



Crop Insurance, Credit, and Conservation

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Foreword

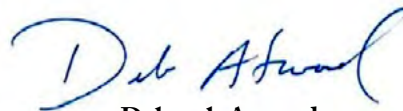
AGree seeks to drive positive change in the food and agriculture system by connecting and challenging leaders from diverse communities to catalyze action and elevate food and agriculture as a national priority. AGree recognizes the interconnected nature of food and agriculture systems globally and seeks to break down barriers and work across issue areas. Through collaboration and frank discussion, AGree continues to encourage a broad coalition of interests to build trust, find common ground, and develop shared strategies for achieving transformative change.

For over six years, AGree has worked to provide opportunities for candid dialogue about specific issues that affect agricultural producers across the country. Given the importance of both conservation programs and crop insurance in the 2018 Farm Bill debate, AGree is exploring strategies that drive broader adoption of conservation practices on working lands, while maintaining a viable crop insurance program across the United States.

This *Point of View* paper was written by Joshua Woodard, Professor at the Dyson School of Applied Economics and Management at Cornell University, and Scott Marlow, Executive Director of Rural Advancement Foundation International (RAFI). The paper, “*Crop Insurance, Credit, and Conservation*” examines the relationship between credit risk and the Federal Crop Insurance program and discusses how lending practices impact both agricultural investment decisions and conservation outcomes. Importantly, the paper outlines several research questions to guide future study about the ways that crop insurance impacts the supply and demand of credit and the linkages to conservation.

While the concepts discussed in this paper will enrich AGree’s discussions, they do not represent official AGree positions or the opinions of AGree’s Co-Chairs, Advisors, or partners.

We hope you find this paper to be a useful resource.

A handwritten signature in blue ink that reads "Deb Atwood". The signature is fluid and cursive, with the first name "Deb" being particularly prominent.

Deborah Atwood
Executive Director, AGree

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Crop Insurance, Credit, and Conservation

The largest direct farm program in the United States and the world is the United States Federal Crop Insurance program, with around \$100 billion in liabilities annually. The availability of finance and risk management markets can have large impacts on agricultural investment, land use, and production decisions. Indeed, it could be argued that the exceptional productivity gains observed in the last few decades in U.S. agriculture have been facilitated exactly because the U.S. has some of the most widely available risk management and credit markets in the world for agriculture. The risks associated with uncertainties and fluctuations in government policies—which arguably have never been higher—can also potentially affect longer term lending and investment decisions by farmers and agricultural lenders, given that risks to future liquidity will be impacted by variable future policy.

It has long been recognized that some agricultural lenders either require or consider crop insurance of borrowers in making loan decisions (e.g., Leatham, McCarl and Richardson, 1987). Nevertheless, with few exceptions (e.g., Pflueger and Barry, 1985; Knight et al., 1989) very little focus has been placed on investigating the intersections of Federal Crop Insurance and credit risk, how that in turn affects which types of production systems farmers choose to invest, and for which types banks are rightly willing to lend. There is some recent literature on the relationship between the quantity of short-term market debt and Federal Crop Insurance (Ifft, Kuethe, and Morehart, 2015), and also some academic studies through time on speculated environmental impacts of Federal Crop Insurance (e.g., Claasen, Langpap and Wu, 2016). However, very little work has been conducted which evaluates investment outcomes through the lens of the credit, insurance, and conservation nexus.

The purpose of this paper is to provide a brief discussion of the links between credit risk and Federal Crop Insurance (FCI), and how these could potentially mediate agricultural investment decisions and conservation outcomes.

How does crop insurance impact the probability that a farmer will default on a loan? How does this in turn affect the availability of credit? How does the availability of insurance & credit for financing different technologies impact what farmers choose to invest in? How would changing Federal Crop Insurance affect the ability of banks to lend for these activities? These core questions remain widely unaddressed to-date in the context of the U.S. agriculture and Federal Crop Insurance.

The purpose of this paper is to provide a brief discussion of the links between credit risk and Federal Crop Insurance (FCI), and how these could potentially mediate agricultural investment decisions and conservation outcomes. We also identify a few potential priority research questions in this area. The focus and scope of this paper is mainly restricted to U.S. agriculture and the FCI program, though to a limited extent we also discuss some links to more limited work in the developing country context. We would note the purpose is not to develop a fully comprehensive academic literature review, but rather to outline what we see as some core issues for future consideration and current knowledge gaps.

Supply and Demand of Credit, and Crop Insurance

Like other markets, economists tend to think about lending and credit in terms of supply and demand. How much money a farmer is willing to borrow at different interest rates or cost is determined by their demand for credit. The demand for credit (i.e., loans) by farmers arises from the availability of investment opportunities, risk preferences, and a host of other firm and market factors, such as crop insurance. Whether banks are willing to lend—and at what interest rate—is dictated by the supply of credit. The supply of credit provided by banks is determined by several factors including the risk of potential borrowers, the likelihood of repayment by those borrowers, the cost to the bank of obtaining loanable funds (e.g., deposits), information & search costs, among others. The eventual amount of credit extended in the market, and the interest rates charged on such loans, is determined by the intersection of these supply and demand curves.

From the farmer's perspective, insurance may positively impact demand for credit as, in risky markets like agriculture, it may allow them to consider investments they might not otherwise take on. Insurance can also free up cash reserves in the event of loss, allowing the farmer to invest more back into their next crop or into on-going conservation efforts. If the farmer fears there is significant risk of losing capital or collateral stemming from taking on debt, they may be less willing to borrow and invest in new technologies or practices (so called *risk rationing*). There are a variety of costs associated with bankruptcy which lenders and farmers both wish to avoid, including legal expenses, opportunity costs of idling production resources, and others. This type of risk rationing could potentially lock certain farmers into situations or production systems which are otherwise suboptimal

(either from their own or society's perspective). Having insurance can relax *risk rationing* behavior and open lines of credit, incentivizing and influencing investments. Thus, the availability of insurance could potentially be critical in pushing the needle on credit demand and subsequent investment.

Insurance can impact lending not only from the farmer's perspective, but also from the bank's perspective, both to whom they are willing to lend, and on what terms. Insurance can be critical from a lending perspective since it guarantees a minimum revenue or yield, which affects the farmer's ability to repay the loan. If insurance results in the farmer being less likely to default on the loan, the bank may be more likely to lend. That is, insurance availability in the market can impact the supply of credit. On the other hand, the absence of insurance can lead to an unwillingness of banks to lend, and so called *credit rationing*. That is, loans with insurance are generally viewed as lower risk, all else equal, and thus banks should need to hold less of a capital cushion against such loans.

So, what does credit & insurance have to do with conservation, potentially? If the insurance market is such that it favors certain practices or technologies over others, this might potentially impact which technologies, practices, and production systems farmers ultimately invest in and adopt. Likewise, the availability of insurance for different activities may well affect what activities banks are willing to lend, and their comfort with lending for particular production systems. While there is some evidence and a sound theoretical basis that the structure of insurance products in the market can impact agricultural practice adoption (Woodard et al., 2012), very little has been quantified about how lending might jointly play into this in U.S context or in specific circumstances. Also, very little is known about how alternative insurance schemes or policies (e.g., higher insurance premium subsidies on insurance for certain practices to incentivize adoption) might impact this lending dynamic.

Banking and Crop Insurance

According to *Crop Insurance America*¹ “*Crop insurance is important for securing loans: Banks can be hesitant in making loans to farmers, particularly to smaller producers, because the risks are inherently high. Banks regard a crop insurance policy as collateral in making what might otherwise be a very risky and costly loan to farmers who need to raise capital.*” Indeed, some companies explicitly ask about crop insurance on loan applications. It is also probably the case that banks prefer *ex-ante* crop insurance to *ex-post* government disaster payments, due to the uncertainty of the latter. With crop insurance, lenders know upfront what the contingencies are, but *ad hoc* disaster assistance is more uncertain and is not targeted. Of course, today *ad hoc* disaster programs in the U.S. have largely disappeared with the emergence of FCI, NAP, and Commodity Title and other risk management based programs.

Some lenders explicitly indicate that crop insurance is generally required for operating loans if the crop is used as collateral, and many ask about crop insurance participation on the loan application itself, and/or indicate that crop insurance may impact the credit decision.² Typically they are also careful to point out that the farmer can buy insurance from whoever they like without impacting the decision.^{3 4}

This point can rightfully be a sensitive one for banks and farmers, given that many banks also sell insurance. It is understandable that banks seek to be careful on this point to avoid potential appearances of conflicts of interest. From an economic standpoint, however, there is a clear basis for why the lender *should* perhaps require insurance. After all, it is not uncommon in other markets for banks to require insurance, such as for home loans and cars. Nevertheless, some banks have also claimed that their insurance and lending decisions are separate and do not influence each other (e.g., Wells Fargo).⁵ In other cases, lenders have rightly

recognized the reduction in transaction & information costs associated with buying crop insurance and making operating loans from the same vendor, but not spoken specifically to requirements.⁶

In any case, it is generally accepted that insurance impacts lending and collateral. James Callan, for example, states “At its most basic level, U.S. federal crop insurance serves rural communities by enabling farmers to obtain yearly operating loans—a prerequisite before banks will issue loans.”⁷ So, while perhaps not technically required by all banks, *de facto* it is generally recognized in the market that crop insurance is usually going to be required of a typical farm, at least for operating loans as a form of collateral. It is also difficult to imagine a scenario in which banks would not change their lending practices in the absence of FCI. Having crop insurance also limits risk to other assets which might be important for sustaining on-going operations.

There is evidence of this collateral effect in other realms as well. For example, Mishra (1994) argues for this collateral effect, and finds that the introduction of the Comprehensive Crop Insurance Scheme (CCIS) in India led to a significant increase in flows of credit to insured farmers, and significant increases in overall loan repayments. Also in the developing country context, Jensen et al. (2014) argues that insurance leads to a reduction in precautionary savings and increased investment; likewise, and similar to findings in the U.S. agricultural finance literature in the 1980’s, Carter et al. (2007) find that insurance may lead to lower insolvency risk and improved loan repayment; Carter et al. (2011) further find that that this is enhanced if credit and insurance are interlinked.

However, such findings are not universal. For example, while Karlan et al. (2014) acknowledge in the developing country context that credit market constraints and incomplete insurance can limit investment, they argue that capital constraints alone are not the only factors that can impede investment. Rather, they find that risk in general hinders investment.

- ***That credit constraints and financial structure (i.e., balance of debt to equity) can affect a host of farm outcomes in general is fairly well supported (Briggeman et al., 2009; Lambert and Volodymyr, 2005).***

They do find that the binding constraints on investment in their small-scale experiments, however, are due to uninsured risk. They also find that even for rainfall index insurance products (which have very high “basis risk”), that even imperfect insurance coverage leads to significantly greater investment.

That credit constraints and financial structure (i.e., balance of debt to equity) can affect a host of farm outcomes in general is fairly well supported (Briggeman et al., 2009; Lambert and Volodymyr, 2005). For example, Briggeman et al. (2009) find that being denied credit leads to lower production. Lambert and Volodymyr (2005) find that financial structure can affect both short- and long-run input use and efficiency on farms. They further find that these can be magnified in the presence of credit constraints. That is, they find that the Fisher separation hypothesis--that investment and financing should be independent--is violated. Their study investigated production generally, however, not with reference to conservation impacts. Whether these same credit constraint/debt/input use relationships apply generally to U.S. agriculture as it regards conservation practice use is certainly plausible, albeit not yet extensively documented or investigated.

Loosely speaking, in the presence of “perfect” financial markets (i.e., perfect information and efficiency in lending, risk transfer, insurance markets, and with

no taxes, no agency costs, no bankruptcy costs, and no information asymmetries), then investment and financing decisions should arguably be independent, and likewise neither should financial leverage have an effect on firm value. However, in reality, imperfections in financial markets or policies can certainly tilt the needle towards incentivizing certain activities or investments over others. Whether this is the case (and in what forms and how extreme) in U.S. agriculture as it regards conservation practice adoption and the insurance/credit nexus is a question that has not received a lot of attention to date in the empirical literature. Much more study here is needed.

Crop Insurance, Credit Risk, and Investment

Despite the important link theoretically and anecdotally between FCI and credit risk, there is fairly little empirical work in this area in recent history. Many of the studies that do exist using broad survey data tend to suffer from causality issues, and mostly rise only to the level of associative studies. Moreover, most of these studies have focused on short term debt, as opposed to longer run debt, investment, and wealth impacts of having crop insurance, and typically do not speak to conservation. There is almost no recent empirical work that explores the link between FCI and the probability of defaulting on a loan, nor on the impact of FCI policy on levels of bank economic capital.

For example, what would happen to the availability of agricultural credit if the FCI were eliminated? While most would likely agree that the market repercussions could be dramatic, no one has actually quantified this well, to our knowledge. What would this do to farmers’ ability and willingness to adopt further conservation practices? Again, this has not been properly quantified, though some have speculated that the first of those investments to be affected if crop insurance were eliminated may well be the voluntary conservation investments producers are making currently.

Past Evidence on the Credit-Insurance Link in U.S. Agriculture

While the evidence in most existing studies is generally limited as it applies to today's U.S. programs and markets, they are nevertheless instructive. For example, Leatham, McCarl and Richardson (1987) find that lenders should always prefer borrowers with crop insurance, all else equal. In another seminal study on the topic, Pflueger and Barry (1985) conduct a survey of farmers and lenders and find that—even in the infancy of the modern crop insurance program—nearly 60% of lenders surveyed indicated they either granted more credit or a lower interest rate to farmers with insurance.

In more recent work, Woodard et al. (2017), through an in-depth survey study of Texas farmers, find that the occurrence of credit denial significantly reduces the probability that a farmer will follow through on their investment plans. They also find that the occurrence of receiving a crop insurance indemnity in a given year reduces the probability of follow-through on their investment plan, perhaps suggesting that farmers in that study were under-insured. Additionally, they find that farmers facing borrowing constraints were less optimistic about the business environment. Ifft, Kuethe, and Morehart (2015) using United States Department of Agriculture (USDA) survey data, find that FCI participation is positively correlated with levels of short-term debt. Stutzman (2016) finds that loan and credit structure affect investment decisions. Burns and Prager (2015) show that FCI and direct payments played a small but important role in the survival and growth of U.S. commercial farms, even during the otherwise very strong period of 2007–2012. El-Osta (2016) finds evidence that U.S. farms with crop insurance have significantly higher debt servicing and repayment capacity.

Further work is needed, however, to quantify the impact of crop insurance on the probability of an adverse credit event directly. The lack of availability of loan level data

generally restricts work in this area. For example, what would default rates have been in a major drought year such as the historic 2012 drought, had no farmers been insured? How would lenders had reacted? While our sense is that the outcome would have looked much different from a bank and farm balance sheet perspective than it did under the current FCI, this has not been quantified.

Another overarching unknown is, what would be the impact on bank economic capital in the absence of a crop insurance program? Banks must hold an amount of capital to withstand unexpected losses, the amount of which is influenced by the risk of the underlying loans. Presumably, the provision of this insurance allows lenders to hold less economic capital against loans secured by crop insurance, and reduce the cost of lending. However, how much the absence of FCI would affect the credit delivery system is not known. Some groups have essentially argued that it would be irrelevant or small. Others have articulated opposing arguments. Nevertheless, agricultural lending risk is highly systemic, so presumably this could have a large effect, but how large is unknown. More research on the impacts of FCI on farm level loan performance and lender portfolio risk is needed in this realm. Quantification of these factors is needed to answer questions around the impact of FCI on the extension of credit, and ultimately on farm investment and wealth.

Crop Insurance and Environmental Externalities

It is important to note that farms that participate in Federal Crop Insurance are subject to strict conservation compliance provisions. The government has also on occasion changed rules for different conservation-oriented practices as well (e.g., cover crops in 2015). It is also important to note that next to the Federal Crop Insurance program, the Conservation

Reserve Program (CRP) has approximately 24 million acres enrolled, and this program can also factor into the equation and potentially interact with crop insurance.

The argument could also be made that the availability of credit and risk management markets causes producers to take on more risk, and to purchase more inputs for improving production. For example, some have argued that these markets allow for investment in more 'risky inputs', such as fertilizer. However, many early studies on the topic were either inconclusive, or found opposing results. For example, Horowitz and Lichtenberg (1993) examine how crop insurance affects corn farmers' fertilizer and pesticide use in the Midwest. They find that insurance has considerable influences on farmers' chemical use. Those purchasing insurance applied significantly more nitrogen per acre (19%), spent more on pesticides (21%), and treated more acreage with both herbicides and insecticides (7% and 63%) than did those not purchasing insurance. They suggest that both fertilizer and pesticides may be "risk-increasing inputs". An alternative explanation is that insurance relieves credit constraints.

While it is fairly well established that in fact farmers tend to over-fertilize as a form of physical insurance (perhaps regardless of crop insurance), leading to environmental consequences (van Es et al., 2007; Sherriff, 2005), at the same time some have argued that the provision of insurance may, on the other hand, actually cause farmers to under-utilize chemical inputs in order to extract undue payments from taxpayers and crop insurance companies (Smith and Goodwin, 1996, in conflict with the Horowitz and Lichtenberg results). There is only scant evidence, however, that the current insurance system causes under- or over-fertilization incentives under its current design, though it is fairly well established that farmers tend to "over-fertilize" generally in an average or expected year perhaps even in the absence of FCI.⁸ The case could even be made that a targeted risk management subsidy aimed at specific nitrogen use practices (such as split-apply) could in fact be warranted to incentivize farmers *not* to over-apply nitrogen early in the season as an alternative form of physical insurance.

While it is difficult to speculate as to how new and innovative crop insurance program ideas might result in driving broader adoption of conservation oriented practices like cover crops, split-apply and adaptive Nitrogen management, and others, much of the recent literature seems to indicate that the FCI program in its current state probably has had only marginal effects on environmental externalities (positive or negative), beyond potential effects related to practice and management choice. Weber, Key and O'Donohue (2016), for example, using a comprehensive dataset with approximately 32,500 farms, find that expanded coverage under FCI from 2000-2013 had "little effect" on fertilizer and chemical use, crop specialization, and others.

Likewise, recent evidence by Claassen, Langpap, and Wu (2016) suggest that the impacts on cropping systems from current insurance designs may be small. Namely, while they find that there could be some impacts of crop insurance, they find only very small impacts on the conversion of land; however, the analysis speaks very little to conservation practice choices. That crop insurance likely has little impact on the conversion of land into agriculture is also supported by other research (e.g., Young, Vandever, and Schnepf, 2001; Goodwin, Vandever, and Deal 2004). They do find more meaningful impacts on crop rotation patterns though, which can be important for conservation. These findings perhaps suggest that the full social costs of insurance are not embedded into premiums still; if this is the case, then differential or additional subsidies for conservation oriented practices or more specific rating of practices could perhaps be warranted. We would note also that such findings do not necessarily preclude the possibility that alternative insurance designs could have different impacts. We would also caution against compliance to reach such goals, but rather to rely on incentives, and to allow farmers to optimize on their own within those incentive structures.

With all that said, we should acknowledge that there are a variety of programs through USDA to encourage lending to small, beginning, and disadvantaged farmers. These programs are not always necessarily integrated

with risk management programs, but still could have important interactions. Evidence from Duke et al. (2016), for example, may allude to this possibility. While their study is not directly relevant to insurance, they find evidence that conservation easements may be indirectly enhancing the efficiency of underlying credit markets if producers are credit constrained. However, loan programs alone are probably not enough, and the existing programs (such as FSA Conservation Loans) are very small in volume. Indeed, sometimes these conservation oriented loan programs are met with low use, and improved education surrounding conservation could potentially increase uptake (see e.g., Stanaland et al., 1996).

Time/dynamic effects of conservation practices on soil health (and ultimately yield performance and risk) are also important to consider in designing new insurance products and subsidy policies. In many cases, it could take several years for a new practice to appreciably impact soil quality enough to impact risk rates. These effects are not explicitly considered under the current FCI program, nor are there mechanisms in the FCI to incentivize them (though one could argue that there should be). For example, consider if a given conservation practice in the first year of adoption rendered the crop riskier than if another conventional practice were used; but, consider that in the long run as soil quality improves, the crop becomes less risky (e.g., this might well be the case with certain cover cropping strategies). In this case, careful thought needs to be put to what kinds of policies could best bridge the time/risk gap between current conventions and future targets, and if crop insurance through alternative designs and subsidies can act as a conduit to achieve those targets or not.

Over time, such investments in technology and conservation efforts could lead to lower system risk, lower production risk, and higher productivity, though how much and in what specific cases is uncertain and largely undefined as it regards intersections with FCE. This integration could prove difficult as well, and requires good data. For example, even if one had enough data to evaluate the impact of using cover crops generally on risk and insurance rates, would one be able

to (or need to) specify the cover crop at the species level (e.g., cereal rye)? Or at the functional group level (e.g., grasses)? How would one design programs for cover crop mixtures rather than one crop? What about for different regions? How much precision and specificity is needed at the pilot stage? These are all highly debatable questions in specific instances that can only be addressed with adequate data. Ironically, the fact that these questions cannot be answered specifically without adequately specific data oftentimes precludes motivation to collect said data, or to propose changes to the program.

Looking Forward

Conservation practices are believed to generally improve soil fertility and sequester carbon, but also have complex impacts on soils that can be difficult to quantify. Improvements in soil health of some conservation practices are not immediate as well, and in fact in early years of adoption can perhaps lead to higher risk of loss in, say, the event of drought when using cover crops. As it regards the FCI's ability to capture these impacts, recent studies show that the government does not use soil data in the pricing of these insurance products (Woodard, 2016), potentially leading to adverse incentives for conservation practice adoption. Approaches to integrating soil type and quality information explicitly into the rating and design of the program is a necessary precursor to being able to later quantify impacts of sustainability practices.

So, how can the government design policies to better incentivize farmers to adopt these types of practices through risk management policy? And, what tools and intelligence can be developed to improve producers' ability in meeting conservation and sustainability goals? These are pertinent questions. While there are no easy answers, targeted risk management/financing packages aimed at priority or desired practices could perhaps be justified (if certain practices have sufficiently positive externalities in order to justify subsidization of them). It is probably important that this not be imposed on producers, but rather incentivized. For example, while

there is experimental evidence that certain cover cropping strategies can improve outcomes, the strategies are wide and varied to our understanding, and in fact large scale data analysis on the topic--particularly as it regards insurance impacts--is mostly absent. The risk of forcing farmers to do something when that something is not well-defined or well-quantified, is usually probably not a wise idea.

While it is difficult to draw firm and generalized conclusions based on existing empirical work, a few observations do arise. First, it seems that the availability of insurance can impact investment and demand for credit. Second, there is fairly broad understanding in the market that insurance impacts lending risk and the supply of credit, though how much has not been well quantified. Third, there are clear theoretical arguments that show that insurance can lead to an increase in the supply and demand for credit, as well as investment, especially when there are binding liquidity constraints, risk rationing, credit rationing, or other market imperfections. Yet, most of the research in this realm has focused on developing countries and index insurance, and not as much on FCI or in the context of conservation. There is also evidence in the U.S. that debt levels and insurance use are at least linked.

Further, while the direction of many of these effects regarding insurance and banking are not disputed, what is less clear are the magnitudes. As it regards the U.S. specifically, it is not known the magnitude to which insurance impacts the probability of defaulting on a loan. It is also not known how the provision (or absence) of Federal Crop Insurance would affect levels of bank economic capital. Again, the direction of the effect is not in dispute, but rather the magnitude. It is also less clear how much the provision of government insurance impacts long run farmer investment and wealth. Last, while there is some anecdotal evidence that the credit/insurance nexus jointly drives at least some investments decisions around conservation, it is not well investigated how this impacts practice choice, or how alternative insurance designs would impact practice and management choices in specific cases. More work here is needed.

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Endnotes

- 1 <http://www.cropinsuranceinamerica.org/issue-brief-crop-insurance/#.WNu7dPkrKUK>
- 2 For example, AGRIfinancial Services states “*Crop insurance required when crops secure the loan.*” <https://www.cgb-afs.com/LoanPrograms/OperatingLoans.aspx>
- 3 <https://www.cgb-afs.com/LoanPrograms/OperatingLoans.aspx>
- 4 See, *ARM Ag resource Management* “Ag Production Loans” <http://www.armlend.com/ag-loans.html>; the Crop Loan Application has 3 questions/attestations on application including “*I have Federal Crop Insurance in force*”, “*I am in good standing with Federal Crop Insurance.*”, and “*I have no outstanding past due Federal Crop Insurance premiums*”. Additionally, the application specifically states “*I understand that a certain level of crop insurance may influence the credit decision. Furthermore, I understand that I may purchase this crop insurance from any licensed agent, and specifically am not required to purchase that insurance from ARM as a condition of approval of credit.*” <http://nebula.wsimg.com/c12859aa35d3ca7153a1746172fbbe76?AccessKeyId=D44466EADCCC527413A8&disposition=0&calloworigin=1>
- 5 Wells Fargo’s website indicates that “*Banking and insurance decisions are made independently and do not influence each other.*” <https://www.wellsfargo.com/biz/online-banking/solutions/agriculture/>
- 6 Mid-America Farm Credit’s website states, “*When you work with Farm Credit, you work with a team that strives to understand your operation. By purchasing both crop insurance and operating loans with us, your financial services officer and crop insurance specialist collaborate to help you streamline the process.*” <https://e-farmcredit.com/farm-loans/operating-loans>
- 7 “The U.S. Federal Crop Insurance Program”, by James Callan, March 2013, AgriFin, available at <https://www.agrifinfacility.org/resource/us-federal-crop-insurance-program>
- 8 By “over-fertilize” we refer loosely to the phenomenon by which farmers have been observed to fertilize at an agronomic rate on the plateau of the expected yield/fertilizer curve under average weather conditions. They engage in such practices presumably to ensure that even in very wet years, that there is enough fertilizer in order to allow the crop to reach maximum production.

About AGree

[AGree](#) seeks to drive positive change in the food and agriculture system by connecting and challenging leaders from diverse communities to catalyze action and elevate food and agriculture as a national priority. The AGree Initiative is housed at [Meridian Institute](#), whose mission is to help people solve problems, make informed decisions, and find solutions to some of society's most complex and controversial issues.

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