Are Agricultural States Able to Absorb Economic Declines Better Than Their Counterparts?

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Abstract

The United States and the world saw one of the worst economic declines at the end of 2007. Due to the crisis more than 7.5 million jobs were lost and the unemployment rate effectively doubled at a national level. However, the increase in unemployment rate was not evenly distributed across the United States. The underlying hypothesis is that predominantly agricultural states are able to absorb economic declines compared to other states. In other words, agricultural states are not hit as hard as other states during economic crises. This paper investigates if the hypothesis is supported by the data using unemployment rate, as the econometric metric, and Ag production value, both absolute and relative, for the top and bottom fifteen agricultural states from 2007 till 2013. The findings of this study suggest that the absolute measure of agriculture production value, agricultural commodities receipts, in itself does not determine the ability of a state to absorb economic downturns. However, that the relative measure, Ag commodities receipts as a percent of SGP, suggests that there is an inverse relationship between the relative measure and unemployment rate. The higher the percentage of Ag receipts the lower the unemployment rate in normal as well as economic decline years. Furthermore, this relationship is even stronger when the measure is above 11 %.

Keywords: agriculture production; unemployment; economic recession

Introduction

The United States and the world saw one of the worst economic declines at the end of 2007. The recession, two or more consecutive quarters of negative economic growth, was so severe and was predicted to be so for a while, that it was given a name- The Great Recession, and called the worst economic crisis since The Great Depression. As a result of the crisis, in the United States more than 7.5 million jobs were lost which resulted in doubling of the unemployment rate (Grusky, D. B., Western, B., & Wimer, C. C. ,2011). There have been several investigations into the causes of the economic recession. The underlying conclusion is that there were complex and interlinked factors behind the emergence of the crisis, namely loose monetary policy, global imbalances, misperception of risk and lax financial regulation (Verick, S., & Islam, I. 2010). Among those reasons one which was purged out to be more contributing to the crisis was the subprime mortgages meltdown. One of the primary causes of the subprime meltdown was the structure of securitization as applied to subprime and other non-prime residential loans, along with resecuritization of the resulting mortgage- backed securities (Eggert, K. (2008-2009). Aftermath of the economic recession saw a great deal of analysis and many regulations and laws being passed most notably- The Dodd Frank Act. Congress responded to the crisis by enacting the broadest financial reform, the Dodd Frank Act, to protect the US from another financial crisis and having to call US taxpayers to rescue financial firms again (Merkley, J., & Levin, C., 2011).

However, the fact remains that economic cycles have always prevailed in the United States in the post-World War II era. The other interesting observation in general is that some states are affected more by the downturn in economic growth compared to their counterparts. For instance- unemployment rate, one of the key economic indicators used to measure economic health of a state, for Nevada was 11.5 % (more than 200% increase compared to 2007) for 2009 while for Nebraska it was only 4.7% (only a 1.7 % increase compared to 2007).

1. Question:
This paper investigates if major Ag producing states absorb the economic shocks/ declines better than their counterparts?

The reason between differentiating Ag states and non- Ag states is because Ag industry complex is unique compared to other sectors. Agriculture as an industry supports all the way from upstream (input suppliers in the supply schedule) to downstream entities (retail shops).

Figure 1 shows this relationship with interlinkages.
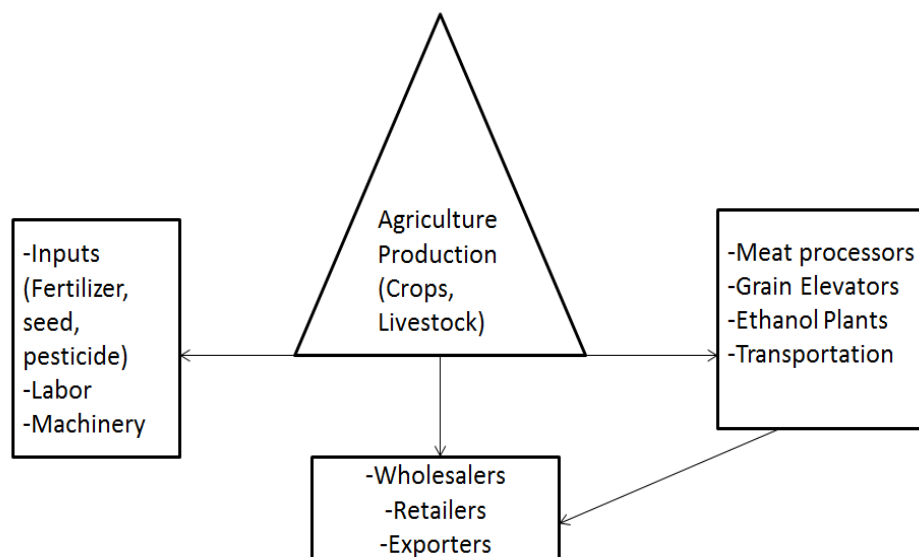
Figure1: Agriculture production interlinkages

Furthermore, agriculture industry also has relatively large multiplier effects compared to other industries. It is generally assumed that Ag states are more resilient and able to absorb economic declines better; however, this hypothesis has not been investigated on the aftermath of The Great Recession.

2. Data, Descriptive Summary, and Analysis

For 2010, a year which reflected normal agriculture production, data was collected from the Economic Research Service (ERS) of USDA and states were cardinally ranked based on the receipts for all agriculture commodities. Then, the top fifteen states with highest receipts and the last fifteen states with the lowest receipts were chosen for the analysis. The middle twenty states were not chosen for the analysis as it was assumed that there could be no meaningful conclusions drawn from these states. Furthermore, data on average annual unemployment from 2007, the starting year of the great recession, to 2013 was collected from the Bureau of Labor for the thirty states.

Table 1 shows the state receipts for all Ag commodities and annual unemployment rate for the top fifteen states. For 2010, California had the highest state receipts of more than 38 Billion nominal dollars. The top ten states all had more than 9 Billion nominal dollars in state cash receipts. Washington was the fifteenth state with receipts in excess of 7.6 Billion nominal dollars. It is noteworthy that due to the multiplier effect the actual contribution or value added would be lot higher than the state receipts for each of the states. However, for the purpose of the

ranking, it is highly unlikely that the rankings would change much as the multiplier effects are directly dependent on magnitude of the cash receipts. For states which ship large values of commodities there might be slightly lower multiplier effect compared to those who process and add value to the commodities. However, one can be reasonably certain that the same fifteen states would be in the top fifteen lists even if the total value was to be used as the metric.

Table 1: State receipts for all Ag commodities and annual unemployment rate for the top fifteen states.

Ranking	State	State receipts for all Ag. commodities in 1,000	Annual Unemployment Rates						
			2007	2008	2009	2010	2011	2012	2013
1	California	38,388,218	5.4	7.5	11.3	12.1	11.6	10.2	8.8
2	Iowa	23,891,765	3.7	4.3	6.4	6.0	5.5	5.0	4.7
3	Texas	20,343,148	4.3	4.9	7.6	8.1	7.7	6.6	6.0
4	Nebraska	17,018,675	3.0	3.4	4.7	4.6	4.3	3.9	3.7
5	Illinois	15,907,425	5.0	6.5	10.3	10.3	9.6	9.0	8.9
6	Minnesota	15,526,156	4.6	5.5	7.8	7.3	6.4	5.5	4.8
7	Kansas	14,761,486	4.3	4.7	6.9	7.0	6.4	5.7	5.2
8	North Carolina	9,777,231	4.8	6.3	10.6	10.7	10.1	9.1	7.8
9	Indiana	9,748,067	4.6	6.1	10.4	10.3	9.0	8.3	7.5
10	Wisconsin	9,020,955	4.9	5.0	8.7	8.6	7.7	7.0	6.6
11	Missouri	8,517,439	5.2	6.3	9.3	9.5	8.3	6.9	6.5
12	Ohio	7,984,435	5.6	6.6	10.4	10.2	8.8	7.4	7.3
13	Arkansas	7,965,816	5.3	5.5	7.9	8.2	8.2	7.5	7.2
14	Florida	7,741,348	4.1	6.5	10.5	10.9	9.8	8.3	7.0
15	Washington	7,655,264	4.7	5.5	9.2	9.9	9.1	8.0	6.9
	U.S.	140,824,967	4.6	5.8	9.3	9.6	8.9	8.1	7.4

Table 1 also shows that there is a lot of discrepancy in the unemployment rate among the states. Nine states Iowa, Nebraska, Texas, Minnesota, Kansas, Wisconsin, Missouri, Arkansas, and Washington never touched double digit unemployment rates while remaining states have double digit unemployment rates for either one or more years. Most notably, California, the number one state has multiple consecutive years with double digit unemployment rate. In fact unemployment jumps from 7.5 in 2008 to 11.3 for 2009- more than 50% increase. This shows that there is no conclusive evidence to suggest Ag states are affected less by economic declines.

Table 2 shows the same variables for the bottom fifteen states. The value of state receipts for Ag. commodities is above one Billion nominal dollars for four states- Maryland, Utah, Wyoming and Delaware. Alaska had the lowest value for Ag commodities at 31 million dollars.

For the annual unemployment rate, it appears that for all states, but Nevada and Rhode Island, the unemployment rate never exceeds double digits for the time period. Nevada as a state relies heavily on tourism and gambling revenues. During the economic downturn it is expected to see higher unemployment as households do not have as much disposable income to spend on recreational activities.

Table 2: State receipts for all Ag commodities and annual unemployment rate for the bottom fifteen states.

Ranking	State	State receipts for all Ag. commodities in 1,000	Annual Unemployment rate						
			2007	2008	2009	2010	2011	2012	2013
36	Maryland	1,865,558	3.5	4.4	7.1	7.6	7.1	6.9	6.5
37	Utah	1,360,021	2.6	3.6	7.5	7.9	6.7	5.4	4.4
38	Wyoming	1,178,262	2.9	3.1	6.3	6.5	5.8	5.3	4.7
39	Delaware	1,087,278	3.5	5.0	8.3	8.4	7.5	7.2	6.7
40	New Jersey	943,389	4.3	5.4	9.1	9.5	9.3	9.2	8.0
41	Maine	701,784	4.7	5.5	8.1	8.1	7.9	7.5	6.6
42	Vermont	687,979	4.0	4.7	6.6	6.1	5.5	4.9	4.4
43	Hawaii	686,902	2.8	4.3	7.1	6.9	6.8	6.0	4.8
44	Nevada	576,638	4.5	6.7	11.5	13.5	13.0	11.1	9.4
45	Connecticut	553,886	4.5	5.7	8.1	9.1	8.8	8.3	7.6
46	West Virginia	545,369	4.6	4.5	7.8	8.6	8.0	7.4	6.7
47	Massachusetts	492,062	4.7	5.6	8.3	8.3	7.2	6.7	6.6
48	New Hampshire	208,701	3.5	3.9	6.3	5.8	5.4	5.5	5.1
49	Rhode Island	78,390	5.2	7.8	11.1	11.2	11.1	10.4	9.2
50	Alaska	31,341	6.4	6.7	7.7	7.9	7.6	7.1	6.9
	U.S	140,824,967	4.6	5.8	9.3	9.6	8.9	8.1	7.4

It appears that generally states with high value of Ag commodities see higher increase in unemployment rate compared to their counterparts. The finding is an interesting one and counterintuitive to the generally accepted paradigm that Ag states are affected less by economic declines.

So in order to investigate the same question in a different light states were ranked again based on the contribution of agriculture on their Gross State Product (GSP). The reason being that relative measure of agriculture might lead to better understanding of the changes in unemployment rate rather than the absolute measure. Perhaps, it is the size of agriculture sector relative to the GSP, which is important in absorbing economic declines, and not necessarily the

absolute dollar value of the agricultural products being produced in the state. As before annual average unemployment rates were listed for the states for years 2007-2013.

Table 3 shows that when Ag receipts are measured as a percent of GSP seven of the states, California, Texas, Illinois, North Carolina, Ohio, Florida and Washington, do no longer make it to the top fifteen list. The new states which make it to the list are South Dakota, North Dakota, Idaho, Montana, Mississippi, Oklahoma, and New Mexico. It is noteworthy that the number one state from the previous list, California, is no longer in the list and the new number one state, South Dakota, did not make into the previous list. This is because California has the eighth highest Gross Domestic Product (GDP) in the world and there are several other important industries, such as technology and entertainment, which contribute more to their economy compared to agriculture in relative terms to the GSP.

An interesting observation is that there is a wide range when it comes to the contribution of Ag receipts to SGP. South Dakota had the highest contribution of nearly 20 percent while Missouri the fifteenth state on the list had slightly above 3 percent. It is notable that all the states on the list have higher contribution when compared with the national contribution of Ag. receipts to Gross Domestic Product of USA (2.20 %).

Table 3: State receipts for all Ag commodities as a percent of GSP and annual unemployment rate for the top fifteen states.

Ranking	State	Contribution of state receipts to GSP in %	Annual Unemployment rate						
			2007	2008	2009	2010	2011	2012	2013
1	South Dakota	19.75	2.8	3.1	4.9	5.0	4.7	4.3	3.8
2	North Dakota	19.23	3.1	3.2	4.1	3.8	3.5	3.0	2.9
3	Nebraska	18.56	3.0	3.4	4.7	4.6	4.3	3.9	3.7
4	Iowa	16.88	3.7	4.3	6.4	6.0	5.5	5.0	4.7
5	Kansas	11.54	4.3	4.7	6.9	7.0	6.4	5.7	5.2
6	Idaho	10.68	3.1	5.2	8.8	9.0	8.2	7.1	6.0
7	Montana	8.14	3.6	5.1	6.9	7.3	6.9	6.0	5.4
8	Arkansas	7.57	**5.3**	5.5	7.9	8.2	8.2	7.5	7.2
9	Minnesota	5.71	4.6	5.5	7.8	7.3	6.4	5.5	4.8
10	Mississippi	5.26	**6.2**	**6.8**	**9.7**	**10.3**	**9.9**	**9.0**	**8.5**
11	Oklahoma	4.01	4.1	3.8	6.4	6.8	5.8	5.2	5.2
12	New Mexico	3.77	3.8	4.5	7.7	8.1	7.5	7.1	6.7
13	Wisconsin	3.55	4.9	5.0	8.7	8.6	7.7	7.0	6.6
14	Indiana	3.45	4.6	**6.1**	**10.4**	**10.3**	**9.0**	**8.3**	**7.5**
15	Missouri	3.32	**5.2**	**6.3**	9.3	9.5	8.3	6.9	6.5
	U.S.A	2.20	4.6	5.8	9.3	9.6	8.9	8.1	7.4

\# Highlighted numbers mean the unemployment rate was higher than national average

Regarding the unemployment rate only two states, Mississippi and Indiana, have double digit unemployment rates for the analyzed time period. This is a significant difference from the previous result (using absolute measure). None of the top nine states see a double digit unemployment rate. Furthermore, when compared with national average, only for 15 years out of 112 years (13.39%) combined for all states, for the time period was the unemployment rate higher than the national average. Out of the 15 years, 13 years came from two states, Mississippi and Indiana, which generally have higher unemployment rate compared to national average irrespective of the economic health. The top nine states never experience unemployment rate above the national average.

Similar to table 3, calculations were done for the bottom 15 states. The results are represented in table 4. From table 4 one can see the list of states have changed. Five states, Wyoming, Delaware, Maine, and Vermont, have been removed from the list. The new states which are included are Florida, Pennsylvania, New York, and Virginia. Another, important observation is that all of the states in the list contribute less than 2.20 % -the contribution of agriculture to the GDP at national level. Furthermore, out of fifteen states 11 states contribute less than 1 % and the range goes from slightly over a percent to slightly above one-tenth of a percent.

Table 4: State receipts for all Ag commodities as a percent of GSP and annual unemployment rate for the bottom fifteen states.

Ranking	State	Ag. commodities receipts as a % of SGP	Annual Unemployment rate						
			2007	2008	2009	2010	2011	2012	2013
36	Utah	1.15	2.6	3.6	7.5	7.9	6.7	5.4	4.4
37	Florida	1.06	4.1	**6.5**	**10.5**	**10.9**	**9.8**	**8.3**	7.0
38	Pennsylvania	1.03	4.5	5.5	8.2	8.4	7.9	7.7	7.0
39	Hawaii	1.02	2.8	4.3	7.1	6.9	6.8	6.0	4.8
40	West Virginia	0.82	4.6	4.5	7.8	8.6	8.0	7.4	6.7
41	Virginia	0.70	3.1	4.1	6.8	7.1	6.5	5.9	5.5
42	Maryland	0.59	3.5	4.4	7.1	7.6	7.1	6.9	6.5
43	Nevada	0.48	4.5	**6.7**	**11.5**	**13.5**	**13.0**	**11.1**	**9.4**
44	New York	0.39	4.6	5.5	8.4	8.6	8.3	**8.4**	**7.5**
45	New Hampshire	0.33	3.5	3.9	6.3	5.8	5.4	5.5	5.1
46	Connecticut	0.24	4.5	5.7	8.1	9.1	8.8	**8.3**	**7.6**
47	New Jersey	0.19	4.3	5.4	9.1	9.5	**9.3**	**9.2**	**8.0**
48	Rhode Island	0.16	5.2	**7.8**	**11.1**	**11.2**	**11.1**	**10.4**	**9.2**
49	Massachusetts	0.12	**4.7**	5.6	8.3	8.3	7.2	6.7	6.6
50	Alaska	0.06	**6.4**	**6.7**	7.7	7.9	7.6	7.1	6.9
	U.S.A	2.20	4.6	5.8	9.3	9.6	8.9	8.1	7.4

\# Bold highlighted numbers mean the unemployment rate was higher than national average

Careful examination of Table 5 shows that there were three states, Florida, Nevada, and Rhode Island, which experienced at least one year of double digit unemployment for the time period. Furthermore, for all the years during the time period 27 years out of 112 years (24.11 %) had higher unemployment rates compared to national unemployment rates. Another significant finding is that more than half of the states (eight) had one or more year when they experienced unemployment rates higher than the national average.

In order to investigate the aggregate affect data on unemployment rate and contribution as a percent for all thirty states were complied. Scatter plot from figure 2 clearly shows an inverse relationship between unemployment rates and Ag commodities receipts expressed as a percent of SGP. On average it appears that as the contribution of Ag receipts increases unemployment rate declines.

Mathematically, the relationship can be written as:

$$\text{Ag as a \% of GSP} \; \alpha \; \frac{1}{\text{Unemployment rate}} \quad \text{----------------------------I}$$

From figure 2 one can also draw a conclusion with moderate confidence that there is a cut off level in this inverse relationship between Ag commodities value and the unemployment rate. It appears to be the case that the break point of this relationship is at around 11 %. From figure 2, once the Ag commodities receipt as a percentage of GSP increases more than 11 %, one can expect the unemployment rate to be significantly smaller.
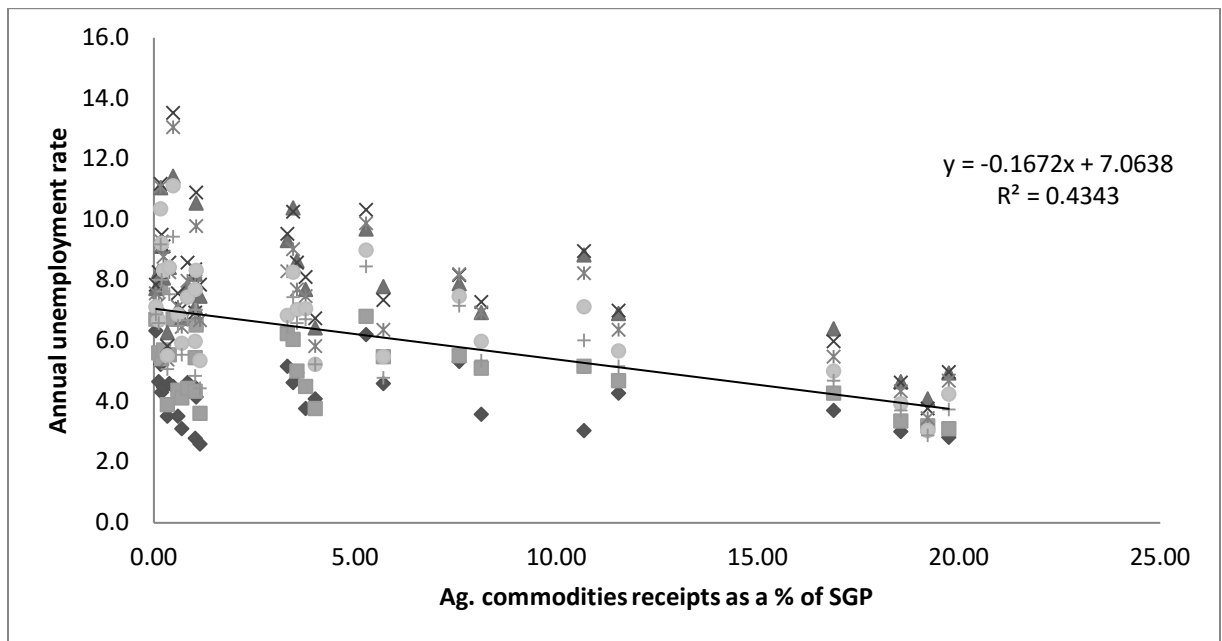
Figure 2: Relationship between Gross State Product (GSP) and annual unemployment rate

3. Conclusions and policy implications

There are two important conclusions from this study. The first one is that the absolute measure of agriculture production value, agricultural commodities receipts, in itself does not determine the ability of a state to absorb economic downturns. The second conclusion is that the relative measure, Ag commodities receipts as a percent of SGP, suggests that there is an inverse relationship between the relative measure and unemployment rate. The higher the percentage of Ag receipts the lower the unemployment rate in normal as well as economic decline years. Furthermore, this relationship is even stronger when the measure is above 11 %. This is primarily because there are different industries supported by agriculture production complex on both sides.

Finally, there is another way to analyze this question and that is to look at the overall Ag production complex value (including value added components). As stated previously, doing so would only change the results quantitatively but not qualitatively. This is because there is a direct correlation between the value of Ag. receipts and Ag production complex. The reason Ag. production complex value was not used for this analysis is that those are estimates and the data on all states are hard to find especially from one source.

One of the policy implications of this finding is that agriculture helps absorb shock in the economic system. So, it is important to support agriculture sector. The payoffs of the investment in agriculture sector might be must crucial in the years when the majority of country and world is facing economic declines. The other important policy implication of this study is that states whose Ag receipts are slightly below 10 percent of SGP need to be supported, encouraged and provided incentives so as they surpass the 10 percent threshold as there is moderate evidence that once that threshold is passed they can absorb economic declines much better.

4. Further study

Recent 2012 drought was an example where many Ag states saw a significant decrease in production. While the farmers for the most part did not see a decline in their net farm income, due to high crop insurance payments as prices of corn and soybean rose significantly, other stakeholders directly and indirectly associated with agriculture saw a decline in economic activity. For instance, livestock producers incurred high input costs (mainly grain cost) which in many cases forced them to liquidate their stock and operate in loss. The grain elevators did not have enough grain to stock due to reduced production so saw a decline in their revenue sources. These all had significant multiplier effects.

Figure 3 shows the agricultural production complex relationships and the effect of a single year drought (which results in significant reduction in production of crops) on supply schedule and demand. An empirical estimate of the shifts in demand and supply would help policy makers be better prepared to support the sectors which experience the most significant economic declines.
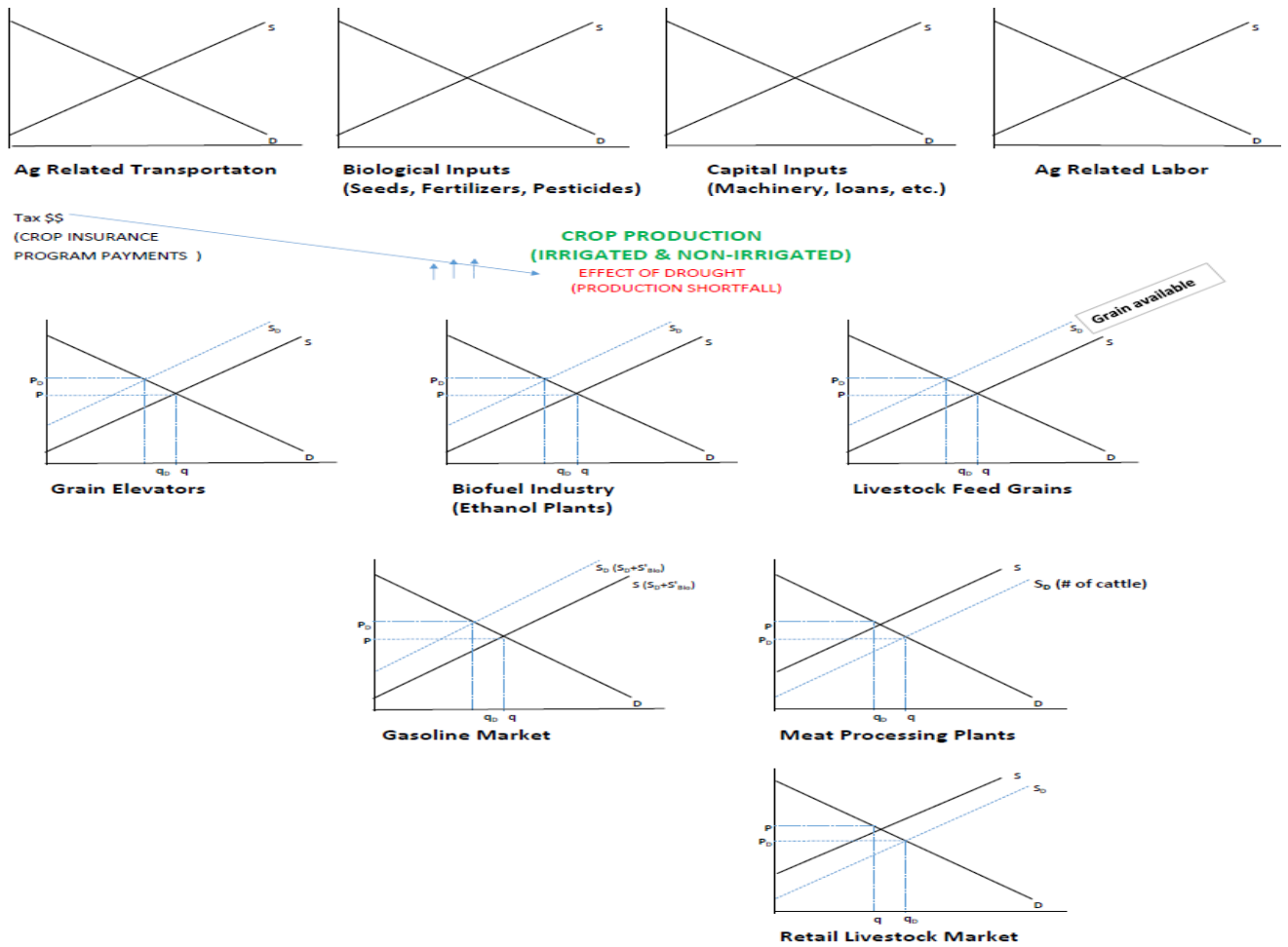
Figure 3: Agricultural production complex relationships and changes during a significant drought year.

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    in each State:http://www.ers.usda.gov/Data/FarmIncome/FinfidmuXls.htm.

U.S. agricultural export values by State are obtained from the USDA Foreign Agricultural
    Service's Global Agricultural Trade System
    (GATS):http://www.fas.usda.gov/gats/default.aspx
    Farm production data by State are published by NASS, Quick Stats 2.0:
    http://www.nass.usda.gov/Quick_Stats/