ACE 427
Spring 2009

Lecture 9

USDA Crop Reports

by
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Required Readings:

Bernard, R. "Under Lock and Key: Inside the Security that Safeguards USDA's Numbers." *Farm Journal Media*, Summer 2007. (ACE 427 class website)

Good, Darrel L. and Scott H. Irwin. "Understanding USDA Corn and Soybean Production Forecasts: An Overview of Methods, Performance and Market Impact over 1970-2005." AgMAS Project Research Report 2006-01, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 2006. (ACE 427 class website)

Introduction

USDA crop reports are the most important _____ consistently released in the corn and soybean markets

Substantial misunderstanding of the USDA's methods, performance and market impact

> "There has been considerable dismay in the industry as to USDA's August corn and soybean estimates. Most do not see them as real objective analysis…We think that NASS just missed it by being too conservative with an immature corn and soy crop."

USDA Forecasting Process

Corn and soybean _____ are made for the following dates:

- August 1 Forecast
- September 1 Forecast
- October 1 Forecast
- November 1 Forecast
- January 1 "Final"

- Once forecasts are generated, reports containing the forecasts are released to the public about the _____ of each month

- Note that _____ estimates are also updated for each report

- Usually, little change in acreage from June planting intentions report, so nearly all of the variation in _____ forecast is due to variation in _____ forecasts

- All phases of the process are conducted by the National Agricultural Statistics Service (NASS), an agency within the USDA

Sampling and USDA Production Estimates

- Previous to the 1940s, respondents for USDA agricultural surveys were not _____ selected

- Instead, a panel of state agents, county reporters, and township reports

- In late 1930s, the USDA pioneered the use of _____

- Probability sampling both reduced _____ and increased the _____ of production and inventory estimates

List Frame Samples

- Samples drawn from a list frame consisting of the names, addresses, and telephone numbers of producers and agribusinesses, grouped by size and type of unit

- Needed for surveys in which the commodity to be estimated is highly _____ within a comparatively small _____ area:

  - Cattle in feedlots, hogs, poultry or rice

  - _____ sampling may not be very accurate in these cases

- Strong points

  - Inexpensive data _____

  - Small sampling _____

- Weak points
  - May not include all farms
  - Lists may become _____ quickly

Area Frame Samples

- Satellite imagery, aerial photos, and maps used to divide the US land area into small _____
- Each segment is about 1 square mile, and each has unique and identifiable boundaries outlined on aerial photographs or maps
- An area frame sample is a _____ of these _____ drawn onto aerial photos
- Field _____ _____ information about agricultural activity within the segment
- Strong points
  - Includes all farms
  - Slowly outdated

- Weak points
  - _____ data collection
  - Large sampling error for rare items

Components of USDA Crop Forecasts

Reported NASS yield forecasts are based on two types of information

- _____ survey
- _____ survey

We will discuss both surveys in the context of the October 1999 crop report:

- Reference Date — Oct 1
- Data Collection — Sep 24 - Oct 1
- Edit, Sum, Analysis — Oct 1-4
- Release — Oct 8

Farm Operator Survey

- Farm operator's assessment of _____
- Sample drawn from list of farm operators who responded for the June Agricultural Survey
- Once selected for a given year, the _____ farm operators are surveyed for each report
- 12,312 farm operators surveyed in the US for the October 1999 crop report
- Of the total, 659 Illinois farm operators surveyed for the October 1999 crop report

Survey methods:

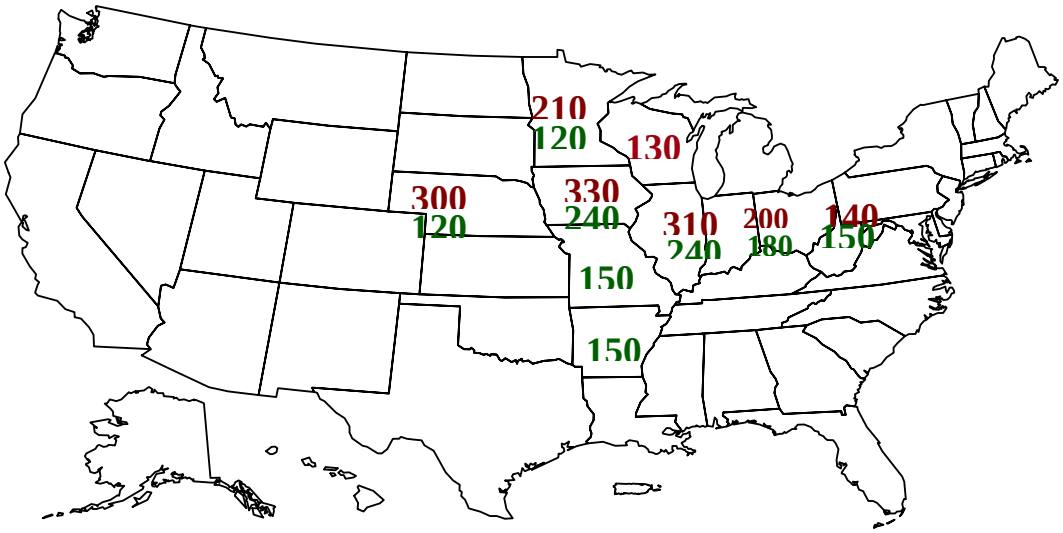
	US	IL
Mail	3%	23%
Phone	10%	0%
CATI	86%	77%
Interview	1%	0%

Objective Yield Survey

- Only conducted for _____ producing states
- Sample fields are selected based on June Agricultural Survey area frame
- Same _____ visited for each report
- _____ made in two plots in each field
- Number of fields for 1999 objective yield survey:

	US	IL
Corn	1,361	294
Soybeans	1,153	225

7 States represent 73% of 1998 US corn production
8 States represent 76% of 1998 US soybean production



- Typical measurements:

Corn	*Soybeans*
Rowspace	Rowspace
2 rows x 15 ft	2 rows x 3.5 ft
Stalks	Plants
Ears & ear shoots	Lateral branches
Ears with kernals	Blooms, dried flowers & pods
Kernal row length	Pods with beans
Ear diameter	Pod weight
Ear weight	

- Computation of objective yield:

Heads, ears or pods
x
Weight per head, ear, pod
=
Gross yield

Net yield = Gross yield - harvest loss

- It is important to note that _____ of the objective yield indications can change through the growing and harvest seasons
  - Early in the season, the yield indications are influenced by assumed _____ between plant counts and fruit numbers, and an assumed fruit weight adjusted for moisture content and harvest loss
  - As the season progresses, fruit counts become known
  - At the end of the season, plots are _____, and yields are calculated based on _____ grain weights and harvest losses
  - In addition, an _____ is conducted with the farm operator immediately after harvest to determine acres actually harvested and the yield realized in the sample field

Preparation of Crop Reports

- The USDA's _____ reviews all indications and determines _____ national and regional yield estimates

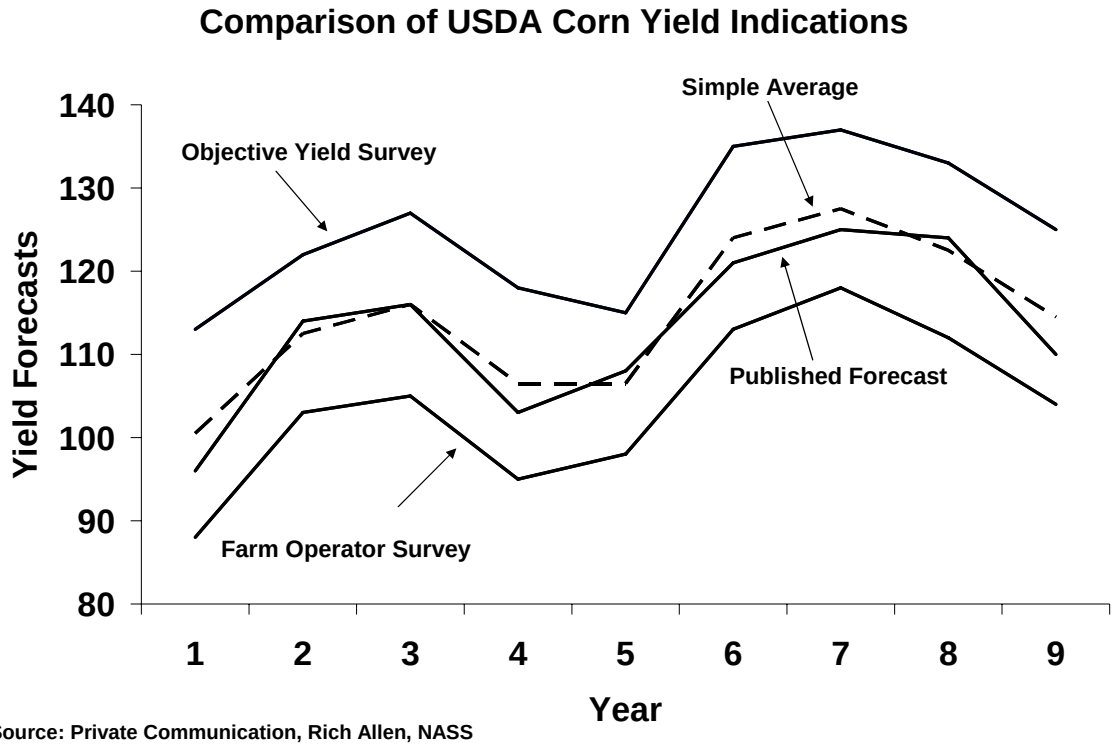
- Farm operator and objective yield indications are _____ in a multistage process

- The process used to determine final production estimates is described by Gardner (1992) this way:

> "A NASS board in Washington then assesses all the indicators of yield, including the estimates of a month earlier. This is not done using a pre-specified formula---in which case a computer could replace the NASS board---but through a consensus of the Board members based on their experience and the full information before them." (p. 1068)

- It is important to emphasize that crop production forecasts are based on the assumption of _____ _____ for the _____ of the season as reflected by historical records

- The USDA does not incorporate any _____ forecasts or factor in _____ as reflected by weekly crop progress reports



Source: Private Communication, Rich Allen, NASS

Lockup

- Lockup occurs on the date that a *Crop Report* is to be released
- Since reports are released at 8:30 am, before grain futures markets open, lockup may be much of the previous night
- Only _____ of the Agricultural Statistics Board (ASB) and _____ are allowed to be present during lockup
- _____ are stationed outside of lockup rooms
- Doors _____
- Windows _____
- Telephones and computer networks _____
- No one may _____ during lockup for any reason
- Every effort is made to avoid information about the Crop Report from leaking out early (No *Trading Places*!)

Publication/Dissemination

- Written release is prepared
- Estimates and reports are released at a pre-announced time
- Hard copies available in DC and field offices
- Electronic versions posted on the Internet
- Further dissemination through newspapers, radio, and wire service networks

USDA Forecast Performance

There are a number of aspects of forecast performance, which are covered in detail in the AgMAS report by Good and Irwin

- We will focus on _____ here

USDA corn and soybean production forecasts are available for the 36-year period covering _____

USDA crop production estimates released in _____ of the year after harvest generally are considered to be _____ estimates

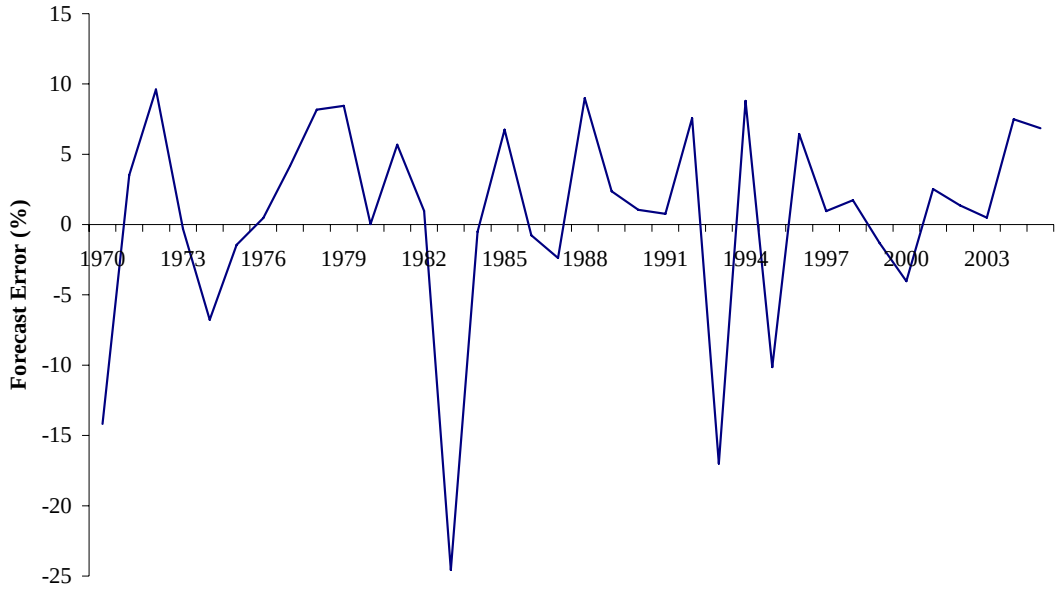
- While January estimates may be subsequently _____ based on stocks reports or agricultural census data, such changes tend to be rather small

Forecast errors are presented in _____ terms, rather than in bushels, in order to standardize for increasing crop size over time:

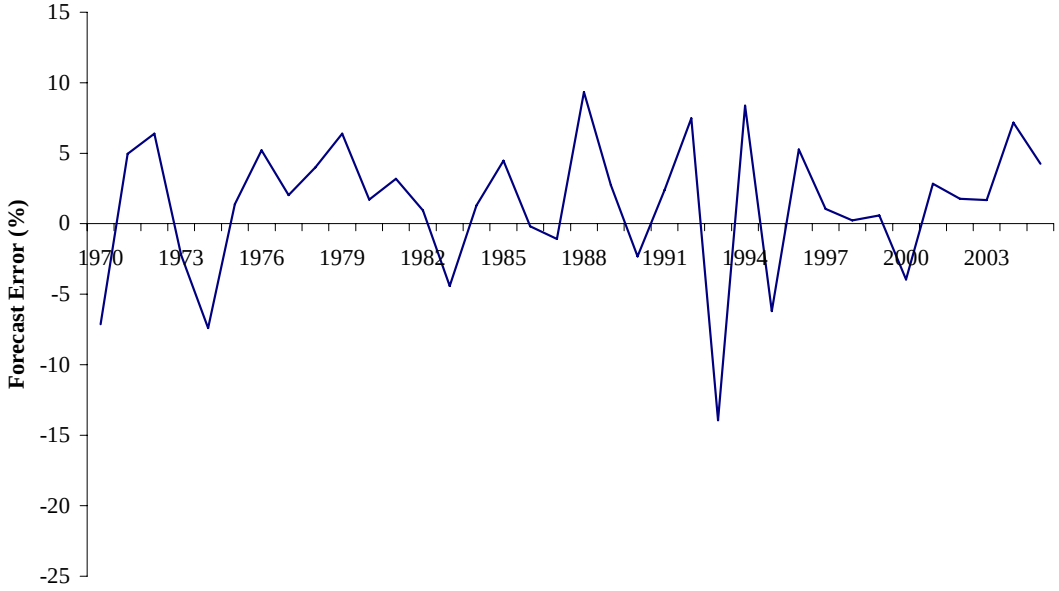
$$\left(\frac{USDA_5 - USDA_i}{USDA_5} \right) \cdot 100 \qquad i = 1, \ldots, 4$$

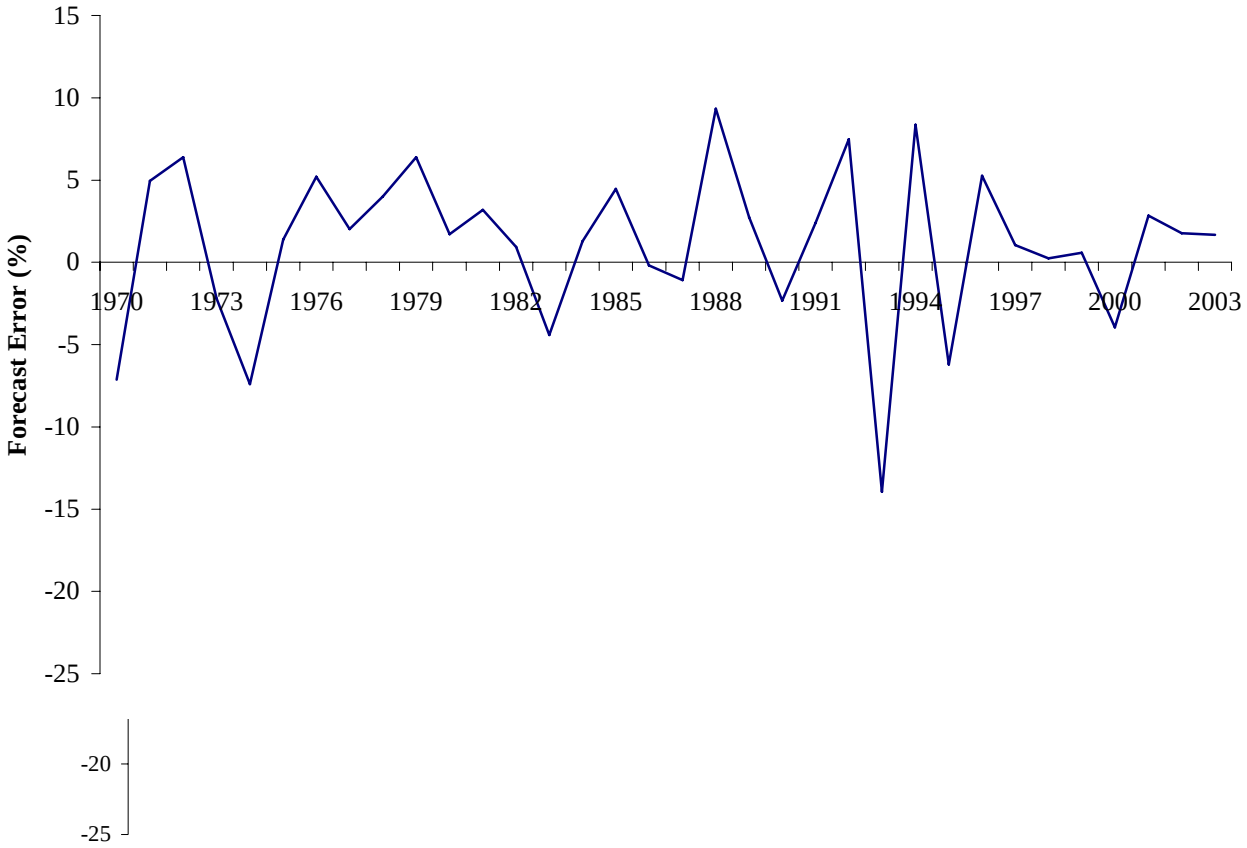
Corn forecast errors:

Panel A: August

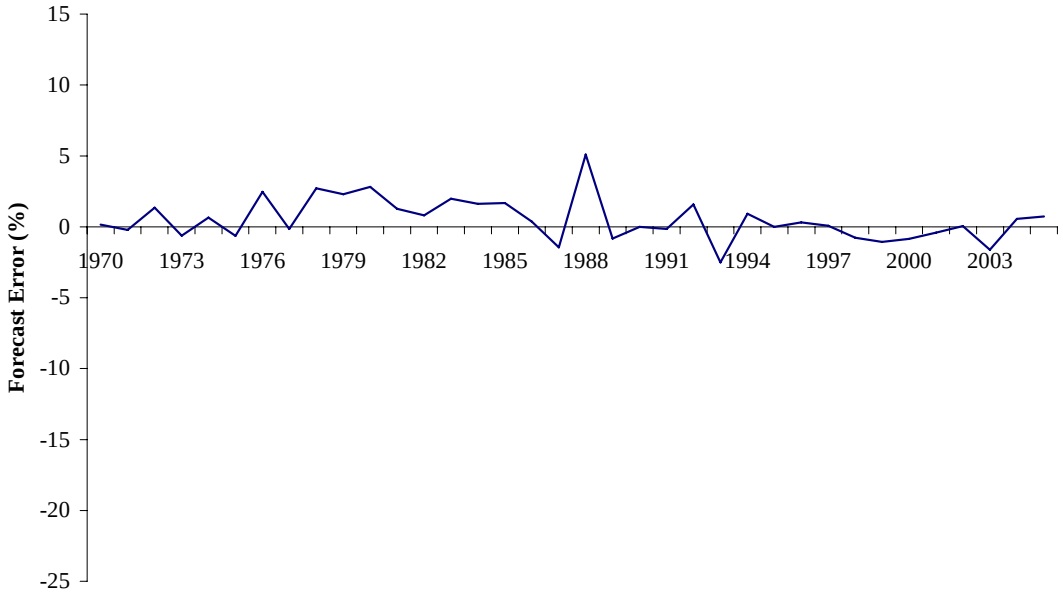


Panel B: September



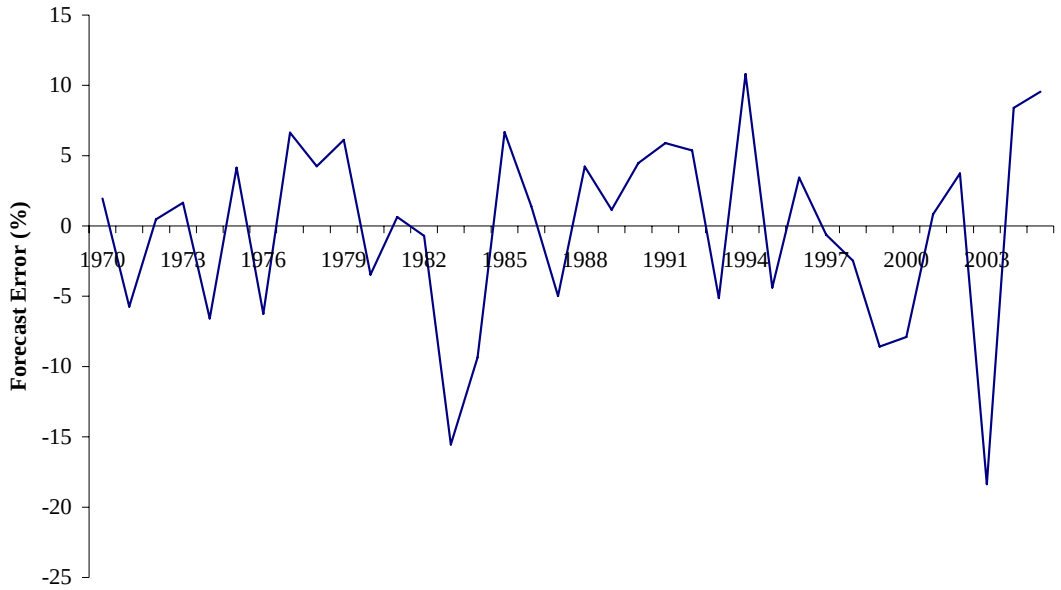


Panel D: November

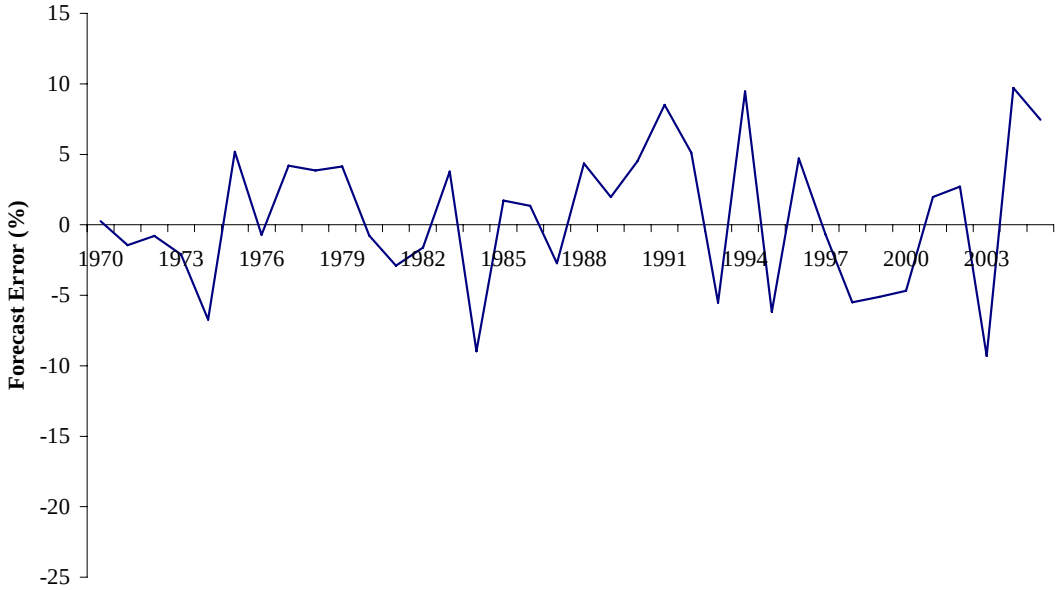


Soybean forecast errors:

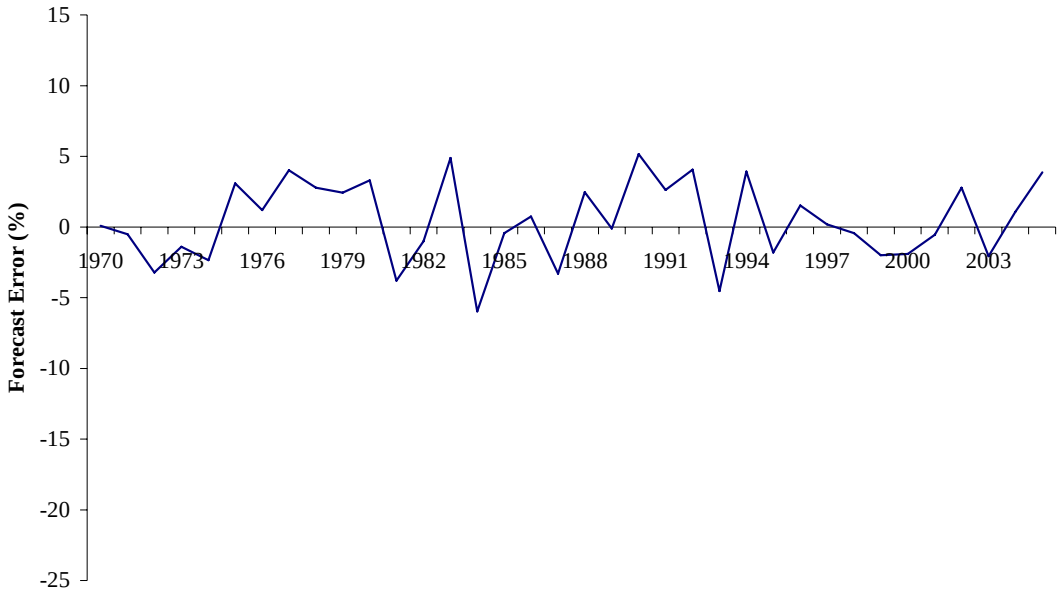
Panel A: August



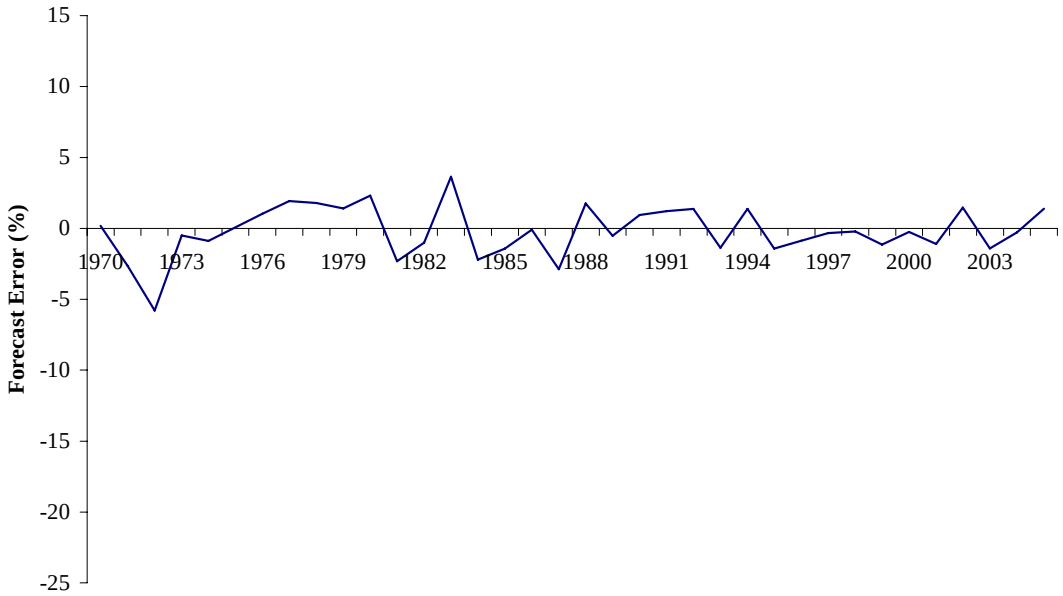
Panel B: September



Panel C: October



Panel D: November



This analysis indicates that the _____ of USDA corn and soybean production forecast errors has been _____ over time

However, this leaves open the question of _____ forecast performance by the USDA

- How well did the USDA perform relative to the forecasts available in the _____?

For the period 1970 through 2000, private market forecasts are represented by an average of the production forecasts by _____ and _____ _____

- Forecasts from these two firms are selected because they generally were considered to be the most _____ and were _____ in the popular press during this period

- Conrad Leslie used a postcard survey of grain marketing professionals, mainly elevator managers and market analysts

- Sparks used a “small-scale” version of the USDA forecasting process

For the period 2001 through 2005, the expected private market changes are represented by changes in the "average trade guess" as reported by Oster/Dow Jones (ODJ)

The change was made because Conrad Leslie discontinued his service after 2000

We will compare _____ for the USDA and the "private market"

- USDA absolute forecast error:

$$\left| \left(\frac{USDA_5 - USDA_i}{USDA_5} \right) \cdot 100 \right| \qquad i = 1,...,4$$

- Private market absolute forecast error:

$$\left| \left(\frac{USDA_5 - Market_i}{USDA_5} \right) \cdot 100 \right| \qquad i = 1,...,4$$

Table 1. Mean Absolute Percentage Errors (MAPE) for USDA and Private Market Forecasts of Corn and Soybean Production, 1970-2005

	Corn			Soybeans		
	USDA Forecast	Private Forecast	Difference	USDA Forecast	Private Forecast	Difference
		---%---			---%---	
August						
1970-2005	5.2	5.4	-0.2	5.3	4.9	0.4
1970-1984	5.9	7.0	-1.1	4.9	4.8	0.1
1985-2005	4.8	4.3	0.5	5.6	5.0	0.6
2001-2005	3.7	4.0	-0.3	8.2	7.9	0.3
September						
1970-2005	4.1	4.4	-0.4	4.2	4.1	0.1
1970-1984	3.9	4.2	-0.3	3.2	3.3	-0.1
1985-2005	4.2	4.6	-0.4	4.9	4.7	0.2
2001-2005	3.5	4.4	-0.9	6.2	6.8	-0.6
October						
1970-2005	2.4	3.0	-0.6	2.4	2.8	-0.4
1970-1984	2.4	3.1	-0.7	2.7	2.7	0.0
1985-2005	2.3	2.9	-0.5	2.2	2.8	-0.6
2001-2005	1.2	2.1	-0.8	2.1	3.1	-1.0
November						
1970-2005	1.1	1.5	-0.4	1.4	1.5	-0.1
1970-1984	1.3	1.8	-0.4	1.8	2.1	-0.2
1985-2005	1.0	1.4	-0.4	1.1	1.1	0.0
2001-2005	0.7	0.8	-0.2	1.1	0.9	0.2

Conclusions

Overall, the analysis presented in this section suggests the USDA _____ reasonably well in generating crop production forecasts for corn and soybeans

- There is nonetheless room for _____

- Commenting on similar forecast accuracy results, Egelkraut et al. (2003), offer this suggestion:

  > "The improved performance by the private agencies for August for both crops during the most recent years, and the ability of the private agencies to generate relatively accurate forecasts in soybeans suggest that it might be useful for USDA to investigate expanding the scope of their subjective yield analysis to incorporate a wider range of market and industry participants. Such a strategy, if proved effective, might lead to improved crop production forecasts." (p. 94)

Market Impact of USDA Forecasts

Theoretically, the _____ of USDA corn and soybean production forecasts should be determined by how well the market _____ the forecasts

If the market _____ anticipates USDA production forecasts, then, under the theory of _____, prices will _____

If the market does not perfectly anticipate the forecasts, prices _____ in relation to the degree that the market is _____ by the new _____

- Market surprise is the "unanticipated component" of the USDA forecast

- Explains the widespread collection and distribution of analyst _____before the release of government reports

To compute surprises, a measure of market _____ (forecasts) is needed

Once again, private market forecasts are represented by an _____ of Conrad Leslie and Sparks Companies, Inc. forecasts from 1970-2000 and ODJ averages for 2001-2005

For example, the computations for the August 1998 corn crop report are:

$$Surprise_t = Aug_{USDA,t} - Aug_{Private,t}$$

$$Aug_{USDA,t} = 9592 \text{ mil. bu.}$$

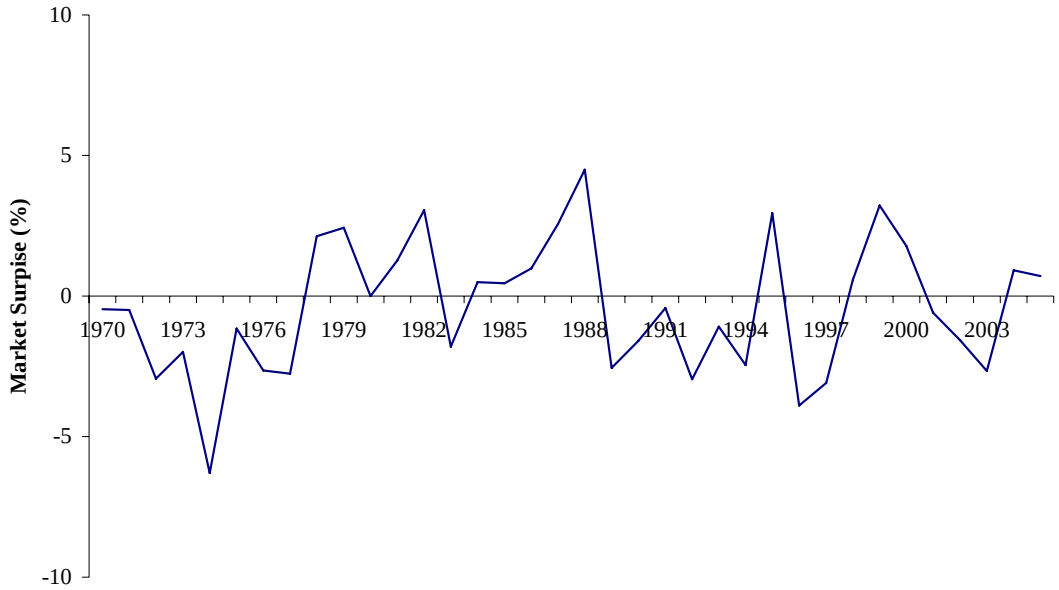
$$Aug_{Private,t} = 9536 \text{ mil. bu.}$$

$$Surprise_t = \_\_\_\_\_ = \_\_\_\_\_$$

- A _____ surprise number is considered _____ because the USDA forecast is larger than the market expectation (increased supply)
- Likewise, a _____ surprise number is considered _____ because the USDA forecast is smaller than the market expectation (decreased supply)

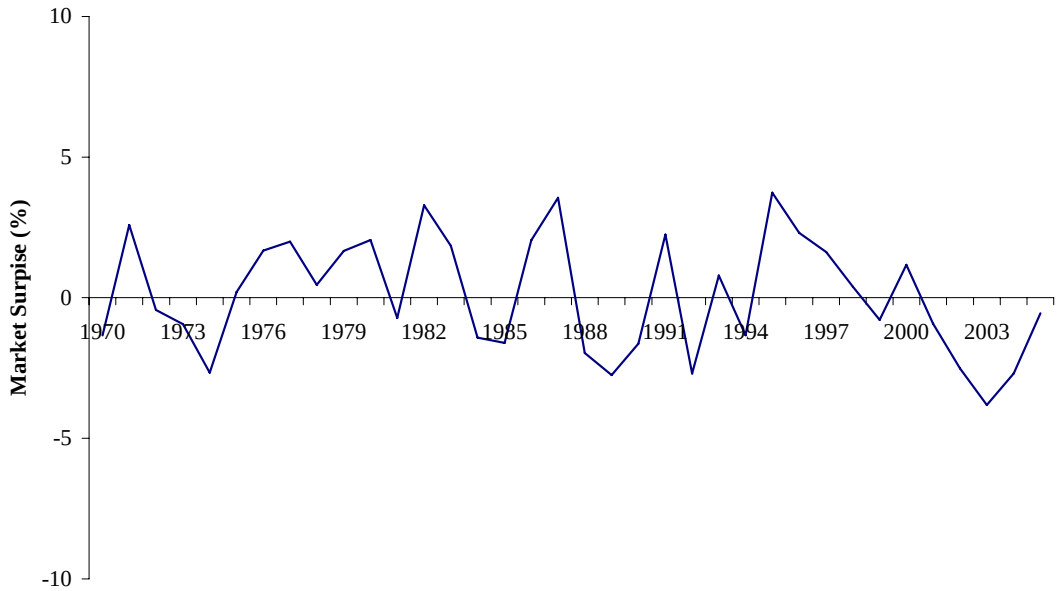
Corn market surprises:

Panel A: August



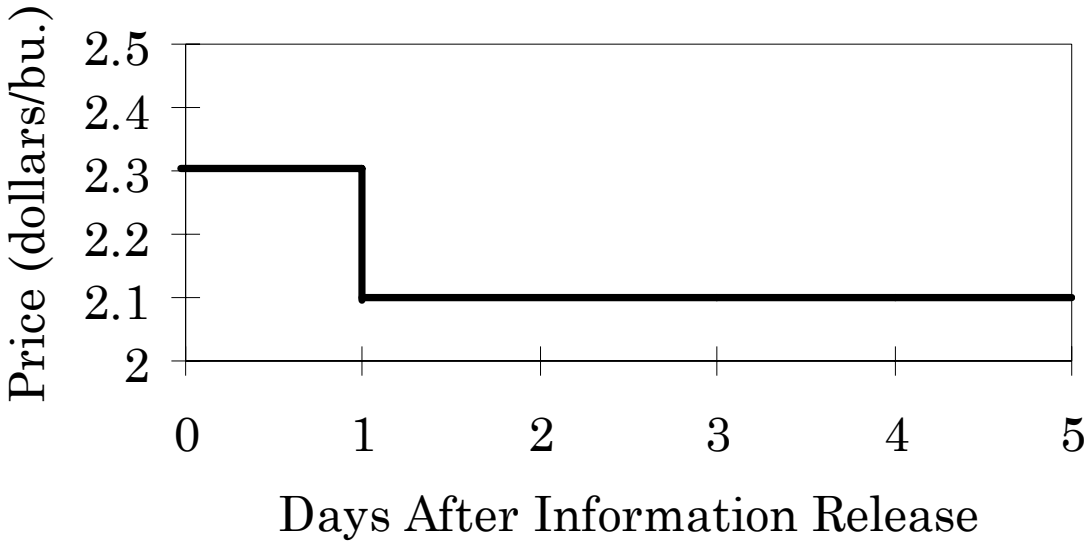
Soybean market surprises:

Panel A: August

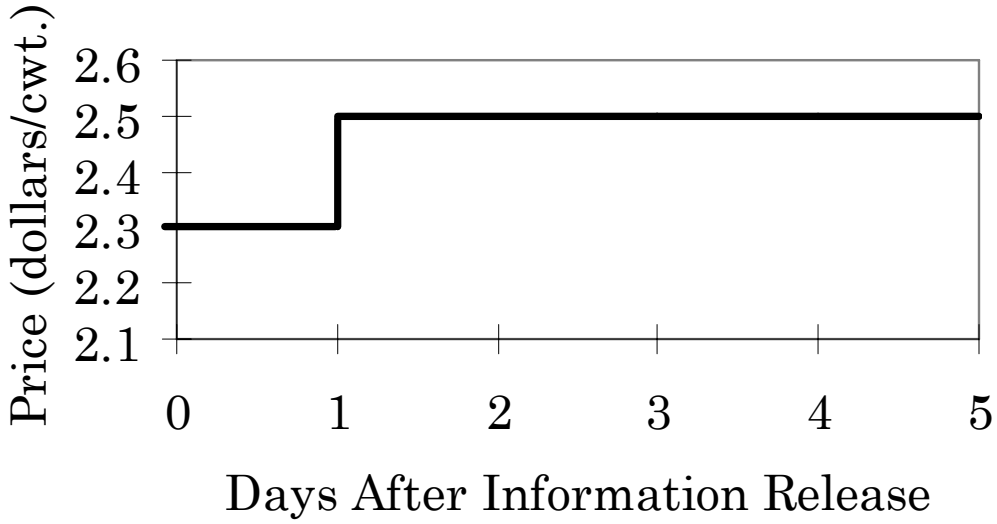


Efficient Price Reaction after Release of Crop Reports

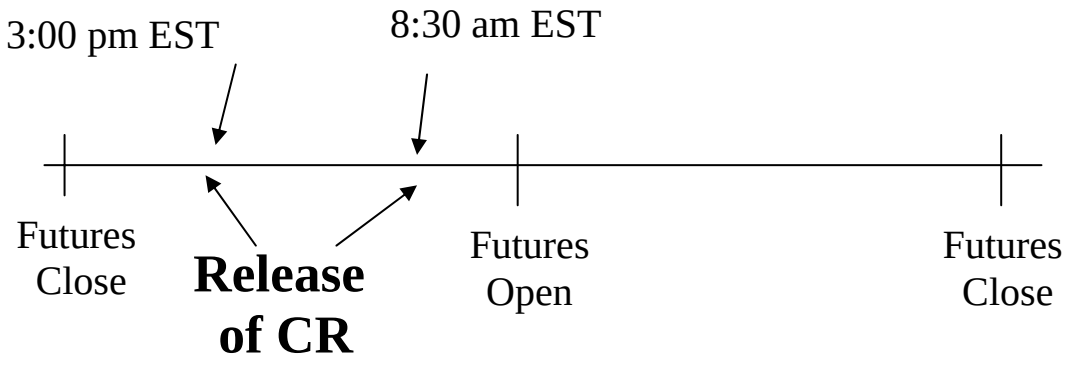
Bearish reports:

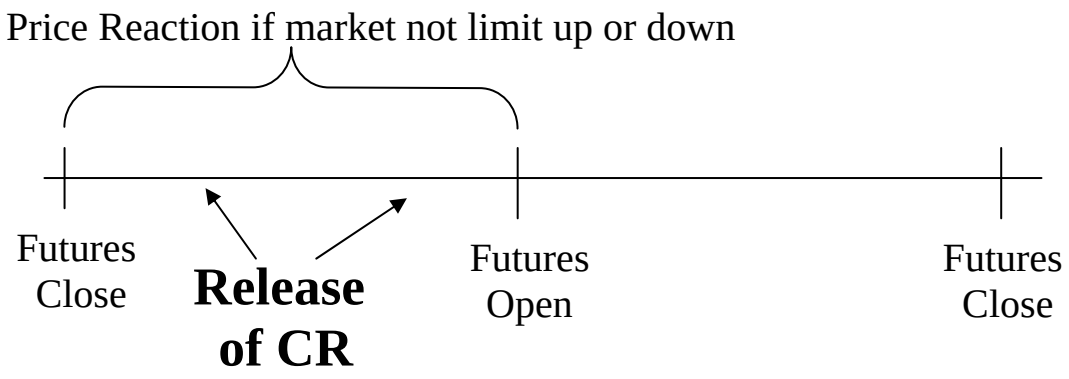


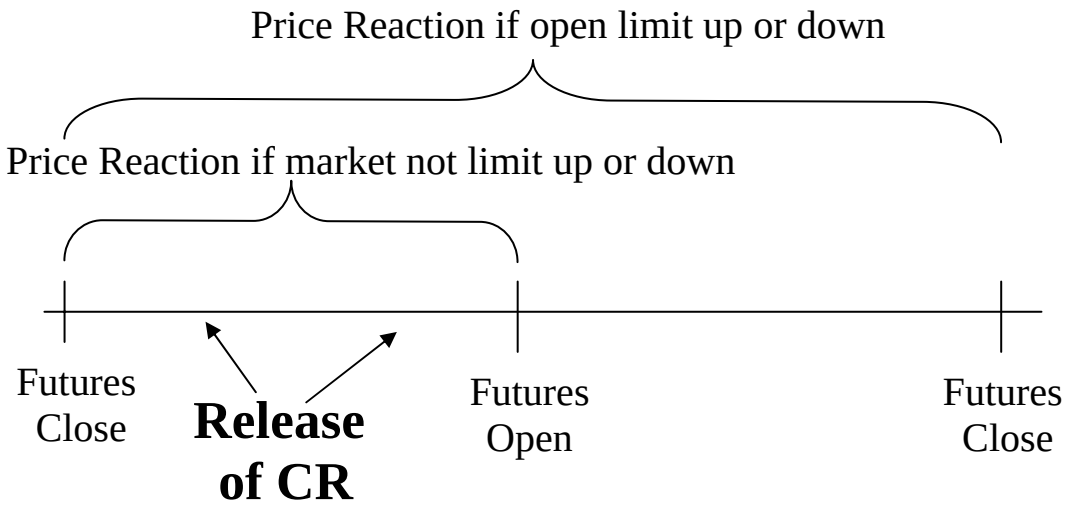
Bullish reports:



Price impact measured by _____ in _____ corn futures and _____ soybean futures:

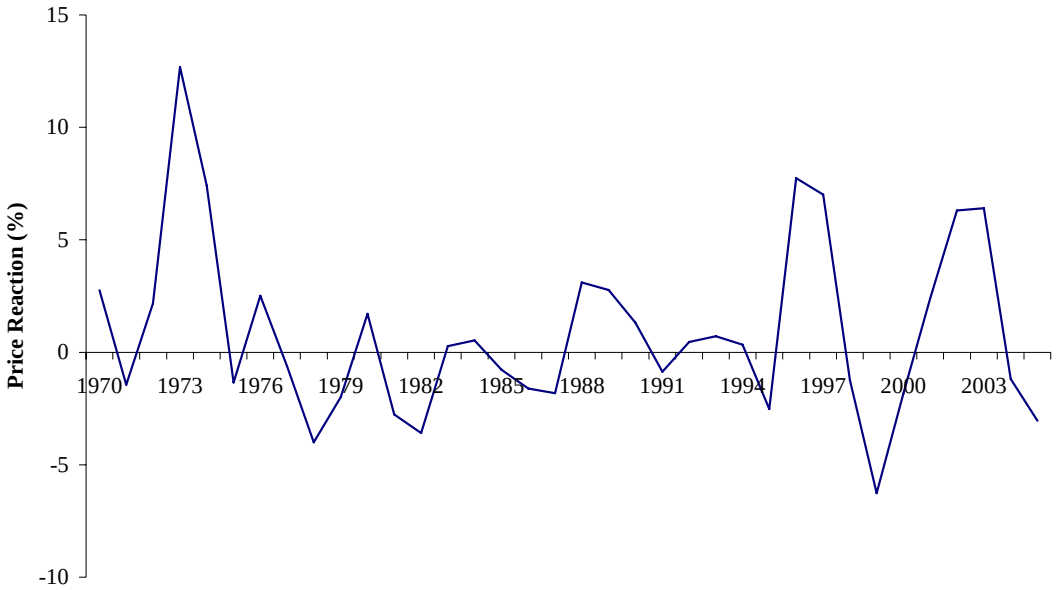






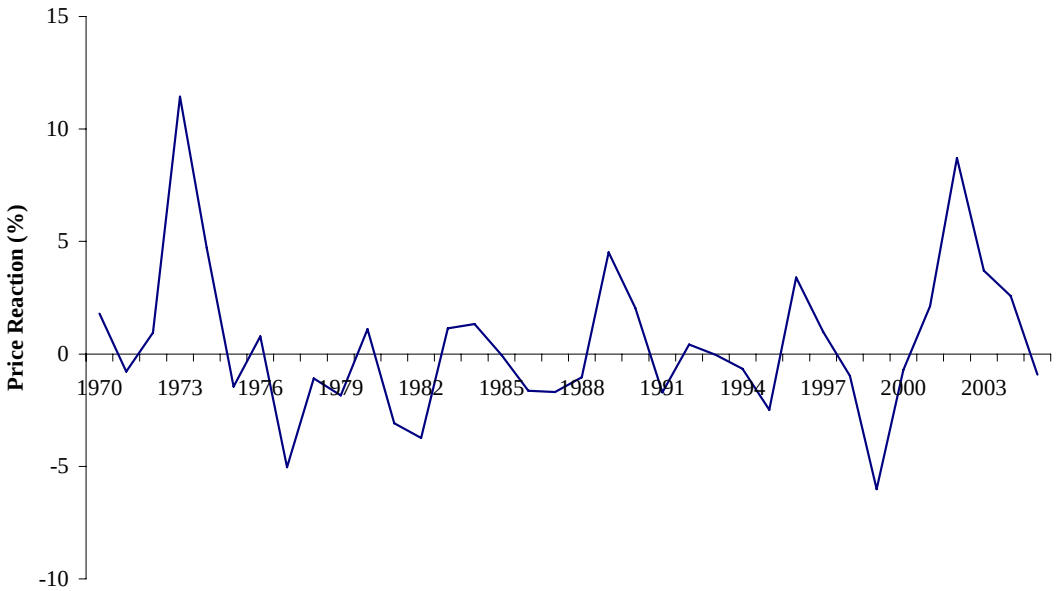
Corn price reaction:

Panel A: August



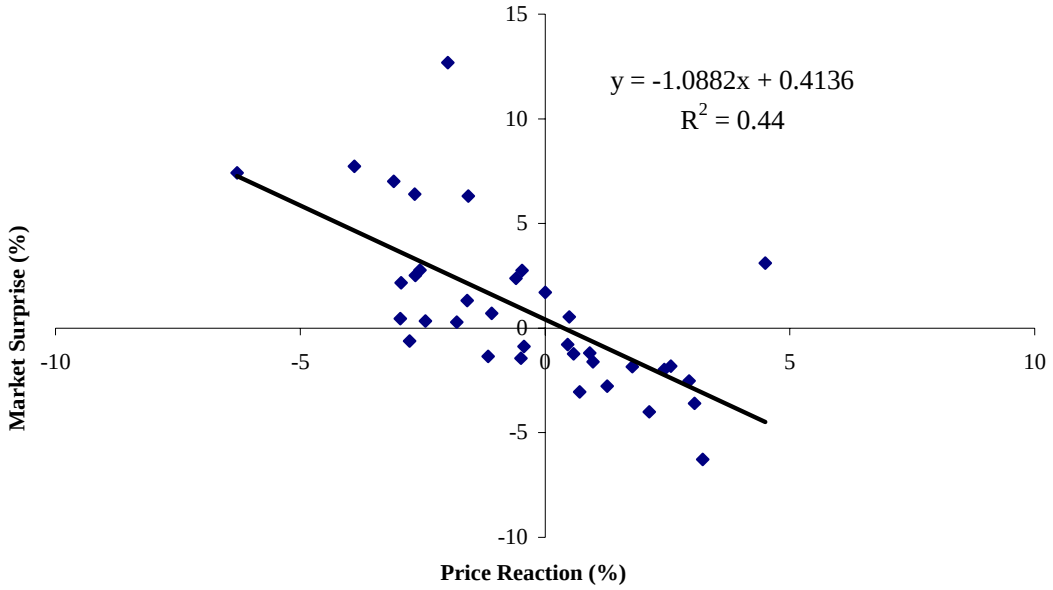
Soybean price reaction:

Panel A: August



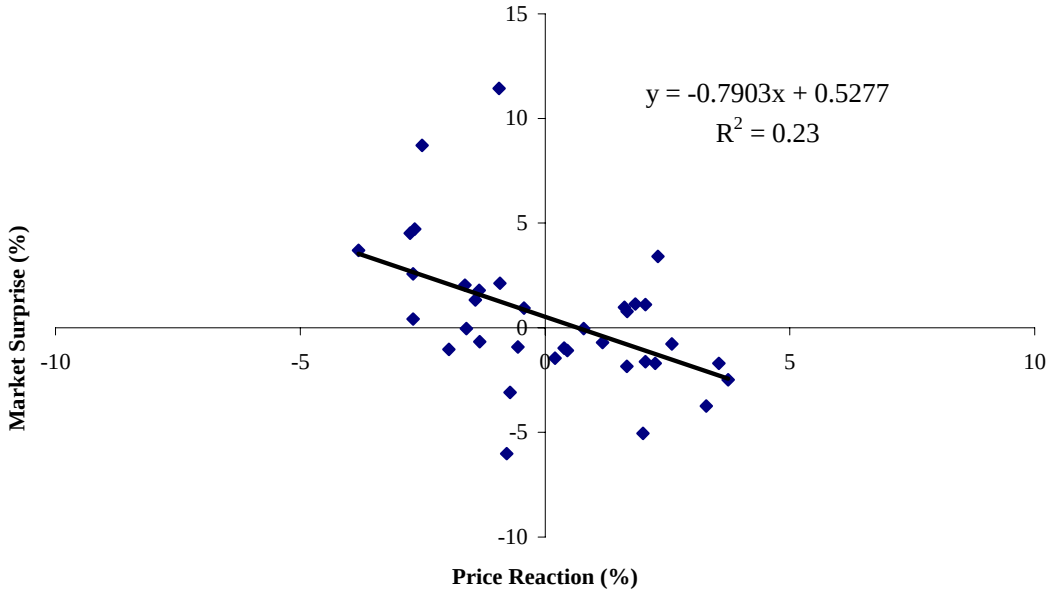
Corn price reaction regression:

Panel A: August



Soybean price reaction regression:

Panel A: August



Price impacts illustrated in this section provide strong evidence that _____ view USDA corn and soybean production forecasts as important _____ _____

This suggests that USDA forecasts improve _____ by moving prices closer to the _____ market equilibrium

It is important to point out that earlier forecast performance results appear to _____ some of the price impact results

- The forecast performance results indicate that private market forecasts early in the season (August) for both crops are now _____ as accurate as USDA forecasts

- At the same time, corn and soybean futures prices continue to _____ to the release of these same USDA forecasts??

USDA Forecasts of Foreign Crop Production

USDA is responsible not only for domestic crop production forecasts, but _____ production estimates as well

The Production Estimates and Crop Assessment Division (PECAD) of the Foreign Agricultural Service (FAS) has specific responsibility for foreign production estimates

In addition to foreign crop production estimates, PECAD is tasked with:

- _____ analyses related to areas of contention, political disturbance, droughts and disasters
- Special assessment requests from USDA and other agencies related to _____ and _____ response
- U.S. _____ and crop conditions assessments

Regional PECAD analysts use a number of data sources and tools to generate production forecasts

- _____ data
- _____ data
- _____ models

PECAD regional analysts _____ extensively in the countries they cover to more fully develop the _____ and _____ within which the assessments will be made

FAS also has a global network of _____ that provide _____ reports of observed crop conditions

Other contextual information plays a significant role in determining final estimates:

- Official governmental _____ where available
- _____ and _____ sources

FAS has extensive information on foreign crop conditions available at its website:

http://www.fas.usda.gov/pecad/

Also of interest is the Crop Explorer web site:

http://www.pecad.fas.usda.gov/cropexplorer/

- This site features near-real-time global crop condition information based on satellite _____ and _____ data

- Thematic ____ of major crop growing regions depict vegetative vigor, precipitation, temperature, and soil moisture

The following paragraph contains a nice description of the entire WASDE process, including the role of FAS/PECAD:

Once a month, the US Foreign Agricultural Service and experts from the Economic Research Service are "locked up" in one room to develop an estimate of worldwide agricultural production and yield. During that day, the analysts offer their respective crop production numbers and sometimes have to show the data and reasoning that support these estimates. During lock-up the group may be organized in as many as five (5) committees based on the commodity (i.e. wheat). The process serves as a 'virtuous circle' where validity of production numbers is supported and reviewed until consensus is achieved. The end result is concurrence on the production estimates that are presented by the World Agricultural Outlook Board. The National Agricultural Statistic Service (NASS) provides the production estimates for domestic agriculture. They enter the lock-up at 2:30 a.m. and provide the fodder on the current US production estimates. The first item undertaken is the balancing of the world supply and demand for these commodities. Next, the U.S. supply and demand is balanced by the NASS estimates. U.S. crop forecasting based on a full survey process is then reviewed. The results of this lock-up process directly affect commodity prices and farmers income and often result in millions of dollars in trade. Monthly revisions of the production estimates are needed to account for changes in weather and other possible factors that have an impact on the harvest.

---Hutchinson et al. (2003)