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Troubled Asset Relief Program: Impact as seen in the Agricultural Sector

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Undergraduate Thesis

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ABSTRACT

I extend Butler and Cornaggia (2011) to examine the impact on agricultural productivity of shocks in access to capital and the impact of the Troubled Asset Relief Program (TARP) in moderating these shocks. Adapting their empirical methodology in Butler and Cornaggia (2011), I find that the financial crisis of 2008 exacerbates the negative relation between counties with low access to capital and productivity. Further, I find that this negative relation is reduced in counties where more banks took advantage of TARP financing. My results underscore the impact of access to capital on productivity and also suggest that the TARP has beneficial effects in the agricultural sector.

Introduction

I extend the study of Butler and Cornaggia (2011) that looked at the relationship of access to finance and how it impacted crop productivity of soybeans and corn. The authors examine this relationship during the ethanol boom when there was an increase in the demand of corn. I use their empirical model and adjust my sample period in order to look at the impacts of the 2008 financial crisis. I then pull into account a measure that captures the influence the TARP has in moderating the effects of the financial crisis. The TARP was enacted by the government in late 2008 in order to stabilize our economy and increase liquidity in our financial sector. The underlying purpose of the government's action was to create opportunity for lending to occur so the markets would not freeze and further worsen the U.S. economy.

There have been many studies to measure the impacts of the TARP. However, little research has been done to see how the TARP affected the agricultural sector. It is important to take into consideration the effects of such governmental actions in all industries. Looking at impacts as seen in the agricultural sector is very different to most similar studies that have focused on more industrial settings and productivity at the firm level.

However, if a similar crisis occurred again agriculture is one of two industries the government might consider infusing more capital into. The agricultural sector is an industry that is much more efficient at generating input (capital infusions) to economic output. Therefore, if the government finds themselves in a similar situation to 2008, it would be beneficial to understand how the TARP affected and impacted the agricultural sector in particular because it was one of the few industries that show a high economic return from capital infusions (Aardt and Naidoo 2010).

Based on my results, I find that the financial crisis did have a negative impact on productivity for the set of counties most likely to be impacted by the financial crisis. I specifically examine productivity impacts of the financial crisis for counties with poor access to finance relative to counties with better access to finance. Among others things, TARP was supposed to provide capital injections to banks to help with lending. Therefore, when there are more TARP banks in a county, then the productivity hampering effects of having low deposits (i.e. the poor access to finance measure) are offset by the lending incentive effects of TARP. In my research I found this to be true; this brings us to the conclusion that TARP did bring positive light to the dark days of the 2008 financial crisis.

Section two details my literature review and hypothesis development. Section three presents the research design and data. Section four discusses the results. Section five discusses supplemental testing, and I conclude with section six.

Literature Review & Hypothesis

During the early and mid-2000s, the United States' economy was hit with several crises. The technology bubble burst mid-way through the year 2000. The terrorist attacks of 2001 brought the country to its knees. Unemployment and entrepreneurial failures were on the rise, and there was an increase in corporate scandals during these years. The combination of all of these events created a situation of economic uncertainty amongst the United States people. As the decade was coming to a close, the ever famous 2008 Financial Crisis hit the country and impacted the lives of millions. The housing bubble burst, people lost their jobs on a grand scale, and banks were filing for bankruptcy. In the midst of all these different crises, each having their

own impact on the people and industry, the government decided to announce a new program in an effort to help get the country back on its feet.

In late September 2008, the Wall Street Journal reported that the financial crisis had continued to march downward. Banks essentially stopped lending to each other, both directly and indirectly, by charging exceedingly higher rates. These actions put further strain on the U.S. and European economies and brought their lending capacities to a standstill (Mollenkamp 2008). Following this announcement the Wall Street Journal put out an article discussing how the United States' financial system resembled a patient in intensive care. At that point the economy could not "fix" itself and was seemingly at the point of no return. "The illness seems to be overwhelming the self-healing tendencies of markets" (Hilsenrath 2008).

In effect, during the 2000s, both individuals and banks had taken on way too much debt. Due to these actions, the banks found themselves in a situation where they could not pay back their creditors. In order to stop the worsening dilemma, banks needed to do three things; mark down the value of distressed assets, pay off debt, and rebuild their capital cushion (Hilsenrath 2008). These items needed to occur quickly and efficiently; however, they all negatively impacted their ability to boost the economy causing further constraint on bank lending.

The United States' government soon answered these concerns with The Troubled Asset Relief Program (TARP), specifically the Capital Purchase Program (CPP). This program was launched by the U.S. Department of Treasury to stabilize the financial system in this time of economic uncertainty in our country. The Troubled Asset Relief fund was created on October 3, 2008, following the passing of the Emergency Economic Stabilization Act. It gave the U.S. Treasury $700 billion dollars to issue in order to provide capital in aiding financial institutions. The Dodd-Frank Act later reduced the $700 billion authorized to $475 billion (United States

Treasury). The program focused on providing capital to financial institutions that met the necessary requirements. The main driver behind this program was the fear of all lending coming to a standstill causing a continued downward spiral for our nation's economy if the government did not intervene.

Although the government stood firmly behind its program and the positive effects it would have, specifically in the increase of liquidity in financial institutions, many did not believe that the program would work. It was broadly viewed as a simple bailout to banks that needed the money to solve their problems. Many believed that the financial institutions would hold on to the capital instead of spurring economic growth through lending (Appelbaum 2009). This idea was well publicized across the nation in the various periodicals and journals. While a lot of the comments were directed towards the larger banks that were bailed out (i.e. Citibank, J.P. Morgan Chase, Eaglebank), many still viewed the overall program to be an unwise use of taxpayer dollars. These negative opinions are where my overlying research questions derive from.

> *Did the Financial Crisis impact the relative productivity of corn and soybeans consistent with increased constraints in access to finance?*
>
> *Did the TARP moderate the effects of the financial crisis on productivity consistent with an easing of access to finance constraints?*

Many papers begin their discussion of the effects on the TARP by referencing the research of Hoshi and Kashyap (2010) and their study of the "bailout" of the Japanese financial institutions. This study, along with general public consensus, questioned if capital infusions were the best action for our government to take during the U.S. 2008 financial crisis. More specifically, they questioned if other alternatives would have generated more positive economic results. The ability for these capital infusions to perform well relied heavily on weak banks participating in the government program (Hoshi and Kashyap 2010). Other factors might have

limited such banks from participating due to fear of the negative impacts accepting government aid could have on their stock yields and their performance in the future (Hoshi and Kashyap 2010). If these concerns of the banks were viable, one might say that those who accepted the capital infusions were in enough trouble that they did not have much of a choice. Therefore, some inferred that the capital infusions were holding up already weak illiquid institutions which could lead to asset fire sales further causing liquidity to dry up in the financial system (Diamond 2009).

The ideas discussed by Hoshi and Kashyap (2010) counteract other research that found that banks who opted out of the TARP program did not promptly disclose. This counteracts the logical thought that if banks were worried about their stock yields in regard to accepting TARP they would quickly disclose the opt-out. Bens, Chyz, and Neamtiu (2014) found that 55% of banks did not disclose their opt-out of TARP. Further research found that on average those who did not disclose were poorer performing financial institutions. One could infer that they might have performed better if they had accepted the TARP funding. Overall, most discussions saw the many different result possibilities of the program being counteractive to one another.

The negative publicity of TARP and growing concern of the financial situation of our banks and overall economy put a lot of pressure on the banks to perform well. Thus, not only did they have to overcome the financial aspect of the crisis but the push from their stockholders to adjust and have good projections for the future. Despite these pressures and negative publicity, on average banks participating in the TARP had more positive financial performance before and after the program initiation (Ng 2011). Therefore, contrary to the negative sentiment, the TARP was aiding the banks in their endeavors. Market valuations diverged from their fundamentals due to investor sentiment and not lack of performance which proved to be evidence

of the negativity connation owners put with their companies being "bailed out" (Hoshi and Kashyap 2010).

The important notion to take into consideration is that many of these papers showed the TARP to have a positive impact on bank performance and overall lending. Therefore, it is reasonable to assume that TARP did moderate the effects of the financial crisis and was a responsible action from a U.S. government policy standpoint.

TARP investments increased the loan supply by an annual rate of 6.43% for banks categorized as having below Tier 1 ratios, defined as Tier 1 (core) capital divided by risk-weighted total assets (Li 2013). This increase in loan supply further suggests that banks that accepted governmental aid via TARP used roughly one third of the capital infusions to support loans lended out to consumers (Li 2013). The study done by Li is not similar to mine in terms of showing concrete economic impact, but it does suggest that the TARP created opportunity for positive, impactful economic opportunity.

Hypothesis:

My analysis observes the relationship of the financial crisis and Troubled Asset Relief Program and each of their impacts on the agricultural sector by looking at crop yields, essentially measuring how productive farmers were in periods before the financial crisis (when capital was less difficult to obtain) relative to periods after the financial crisis (when capital access is constrained). Butler and Cornaggia (2011) discussed how a farmer's budget is heavily reliant on how much capital they can receive. Capital shows to be very impactful on how productive the farmers can be; this is due to farmer's having to pay for a majority of their costs up front and not receiving any revenues until the end of the harvesting season. The more money they have access

to for seed, fertilizer, and many other inputs can have huge consequences on how well their crop performs. Based on these facts and those proved by Butler and Cornaggia (2011) my first hypothesis looks at the impact that strictly the financial crisis has on crop productivity. Due to the financial crisis causing banks to be willing to loan out less of their money, my first hypothesis assumes gaining access to capital was much harder for farmers post financial crisis in the years of 2009, 2010, and 2011.

> *H1: There is a more negative association between productivity and access to finance in the post financial crisis period.*

The second main focus in my study is the interaction of the counties with low access to capital and the TARP. For my second hypothesis I examine the effect that I propose in hypothesis 1 to see if it is moderated when low access to capital counties have more TARP backed deposits (i.e. more banks participating in the TARP program). I focus on if counties with more banks that received TARP funding showed greater productivity. Thus, I make the assumption that low access to capital counties that have more banks participating in the TARP program would have higher crop productivity than banks in a similar financial situation (low access to capital) with a lower ratio of bank deposits backed by the TARP. My assumption is based on that the TARP increases the amount of loans lent out, further proving the results of Butler and Cornaggia (2011) that the amount of capital available has a large impact on the success of productivity.

> *H2: The more negative association between productivity and access to finance in the post financial crisis period is moderated by the TARP bank presence.*

Research Design & Data:

The data I used to generate my tests is captured annually at a county level across twelve Midwestern, high crop yielding states. The states in my study are as follows: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. I gathered data from the same twelve states as Butler and Cornaggia (2011) for the years 2005 through 2011, excluding 2008. My sample period includes the ethanol boom, financial crisis, and issuance of the TARP. Butler and Cornaggia (2011) looked at periods before and after the ethanol boom to test their theory. I focus on periods after the ethanol boom so that the effect of the ethanol boom does not confound the effects I document in my study. The beginning of the ethanol boom was in the year 2005. I use the years 2005-2007 as my comparative sample prior to the 2008 financial crisis and the years of 2009 through 2011 to measure the economic impacts exposed by the financial crisis. For my research method, I used the same empirical model that was used in Butler and Cornaggia (2011) (see below). Subscripts I, t, and k denote county, year, and crop respectively. I perform a multivariate ordinary least squares regression, using the same model for both corn and soybean yields.

$$Yield\_Corn_{it} = \alpha_0 + \beta_1 Finance_{it} + \beta_2 Crisis\_Period_t + \beta_3 Finance*Crisis\_Period_{it} + \beta_4 TARP_{it} + \beta_5 Finance*TARP_{it} + \beta_n X_{it} + \beta_k S + e_i$$

Based on my model and research design, I should be able to see support of Hypothesis 1 in the interaction of the Finance and Crisis_Period variables. I expect to find a negative coefficient in this interaction as it captures the difference in output in the financial crisis period when finance is poor (Finance =0) and the TARP ratio is zero compared to when finance is higher (Finance = 1). Support for Hypothesis 2 will be found in the interaction of the Finance, Crisis_Period, and TARP variables. It explains the change documented in Finance_Crisis_Period in the relation to the change of TARP funding. Specifically, the increasing TARP counteracts the

negative impact on productivity brought about by low access to capital in the post financial crisis period. I expect the coefficient of this variable to be positive.

Independent Variables:

The first independent variable of interest is access to finance. I sum all of the bank deposits held in banks insured by the Federal Deposit Insurance Company (FDIC) in any given county; this data can be found on their website. Butler and Cornaggia (2011) found that banks with more deposits make more agricultural loans; this was one of their key insights for understanding the impact of access to finance on crop productivity. My main measure of access to finance is of the counties that are in the lowest quintile of bank deposits. My results suggest that for counties in the lowest quintile, productivity is relatively lower during the financial crisis. This result is consistent with the conventional wisdom that banks were, on average, less willing to loan money following the financial crisis

Another independent variable and the one unique to my study is one that represents the impact of the Troubled Asset Relief Program. This variable is the ratio of the sum of all banks deposits held within banks that received the TARP funding to the sum of all bank deposits held within the same given county. I gathered this data from the U.S. Treasury Department by looking at the Transaction Report data from October 1st 2010. I chose to use this data because it showed the best representation of the TARP because by this point all firms have been selected for the program and have received funding.

The other variable unique to my study is the crisis period. This is an indicator variable equal to 1 for years after crisis period (2009-2011) and 0 for years prior to the financial crisis (2005-2007). In my study, data from the years of 2009, 2010, and 2011 are defined as the post crisis period because they occurred after the initial financial crisis of 2008. It was during these

years that the economy was distressed and many changes in the financial sector were occurring. The years of 2005, 2006, and 2007 are before the financial crisis hit and are used as a baseline to look at the impacts that the financial crisis has on productivity.

Dependent Variables:

The dependent variables used in this study are the corn and soybean yields for the given years. I gathered the data from the National Agricultural Statistics Service (NASS) website. I took the county level of bushels harvested per acre for each crop to measure the output.

Control Variables:

In my study I used the same control variables found in that of Butler and Cornaggia (2011). As expected the weather has a huge impact on the success of a harvested crop. I controlled for this by gathering observations of precipitation and growing degree days from Weather Underground. Growing degree days is a typical, relevant measure used in the agricultural industry. There is one slight variation in our studies; Butler and Cornaggia (2011) took four weather stations from each state and assigned all counties within the state to one of the four chosen weather stations. I chose the most centrally located weather station in each state and assigned its results to all the counties in that state. This is due to my inability to replicate the assumptions of Butler and Cornaggia (2011) for county weather station assignment. This is under the assumption that weather will not have a significant differentiation across a given state.

I also controlled for population density, as this can be directly tied to both crop yields and county level bank deposits. I calculated population density by using the estimates of county population from 2005 to 2011 found on the US Census Bureau website, and then divided the estimate of a county's population by the county's square mileage. I control for economic

conditions with county level unemployment rates and per capita income. These data sets were also available on the US Census Bureau website.

Per capita income from 2009 through 2011 could be found on the US Census Bureau website for the entirety of my sample period. However, for the years 2005, 2006, and 2007 only partial data sets were available. Due to this I estimate some of the per capita data. I did this by running a model for the years 2009, 2010, and 2011 of per capita income, unemployment, and population density. I then analyzed my model and calculated a beta from the years that I have full data sets. I used this beta to estimate the per capita income for the years 2005, 2006, and 2007. Therefore, for 2005-2007 per capita income is an estimate based off of a function of my beta, unemployment rate, and population density. I checked the robustness of this estimate against my partial data sets gathered for 2005-2007 and found it to be accurate.

Results

I pooled all of the data together for all years included in my sample period. I then performed univariate t-tests on the average difference in means. I partitioned the data set on Crisis_Period which determined two groups: prior to the financial crisis and post financial crisis. After parting out the data I calculated the averages of the yields for the two subsets and performed a t-test on average differences in means.

I then further partitioned the data based on my finance variable. I partitioned the data by counties in the lowest quintile of my study with poorest access to capital and the remaining counties who were not under such strenuous capital restraints. From this partition you see that counties with greater access to capital have a higher increase in productivity seen in both corn and soybean yields after the financial crisis. Visuals of these changes can be seen in Figures

1&2. Figure 3 shows the results of my univariate t-tests on average difference in means. The increase of productivity seen in the high access to capital counties show statistical significance for both crops. However, for counties with low access to capital the increase in soybeans was not statistically significant and for corn, while statistically significant, is not as large as it is in the counties with more access to capital.

Therefore, the baseline trend shows to be an increase in output over time, and this increase was not greatly impacted by the 2008 financial crisis except for counties with low access to capital. If that was the case, the baseline trend was halted with respect to soy and to some extent corn. This would be the case if the demand for soy was increasing over time, even in the financial crisis, but farmers in areas with low access to capital could not meet these demands because they did not have the resources to produce due to the banks not lending as much money after the crisis period. This reduced lending can also explain why counties with lower access to capital have lower corn yields when compared to those counties with more access to capital.

For my preliminary support for H2, I have Figures 3 & 4. For these results I partitioned my data set based on their access to finance and then further divided the data based on their TARP ratios. Based on the division of the data set one should be able to recognize the impact that the TARP has on the productivity based on the average bushels per acre that is recorded for each group. The results show that counties with low access to capital and high TARP ratios harvested roughly four bushels more per acre of soybeans than counties with low access to capital and low TARP ratios. The increase of productivity due to TARP can also be seen in the counties with higher access to capital, but the results are not as significant.

The results of my multivariate tests are compiled in Table 5. I accounted for state fixed effects for soy and corn yields in columns 2 and 4 respectively. For H1 this made my results more statistically significant. I see strong support for H1 which stated that there is a more negative association between productivity and access to finance in the post financial crisis period. In terms of crop productivity one can assume, based off of these results, (taking into account state fixed affects) that farmers in counties with low access to finance harvested -3.6 bushels of soybeans per acre compared to farmers in counties with higher access to finance.

My results do not support H2 as strongly, specifically my results from the corn yields. I find that the results from corn yields do not show to be statistically significant. However, the results do prove to be significant when looking at my results for soybeans. Note that this is a positive relationship due my Finance_Crisis_Period_TARP variable showing the TARP mitigating the effects of the Finance_Crisis_Period interaction.

We can question why corn does not show significant results in this test. One reason for this is that corn and soybeans are very different crops and are significantly different markets. I discussed that the time period of my study is after the ethanol boom. This could cause the TARP to have less of an impact because the demand for the crop is still significantly rising.

Supplemental Testing

An additional regression that I ran was based on lending based on the "type" of bank in the selected counties. The call reports that were used to gather deposit data for my finance variable banks can be categorized as being agricultural banks. Due to my study showing how the TARP impacted the agricultural sector, I chose to see if banks being categorized as such would show different results. I introduced this additional test separately to consider heavy agricultural

lending presence to see if the effects that I proved might be stronger. I partition the regression by dividing the counties at the annual median based on a ratio defined by the amount of deposits from agricultural banks divided by the total amount of deposits in the county. This gave me two different groups to run through the regression (Agro 0 and Agro 1).

I define Agro 0 as the group of counties with a lower agricultural banking ratio. I find that for both groups my hypothesis holds true with counties who have lower access to capital having a more negative impact on their crop production during the crisis period. However, when I look at the results based on my three way interaction term and see that the TARP has a much larger impact in the counties that have a higher ratio of agricultural banks. This can especially be seen in Table 6 with the t-statistic tripling for the Agro 1 counties when looking at soy yield. Furthermore, when you look at the corn yields, the impact of the TARP is insignificant for the Agro = 0 group, but the TARP showed to have a significant impact on the counties with more.

These results would be expected if farmers are more likely to do business with the banks that are categorized as agricultural financial institutions. These banks may be smaller and closer to where the farmers are. Since the TARP provided a lot more capital to the banks, and farm loans tend to be viewed as low risk loan, the TARP could be viewed as providing extensive capital to be used in financing low risk loans. This concept does not explain why the TARP variable was less significant in the corn yields. However, as previously mentioned little impact on corn yields could easily be explained by corn simply being a different crop that holds several different purposes. One of those purposes is ethanol and all of my study time periods were after the ethanol boom when demand for corn was still on the rise.

Conclusions

Based on my results and supplemental testing, I find further support for the findings of Butler and Cornaggia (2011) that access to capital has significant implications in terms of crop productivity and the producer success using exogenous shocks in access to capital. In addition, I found that the Troubled Asset Relief Program was successful in mitigating the effects of the financial crisis in helping to spur economic growth. This output generated by farmers shows a physical example of how governmental input of capital infusions increased economic output.

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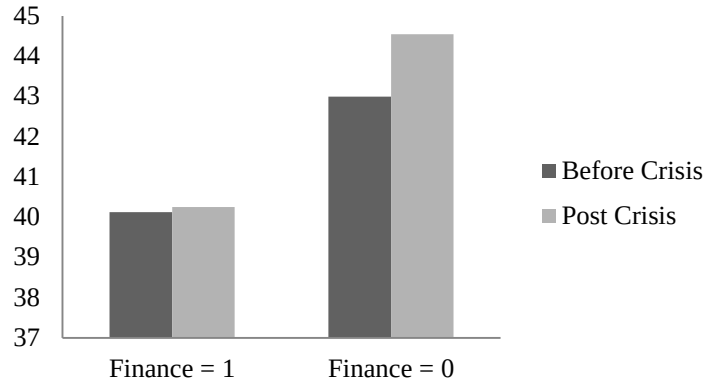
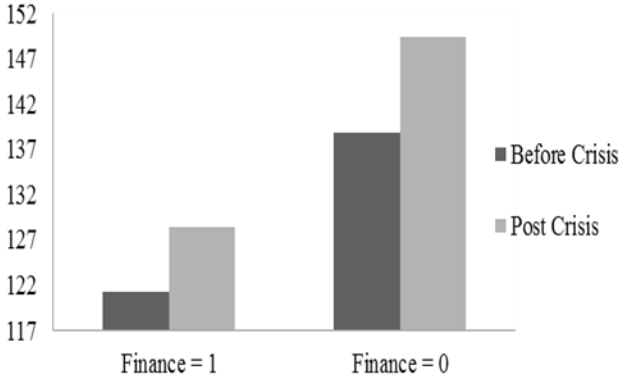
Figures 1, 2, & 3
Preliminary Support for H1

Yield_Soy



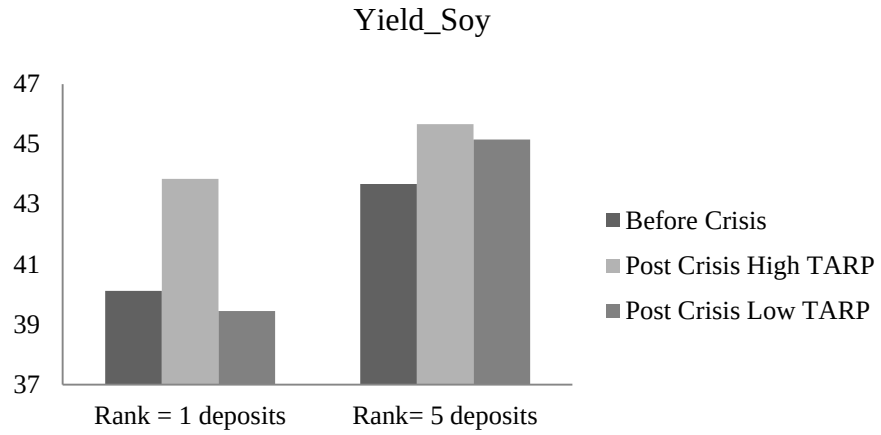
Yield_Corn



Univariate T-Test Avg. Means

	Before Crisis (A)	*Post Crisis (B)*	*Comparison of (A) and (B)*	
Correlation	Mean	Mean	Difference	t-statistic
Soy				
Finance = 1	40.122	40.249	-0.1271	-0.16
Finance = 0	42.994	44.547	-1.5536	-5.59
Corn				
Finance = 1	121.3	128.5	-7.1732	-2.98
Finance = 0	138.8	149.4	-10.587	-11.61

Figures 4 & 5
Preliminary Support for H2



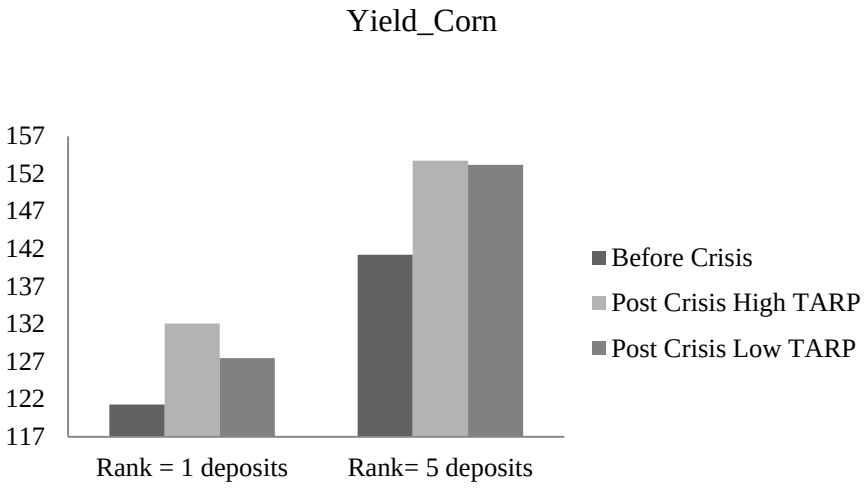


Table 1
Data Descriptives

Variable	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Yield_Soy	5111	43.2091763	9.5391719	37.2	44.8	50.3
Yield_Corn	5296	140.751888	32.6204396	121.9	146	164.1
Deposits	6286	1250981.64	6457318.63	151277	311081.5	678958
Finance	6286	0.1994909	0.3996495	0	0	0
TARP_Deposit_Ratio	6286	0.2669359	0.2691362	0	0.1951105	0.4415332
Unemployment	6251	6.424764	2.9271153	4.2	5.6	8.2
Per_Capita_Income	6251	24040.96	2446.53	22684.27	23877.01	25347.86
Population_Density	6252	121.36592	357.122489	12.985206	33.415514	81.2902407
Precipitation	6286	17.8700859	8.2062959	13.77	17.51	22.19
GDD	6286	8.0149895	0.2260632	7.820038	8.0401247	8.2035777

Presentation of pooled summary statistics for county-year crop observations. I examine counties in the 12 mid-western states from 2005 through 2011, excluding the year 2008, with non-zero yields of corn and soybeans. Individual crop yields are measured in bushels per acre. Crop yields data come from the National Agricultural Statistics Service (NASS), which is affiliated with the United States Department of Agriculture. Deposits represent the sum of all deposits held within banks insured by the Federal Deposit Insurance Corporation (FDIC) for a given county and a given year. Population Density is equal to the county population for a given year divided by the number of square miles in the county. Unemployment is equal to the percentage of the working population without employment for a given county-year. Per Capita Income is the average personal income for a given county-year, measured in thousands of dollars per person. Population, unemployment, and per capita income data come from the US Census Bureau's website. Precipitation and GDD represent the inches of precipitation and number of growing degree days in an associated crop's region from May through October of a given year, respectively.

Table 2
Descriptive Crisis Period = 1

Variable	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Yield_Soy	2503	43.9223332	9.4304192	38.5	45.1	50.5
Yield_Corn	2649	145.921329	31.0057019	127.3	151	168.5
Deposits	3145	1446918.93	7601255.82	169235	350785	749643
Finance	3145	0.1993641	0.3995858	0	0	0
TARP_Deposit_Ratio	3145	0.2680304	0.2673115	0	0.1988562	0.4403638
Unemployment	3129	7.9716523	3.1269524	5.4	7.9	10.1
Per_Capita_Income	3129	23161.23	2239.53	22066.1	23105.11	24234.86
Population_Density	3129	122.170239	357.343356	12.922754	33.390671	82.0785957
Precipitation	3145	20.2714754	9.1337872	15.63	19.28	26.16
GDD	3145	7.9864148	0.2428075	7.776535	8.0297585	8.1909089

These descriptives derive from the same sources as those above. However, they are derived from Crisis Period 1(Years 2009, 2010, 201

Table 3
Descriptive Crisis Period = 0

Variable	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Yield_Soy	2608	42.5247316	9.5944599	36	44	50
Yield_Corn	2647	135.578542	33.3734231	117	141.1	159.9
Deposits	3141	1054794.82	5052788.96	135666	279604	606597
Finance	3141	0.199618	0.3997768	0	0	0
TARP_Deposit_Ratio	3141	0.26584	0.2709891	0	0.1913039	0.4415463
Unemployment	3122	4.8744074	1.5983856	3.7	4.7	5.7
Per_Capita_Income	3122	24922.66	2325.1	23252.24	24845.88	26178.4
Population_Density	3123	120.560057	356.956469	13.00842	33.450474	80.1882654
Precipitation	3141	15.4656383	6.3009851	13.14	15.84	19.59
GDD	3141	8.0436006	0.2040177	7.8743588	8.0545226	8.2406489

These descriptives derive from the same sources as those above. However, they are derived from Crisis Period 0(Years 2005, 2006, 2007)

Table 4
Multivariate Results

	(1)	(2)	(3)	(4)
	soy_output	soy_output	corn_output	corn_output
Finance	-0.376	0.349	-5.431	-0.174
	(-0.42)	(0.54)	(-1.76)	(-0.07)
Crisis_Period	2.823***	2.936***	11.35***	13.72***
	(5.92)	(7.91)	(7.66)	(11.55)
Finance_Crisis_Period	-3.685***	-3.617***	-7.163**	-8.802***
	(-5.05)	(-6.03)	(-2.97)	(-4.19)
Finance_Crisis_Period_TARP	11.87***	5.477*	7.839	-5.541
	(4.01)	(2.16)	(0.97)	(-0.76)
Unemployment	-0.739***	-0.972***	-1.997***	-3.475***
	(-5.44)	(-8.06)	(-5.18)	(-8.23)
Per_Capita_Income	-0.000234	-0.000315**	-0.00128**	-0.00163***
	(-1.67)	(-2.94)	(-2.82)	(-3.53)
Population_Density	1.569***	0.438*	6.726***	3.002***
	(5.91)	(2.21)	(7.53)	(4.22)
Precipitation	2.468***	3.652***	9.864***	6.610***
	(8.29)	(11.07)	(10.00)	(5.72)
GDD	-4.038**	-8.018***	-27.71***	-69.01***
	(-2.71)	(-8.28)	(-6.18)	(-23.11)
_cons	72.06***	108.2***	350.8***	720.2***
	(5.57)	(13.05)	(9.02)	(27.01)
State Fixed Effects	No	Yes	No	Yes
R-Squared	0.0921	0.4297	0.1585	0.4168
N	5087	5087	5274	5274
t statistics in parentheses				
="* p<0.05	** p<0.01	*** p<0.001"		

Individual regressions for corn and soybeans. This table presents ordinary least squares regression results based on county-year-crop observations. The regression specification is $Yield\_Corn_{it} = \alpha_0 + \beta_1 Finance_{it} + \beta_2 Crisis\_Period_t + \beta_3 Finance*Crisis\_Period_{it} + \beta_4 TARP_{it} + \beta_5 Finance*TARP_{it} + \beta_n X_{it} + \beta_k S + e_i$ The dependent variable is crop yield, measured in bushels per acre. I separately sort corn and soybean .Regressions 1& 3 include no state fixed effects; Regressions 2 & 4 include state dummy variables. Low Deposits is a dummy variable equal to one if the level of bank deposits in a given county falls into the bottom quintile of all county-level bank deposits for a given year, and zero otherwise. Finance captures output when there is low access to capital in periods before the financial crisis and where access to TARP is zero Crisis_Period captures output during the financial crisis when access to capital is better and there is no TARP. Finance_Crisis_Period captures the difference in output in the financial crisis period when finance is poor and TARP is zero. Finance_Crisis_Period_TARP documents the relation in Finance_Crisis_Period as it changes as the level of TARP funding changes. Population Density is equal to the county population for a given year divided by the number of square miles in the county. Unemployment is equal to the percentage of the working population without employment for a given county-year. Per Capita Income is the average personal income for a given county-year. Precipitation and GDD represent the inches of precipitation and number of growing degree days in an associated crop's region.

Table 5
Agricultural Bank Results

	(1) **Agro = 0** soy_output	(2) **Agro = 1** soy_output	(3) **Agro = 0** corn_output	(4) **Agro = 1** corn_output
Finance	2.709 (1.53)	0.147 (0.13)	11.20* (2.20)	-4.213 (-1.03)
Crisis_Period	1.207 (1.67)	1.961** (3.07)	6.948** (3.20)	8.549*** (4.13)
Finance_Crisis_Period	-5.069** (-3.23)	-2.555** (-3.26)	-12.41* (-1.92)	-4.045 (-1.59)
Finance_Crisis_Period_TARP	5.776 (1.62)	16.72*** (4.77)	-6.668 (-0.75)	17.12 (1.79)
Unemployment	0.369* (2.15)	-1.387*** (-5.82)	0.785 (1.60)	-3.181*** (-4.40)
Per_Capita_Income	0.000311 (1.81)	-0.000267 (-1.13)	0.000125 (0.25)	-0.000788 (-0.98)
Population_Density	1.752*** (5.20)	3.542*** (6.59)	7.778*** (7.40)	12.74*** (6.97)
Precipitation	1.739*** (5.28)	6.247*** (3.64)	7.811*** (7.54)	20.53*** (3.68)
GDD	-0.344 (-0.20)	-5.583** (-2.67)	-20.45*** (-4.02)	-30.12*** (-4.63)
_cons	21.15 (1.35)	73.51*** (3.80)	233.9*** (5.16)	322.5*** (5.28)
R-Sqaured	0.125	0.1878	0.1986	0.243
N	2394	2693	2461	2813
t statistics in parentheses				
="* p<0.05	** p<0.01	*** p<0.001"		