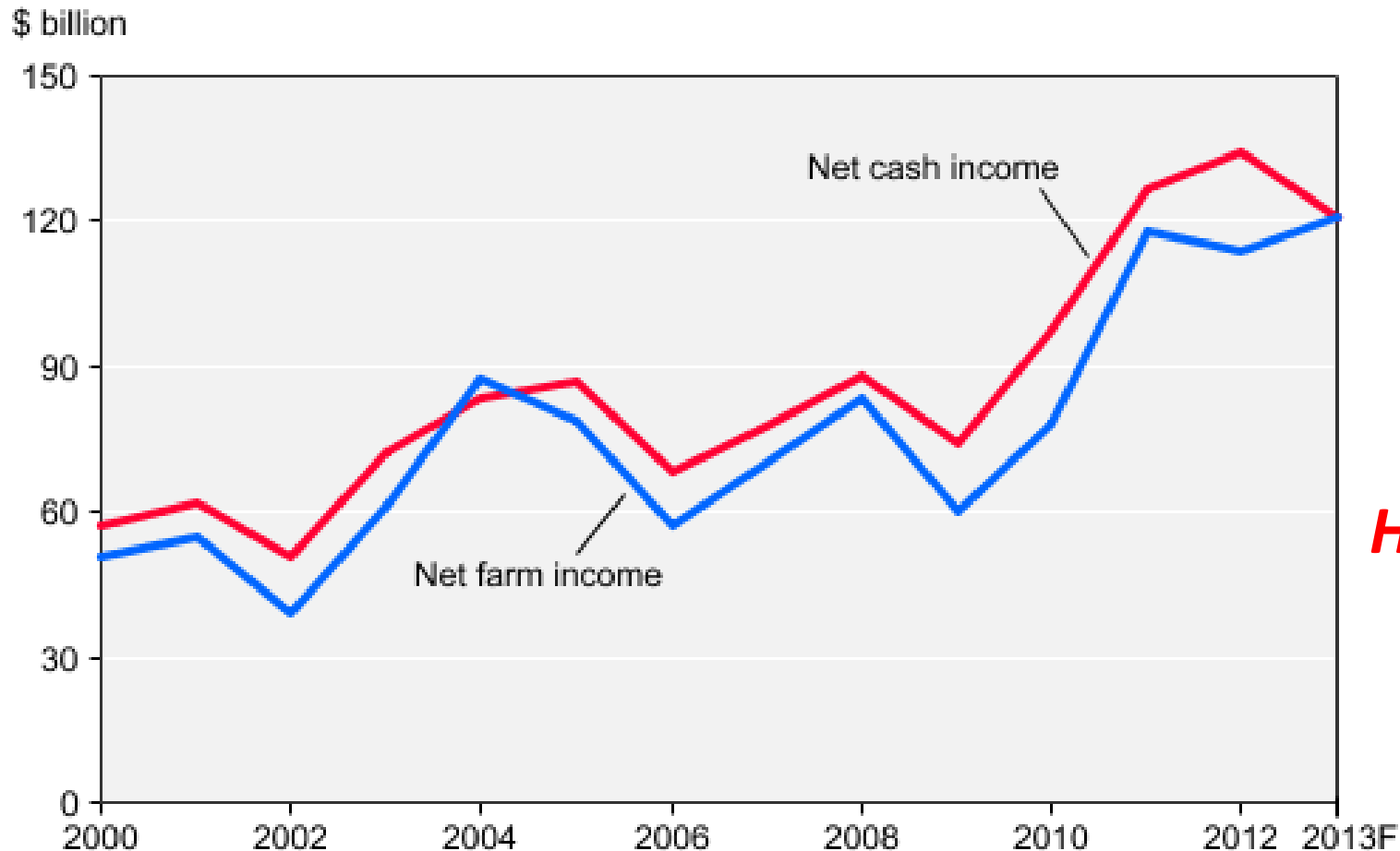


←----- “Productivity Convergence” Technology Integration -----→

***Suppliers Seek Growth by Acquiring Technologies Which Enable Integrated Solutions for Powerful Customers***



# Changing Production Economics: Historical Net Farm Income



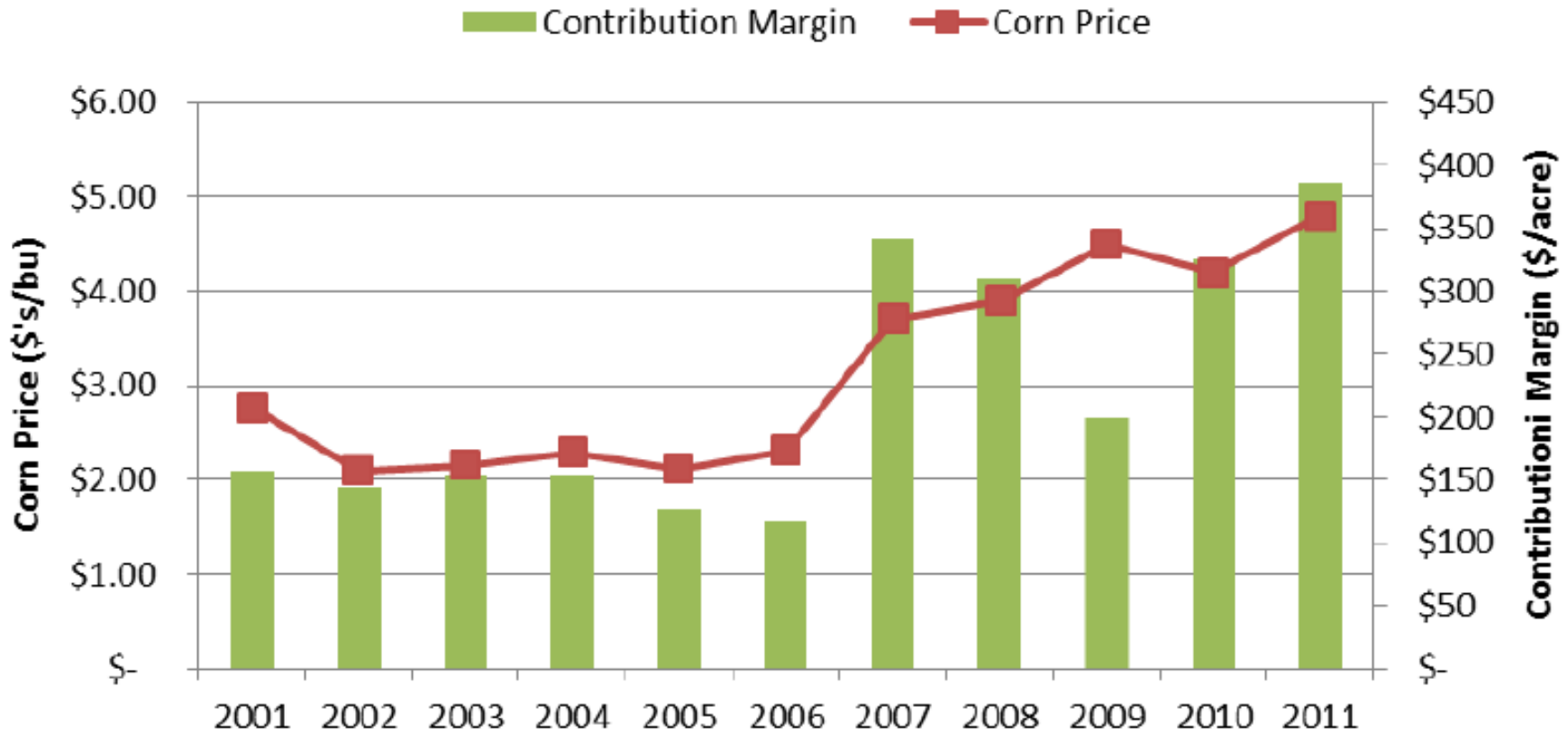
***Farm  
Income  
Well  
Above  
Historical  
Norms!***

F = Forecast.

Source: USDA, Economic Research Service, Farm Income and Wealth Statistics.

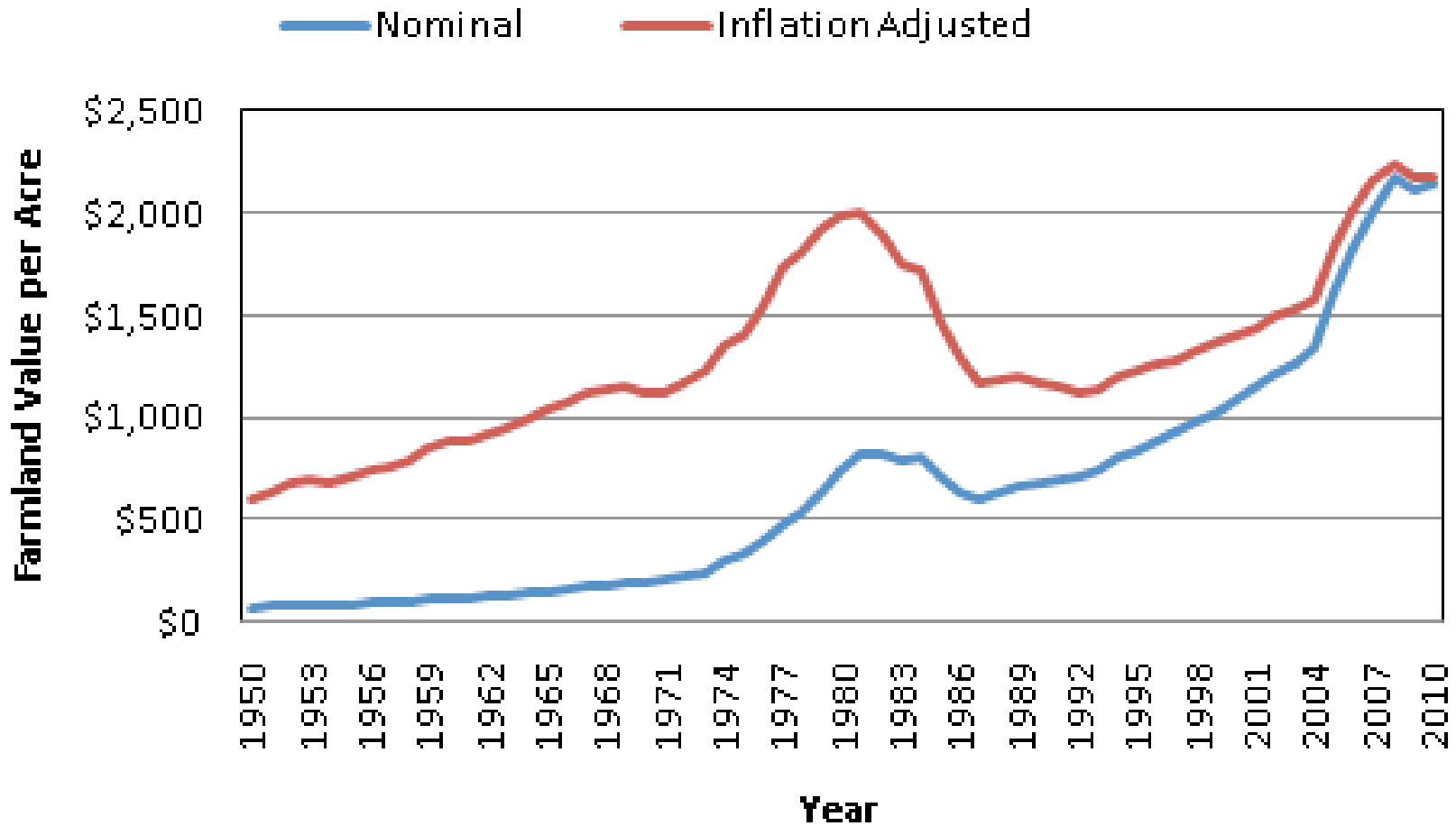
Data as of August 27, 2013.

# Corn Profitability Post Ethanol Boom



***Corn Has Been Generating \$150-250 Per Acre in Contribution Margin Above Historical Norms!***

# US Farmland Value Trends

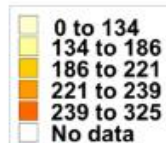
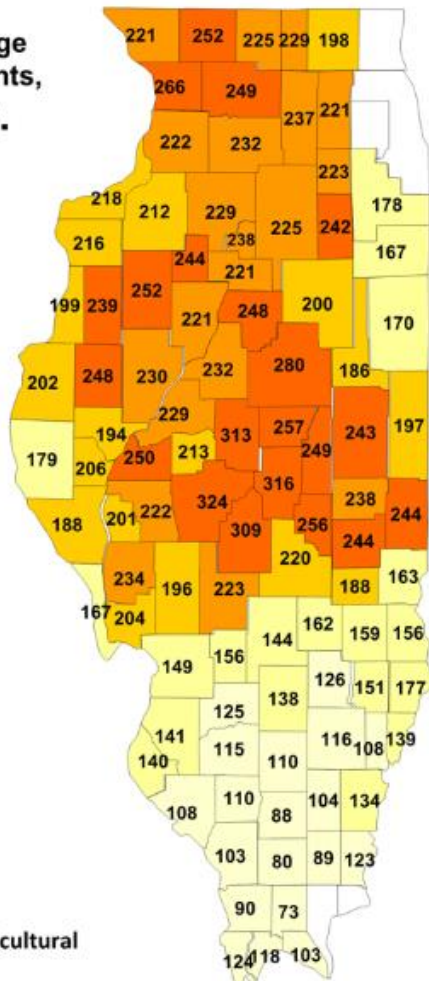


Source: USDA

# Cash Rent Trends

## Rates Doubled Since 2007

**Figure 1. Average County Cash Rents, \$ per Acre, 2012.**



Source: National Agricultural Statistical Service

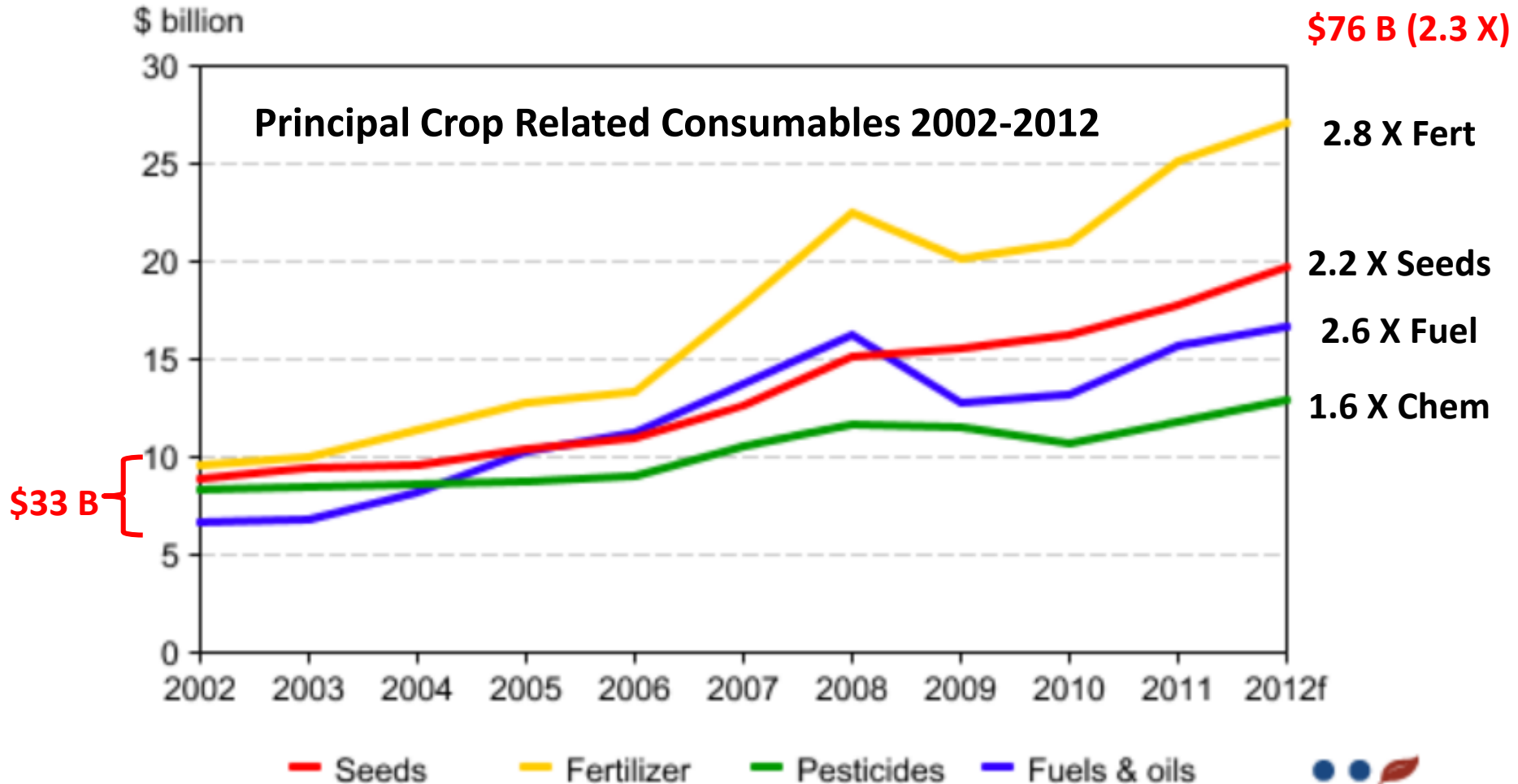
Land Quality	Expected Corn Yield	2012 Rent	2013 Projected Rent	Percent Change <sup>1</sup>
	<u>Bu. per acre</u>	<u>\$ per acre</u>		
Excellent	Over 190	373	384	2.9%
Good	170 - 190	317	326	2.8%
Average	150 - 170	268	272	1.5%
Fair	Less than 150	212	214	0.9%

Source: Illinois Society of Professional Farm Managers and Rural Appraisers, 2012 Mid-Year Survey, available at [www.ispfmra.org](http://www.ispfmra.org).

**Table 2. History of Cash Rents for Mid 1/3 of Cash Rent Leases.**

Year	Land Class <sup>1</sup>			
	Excellent	Good	Average	Fair
	<u>\$ per acre</u>			
2007	183	164	144	120
2008	241	207	172	138
2009	267	221	187	155
2010	268	231	189	156
2011	319	271	220	183
2012	379	331	270	218
2013	396	339	285	235

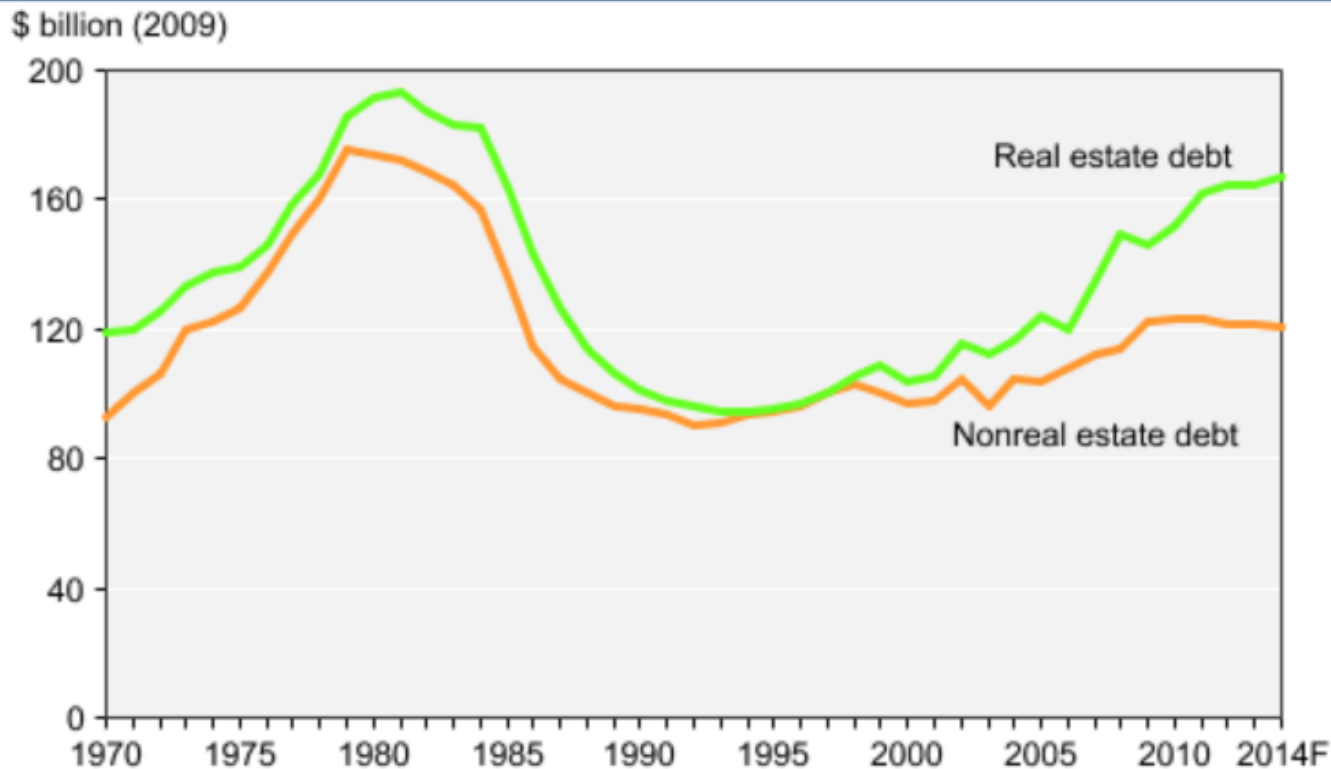
# Ten Year Input Cost Increases



Source: Economic Research Service, USDA. Data as of August 28, 2012.

# High Farm Debt...

## Farm sector business debt, inflation adjusted, 1970-2014F



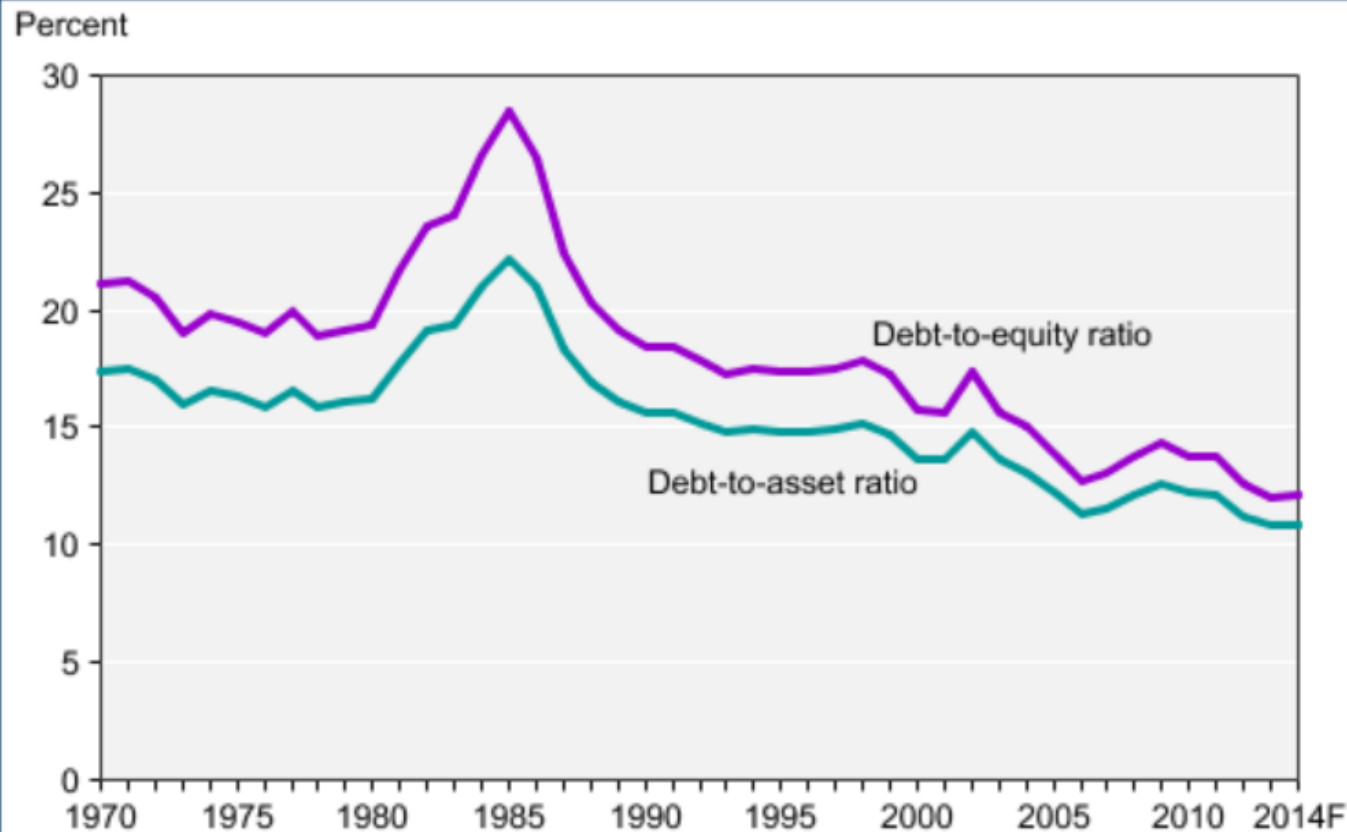
Note: Data for 2013 and 2014 are forecasts. The GDP chain-type price index is used to convert the nominal (current-dollar) statistics to real (inflation adjusted) amounts (2009=100).

Source: USDA, Economic Research Service, Farm Income and Wealth Statistics.  
Data as of August 26, 2014.

***Highest  
Debt  
Levels  
Since the  
1980s!***

# ...But Manageable Leverage

Farm sector debt ratios, 1970-2014F



Note: Data for 2013 and 2014 are forecasts.

Source: USDA, Economic Research Service, Farm Income and Wealth Statistics.

Data as of August 26, 2014.

# ...Consequences of the “Bull”

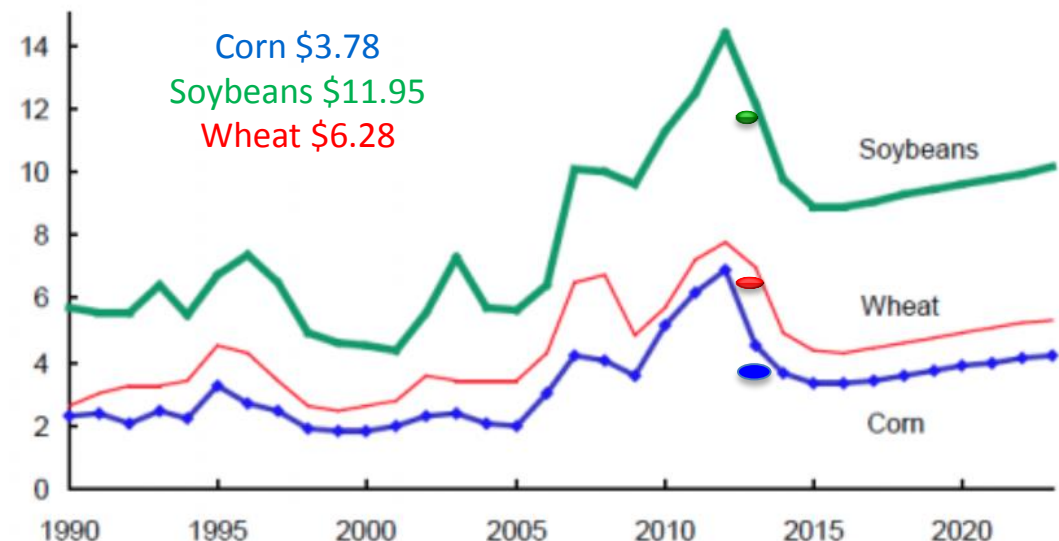
- Supply Expansion
  - More Corn Acres
  - Yield Enhancement Focus
  - Foreign Production
- Demand Destruction
  - Ethanol Plant Shutdowns
  - Livestock Liquidation
  - Grain Export Drop
- Asset Prices and CODB
  - Higher Land Prices
  - Input Volume/Prices Up
  - Equipment Purchases Up

***“The Cure for High Prices is High Prices”***

U.S. farm-level prices: Corn, wheat, and soybeans

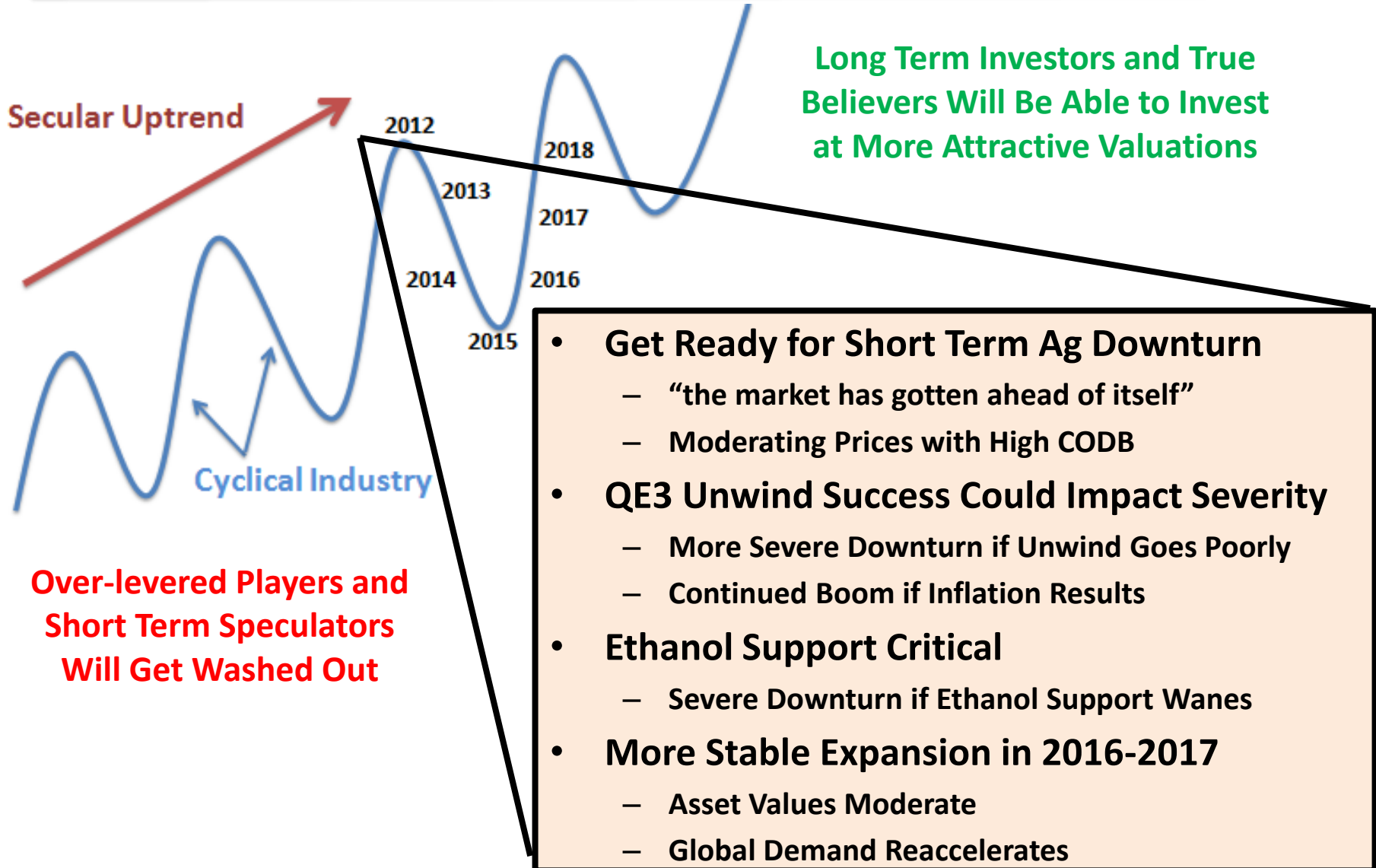
Dollars per bushel

USDA Projections March 2014





# My Ag Macro Outlook



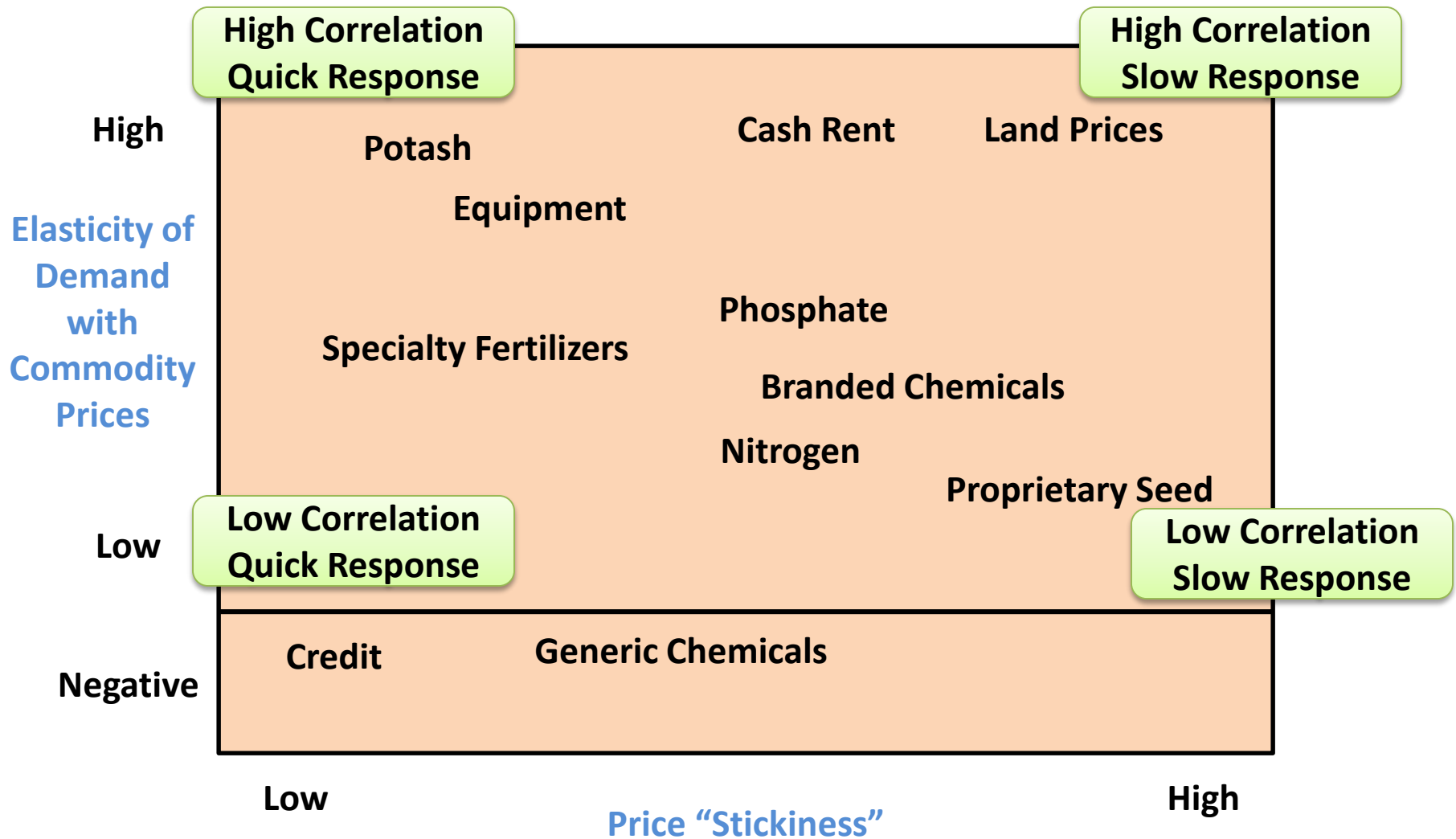
# Elasticity and Stickiness

- Elasticity: *Degree* to Which Prices of Two Assets Correlate with One Another
- Stickiness: *Speed* with Which Price Responds



- Retail Gas is Highly Elastic wrt Oil But Also Sticky

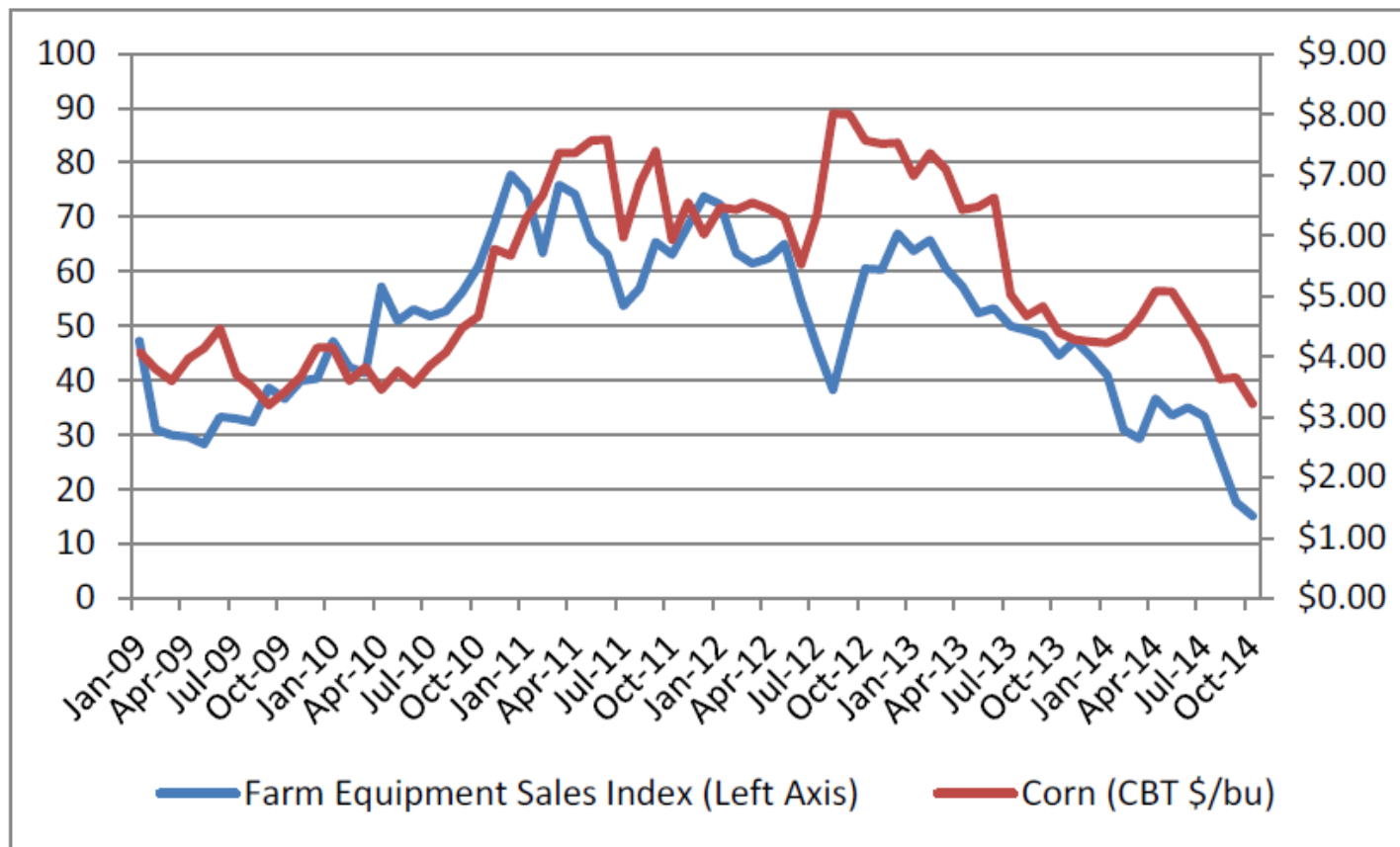
# Ag Elasticity and Stickiness



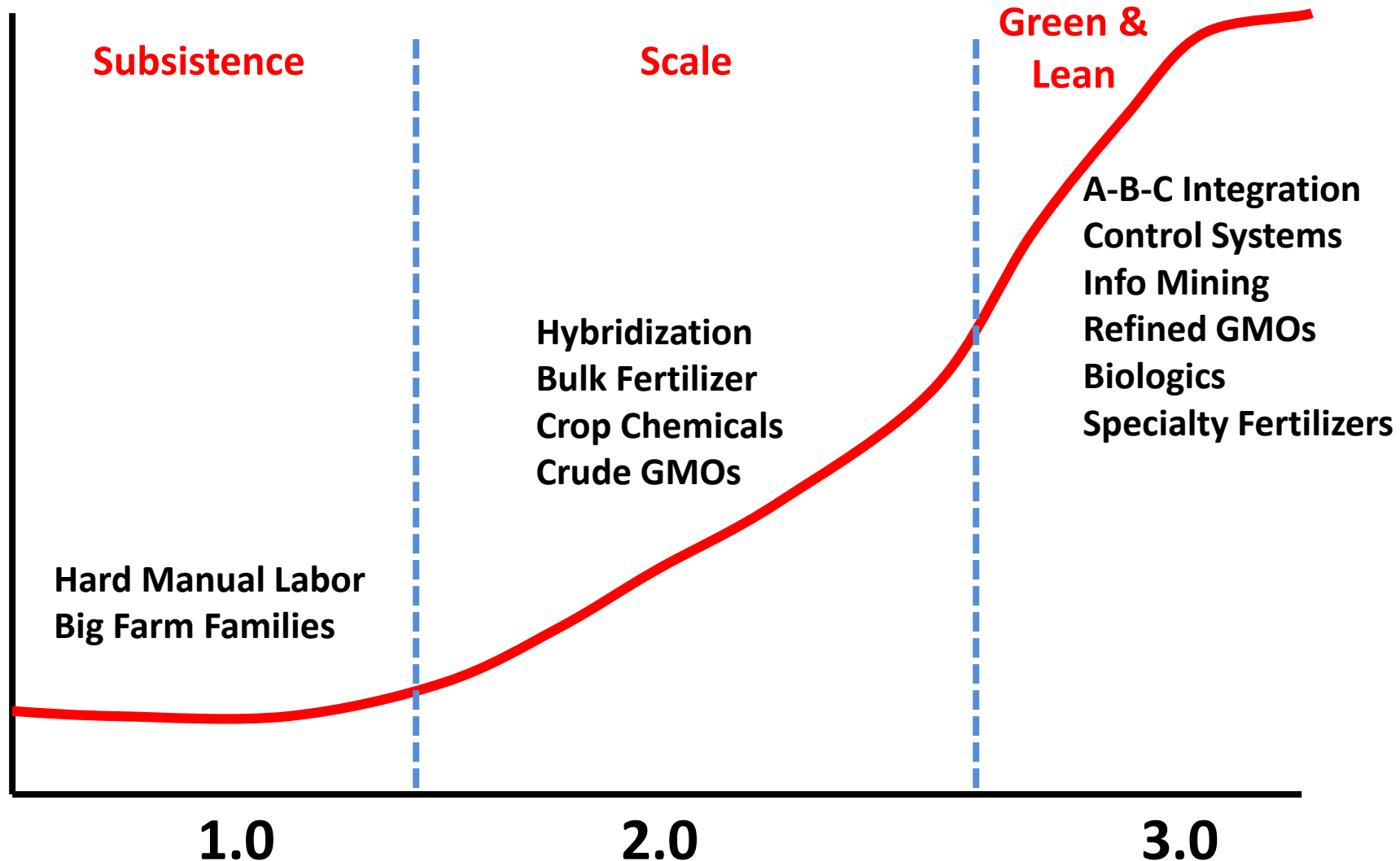
# Equipment Sales Decline

## CREIGHTON UNIVERSITY FARM EQUIPMENT SALES INDEX VS CORN

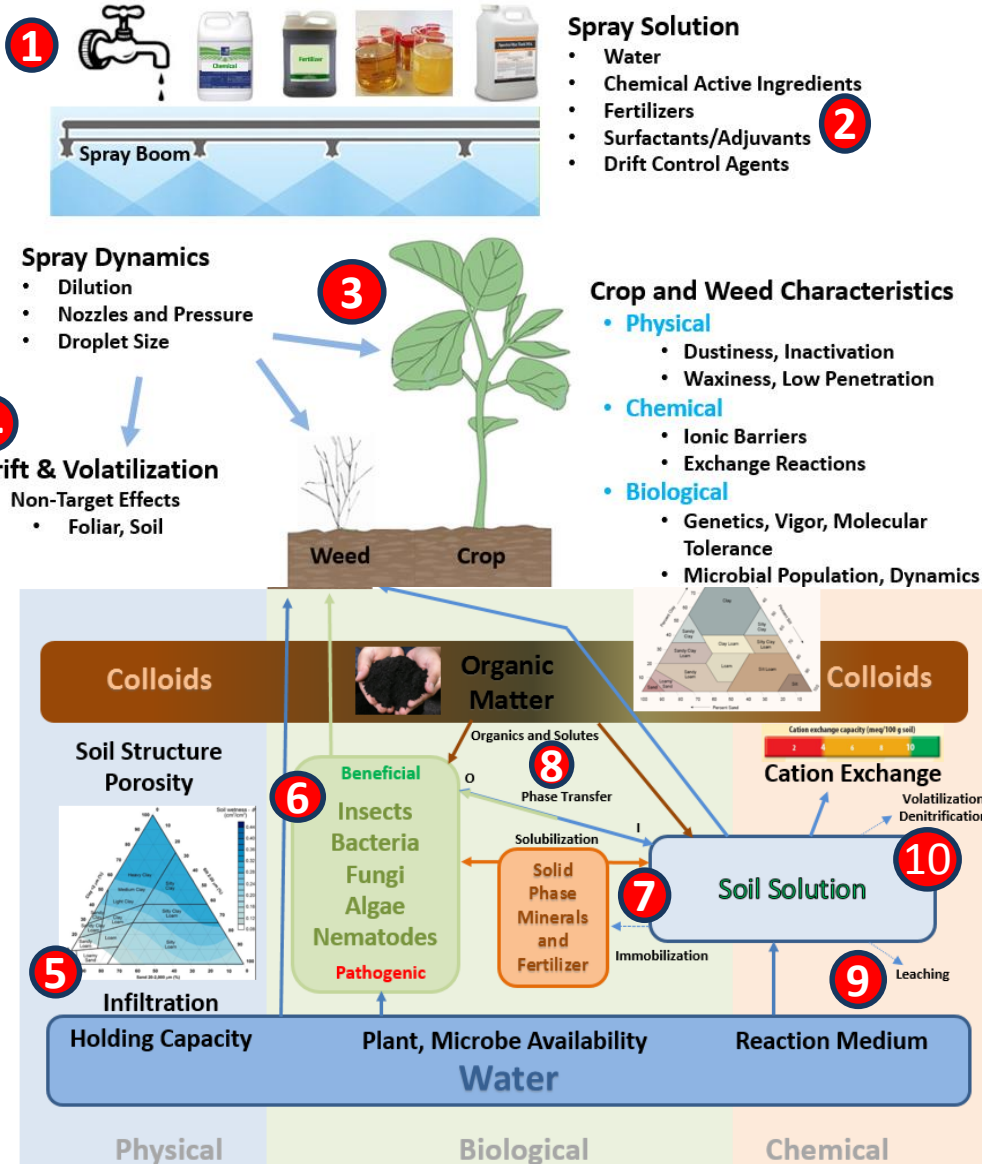
Index score above 50 denotes expansion



# A Vision for Ag Productivity



# BHN Focus



1. Manage Water Quality
2. Multi-Chemical and Surfactant Interaction
3. Micronutrient Deficiency
4. Drift & Volatilization Control
5. Enhanced Water Infiltration and Holding Capacity
6. Enhanced Microbe Colonization
7. Nutrient Solubilization Technologies
8. Phase Transfer Catalysts
9. Nutrient Leaching Controls
10. Nitrogen Volatilization and Denitrification Control

# A Few Closing Thoughts....

- Global Macro Trends Ominous
  - The Only Thing Certain is Volatility
- Ag 3.0 Is Upon Us
  - Declining Returns to Scale => No Molecule Wasted
- Quality Agronomic Advice Key to Profitability
  - Be an A-B-C Expert!
- Figure Out How to Relate to the Platforms
  - Cost of Being Neutral is Rising
- BHN Has the Wind at Your Back
  - Approach and Portfolio Supports Ag 3.0

# Navigating Change



***“Pessimists complain  
about the wind;  
optimists expect it to  
change;  
leaders adjust their  
sails.”***



# Agrifood's Future is Bright!



*Thanks!*