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Theme Overview: The 2014 Farm Bill—An Economic Welfare Disaster or Triumph?

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The farm program components of the 2014 Agricultural Act deserve careful, thoughtful, critical assessments with respect to their potential economic benefits and costs, and their overall effects on economic welfare. Too often, perhaps, agricultural economists are accused of focusing only on the effects of farm programs on the farm and closely related sectors. However, any program should be evaluated in terms of its consequences for all of the individuals who are affected by the policies embedded in that program. These impacts are not simply limited to concerns about economic efficiency. As has been the case from the inception of debates over U.S. farm income and price support programs, equity concerns with respect to transfers of income are also important. These are the issues examined by a sequence of six articles in this new *Choices* theme: *The 2014 Farm Bill: An Economic Welfare Disaster or Triumph*?

The articles generally correspond to the major titles in the new farm bill and address price- and income-support programs, subsidized agricultural insurance, conservation programs, international food aid, the effects of domestic- and trade-related agricultural policies on economic efficiency and trade relations, and agricultural research and development policies. (Highlights of the nutrition and other titles were summarized in a related *Choices* theme.) All of the articles, each of which is authored or co-authored by distinguished Fellows of the Agricultural and Applied Economics Association (AAEA), raise substantive concerns about the distributional equity and economic efficiency effects of many of the programs they discuss. In this overview of these analyses, we begin by providing a brief background on the new legislation and evaluating the traditional arguments for farm subsidies that continue to be made by agricultural lobbies and related interest groups. We then provide brief descriptions of the major findings of each of the articles and a short summary of their implications with respect to the economic efficiency and economic welfare effects of the new farm bill programs.

Articles in this Theme:

A Paradox of Plenty: Agricultural Subsidies and the 2014 Farm Bill

After one of the longest Congressional debates ever over agricultural policy, The Agricultural Act of 2014 (P.L. 113-79, HR 113-333) was signed into law by President Obama on February 7, 2014. The omnibus legislation has been hailed by some lawmakers from both parties, especially members of the House and Senate agricultural committees, as a successful example of policy reform and deficit reduction. In his remarks made at the signing of the legislation, President

AAEA-0914-061

Obama paradoxically pointed out that "those at the very top of the economic pyramid are doing better than ever, but the average American's wages, salaries, incomes haven't risen in a very long time…a lot of Americans are working harder and harder just to get by." While the merits of this statement can be debated, it seems rather perverse in light of the fact that some of the wealthiest individuals in the economy are among the major winners of this windfall of subsidies, and the so-called budget deficit reduction aspects of the legislation are for, the most part, achieved through a notional $8.7 billion in cuts to food stamp recipients over a ten year time horizon.

The Congressional Budget Office (CBO) has scored the 10-year cost of the legislation at nearly $1 trillion. However, those cost estimates are based on long-run price projections. If prices fall, as they have recently done, and remain at low levels, the actual cost of the legislation could be far more than what has been projected by CBO. The political dynamics underlying this rare example of bipartisan legislation are showing signs of changing and rhetorical arguments regarding the necessity of subsidies to "save the family farm" are wearing thin. House Republicans attempted bigger farm program spending cuts and proposed separating nutritional assistance from farm subsidies—a change that would make passage of such an immense bundle of subsidies much more difficult.

The conventional wisdom underlying farm subsidies is built on a number of key assertions. Farms are assumed to be at an unfavorable financial position relative to non-farm small businesses. They are asserted to face more financial leverage and a higher probability of bankruptcy than do non-farm businesses. And farm households are often assumed to have less wealth and lower incomes than other households. The standard pro-farm policy rhetoric also typically claims that subsidies are needed to save small family farms. Farm subsidies are also often asserted to be important rural development mechanisms.

The intangible need to use subsidies to "save the family farm" has resonated well with the taxpaying-public and policymakers have appealed to this conventional wisdom to keep farm program subsidies flowing. However, the conventional wisdom is based on a paradigm that is, at best, a relic of history and the assertions that are often put forward to argue for billions of dollars in taxpayer subsidies are false in almost every case.

The fact is that U.S. agriculture is largely comprised of family farms that are made up of households that are far wealthier and that enjoy higher incomes than is the case for the overall non-farm economy. The U.S. Department of Agriculture (USDA) considers 98% of U.S. farms to have "high wealth," which is defined as household wealth greater than the median level for the economy as a whole. Farm households have realized substantially higher median incomes than has the typical U.S. household. In 2012, the USDA estimates that the median farm household realized an income of $68,298, 34% higher than the median total income of $51,017 received by all U.S. households (USDA Economic Research Service, 2014).

Like most small business owners, U.S. farmers depend on borrowed capital. However, the leverage ratio (debts over assets) of farms has fallen to less than 10%, which represents an all-time low. In contrast, the U.S. Department of Commerce (USDC) reported that U.S. households had an average leverage ratio of about 29% in 2010 (USDC, 2012). Between 2010 and 2013, net farm income rose from $78 billion to $130.5 billion. Projections for 2014 indicate a fall in net income to $95.8 billion, a decrease fuelled by lower crop prices, which is still 23% higher than in 2010. The Environmental Working Group (2014) reports that the top 20% of farm payment recipients received 89% of all farm subsidy payments over the period 1995-2012. Over the same period, 25% of all farm program payments went to only 1% of all recipients. Clearly, farm programs work especially well for households at the top of President Obama's economic pyramid.

In addition to the significant cuts to nutritional assistance, the legislation eliminated direct payments, which were made to farms without regard to their current production. Instead, crop insurance subsidies were significantly expanded and farmers are now allowed to choose from a suite of programs that serve to eliminate nearly all of the financial risk from farming. These insurance programs have a rather perverse feature of increasing the revenue guarantee to farmers when times are good. Higher prices yield higher guarantees and a drop in prices such as the one we are currently experiencing may trigger very significant taxpayer outlays.

Despite the rhetoric they use in public, agricultural policymakers and the farm lobbies are clearly well aware of these basic facts. The agricultural lobby is one of the most effective in securing subsidies. Higher cash rents and land values suggest that landowners, many of whom have little direct connection to production agriculture, are significant beneficiaries of subsidy payments. Likewise, the extensive crop insurance industry, which is paid significant subsidies to operate crop insurance programs and afforded risk-sharing terms that one would never find in private insurance lines, also receives a significant share of taxpayer outlays on subsidies. As a concept, insurance sounds like a reasonable approach to providing farmers with a farm safety net. However, with premium subsidies of 65%, the typical farmer receives over $1.90 in

payments for each $1 in premiums he or she pays. Add to this the substantial subsidies paid to crop insurance companies to operate the programs and it is easy to see how the CBO baseline score for crop insurance is over $41 billion over the next five years.

The Economic Efficiency and Welfare Effects of the 2014 Farm Bill

The above discussion clearly indicates that the farm program components of the 2014 Farm Bill deserve careful, thoughtful, critical assessments in terms of their potential economic benefits and costs. If the traditional arguments put forward by proponents of income transfers to the farm sector are largely vacuous which, from a factual perspective, certainly appears to be the case, then what economic welfare rationales for those programs do or do not exist? As discussed above, the six articles in this new *Choices* theme, *The 2014 Farm Bill—An Economic Welfare Disaster or Triumph?*, generally correspond to the major titles in the new farm bill. In his article, Professor Bruce Babcock considers the rationale for and the structure of the new subsidy programs introduced in Title I of the farm bill under the guise of farm income safety net programs. He concludes that Becker's hypothesis about the likely structure of programs that benefit the few at the expense of the many applies with respect to the new subsidy programs introduced in the 2014 Agricultural Act. In general, Becker argued, lobbies will seek subsidy programs for the interest groups they represent that tend to minimize adverse economic effects in order to maximize the income transfers while, at the same time, justifying the programs with superficially plausible arguments that often have little basis in fact. He concludes that such seems to be the case for the new quasi-price and -revenue support programs (Price Loss Coverage and Agricultural Risk Coverage) that are tied to a farm's historical production of a crop rather than the farm's current production decisions.

Professor Eric Lichtenberg examines the economic rationales for and the efficiencies of the plenitude of conservation programs authorized under Tittle II of the 2014 Agricultural Act. His careful assessment indicates that, while some of those programs are effective with respect to objectives such as soil conservation and reduced water pollution, many are poorly targeted, tend to be less efficient than they could be, and, in some cases (for example, the Conservation Stewardship Program), appear to provide few or no environmental or other conservation benefits.

Two articles address trade and international aid-related issues. Professors Christopher Barrett and Erin Lentz examine the problems associated with international emergency food aid that derive from cargo preference (requiring that emergency aid be transported on ships flagged in the United States), requiring sourcing of U.S. food aid from the United States instead of locally or regionally relative to the location where the aid is needed, and the monetization of food aid (where some non-government aid agencies sell aid food in markets in or near the country in which they operate and use the funds for other forms of assistance). They conclude that the evidence indicates that the extent to which emergency aid is required to be sourced in the United States rather than locally, monetization of aid is permitted, and cargo preference is required makes the U.S. emergency food aid programs very inefficient, both with respect to the amount of aid that can be provided with the aid budget and the timeliness with which the aid is provided. The cost of these inefficiencies is substantial in human terms: millions of lives that could be saved are not saved. The long-run morbidity consequences of malnutrition for, perhaps especially, children associated with the long delays that result from cargo preference and requiring U.S. sourcing in delivering emergency food aid are also extensive.

Professor Colin Carter investigates the trade policy implications of the 2014 Farm Bill with a particular focus on two aspects of the legislation: the new dairy margin protection program and the deliberate decision of the House and Senate agricultural committees to fail to address the trade relations and World Trade Organization (WTO) violations associated with the livestock-related Country-of-Origin Labeling (COOL) provisions of the 2008 Farm Bill in the new legislation. Both with respect to COOL and the new dairy program, as appears generally to be the case with all of the new subsidy programs, the 2014 Farm Bill appears to pay little attention to current U.S. trade commitments and is likely to adversely affect the ability of the United States to negotiate new trade agreements (such as through the Trans Pacific Partnership initiative) that will create broad-based economic benefits for U.S. consumers, exporters, and the U.S. economy as a whole.

The federal agricultural insurance program has become the elephant in the room with respect to farm subsidy spending, not least because it is politically sellable since it appears to provide subsidies to farmers when they most need them (when yields or incomes are somewhat lower than average). Currently, the program accounts for about 30% of all farm program subsidy spending, an estimated $8 billion a year or more, according to the CBO, and typically exceeds total annual federal spending on all conservation, foreign aid, and public agricultural research and development programs. Professor Brian Wright examines the economic benefits and costs of the federal agricultural insurance program and finds

little evidence to suggest that, overall, the program amounts to anything more than an income transfer targeted mainly to wealthier farm operations. At the same time, the program continues to encourage moral hazard behaviors that increase the inherent riskiness of farm operations while transferring most of the financial risks involved in farming to the taxpayers and also having complex spillover effects on the environment.

Finally, professors Philip Pardey, Steven Buccola, and Jason Beddow consider the provisions of the 2014 Agricultural Act with respect to the funding and execution of public research and development programs. They observe that the research title of the 2014 Farm Bill saw a small shift towards redressing a substantial decline in the absolute and relative position of U.S. public agricultural research and development (R&D) evident over the past two decades. The bill included a comparatively modest, but by no means game-changing, increase in nominal funding for agricultural R&D, a continuation of R&D Congressional earmarks, and the establishment of a new Foundation for Food and Agriculture Research (FFAR)—a non-profit corporation seeded with $200 million in one-time startup funds to be matched one-for-one with private funding to conduct research on problems of national and international significance. That, Pardey, Buccola, and Beddow note, is the mildly encouraging good news. The bad news is that the new funding streams are insufficient to redress the chronic market failure and underfunding realities that befall U.S. food and agriculture R&D and are unlikely to reverse the dramatic decline in the United States' share of global public food and agricultural R&D spending, with important adverse consequence for the future productivity of U.S. agriculture. They conclude that failing to sufficiently replenish the stock of public R&D knowledge in the face of ever-evolving pests and diseases, changes in climate, and changes in markets that all act to undermine past R&D-induced productivity gains has profound consequences for the competiveness of U.S. agriculture in the decades ahead.

In summary, from a short-term and longer term economic welfare perspective, the 2014 Agricultural Act generally appears mainly to be focused on transferring income to relatively wealthy farm families as well as some non-farm entities such as the U.S. mercantile marine and private insurance and reinsurance companies. It does so at the expense of consumers and taxpayers, the long-run productivity of the agricultural sector, and efficiently and effectively meeting humanitarian needs through reasonable reforms to international food aid programs. The new farm bill legislation does pay some attention to conservation issues and, relative to recent bills, does not intentionally reduce spending on public research and development programs. However, this *Choices* series of articles, each of which is engaging, provocative, and based on careful scholarship, sends a surprisingly consistent message. Like many of its recent predecessors, and perhaps to an even greater degree, the 2014 Farm Bill does much in the short term to improve farm and landowner incomes and wealth, especially for wealthier households, but does too little to improve agricultural productivity or efficiently address important conservation issues, and is likely to adversely affect the ability of U.S. trade negotiators to obtain new welfare-increasing trade agreements. And the legislation is likely to have such adverse effects for consumers and taxpayers that, in the aggregate, it will almost certainly reduce the economic welfare of the average U.S. citizen.

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Welfare Effects of PLC, ARC, and SCO

Bruce Babcock

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Keywords: Deadweight Loss, Farm Programs, Rent Seekers

The late Gary Becker (1930-2014), winner of the prestigious Nobel Prize in Economics and the Presidential Medal of Freedom, was a theorist who developed explanations for common phenomena not normally associated with economic inquiry. He analyzed drug addiction, crime, and family structure among many other topics. Of particular relevance to farm policy and the development of the Agricultural Act of 2014 is Becker's (1983) theory of political competition between rent-seeking pressure groups which predicts that policies that have enough political support to be adopted will tend to have two attributes.

First, they have lower deadweight losses—an economic measure of the loss of economic efficiency—than competing policies because high deadweight losses increase the political advantage of opponents. Second, the chosen policies will be designed to allow them to be defended as providing public goods, as correcting externalities, or as increasing social welfare, broadly defined. Policies with this second attribute create opportunities for public relations campaigns to deflect criticisms about wealth transfers from consumers and taxpayers to favored industries.

Leaders of the House and Senate agricultural committees introduced several new policies in the new farm bill, including the new commodity title programs called Price Loss Coverage (PLC) and Agricultural Risk Coverage (ARC), and the new crop insurance program called Supplemental Coverage Option (SCO). An examination of the likely deadweight losses from these policies along with the arguments put forward by their supporters shows that Becker's theory of competition provides a useful framework for understanding why farm subsidies have been so resilient.

Stated Rationale for New Farm Programs

Farm programs are largely written by House and Senate leadership with direct input from representatives of the beneficiaries of the programs. In addition to agricultural commodity group representatives, a relatively new beneficiary of farm support is the crop insurance industry, which consists of insurance providers and crop insurance agents. Congress uses baseline budgeting procedures—an accounting approach to develop future cost estimates that uses the current spending level adjusted by forecasts of inflation and population changes. Hence, the problem facing this collaborative group was how to allocate a largely fixed budget among programs and commodities that the group could support internally without generating so much opposition from external forces that it could not pass Congress and be signed into law.

Early in the process of creating the new farm bill, Frank Lucas, chairman of the House Agriculture Committee (R-OK) stated the rationale for farm programs as one of providing a necessary safety net:

> "Along with crop insurance, Title I programs form the very fabric of our farm safety net. They ensure that dramatic swings in commodity prices and volatile weather don't put our farmers and ranchers out of business."

Lucas went on to argue that taxpayers and consumers benefit from farm programs because they insure an adequate food supply:

> "While they (farmers) do the hard work of producing our food, we have to do our part to support them. Without a safety net, a few bad seasons can put a farm

> out of business. When we lose that source of production, we don't usually get it back. So maybe instead of speaking about this as a farm safety net, we need to start calling it a food safety net. Perhaps that will get the message out that commodity support keeps farmers in business, which keeps food on our plates." (Oklahoma Farm Report, 2011.)

Lucas' framing of the rationale for farm programs was adopted by nearly all supporters of farm subsidies because it was easy to state, easy to understand, and argued that, because the public interest was being served, farm programs deserved taxpayer support. Becker's theory focuses on how increasing deadweight losses from wealth transfers limit the equilibrium amount of transfer that will take place. The purpose in Lucas' framing of farm programs was to make it appear that transfers to farmers actually increase social welfare in an attempt to neutralize political opposition motivated by the economic damage such transfers can cause.

Actual Deadweight Losses

Farm programs have the potential for generating significant deadweight losses in two ways.

First, deadweight losses caused by inefficiencies in tax collection will occur even with lump-sum transfers. Assuming that the amount of money spent on farm programs was going to be spent on other programs and not used to reduce government outlays, the net increase in deadweight losses from tax collection to fund farm programs is zero. If actual farm bill spending changes relative to projections, then so, too, will deadweight losses associated with collecting taxes.

Second, within the crop-producing sector, a necessary condition for large deadweight losses is for farmers to significantly alter the mix of crops as a result of the incentives provided by the programs. Past experience with U.S. farm programs demonstrates that the mix of crops is significantly altered only if program payments are coupled with current planting decisions. Thus, the most important factor that determines whether farm programs have the potential for creating deadweight losses is whether the size of program payment varies with a farmer's planted acreage. One major discussion during the farm bill debates centered around whether subsidies should be paid based on the actual acres a farmer plants or instead on the farmer's "base"—which are the historical planted acres of certain crops (Zulauf, 2013).

Becker's theory predicts that, to reduce opposition to new farm programs, they would be designed to minimize deadweight losses by basing payments on base acres and base yields rather than actual planted acres. An examination of the three new programs for crops—PLC, ARC, and SCO—largely supports this prediction.

Price Loss Coverage

PLC is basically the previous countercyclical payment program with a new name and higher trigger prices. Payments are triggered when the season-average market price is less than a crop's reference price. The payment is equal to the product of 0.85 base acres of the covered commodity, the difference between the reference price and the effective price, and the program payment yield for the covered commodity. The key feature of this program is that payments depend on base acres and base yields. Thus, they are "decoupled" from actual planted acreage and will have minimal impact on acreage decisions, hence minimal deadweight losses. Even though payments to a particular crop may be substantial if market prices fall below program reference prices, there is no reason to believe that farmers will respond to large, anticipated payments for a particular crop by planting more because the amount of payment they receive will not be affected.

Agricultural Risk Coverage

ARC generates payments to farmers when per-acre actual market revenue falls below the ARC per-acre revenue guarantee. Growers have a choice of whether to calculate actual revenue and revenue guarantee on county yields or on farm yields. The key feature for ARC, in terms of it generating deadweight loss, is that payments are calculated using base acres as with PLC. Thus, an individual grower's planting decision has no effect on the size of any payment. Hence, ARC payments will not cause significant deadweight losses within the agricultural sector.

Supplemental Coverage Option

SCO is a new crop insurance program that makes payments if county revenue or yield falls below 86% of the SCO guarantee. Unlike PLC and ARC, SCO payments will be based on planted acres. Hence, they have the potential to distort planting decisions and cause deadweight losses. However, two features of SCO make it unlikely that these losses will be significantly higher than they currently are with other crop insurance programs. First, prices that will be used to set SCO guarantees will be the same prices used to set other crop insurance guarantees. Crop insurance prices reflect current market conditions at about the time that planting decisions are made. Thus, crop insurance guarantees provide no incentive to plant a particular crop that is not already reflected in current market prices. Second, price or revenue must fall 14% before an SCO payment is received so, at planting, there is a rather low probability that a payment will be received. An additional consideration that limits deadweight losses is that because SCO provides coverage between 86% and the percent coverage level of a grower's underlying crop

insurance, it is likely that many growers will substitute SCO coverage for their individual coverage level. Thus, even if crop insurance coverage causes deadweight losses, any net increase in deadweight losses from SCO should be negligible.

During the farm bill negotiations within and between the House and Senate agriculture committees, there was a lot of discussion about whether PLC and ARC payments should be calculated using base acres or planted acres. The Lucas rationale for farm programs argues for planted acres because it is difficult to imagine designing an effective safety net for soybean farmers who have wheat base if, for example, their payments are based on what happens to wheat. Arguments for base acres were made by groups concerned that farmers would otherwise plant in response to government prices rather than market prices, thereby resulting in deadweight losses. The compromise solution was to allow farmers to update their base acres using recent past planting decisions. This feature better aligned base acres to the crops actually planted on farms while keeping payments decoupled from current planting decisions. This compromise was consistent with Becker's prediction that consideration of deadweight losses is likely to be important in determining which policies are adopted.

Resiliency of Farm Programs

Record crop income in recent years and subsequent record-high land prices make it absurd to argue that crop subsidies are needed to maintain agricultural production capabilities in the United States. And the argument that the food security of the United States depends on subsidizing production of crops is easily countered by the fact that 30% to 40% of U.S. corn production is diverted to produce ethanol while about 50% of U.S. wheat production is sold in export markets. Yet these two arguments continue to be the primary justifications put forth for crop subsidies.

The disconnect between a lack of an actual economic rationale for farm subsidies and their continued existence demonstrates that farm programs exist not because of a need to enhance social welfare but rather to meet the political objective of members of Congress to care for a constituency that lends them political support. Thus, it is not surprising that record farm income in the last five years had no real impact on the question of whether farm subsidies would continue. Farm income levels have no impact on the benefit of subsidies to farmers and, hence, they have no impact on the political benefits to members of Congress to provide the subsidies.

The outcome of the recent farm bill, in terms of what programs were adopted, coincides nicely with Becker's theory of political competition with its focus on deadweight losses. The newly adopted programs will not lead to a significant misallocation of resources because program payments are decoupled from planted acreage. This attribute helped defuse opposition to the programs because, in one sense, they do no economic harm.

Unlike in some previous farm bills, the most important welfare costs of farm subsidies in the Agricultural Act of 2014 are not traditional deadweight losses, but rather the lost opportunity to use the funds for programs that unequivocally have the potential to increase social welfare. Examples include agricultural research, agricultural pollution prevention, invasive species control, transportation infrastructure investments, increased food quality and food safety inspections, and nutrition programs. But transferring funds from farm subsidies to these types of public goods will not happen without a dramatic increase in the political power of groups advocating for the public good, which is a daunting challenge, given the defuse nature of public good benefits and the highly targeted nature of the current subsidy programs to a relatively small number of farm households.

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Conservation, the Farm Bill, and U.S. Agri-Environmental Policy

Erik Lichtenberg

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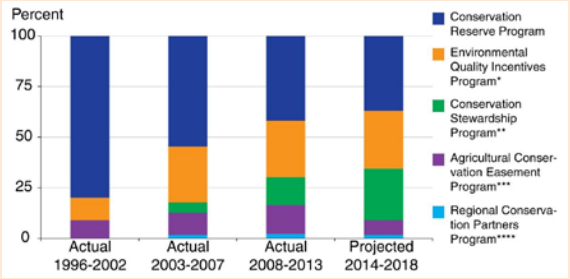
Keywords: Additionality, Conservation, CRP, EQIP, Slippage

Conservation programs have been a component of U.S. farm legislation from its beginnings in the 1930s. And from the beginning, those conservation programs have had multiple goals. Paid diversion of erodible land into conservation uses, introduced in the 1936 Soil Conservation and Domestic Allotment Act, was enacted largely as an alternative means of providing financial assistance to farmers by controlling supply after the 1933 Agricultural Adjustment Act was declared unconstitutional by the Supreme Court. Suspended during World War II and its aftermath, when commodity prices were high, paid diversion of cropland into a Soil Bank was reintroduced by the 1956 Agricultural Act. The Soil Bank consisted of both fallowed cropland and a conservation reserve on which the government paid for measures that reduced erosion, enhanced wildlife habitat, and addressed water quality and other concerns. Similar provisions were contained in farm bills but were abandoned in the early 1970s, when commodity prices spiked because of Soviet grain purchases.

Paid diversion of erodible farmland into conservation uses, combined with government financial support for conservation investments, returned in the form of the Conservation Reserve Program (CRP) in 1985, at the time of a farm financial crisis caused by overexpansion during the high price years of the 1970s (Cain and Lovejoy, 2004; and Lubben and Pease, 2014). The CRP was publicized as ushering in a new era in agricultural conservation that stressed environmental protection. However, from the beginning, supply control and protection of agricultural productivity were also explicit CRP goals (Reichelderfer and Boggess, 1988).

Federal cost-share financing for conservation investments, together with technical assistance for planning on-farm conservation, also dates back to the 1935 Soil Conservation Act (Cain and Lovejoy, 2004). Until recently, spending on subsidies for conservation on working farmland was small relative to expenditures on paid land diversion programs. Since 2002, however, working farmland

Figure 1: Shifts in Conservation Spending Toward Working Farmland and Away from Diversion of Land to Noncrop Uses



*Includes EQIP and the Wildlife Habitat Incentives Program for 1996-2013.

**Includes the Conservation Security Program for 2002-2007.

***Includes the Wetland Reserve Program, Farmland Protection Program, and Grassland Reserve Program (easement portion) for 1996-2013.

****Includes the Agricultural Water Enhancement Program, Chesapeake Bay Watershed Program, Cooperative Conservation Partnership Initiative, and Great Lakes Basin Program for 1996-2013.

Source: USDA Economic Research Service and ERS analysis of Office of Budget and Policy Analysis data on actual expenditures for 1996-2013; spending levels provided in the 2014 Farm Act and Congressional Budget Office estimates for 2014-2018.

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conservation subsidies have become a growing share of federal farm conservation expenditures. They now represent about half of all conservation spending authorized by the 2014 Agriculture Act (Figure 1).

Why Subsidies for Conservation?

Why do we subsidize conservation? The original argument was that these subsidies are needed to protect the nation's capacity to produce food and fiber in the face of threats from erosion and other forms of land degradation. The question that arises in this context is, where's the market failure? Private ownership combined with well-functioning land and capital markets, as in the United States, create incentives for farmers and landowners to invest in conservation to protect land productivity (McConnell, 1983). Land and capital markets may not have functioned well in the 1930s, as the Dust Bowl experience suggests, but ought to function well today. Information about prices, productivity, and conservation is readily available. The U.S. farm credit system, whose purpose is serving agriculture, provides institutional infrastructure for financing conservation investments should private financial institutions prove incapable of that task. There's a clear public good rationale for publicly provided technical assistance, but it's hard to see a market failure rationale for spending public money to protect private farmland.

Environmental protection provides a stronger rationale. Agriculture is a major contributor to many environmental problems in the United States. Arguably, the major concern is water pollution: agriculture accounts for an estimated 70% of the nitrogen and phosphorus creating the dead zone in the Gulf of Mexico, and 40-50% of nitrogen phosphorus pollution in the Chesapeake Bay, as well as in numerous other waterways (Alexander et al., 2009; and U.S. Environmental Protection Agency, 2010). Farming is also responsible for the destruction of wildlife habitat in many areas and is seen as a major threat to habitat for some endangered species. In addition, farming practices such as confined animal feeding operations (CAFOs) may also be important sources of air pollution in some areas.

In fact, agriculture is largely exempt from most environmental regulation—notable exceptions being pesticides, endangered species, and, for water pollution, CAFOs, which are required to have permits for discharges into waterways in compliance with the Clean Water Act. Instead, subsidized conservation is the main way we address most environmental problems in agriculture. Taxpayers pay to place environmentally sensitive croplands into conservation uses via the CRP, Wetlands Reserve Program, Grasslands Reserve Program, and the new 2014 Farm Bill's Agricultural Conservation Easement Program. And we share the costs of adopting conservation measures on working farms via the Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP). The implicit assumption is that these conservation activities and environmental protections are close complements so that these conservation subsidy programs help protect the environment.

There are several reasons to expect that addressing environmental problems through the conservation programs authorized in the farm bill may not work so well. Viewed strictly through an environmental lens, these programs suffer from significant problems with their design and in how they are implemented that make them less than fully effective.

Problems of Design: Slippage and Additionality

Subsidy incentives for reductions in environmental damage have two kinds of effects (Baumol and Oates, 1975). They do create incentives for agents to cut back on activities that have negative environmental effects. For instance, providing cost-share assistance for adopting conservation practices that reduce nutrient runoff makes it more likely that farmers will adopt those practices, leading to less runoff and improved water quality. However, cost-sharing subsidies for conservation practices and payments for taking highly erodible land out of production make farming more profitable, creating incentives for farmers to expand their operations in ways that, at least partially, offset any pollution reductions. In other words, programs such as the CRP, EQIP, and CSP are prone to what is called "slippage."

The available empirical evidence indicates that slippage effects have been fairly substantial. Econometric studies have found that for every 100 acres enrolled in the CRP, 20 acres were converted from non-crop to crop use (Wu 2000, 2005; Roberts and Bucholz, 2005; and Uchida, 2014). Slippage has not been confined to CRP. Receipt of cost sharing by Maryland farmers was associated with large reductions in areas of vegetative cover, consistent with conversion to crop use (Lichtenberg and Smith-Ramirez, 2011). Federal programs that provide cost sharing for conservation practices make it profitable for farmers to convert some grazing land to crop production because those practices reduce or prevent erosion. Nutrient runoff from the land converted to crops will increase because runoff from cropland is greater than runoff from vegetative cover. In a similar vein, using data from a later period, Fleming (2014) finds that cost sharing of cover crops in Maryland reduces acreage on which stripcropping and contour plowing are used. This suggests that reductions in nutrient runoff due to the use of cover crops are at least partially offset by increases in soil erosion and runoff because of reductions in stripcropping and contour plowing.

A closely related question concerns the issue of "additionality"—how much extra environmental protection we get from conservation subsidy payments above and beyond what farmers would have done without them. For example, how much of the land enrolled in the CRP would have been put into conservation uses if not enrolled in CRP? How many EQIP- or CSP-funded projects would farmers have undertaken anyway? And are there screening mechanisms in place that ensure we get what we pay for?

It seems likely that additionality would be greatest with EQIP and least with CSP. The U.S. Department of Agriculture (USDA) exercises substantial oversight of projects funded under EQIP. For example, only projects approved by Natural Resource Conservation Service (NRCS) technicians are eligible for EQIP funding, a screening process that may weed out projects that have little merit. To be eligible for CRP enrollment, parcels must have been cropped in at least two of the preceding five years—a less stringent criterion than technical approval by NRCS but nonetheless providing some assurance that some cropland is diverted into conservation uses. CSP, in contrast, explicitly allows funding for measures that farmers are already using. In such cases, the subsidy results in no additional environmental protection for the money.

Figure 2a: Relationship between CRP Enrollment and EBI by State

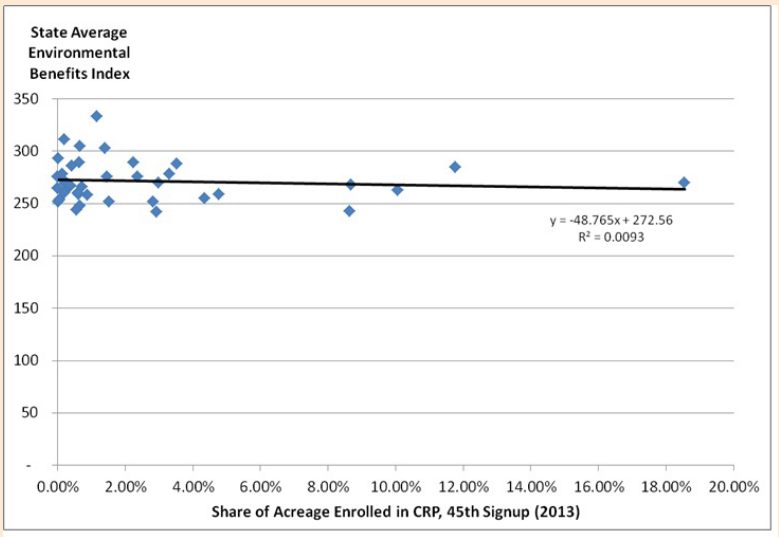
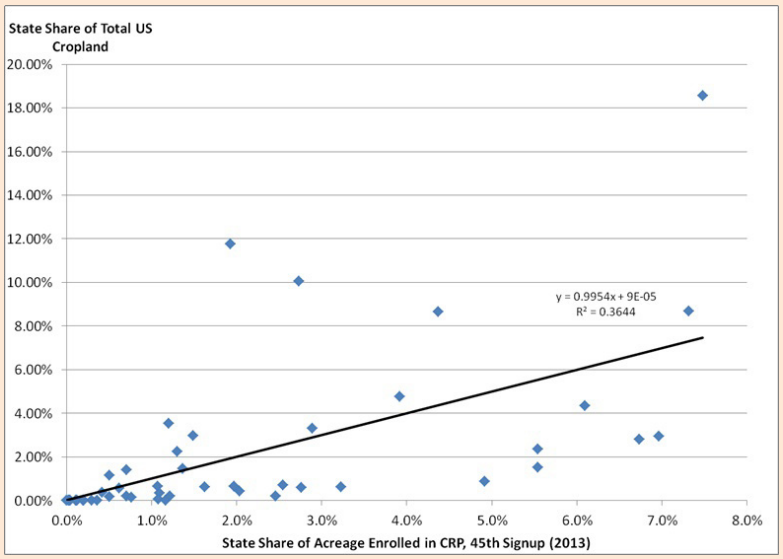


Figure 2b: Relationship between CRP Enrollment and Cropland by State



The limited empirical evidence we have is consistent with that characterization. Cost sharing under the EQIP program made farmers substantially more likely to install many conservation practices (Lichtenberg and Smith-Ramirez, 2011; Mezzatesta, Newburn, and Woodward, 2013; Fleming, 2014; and Claassen et al., 2014). Substitution between practices due to differences in cost-share rates and eligibility, however, suggests a need to adjust estimated additionality downward (Lichtenberg, 2004; and Fleming, 2014). Studies of CRP suggest that additionality could be quite low, especially once slippage is taken into account (Roberts and Lubowski, 2007; and Lubowski, Plantinga, and Stavins, 2008). Additionality in the CSP has not, to my knowledge, been studied.

Problems of Implementation: Single Instruments, Multiple Objectives, and Institutional Structure

Economic theory indicates that policies using a single instrument in pursuit of multiple objectives are bound to be inefficient unless those objectives are perfect complements (essentially, perfectly linked), not just related to one another. Federal conservation programs have always had multiple objectives: protecting farm productivity by reducing erosion, preserving wildlife habitat, protecting water quality, and supporting farm incomes. These objectives are not perfect complements on any farm.

Figure 3a: Relationship between EQIP Spending and Water Quality by State

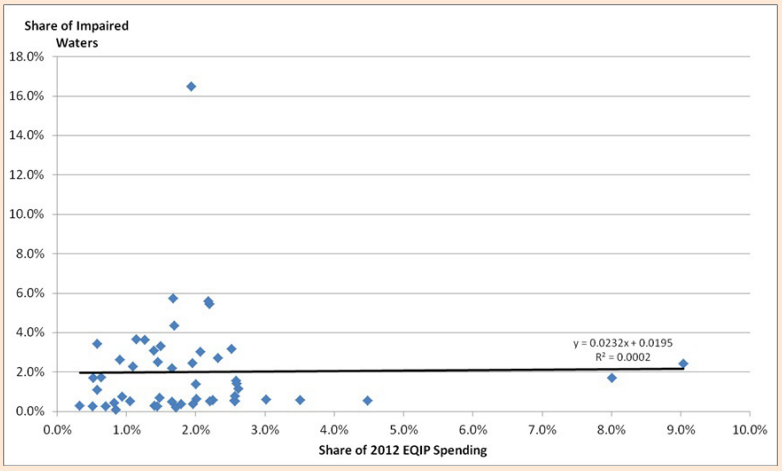
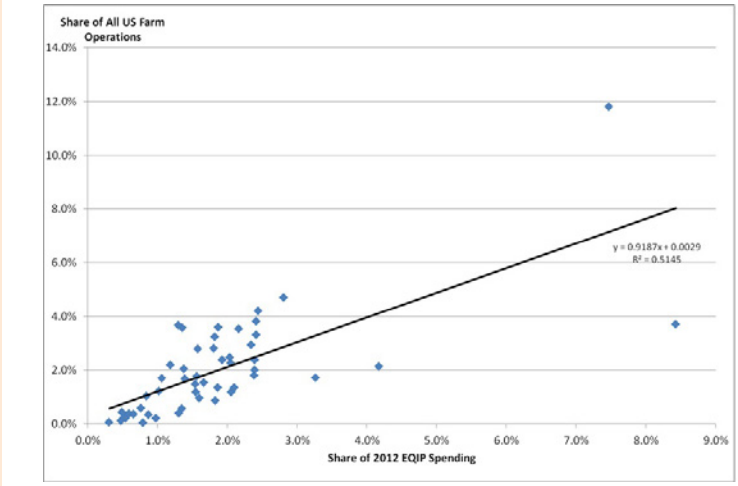


Figure 3b: Relationship between EQIP Spending and Number of Farm Operations by State



From a broader perspective, they are not necessarily even closely related; that is, accomplishing one objective does not move the farm very far forward with respect to the other objectives. Parcels that provide significant wildlife habitat benefits, for instance, may provide few benefits in terms of water quality protection, so that optimal selection of parcels for CRP enrollment to maximize wildlife habitat will be very different than optimal selection of parcels to maximize water quality protection (Wu, Zilberman, and Babcock, 2001). And, of course, complementarity between environmental quality and supply control/income support objectives on the other is far from assured.

Empirical analyses of CRP suggest that the allocation of conservation funds has not come close to getting the most social value for the money. Early CRP enrollment decisions were more consistent with getting as much land as possible into the program rather than maximizing environmental benefits (Reichelderfer and Boggess, 1988). As a result, CRP enrollment was heavily oriented towards the High Plains, where land was cheap but social damage from erosion was small. The CRP budget could have generated much greater social benefits had it been oriented towards the Corn Belt and Eastern Seaboard states, where water quality problems are more pressing and affect a much larger share of the U.S. population (Ribaudo 1986, 1989). In 1991, USDA introduced an explicit Environmental Benefits Index (EBI) to be used to weight CRP enrollment bids as a means of reorienting sign-ups toward environmental goals. As a result, enrollment in the Corn Belt and Lake States increased, suggesting greater water quality benefits. But even today, wildlife viewing and recreational hunting—concentrated in the Plains states—account for almost 60% of the estimated environmental benefits of the CRP (Hansen, 2007).

In fact, the extent to which the EBI steers enrollment to the most environmentally sensitive areas is by no means clear. Figures 2a and 2b compare the share of acreage enrolled in the 45th CRP signup in 2013 by state with each state's average EBI and share of total U.S. cropland. There is no apparent relationship between the share of acreage enrolled and the average EBI. There is, however, an almost perfect correlation between a state's share of acreage enrolled in the CRP and that state's share of total U.S. cropland, a pattern more suggestive of formula funding than of funding allocated in accordance with environmental benefits.

Similar patterns emerge when spending shares on EQIP and CSP are compared with measures of environmental quality versus farming activity. Figures 3a and 3b compare shares of 2010 EQIP spending by state with each state's share of impaired waterways (admittedly a crude measure of environmental quality problems) and, since EQIP targets both crop and livestock farms, its share of U.S. farm operations. Figures 4a and 4b compare shares of 2010 CSP spending with each state's share of impaired waterways and share of

Figure 4a: Relationship between CSP Spending and Water Quality by State

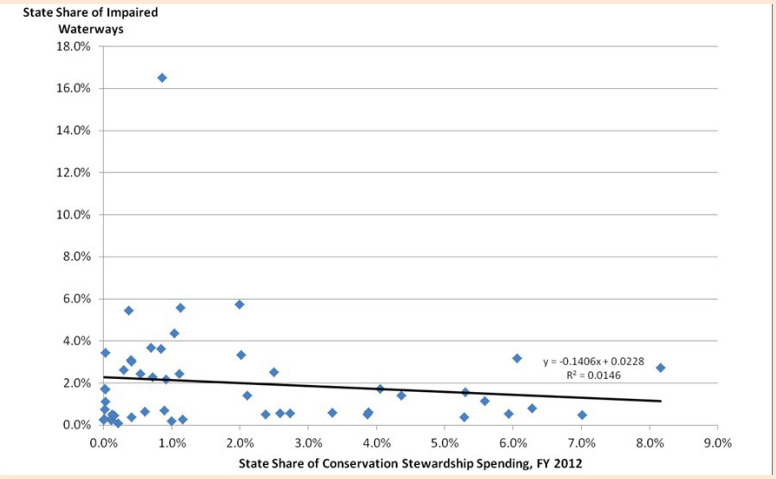
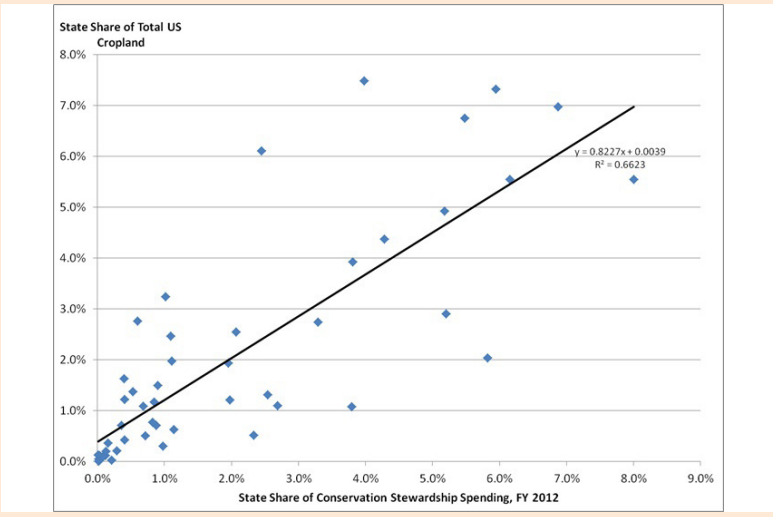


Figure 4b: Relationship between CSP Spending and Cropland by State



U.S. cropland. There is no apparent relationship between conservation expenditures in each state under each program and water quality problems. There is, however, a close relationship between conservation spending in each state and a measure of farming activity—as in the case of CRP, a pattern suggestive of funding allocated to support farm interests rather than improving environmental quality.

These spending patterns are consistent with an overarching outlook of an agency that exists to serve commercial farm interests, including siphoning money from the public purse into commercial commodity farmers' pockets. USDA has, in fact, been characterized as the archetype of an agency designed to use public power to serve private interests (McConnell, 1967; and Lowi, 1979). USDA's institutional structure reinforces that ethos. EQIP and CSP funds are allocated among states by formulas that primarily reflect the amount of farming in each state. The power to allocate EQIP and CSP funds within each state lies in the hands of county-level committees elected from and by local agricultural producers, who may be oriented largely toward supporting farm productivity and income (Bastos-Filho and Lichtenberg, 1991).

Final Remarks

This article has arguably been unduly harsh in its evaluation of the farm bill's conservation programs. It is certainly true that those programs have done a great deal of good in terms of promoting erosion and runoff control measures, protecting and expanding wildlife habitat, and improving the natural environment in other ways. It is also true that the environmental performance of the CRP has improved over time. Perhaps, too, the farm bill has been the only politically feasible way to provide any funding to address environmental problems in agriculture. Moreover, some of the evidence I presented is suggestive rather than dispositive. But the weight of the evidence indicates that, in principle, we could get more environmental protection for the money we spend under the farm bill's conservation titles. And the evidence, combined with what we've observed of USDA's institutional culture, suggests that will likely be the case as long as environmental problems in agriculture are addressed via the conservation titles of a farm bill.

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The Negligible Welfare Effects of the International Food Aid Provisions in the 2014 Farm Bill

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JEL Classifications: O19, P45, Q18
Keywords: Farm Bill, Food Aid, Food Assistance

As of 2013, globally, 840 million people were estimated to be food insecure (FAO, 2013). With an annual average budget of about $2.2 billion over the past decade (Schnepf, 2014a), international food assistance from the U.S. government (USG) cannot possibly support all food insecure individuals. As a result, the USG, like other major food assistance donor countries, has increasingly concentrated its assistance on populations affected by natural disasters and "complex emergencies" involving conflict, where food assistance's positive impacts are greatest (Barrett and Maxwell, 2005). A growing body of rigorous evidence strongly indicates that increased flexibility for the USG to choose the most appropriate form of food assistance for a given food emergency could reach more individuals, faster, and with greater recipient gains, for the same budget, than has been feasible to date given the legislative restrictions on the use of food aid funds. Currently, most of those funds must be used to make food aid purchases in the United States and then those purchases are shipped from the United States to recipient countries on U.S.-registered ships at a relatively high cost.

While the Agricultural Act of 2014—commonly known as the 2014 Farm Bill—moves U.S. international food aid and food assistance policies in the right direction, ultimately it falls far short of what could be done. Globally, over the past decade, international food assistance has been radically reinvented by most donor countries (Barrett, Binder, and Steets, 2012). The Canadians, Europeans, and other donors now procure little or no food from within their own borders. Instead, they provide cash and vouchers, and increasingly rely on local and regional procurement (LRP) whereby food aid commodities are acquired in recipient or neighboring countries rather than being shipped from the donor country. In 1994-95, 13% of all global food aid (by value) was LRP; by 2010, that number had increased to 67%. The United States has been far slower to embrace new forms of food assistance, becoming increasingly isolated and now almost the sole provider of old-fashioned, transoceanic food aid, responsible for 89% of global deliveries in 2011.

Recent studies have reported that LRP, cash, and vouchers are faster and typically more cost effective (U.S. Government Accountability Office (GAO) 2009; and Lentz, Passarelli, and Barrett, 2013). For example, a nine-country study found that, on average, the cost savings for grains purchased locally relative to grains purchased within the United States was 53%. For pulses and legumes, the average savings was 25%, although there were little to no savings from locally or regionally purchasing processed products such as vegetable oil and corn-soy blend (Lentz, Passarelli, and Barrett, 2013). The same study also reported that, on average, LRP, cash, or vouchers reduced food aid delivery times by 13.8 weeks relative to transoceanic food aid. The savings in delivery times were even more substantial for aid targeted for landlocked countries (Lentz, Passarelli, and Barrett, 2013). Increasing the timeliness is particularly important for food-insecure children because the first 1,000 days of a child's pre- and post-natal existence—from conception until a child turns age two—is the most critical window for nutrition during a person's life (Black et al., 2013). A savings of 14 weeks in the delivery of food assistance can have a substantial, lifelong effect on human capital development with important and significant long-term implications for economic growth and poverty reduction.

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The International Food Aid Provisions of the 2014 Farm Bill

Emergency food aid represents a tiny share of the total estimated cost of the 2014 Farm Bill, about 0.4% (Mercier, 2014). Both the U.S. Department of Agriculture (USDA) and the U.S. Agency for International Development (USAID) receive food assistance funding under the farm bill with about 75% allocated to USAID's Title II (Food for Peace) emergency and development programs.

In fiscal year (FY) 2012, Food for Peace delivered 1.4 million metric tons of food to recipients in 44 countries, worth $1.6 billion (USAID, 2013). Food for Peace also receives funding through other programs and, in 2013, under the Emergency Food Security Act, the program provided $373 million for LRP, cash, and vouchers in 19 countries. USDA also runs smaller food assistance programs, including the McGovern-Dole Food for Education program and Food for Progress (USDA and USAID, 2013).

The food aid provisions in the 2014 Farm Bill authorize several changes relative to the 2008 Farm Bill. First, the provisions increase the allocation of Title II funds to section 202(e) from 13% to 20%, an increase of about $100 million. 202(e) offers cash funding to cover non-commodity costs associated with food aid programs such as administrative costs. The farm bill also relaxes some of the restrictions on the use of those funds in providing food aid (USAID, 2014a; and Mercier, 2014). As a result, USAID now has more flexibility to give operational agencies cash for programming that complements food deliveries (for example, maternal and child health center staffing).

Through USAID's ability to draw on more 202(e) cash funding, the agency can also curtail the practice of "monetization" of U.S. food aid—the process in which aid agencies sell U.S. food aid in developing countries to raise cash needed for food security projects (Barrett and Maxwell, 2005; and GAO, 2011). Monetization had become widespread, routinely accounting for more than half of Title II non-emergency food aid and more than 90% of Food for Progress resources over the last two decades. But monetization wastes millions in U.S. taxpayer dollars and has often proved disruptive to regional markets. In FY 2012, Title II food aid monetization had only a 75% cost recovery rate and, therefore, wasted $32 million of taxpayer dollars—enough to feed more than 800,000 additional individuals—while USDA's Food for Progress monetization yielded only 58 cents of revenue for aid agencies for every taxpayer dollar spent procuring and shipping the commodities (GAO, 2011). The practice has, therefore, been eliminated by most other donor countries. Even some aid groups, such as CARE and Technoserve, have turned down funds generated through monetization. The USAID argues that the ability to use 202(e) funds rather than proceeds from monetization to provide various forms of aid will enable the agency's aid programs to reach 600,000 more people per year (USAID, 2014a).

Second, the farm bill authorizes an $80-million-per-year LRP program to replace a previous pilot program managed by USDA. This increase in the flexibility with which food assistance can be delivered represents only 3% of total U.S. food assistance funding. Further, it remains to be seen whether Congress will appropriate resources for this new program. In FY 2012, USAID reported that LRP cost about 20% less than emergency Title II programs (USAID, 2014b). Because the program will be run by USDA, however, it runs a real risk of not being integrated well with core Title II emergency programs that are run by USAID.

Other changes to the farm bill may also improve food aid programming at the margin. First, USAID is required to improve its reporting on costs, including on monetization programs that generate 70 cents on the dollar or less (Congressional Research Service (CRS), 2014). Greater transparency about grossly inefficient monetization events could curtail them and may help make the case for more cash-based assistance. Second, the 2014 Farm Bill extends efforts initiated in the previous 2008 Farm Bill to improve food aid quality and safety (CRS, 2014). Third, the farm bill authorizes $10 million per year (up from $8 million per year) to fund prepositioning of food, a practice that improves delivery times, albeit at higher costs relative to non-prepositioned, transoceanic food aid or LRP (GAO, 2014).

These provisions all represent modest progress in the direction of flexibility, cost-effectiveness, and timeliness. Nevertheless, and far more importantly, the 2014 Farm Bill failed to relax the core restrictions placed on the Food for Peace programs managed by USAID. Title II food aid must still be purchased in the United States and shipped abroad under an anti-competitive restriction on ocean freight called "cargo preference" that compels the USG to send at least 50% of all food aid (measured by volume) on American-flagged vessels (GAO, 2007). In FY 2006, shipping on U.S.-flagged vessels cost 46% more than shipping the aid at competitive freight costs (Bageant, Barrett, and Lentz, 2010). In fact, more recently in FY 2012, American taxpayers spent more Food for Peace aid funds on transport and handling (45%) than on food (40%) (GAO, 2014b; and USAID, 2014c). By contrast, Canada spends roughly 70% of its food aid budget on commodities because it does not face the same anti-competitive restrictions, especially on

shipping, and makes far more extensive use of LRP, cash, and vouchers.

Further, the 2014 Farm Bill failed to relax a "hard earmark" enacted in the 2008 Farm Bill that restricted the USAID administrator's ability to reallocate non-emergency resources to cover emergency needs. The 2014 Farm Bill replaced the former expenditure minimum with a provision that between 20% and 30% of funds—or a minimum of $350 million per year—be spent on non-emergency food aid programs (CRS, 2014). This still, almost surely inadvisably, limits the flexibility of the administrator to respond to unanticipated emergencies. For example, had Super Typhoon Haiyan devastated the Philippines in August or September 2013 (at the end of the USG fiscal year) instead of in early November (at the start of the new fiscal year), the USG would not have had emergency food aid funds to respond to the disaster.

Looking Forward to the 2019 Farm Bill

The formidable political challenges associated with reforming USG food aid policy—in particular, the influence of several powerful special interest groups committed to maintaining the status quo—explain why the 2014 Farm Bill failed to generate the considerable potential economic efficiency and related substantial economic welfare gains that might have been generated by the Obama Administration proposal to permit up to 45% of Title II food aid to be sourced outside the United States in order to accelerate delivery and reduce costs. The U.S. maritime industry, which benefits from preferential treatment under the Cargo Preference Act, has the most to lose from food aid reform (Bageant, Barrett, and Lentz, 2010). Clapp (2014) found that politicians who received more than $10,000 from shipping groups voted against reforming food aid by 7 to 1, noting "money talks" (p. 2). Indeed, shortly after the 2014 Farm Bill was enacted, shipper interests slipped two provisions into the 2014 Coast Guard and Maritime Transportation Act of 2014 (passed by the House but not, at the time of writing, by the Senate) that would increase cargo preference from 50% to 75% and end any public oversight of the wasteful practice (Barrett and Lentz, 2014). In spite of the modest progress in food aid reform included in the 2014 Farm Bill, the prospect of backsliding towards even more inefficient and ineffective U.S. food aid programs is very real.

Nonetheless, given how far the 2014 Farm Bill international food aid provisions fell short with respect to accomplishing the global welfare gains that could have been achieved, food aid reform remains high on the agenda of many other interests and many legislators. Most recently, in its 2015 budget request to Congress, the Obama Administration reiterated many of its 2014 proposals for food aid reforms. Not inconsequentially, the Obama Administration proposals were similar to reforms unsuccessfully proposed by President George W. Bush. Moreover, Senator Chris Coons of Delaware and Senator Bob Corker of Tennessee introduced the bipartisan Food for Peace Reform Act in the Senate in June 2014 which also included analogous food aid reform initiatives.

These efforts all aim to improve the efficiency and humanitarian impacts of U.S. international food assistance programs by expanding LRP funding and ending cargo preference and monetization. The USAID has estimated that, if 25% of emergency resources were to be untied as in President Obama's FY2015 budget request, those funds could be used to reach up to 2 million more people per year (USAID, 2014b). Fully untying resources could result in an additional 4 to 10 million more people being reached (Elliot and McKitterick, 2013).

Any domestic impacts of removing restrictions on the use of food aid funds will likely be limited to the maritime industry. Various estimates developed by the U.S. Department of Defense, USAID, and independent economic researchers all indicate that ending cargo preferences would only affect six to 11 mainly outdated vessels—none of them militarily useful—for which there is little commercial demand (Bageant, Barrett, and Lentz, 2010; and USAID, 2014d). The costs would fall mainly on those fixed factors of production—the antiquated ships that cannot readily find commercial traffic—even under the Jones Act provisions that require all trade among U.S. ports be carried on U.S.-flagged vessels constructed in the United States, owned by U.S. citizens, and crewed by U.S. citizens or permanent residents. The number of workers affected would likely measure in the low hundreds, split between mariner and shore-based support positions. These potential job losses should be compared against 4-10 million acutely malnourished people who would receive food aid at the extensive margin with the resulting cost savings. In other words, roughly 10,000 additional hungry people are not being fed for each domestic shipping job protected. Those are stark tradeoffs.

The USG can and does use existing programs, like the Maritime Security Program (MSP) created in 1996, to ensure support for militarily useful vessels and merchant mariners. The USG pays $186 million each year to the owners of 60 vessels in the MSP in return for the promise that the vessels and crews will be available for military use if needed.

Direct payments, rather than indirect and wasteful subsidies that increase USAID and USDA food aid shipping costs, offer a better way to meet the need for American-flagged sealift capacity for national security. To cushion the impact of the reductions

in food aid cargoes, the USG could invest $50,000 per worker for retraining to help any adversely affected mariners and port workers transition to more commercially sustainable jobs. Since the excess taxpayer costs resulting from cargo preference are an estimated $100,000/year for each mariner involved in shipping food aid (Bageant, Barrett, and Lentz, 2010), such a policy adjustment offers a win-win-win opportunity: save taxpayers money, feed hungry people, and help those whose jobs are tied to outdated, commercially nonviable vessels to transition to jobs with better prospects.

There is ample evidence about how to make international food assistance more responsive to recipient needs, faster, cheaper, and healthier. The 2014 Farm Bill made modest progress but fell well short of its potential to act on that evidence. The questions now are whether policymakers will respond to the evidence, and how donors and practitioners can best use the greater flexibility that access to cash, voucher, LRP, and transoceanic food assistance can provide.

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Some Trade Implications of the 2014 Agricultural Act

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The United States, Japan, and the European Union (EU) all subsidize their farmers heavily. Together these three regions account for over 80% of Organisation for Economic Co-operation and Development (OECD) farm subsidies, totaling about $300 billion per year. The Uruguay round of the General Agreement on Tariffs and Trade (GATT), which concluded with the establishment of the World Trade Organization (WTO), aimed to rein-in farm subsidies in these and other countries, and to modify farm subsidy programs to be less production- and trade-distorting. Since the completion of the Uruguay round in 1995, farm subsidies have declined in the EU and Japan. Unfortunately, after Congress passed the 1996 Farm Bill (the Federal Agriculture Improvement and Reform Act), U.S. farm subsidy programs expanded. The trend towards larger subsidies in the United States was reinforced through the provisions of the 2014 Farm Bill. The new legislation not only expands subsidies paid to U.S. farmers but also ties those subsidies more directly to recent and current production and market conditions and, therefore, makes them more production- and trade-distorting. On both counts (larger and more distortive subsidies), the 2014 Farm Bill fails the test of being consistent with WTO objectives.

The WTO's Doha round, initiated in 2001, has focused over the past 13 years on reducing agricultural trade distortions. The provisions of the 2014 Farm Bill, which chart a diametrically opposite path, may well have cost the United States any credibility in future agricultural trade negotiations in the Doha round. Perhaps even more importantly, the 2014 Farm Bill has undermined U.S. credibility in regional trade negotiations targeted at improving market access and protecting intellectual property in both agricultural and larger non-agricultural sectors of the U.S. economy.

Expanding global trade is an explicit economic goal of the Obama Administration. In his State of the Union Address in 2010, President Obama announced the National Export Initiative and set a goal to double American exports by the end of 2014, including agricultural exports. U.S. agricultural exports are forecast at a record $149.5 billion in fiscal 2014, up from $108.5 billion in 2010. This is almost a 40% increase and it reflects a significant expansion of exports to China, Canada, and Mexico, among others. During this five-year period, dairy exports doubled with exceptionally strong export sales to Asian economies. The 2014 Farm Bill may lead to even more domestic U.S. production and higher exports, but at the same time, it will draw international attention to the fact that, for a large number of commodities, U.S. agricultural exports are being influenced by domestic subsidies.

The United States is promoting freer trade through the Trans Pacific Partnership (TPP). The TPP was initiated in order to create a platform for economic integration across the Asia-Pacific region. The 12 TPP members (Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States, and Vietnam) account for close to 40% of the world's economy and one-third of world trade. The U.S. Administration has championed the TPP as being an upgrade to existing trade agreements. The U.S. government stated that it was particularly interested in greater market access for agricultural products in TPP countries. Passage of the new farm bill

has made this outcome less likely. The TPP initiative is clearly at odds with agricultural protectionism in U.S. Congress. If the TPP fails because of the provisions of the highly protectionist 2014 Farm Bill, then the economic costs of the farm bill will go well beyond domestic welfare costs associated with deadweight losses due to inefficient income transfers and unproductive lobbying activities. In addition, there are likely to be significant foregone economic benefits associated with failure to attain greater economic integration in the Asia-Pacific in sectors outside of agriculture.

Many aspects of the 2014 Farm Bill conflict with U.S. commitments under current international trade agreements. One obvious conflict is the so-called commodity *crop insurance*—now even more transparently product-specific and more trade distorting (Smith and Glauber, 2012)—a policy that could be successfully challenged by WTO members. However, two other aspects of the 2014 Farm Bill are especially noteworthy in conflicting with the international trade commitments of the United States.

The first is that the U.S. Congress failed to modify mandatory Country-of-Origin Labeling (COOL) on meat products despite its clear violation of WTO rules. Efforts by important agricultural groups such as the National Cattlemen's Beef Association and some Congressional members failed to terminate the COOL program when rewriting the farm bill. In other words, the WTO did not seem to be important to the U.S. House and Senate agricultural committees, the chairs of both who recognized that COOL was probably a serious WTO violation but found it more politically convenient to ignore the issue.

The second is the farm bill's new dairy margin insurance program. One implicit reason this program was introduced was to offset adverse effects on dairy net returns from the substantial increases in corn prices arising from U.S. biofuel policies, a clear example of unintended consequences of policy interaction that may well raise international objections and potentially lead to a trade dispute. Both COOL and the dairy margin insurance scheme are discussed in more detail below.

Mandatory Country-of-Origin Labeling

The 2014 Farm Bill failed to modify COOL as it applies to meats, a highly contentious and protectionist policy, especially affecting two close and important agricultural trading partners, Canada and Mexico. Supporters of COOL often point to surveys that show consumers have a stated preference for country-of-origin food labeling, but economic logic suggests that the benefits of COOL are unlikely to outweigh the costs of compliance. Surveys do indicate that American consumers say they would prefer to buy U.S. food products if all other factors were equal, and that consumers believe American food products are safer than imports. However, existing inspection rules ensure that foreign and domestic meats are processed using the same standards. Furthermore, surveys also suggest that labeling information about freshness, nutrition, storage, and preparation tips is more important to consumers than country-of-origin. More tellingly, the fact that the food industry has not found it profitable to voluntarily provide COOL is strong evidence that willingness to pay for this information does not outweigh the cost of providing it.

COOL was introduced in the 2002 Farm Bill (Carter, Krissoff, and Zwane, 2006) but not fully implemented until the 2008 Farm Bill. In 2009, Canada and Mexico filed WTO complaints against the United States' application of its COOL policies to meat—cattle, hogs, beef, and pork. Canada and Mexico alleged that COOL violated several WTO articles and is, therefore, an illegal barrier to trade under the Agreement on Technical Barriers to Trade (TBT Agreement). The WTO agreed with Canada and Mexico. According to the WTO, not only does COOL favor domestic meat products and affords less favorable treatment to meat products from Canada and Mexico, but the policy fails to adequately achieve its purpose of providing information to consumers about the country of origin. The U.S. Department of Agriculture (USDA) amended the challenged version of COOL, but the new version of COOL is perhaps even more onerous than the first. USDA's revision to COOL requires *born*, *raised*, and *slaughtered* production step labels. The American Meat Institute has pointed out that COOL causes companies to source their meat domestically in order to simplify compliance with labeling requirements. As a result, consumers do not have access to a variety of imported meats that may be either of higher quality or offered at a better price.

One of the main arguments in favor of COOL, the consumers *right to know*, has also been used to justify mandatory labeling of genetically modified (GM) food in Europe. Ironically, the U.S. government has strongly opposed mandatory GM labeling, and for good reason. The United States considers the EU's mandatory labeling of GM foods to be an unfair trade practice. In practice, GM labeling has not given EU consumers greater choice because food processors in Europe have recombined ingredients away from GM food to avoid labeling. This pattern is now developing with COOL and, therefore, U.S. consumers will see their choices reduced because labeled imported food will not be made readily available. The irony of the United States criticizing mandatory GM food labeling on the one hand and then mandating COOL on the other is not lost on U.S. trading partners.

Implicit Dairy Export Subsidies

Dairy subsidies received a potentially substantial boost in the 2014 Farm Bill. The legislation replaced the *Milk Income Loss Contract* and *Dairy Price Support* programs with a new *Margin Protection Program* (MPP). Dairy farmers can participate in either the new MPP or use the *Livestock Gross Margin Insurance* (LGM) for dairy, an insurance product introduced by the USDA Risk Management Agency in 2008. MPP creates a new *margin insurance* scheme that offers generous *insurance* payouts if there is a decline in average dairy income-over-feed-cost margins. Any dairy in the United States now has access to government-subsidized margin protection on up to 90% of their recent historical production. When dairy margins drop, government payments will be exponentially larger than under the previous legislation.

The MPP pays indemnities when the average difference between the national milk price and a feed ration index falls below a user selected coverage level. Margin protection is available from $4.00 to $8.00 per hundredweight and offers protection on up to 97% of the historical average margin. Payouts under the program are, therefore, likely to be frequent and may be very substantial. When dairy margins are low, as was the case in 2009 and again in 2012 (during the drought), indemnities to dairy farmers with an $8.00 level of margin coverage could result in annual taxpayer costs of about $5 billion dollars (Nicholson and Stephenson, 2014).

WTO members such as New Zealand, who have a comparative advantage in dairy exports, could challenge the U.S. meld of a subsidy and an insurance program. In 1999, based on a complaint from New Zealand and the United States, the WTO ruled that Canada was dumping subsidized dairy exports. Canadian dairy exports were found to benefit from implicit export subsidies arising from Canada's *supply management* program. It is plausible that the new U.S. dairy subsidies could be similarly viewed as constituting an export subsidy even though payments are tied to a dairy's recent historical production rather than current year production.

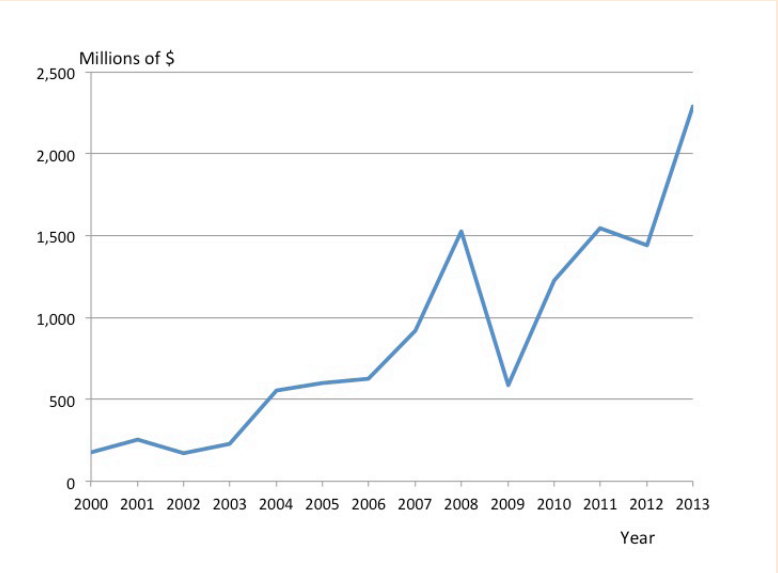
This program could be challenged through either the WTO (under the Agreement on Subsidies and Countervailing Measures—the SCM agreement) or through member antidumping and countervail duty laws. If corn prices spike and there is a big subsidy payout to U.S. dairy farmers then export prices would be lower than domestic U.S. milk prices inclusive of the subsidy. Viewed alternatively, export prices would be lower than U.S. production costs, a violation of trade law. Why is this an issue? Well, there is clearly a conflict between the 2014 Farm Bill and the growth in U.S. dairy exports. The U.S. dairy industry exports about 16% of its production (Figure 1) and is, therefore, vulnerable to a WTO ruling against U.S. dairy subsidies.

Analysts often treat government policies in isolation from one another, failing to recognize important interaction effects. Adverse interactions between the 2014 Farm Bill and the 2007 Energy Independence and Security Act (EISA) raise some important issues from the perspective of United States' trading partners. The EISA mandated use of over 14 billion gallons of corn ethanol in 2014, removing about one-third of U.S. corn from the market and driving up dairy feed costs. In turn, in response to higher feed costs, the 2014 Farm Bill MPP will now provide new subsidies to dairy farmers. You cannot blame the dairy lobby for seeking subsidies to offset losses due to the corn ethanol lobby, but the net effect is very costly to taxpayers and other industries that would benefit from freer international trade—especially in the Asia-Pacific region.

Concluding Comments

The U.S. dairy industry viewed the 1999 WTO ruling against Canadian dairy exports a significant trade victory. It is paradoxical that the 2014 Agricultural Act invites a similar international challenge to U.S. dairy exports. The U.S. biofuels policy has driven up the price of animal feed and

Figure 1: U.S. Milk Powder Exports



Source: USDA, FAS, GATS. HS code: 0402, Milk Concentrated.

now the farm bill has introduced a counteracting policy to subsidize dairy farmers when their price-cost margins are low. The net effect is that the corn ethanol lobby may have inadvertently subjected U.S. dairy exports to a potential international challenge.

Various aspects of the 2014 Farm Bill send a message to trading partners that U.S. agriculture is becoming more protectionist. Furthermore, the new farm bill indicates that international trade commitments have little or no influence over U.S. farm policy choices. This is unfortunate because foreign markets are extremely important to U.S. agriculture and so the industry has a huge stake in increased trade liberalization, not more protectionism. Lobby groups pushing for larger and more distortive subsidies are very shortsighted.

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Multiple Peril Crop Insurance

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Consider a deal where, for about 200,000 farmers, every dollar they can pay to the government in crop insurance premiums will give them an expected return of $1.90 as J.W. Glauber reported was the case for 1990 to 2011. Imagine that it costs the taxpayers at least $1.10 to get farmers paid that expected a 90-cent profit (Glauber, 2013). Imagine that this deal has just been sweetened further with a new set of giveaways in the legislation that is widely called the 2014 Farm Bill, at the end of a half-decade called the "great recession" when farm families' wealth has soared to over eight times that of the average American family (Bricker et al., 2012; and U.S. Department of Agriculture (USDA), 2014). In an ingenious and successful political marketing campaign, farmers continue to promote public support for this deal as crop "insurance."

Americans generally seem to follow admirably practical strategies with respect to innovations in goods and services. They believe that the best test of a consumer's valuation of a product is what the consumer is willing to pay for it. They believe in putting a novel good or service to the market test; if, as is usually the case for an innovation, it does not sell at a price that pays what it costs to produce it, take it off the market and try something else. They favor private sector provision of goods and services where it is more efficient than public provision—as is typically true—but support public provision when it is clearly superior, as in Medicare.

But American politicians behave very differently when considering federal crop insurance programs.

In 2013, a year of fiscal stringency, right after the end of the government shutdown forced by opposition to raising the debt ceiling, federal politicians decided to focus on the Farm Bill. Focus they did, but not on cutting expenditures on bad programs. They made overall "risk protection" even more attractive to farmers, and much more expensive for taxpayers. Indeed they made it the centerpiece of transfers to farmers, eliminating a program of direct payments more or less "decoupled" from farmers' production decisions that was vastly more efficient per dollar of transfer.

The government is thus expanding an insurance program that would not be sustainable on a free market owing to its inherently high cost of administration and reinsurance. In 2011, the program cost $11 billion, compared to less than $5 billion in direct payment, introduced in 1996 as the main program for transfers to farmers (Glauber, 2013, pp. 482, 486). Not even farm lobbyists try to defend the inefficient wealth transfers to farmers under the crop insurance program, the bulk of which go to unusually wealthy families. Nor do they dwell on the fact that a large portion of the transfers goes to insurers and their agents. As Smith (2011) has noted, between 2005 and 2009, for every dollar transferred to farmers, private insurance companies received $1.44 in administrative and operating subsidies and underwriting gains.

The Costs of Federal Crop Insurance Subsidies

An abundance of experience over three quarters of a century make one thing very clear:

Few farmers will buy insurance of their crop yields against multiple perils at the expected full cost to the insurer; in fact no purely private multiple peril insurance program has ever been sustained by the voluntary participation of farmers. A fundamental problem is that the cost of administration,

adjustment and reinsurance is just too high, between thirty and forty percent of indemnities. Costs tend to be at least 25% of expected indemnities even when payouts are tied to a weather index, thereby eliminating costly "adjustment" of claims (Smith and Watts, 2009, pp. 28-29).

In considering development of insurance markets, economists often focus on another problem that they call "adverse selection." Early adopters tend to be those who have private knowledge that they have unusually large expected losses per dollar of premium. Premiums to cover expected payouts will be too high to attract less risky farmers. A subsidy can solve this problem by attracting a large portion of the population of potential customers, thus reducing the average risk of loss and improving overall performance.

This strategy has been tried in a large number of crop insurance programs worldwide. As many painstaking empirical studies have verified, uptake of crop yield or revenue "insurance" unsurprisingly expands nicely once the cost of an expected dollar of indemnities falls far enough below one dollar. Between 1999 and 2005 the average U.S. subsidy per acre was $7.76, not including administrative costs. By 2011, over 70% of enrolled acres were ensured for at least 70% of a measure of expected revenue or yield. (In 1988, only 9% had such high coverage.) With this level of participation adverse selection is unlikely to be a major issue. Nevertheless, the federal government is still subsidizing about 60% of the expected indemnities, accounted for as part of total premiums, as well as carrying the large burden of the costs of administration, adjustment and reinsurance.

How have we reached this point, where the United States is expanding a program where a dollar of the farmer's premium pays out on average around double the investment, and costs taxpayers substantially more?

The Road to Higher Insurance Subsidies

The history of federal crop insurance is a lesson in the path-dependence of a program that, for the four decades after 1938, was for the most part managed as a fiscally responsible pilot program that demonstrated the need for nothing more. However, beginning in 1980, it began its persistent expansion to what is now a hugely wasteful, inequitable, and environmentally damaging program with no apparent accountability to fulfill its stated goals or to manage taxpayers' money responsibly.

The adequacy of private crop insurance was discussed in the U.S. Senate as far back as 1923, and the droughts of 1934 and 1936 understandably revived interest in the issue during the Presidential election campaign of 1936. In fulfillment of an election pledge, the Roosevelt administration established multiple peril ("all risk") crop insurance as part of the Agricultural Adjustment Act of 1938. The Federal Crop Insurance Corporation (FCIC) first offered yield insurance to corn and wheat farmers, marketing the policies using USDA personnel and also making use of independent insurance agents (Chite, 1988). The program was a modest initiative offered in only a limited number of counties.

The premium paid by the farmer was designed to be "actuarially fair," meaning the premiums covered the expected cost of indemnities. This did not mean that the original program was designed to be self-financing. Multiple peril crop insurance is a very costly means of risk protection. Typically, for each dollar of expected indemnities, around 40 cents extra is needed to cover the substantial cost of reinsurance, marketing, and loss adjustment for this type of insurance. Understandably, there were no prior examples of successful multiple peril private insurance to serve as models for this public program. To encourage participation, taxpayers financed this administrative cost burden.

In fact, the taxpayers paid a good deal more than was expected when the plan was established. In that era (unlike today), the loss ratio reported by FCIC actually indicated whether farmers were covering the dollar value of the indemnities they received. No crop had a loss ratio of less than unity in any year until 1945; indeed, the program was cancelled for more than a year in 1943. After the number of counties covered was reduced in 1948, loss ratios improved even as farmers received indemnities during the drought years of 1951 and 1952. Expansion in the 1960s increased loss ratios again. The program remained of modest size with low uptake. By 1980, only 9.6 % of eligible acres were insured and the deductible was high. Despite the subsidy covering operating costs, the product was not as interesting to good farmers as it was to many economists involved in evaluating agricultural policy.

Early economic analyses of crop insurance programs often over-estimated the value of multiple peril crop insurance because they focused on annual income from one crop, rather than on farmers' annual consumption, which is much less variable (Langemeier and Patrick), or on total wealth. They generally used what we now know to be impossibly high estimates of farmers' risk aversion (Rabin and Thaler, 2001). In their analyses, early economists often neglected to consider the alternate means of risk protection or risk mitigation as well as the true costs of operating an insurance program.

In the late 1970s, a third argument for subsidized crop insurance emerged. Substantial government disaster relief payments, averaging $436 million per year (Chite, 1988) were seen by farmers as substitutes that reduced their already tepid demand for crop insurance. Allegations that "prevented planting" payments

encouraged expansion into environmentally fragile areas quickly made the disaster programs politically controversial. There was a consensus that something had to be done to contain the cost—both fiscal and environmental—of the disaster payouts.

Disaster payments are much more difficult to budget and less efficiently targeted than insurance indemnities. Congress argued that it could not credibly commit to refuse to make disaster payments to farmers after their production had been affected by adverse weather or other negative, exogenous events. Even though farmers' response to the pilot program since 1938 could not justify crop insurance on its own merits, it could be justified if the only politically feasible alternative were a more costly disaster program. Congress could refuse to make disaster payments, if farmers knew that the crop insurance program would protect them. Accordingly, the 1980 Crop Insurance Act expanded the geographic coverage of crop insurance and increased the number of crops covered. It subsidized premiums at 30% for up to 65% coverage of losses.

Congress also urged that marketing and loss adjustments be handled by private-sector firms, a policy that could seem attractive in a time of renewed appreciation of private initiatives and competition. But there was no auctioning of the award of the contracts for these services, and companies were forbidden from refusing to service some customers or competing on price.

This plan saw acres covered increase to 24.5% by 1988, less than half the goal of the 1980 Act. Bills for disaster aid to farmers passed in 1983, 1986, and 1987, before a major drought hit in 1988. Combined costs of the expanded insurance program and the disaster assistance it was supposed to eliminate averaged $1.1 billion from 1981-88. The 1980 Act clearly had not met its stated coverage and cost objectives. The Bush Administration sensibly proposed eliminating crop insurance in favor of a standing disaster assistance program (USDA, 1990).

Despite such clear evidence of the failure of crop insurance to prevent disaster payments, Congress rejected the Administration's proposal. Instead, in the Crop Insurance Reform Act of 1994, it made a minimal level of insurance compulsory for farm program participation in the form of Catastrophic Risk Protection (CAT) which covered half of a producer's approved yield at 60% of the expected market price. The subtle difference from a standing disaster relief program was that producers had the burden of a $50 sign-up fee per county—the government covered all other costs. A program designed to eliminate costly disaster relief had instead institutionalized such relief.

After the completion of the Uruguay Round of trade negotiations, farm support began to shift to "decoupled" direct payments and to insurance, away from distortionary price supports, which were banned under World Trade Organization (WTO) rules. Insurance coverage more than doubled in1995, but more than half was CAT coverage. Apparently the $50 fee for otherwise free coverage was an intolerable burden; the requirement for CAT cover was eliminated in 1996. Subsequently, successive increases in subsidies for higher coverage levels greatly increased uptake.

Even with high insurance participation, disaster payments averaged close to $1 billion per year between 2001 and 2009; the expansion of crop insurance that began in 1980 totally failed to fulfill its original stated goal of enabling the U.S. Congress to eliminate disaster payments. In the same period, total revenue of primary insurance companies increased 393%, from $1 billion to nearly $4 billion (Smith, Glauber, and Dismukes, 2012, especially p.8), solidifying the establishment of a new rent-seeking lobby supporting crop insurance—the independent insurance agents who gained from insurance companies competing with one another for the above-market rents available from the program.

Furthermore, if the goal of privatization of delivery was truly cost efficiency, then privatization was also a total failure. Mahul and Stutley (2010) rank delivery of U.S. crop insurance as the most expensive per dollar of premium in the world, far less cost-efficient than public Canadian crop insurance delivery. Privatized delivery continues nonetheless, with questionably effective controls on payments to agents.

The Current State of the U.S. Federal Crop Insurance Program

The 2014 Farm Bill eliminates direct payments. These were favored by economists when introduced in the 1996 Farm Bill as less wasteful and more transparent means of transferring income to farmers during a transition to an unsubsidized marketplace. In their place is an expanded crop insurance program, supplemented by "shallow loss" government payments. This major shift to crop insurance as the principal means of agricultural support has nothing to do with efficiency or risk aversion. It exists because it has not been prohibited under WTO rules, and because the expected extent of insurance-mediated transfers to wealthy farmers is much less transparent than are direct payments. Conditionality of insurance on price levels means huge exposure of the insurance budget to reversion of prices even half way back to previous real levels, but such exposure is not evident in initial reports of program costs.

The labels of the parameters of the program are chosen to hide the real costs and the extent of transfers. The loss ratio, the ratio of indemnities

to premiums, is an index of actuarial soundness ordinarily indicating what percentage of payments by the insured is paid back as indemnities. After a redefinition of "premiums" to be the sum of farmer payments and large federal subsidies, the loss ratio for crop insurance is not informative about and, indeed, continually misrepresents, the share of actuarial exposure borne by the insurance program. By excluding administrative costs such as marketing and loss adjustment, it further understates the extent of public expenditure on the program.

For those interested in the sustainability of U.S. agriculture and the environment, the crop insurance and disaster programs are themselves disastrous. The program reduces the incentive for farmers to manage farm risks and environmental problems, and reduces their motivation to adapt to a changing environment. Such adaptation will be all the more crucial for effectively competing on the world market as climate change progresses across the global agricultural sector.

Nevertheless U.S. farmers, and especially farm landowners, support the program because it increases their wealth, which far exceeds the average wealth of nonfarm families and continues to rise. The fact that each dollar they gain costs taxpayers $1.44 (Smith, 2011; and Babcock and Hart, 2006) is not their problem. Crop insurance may be very inefficient, but it has the advantage of obfuscation; the average citizen has little notion of the wastefulness and inequity of this entitlement program.

Two more decades of well-funded global experimentation using advanced empirical methods have only generalized conclusions that were obvious two decades ago (Wright and Hewitt, 1994; and Just, Calvin, and Quiggin, 1999). Two recent reviews (Miranda and Farrin, 2012; and Smith and Glauber, 2012) make it clear that farmers globally are not sufficiently interested in purchasing multiple peril crop insurance to support a market when rates are high enough to cover their own expected indemnities plus the cost of administration and reinsurance. And Patrick's empirical conclusion in 1988 that indemnification using area yield or rainfall indices did not make insurance of very risky Australian wheat crops commercially viable has now been generalized to many other countries and environments.

The economic case against subsidized multiple peril crop insurance, both theoretical and empirical, is stronger than ever. And the record shows consistent failure of successive federal crop insurance programs to fulfill their stated objectives. Yet the latest Farm Bill has not only expanded this wasteful and inequitable program, but also made it the centerpiece of federal support for farmers.

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Losing the Plot? Agricultural Research Policy and the 2014 Farm Bill

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A large part of U.S. agricultural output and its competiveness in international commodity markets is attributable to research-induced gains in productivity accumulated over the 20th century. In 2012, the United States accounted for a sizable share (9.5% by value) of the global food, feed, and fiber economy. This is substantially smaller than its 1961 share of 14.8% (United Nation's Food and Agriculture Organization (FAO), 2014). Over the same period, the Asia-Pacific region (including India and China) grew its global share from 24.2% to 45.1%. Productivity growth in U.S. agriculture has declined along with its global market share. For the post-World War II period through 1990, agricultural productivity—measured by accounting for changes in the use of multiple factors of production—grew on average by 2.1% per year, but dropped to almost half that rate (1.2% per year) during the subsequent two decades (Pardey, Alston, and Chan-Kang, 2013).

As the 21st century unfolds, a question of major importance is whether a continuation of contemporary trends in public investments in research and development (R&D) are sufficient to preserve or enhance past productivity gains and ensure the United States remains competitive in global agricultural markets (Alston et al., 2010, especially chapter 11). While the links between R&D investments and changes in productivity are difficult to disentangle, there is compelling evidence that these investments continue to yield relatively large social dividends (Hurley, Rao, and Pardey, 2014), but with several major, and politically crippling, caveats. The lags between investing in R&D and realizing returns on those investments are long (often spanning decades), and the benefits are diffuse, accruing to a broad range of producers and consumers, and not limited to any particular political jurisdiction or constituency. It is, therefore, harder for politicians to reap short-term electoral benefits by acting in a far-sighted fashion for the country's long-run economic and environmental gains. Nevertheless, decisions taken now will have potentially profound consequences for U.S. and global agriculture at least through the middle of this century.

So how have political commitments to the public investments in R&D that affect the food and agricultural sectors fared of late? Are the institutional arrangements for funding and performing public agricultural R&D evolving in ways that will lead to a robust future for U.S. agriculture? Are the investment and institutional changes envisaged in the 2014 Farm Bill sufficient in light of substantive shifts in the roles of public versus private R&D within the United States, and the position of the United States in global innovation markets for food and agriculture?

We examine the 2014 Farm Bill for recent evidence on the changing landscape of U.S. agricultural R&D policies and practices. But the new farm bill is not the only source of relevant evidence: reviewing past investment trends also yields insights, especially given the generally long lags between R&D activity and substantive economic outcomes. It is also important to place farm bill developments in the context of evolving private sector roles and other changes in arrangements for prioritizing and funding public research.

The Shifting Landscape of R&D

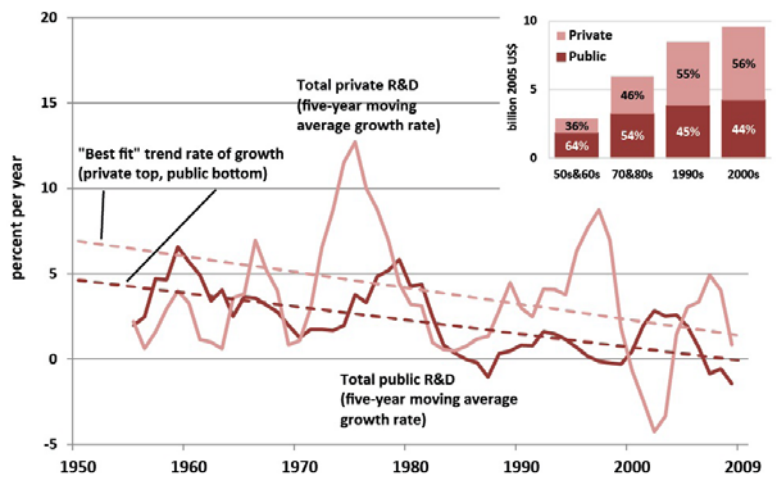
Against a backdrop of a projected, but perhaps unrealistic, prediction of reductions in total federal government funding for agriculture, the Agricultural Act of 2014 yielded

modest increases in funding for public food and agricultural R&D. The U.S. Congressional Budget Office (CBO) credited the 2014 Farm Bill with a budget savings of $16.6 billion over the next 10 years, even with a $1.3 billion increase in agricultural R&D funding over that 10-year period (CBO, 2014). This increase in nominal funding is a break from recent trends that at first blush, looks promising for the future of U.S. agriculture. However, the funding increase is unlikely to make a substantive difference in the performance of public food and agricultural R&D.

Pardey, Alston, and Chan-Kang (2013) concluded that "evidence on returns [to public R&D spending] suggests it should be socially profitable to at least double the total annual investment, but it would make sense to phase in any major increase over 5-10 years given the current limitations on capacity of the system that have arisen from past funding and spending patterns." The additional R&D funding authorized in the 2014 Farm Bill falls far short of doubling public support for the agricultural sciences. It constitutes an average nominal increase of just $130 million per year, equivalent to an average annual increase of only 2.8% of total U.S. public R&D spending for food and agriculture (relative to the 2009 total, the latest year such national spending totals are available). Moreover, for every extra dollar invested in R&D over baseline funding by way of the 2014 Farm Bill, the CBO estimates that $30 to $50 additional will go to public subsidies for new crop insurance and "shallow loss" risk management programs. While R&D demonstrably grows the agricultural pie—yielding economic returns of around $20 for every $1 invested (Alston et al., 2010)—public support to crop insurance (and, especially, the large subsidy component of that public support) largely redistributes the existing economic pie (Smith and Glauber, 2011).

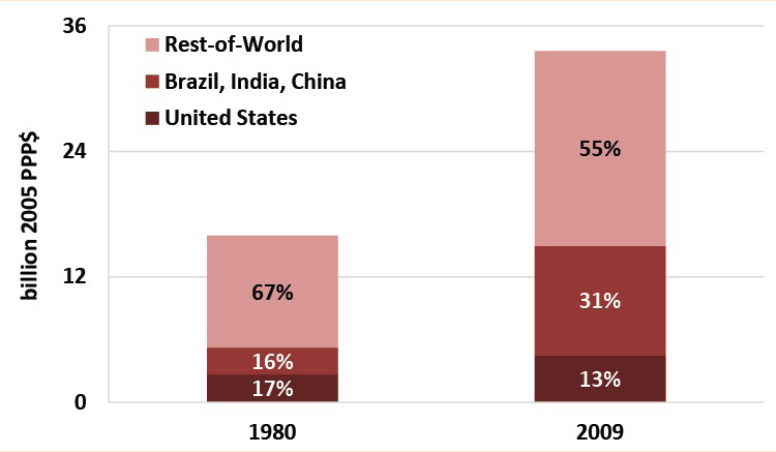
The relatively small gains in nominal R&D spending prescribed in the farm bill fail to redress the rundown in U.S. public research capacity witnessed of late. Adjusting for inflation, the rate of growth in U.S. public food and agricultural R&D spending has been declining for the past three and a half decades (Figure 1). During the 1950s and 1960s, inflation-adjusted spending on public food and agricultural R&D grew by 3.7% per year on average; from 2000-09, it grew by just 0.05% per year. Since 2002, the United States has actually been divesting itself of public food and agricultural R&D: in real terms (2005 prices), spending in 2009 ($4.07 billion) was less than it was in 2002 ($4.36 billion). Growth in private food and agricultural R&D spending has generally been faster than the growth in public spending. Thus, a larger share of U.S. food and agricultural R&D is now done by the private sector (36% of the total in the 1950s and 1960s versus 56% during the 2000s).

Figure 1: U.S. Public and Private Food and Agricultural R&D Spending, 1949-2009 (trends in main figure; shares in inset)



Source: Pardey, Chan-Kang, and Dehmer, 2014.

Figure 2: Public Food and Agricultural R&D Spending Worldwide, 1980 and 2009



Source: Pardey, Chan-Kang, and Dehmer, 2014.

The United States has also fallen behind in terms of its public research spending in a global context. In 1980, the United States accounted for 17% of the $15.9 billion (2005 PPP prices) invested in public food and agricultural R&D worldwide, more than the combined spending of Brazil, India, and China (BIC) (Figure 2). By 2009, the U.S. share of the $33.6 billion (2005 PPP prices) global total had shrunk to 13%, well behind the corresponding BIC share of 31%. As these spending differentials gradually translate into differences in relative innovative output and relative productivity, the United States will increasingly lose its competitive edge in global food and agriculture markets.

Changing Federal Funding Roles

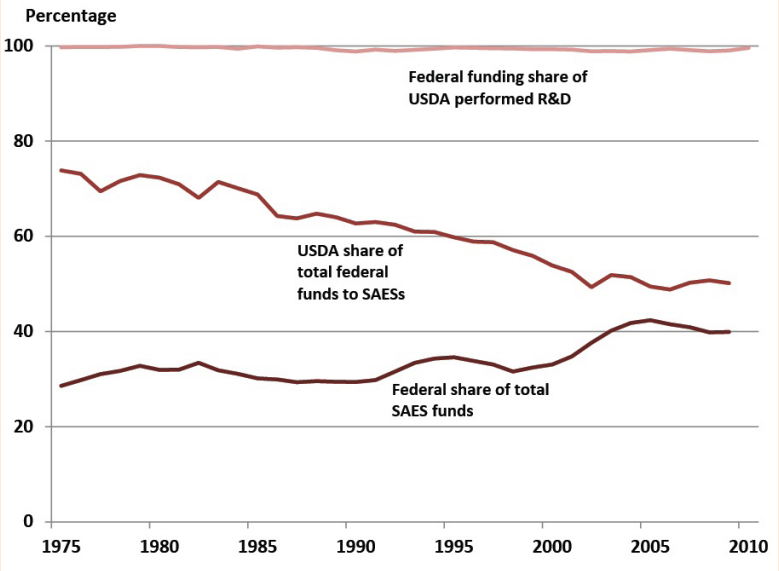
Not all publicly performed food and agricultural R&D is funded by way of the farm bill. So how critical is the farm bill—and federal government support more generally—to spurring technical and economic growth in the U.S. farm and food sectors?

Over the past several decades, around one-third of all public food and agricultural R&D was performed as intramural research by the U.S. Department of Agriculture (USDA) and about two-thirds of the research was done in the State Agricultural Experiment Stations (SAESs). Federal government support accounted for almost all funding for the USDA's intramural research (Figure 3).

The story is more complicated for the SAESs. As state government support for SAES research has waned in many states (accounting for, on average, 61% of the total in 1975, down to just 38% in 2009), the federal government share has grown (from 29% up to 40% over the same period). Funding authorized by Title VII of the farm bill for support of the SAESs accounts for a consistently declining share of total federal support to SAES research (74% in 1975 and 50% in 2009).

The growing share of funding to the SAESs accounted for by other federal government agencies (including the National Science Foundation (NSF), National Institutes of Health (NIH), U.S. Department of Defense, U.S. Environmental Protection Agency, and others) somewhat offsets the shortfall in Title VII funding, but with two potentially adverse effects. First, as funding from other (non-USDA) agencies has grown, research priorities have been increasingly determined by those other funding agencies which, generally, have less, if any, interest in research directly targeted to increasing farm productivity. Little surprise then that Pardey, Chan-Kang, and Dehmer (2014) report a substantial decline in farm productivity-oriented research carried out by the SAESs, from 65% of the total in 1976 to 56% in 2009. Second, it means that the overall funding for SAES research becomes increasingly sensitive to the funding futures of these other agencies. Hence, if the growth in R&D funding from NIH, NSF, and other federal government agencies continues to slow, so too will funding for U.S. food and agricultural R&D.

Figure 3: Federal Government Research Performed by USDA and SAES, 1975-2009



Source: Pardey, Chan-Kang, and Dehmer, 2014.

Institutional Innovations

While the amount and sources of funding matter, so do the institutional arrangements by which this public funding is prioritized, disbursed, and deployed. This especially matters for the efficiency and effectiveness of the overall R&D enterprise in the context of evolving private-sector roles in R&D.

Foundation for Food and Agriculture Research

As Pardey, Alston, and Chan-Kang (2013) observed, "Some commentators seem to expect that we can take productivity growth for granted, or that we can rely on the private sector to play all the required roles. But the private sector typically focuses its effort on the development end of the R&D spectrum, with an eye to developing commercial applications of new

ideas and technologies, which yield market rewards of increased productivity and profitability for those who develop and deploy the resulting innovations. Much of this effort stands firmly on the shoulders of the more basic, sometimes 'blue sky' research that can have, and demonstrably has had, large social value. Seen from this perspective, public and private R&D are more often complements rather than substitutes, suggesting that, as well as revitalizing public research, attention should be paid to incentivizing public-private linkages rather than cutting back on publicly conducted (as distinct from publicly funded) R&D in the belief that the private sector will fill the void."

The United States has innovated little in funding publicly performed R&D or in tapping the complementarities of that R&D with the growing amounts of privately performed research. The legislative authority for the creation of the Foundation for Food and Agriculture Research (FFRA), established in the 2014 Farm Bill and made operational on July 23, 2014, has real potential for reshaping public-private partnerships in U.S. food and agricultural R&D. Whether that potential will be fully realized is an open question. FFRA is a non-profit entity with a mandate to solicit non-federal (including private) funding, which is then matched with federal government funding to underwrite research focused on addressing key problems of national and international significance. The private sector has shown a willingness to fund publicly performed food and agricultural R&D (investing $296 million in SAES research in 2009; 8.2% of the SAESs total that year versus 4.9% of the total in 1975). Unfortunately, the 2014 Farm Bill authorized only a limited, one-off, startup allocation of funds in the amount of $200 million (equivalent to only $40 million a year over the anticipated five-year life of the bill) in matching public funds for FFRA, severely curtailing the new agency's options for leveraging additional public funds in future years. Moreover, expansion of the funding base for publicly performed food and agricultural R&D requires that private funds directed to FFRA be additional to the private funds that otherwise would be invested in SAES research.

Prospective AFRI Reforms

A perpetual problem with public food and agricultural R&D funding authorized by a farm bill is the extent to which that funding is earmarked. The new R&D funding authorized in the 2014 Farm Bill continues these past trends, with research funding earmarked for organic research (an additional $100 million over 10 years by CBO accounts) and more than half of the additional R&D dollars ($745 million of the $1.145 billion over the next 10 years) destined for specialty crops research.

Striking the right balance between formula, competitive, and other forms of funding is also a perennial and often contentious problem. Other federal funding agencies (such as NSF and NIH) rely heavily on competitive processes to allocate research dollars, whereas R&D funding made available by way of the farm bill is less reliant on competitive processes (just 5.8% of the total in 2009). This stands in stark contrast to a string of recommendations dating back at least to a 1987 National Research Council (NRC) study (NRC, 2014), which suggested that around 20% of USDA-financed research be allocated on a competitive basis rather than by Congressional fiat.

The National Research Initiative (NRI, established in 1990) and its successor, the Agriculture and Food Research Initiative (AFRI, established in the 2008 Farm Bill), were tentative moves towards more competitive funding of food and agricultural R&D. A recent NRC review of the AFRI program, released on September 9, 2014, finds that, despite some success, AFRI has fallen far short of its intended purposes. The critique can be summarized in three broad categories:

- Finance: Congress has a long track record of failing to follow through on legislated intentions to fund competitively allocated research. An average of only $250 million per year has been appropriated to AFRI of late, much lower than the $700 million authorized.
- Research Topic Areas: Especially with the introduction of AFRI's challenge grant program in 2011, topic areas solicited for proposal have moved in the direction of highly specified, applied subjects (such as bioenergy and childhood obesity). By 2011-12, the share of AFRI's budget allocated to basic research had fallen to 29% versus 58% during the last year (2008) of the NRI period. This shift seems likely to have undercut the ability of publicly funded research programs to provide research outputs that are complementary to the more applied research programs used by the private sector.
- Project Scale and Scope: AFRI has moved toward very large-scale, complex (often multi-institutional and multi-disciplinary) projects; this is especially pronounced in the recent expansion of the Coordinated Agricultural Project (CAP) program. Although the projects are still young and evidence is, therefore, incomplete, analysis of 2009-10 and 2011-12 publication rates of AFRI projects suggests this scale and scope expansion has injured scholarly output per dollar invested with CAP projects scoring particularly poorly under this metric. Hence, the 2014 NRC report recommends that NIFA eliminate the CAP and challenge grant categories, and move back toward more focused, investigator-driven initiatives.

Summing Up

The research title of the 2014 Farm Bill saw a small shift towards redressing the substantial decline in the position of U.S. public agricultural R&D evident over the past two decades. The bill included a modest increase in nominal funding for agricultural R&D, a continuation of R&D earmarks, and the establishment of a new Foundation for Food and Agricultural Research (FFAR)—a nonprofit corporation seeded with $200 million in one-time, startup R&D funds to be matched with funding from private and other non-federal sources.

That's the mildly encouraging good news. The bad news is that the preponderance of the new funding in the farm bill will have income redistribution rather than public-good and productivity-promoting consequences (Goodwin and Smith, 2014). Certainly the comparatively small amount of new funding directed to public research is insufficient to redress the chronic market failure and underfunding that befall U.S. food and agricultural R&D and are unlikely to reverse the dramatic decline in the U.S. share of global public food and agricultural R&D spending. Failing to replenish the stock of public R&D in the face of ever-evolving pests and diseases, climatic uncertainty, and changes in markets that all undermine past R&D-induced productivity gains may have profound adverse consequences for the competiveness of U.S. agriculture.

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