Ideology, Electoral Incentives, PAC Contributions, and the Agricultural Act of 2014

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Abstract

This paper examines the effect of legislator ideology, electoral incentives, and interest group political action committee (PAC) spending on the passage of the Agricultural Act of 2014. A mixed process model is used to examine the correlations between ideology, constituent characteristics, and PAC campaign contributions by agricultural and environmental interests and the probability that a legislator voted in favor of the bill. Instrumental variables are used to control for potential endogeneity in the effect of PAC contributions on legislators' votes. I find a positive association between both agricultural and environmental PAC contributions and the probability that a legislator voted in favor of the bill. Further, I find that legislators representing districts or states with relatively large rural populations were more likely to vote in favor of the 2014 Farm Bill.

JEL codes: Q18, H25, H30

Keywords: agricultural policy, political economy, farm bill

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Since 1965, the US Congress has regularly passed legislation generally known as the Farm Bill. Across its 12 titles, the Farm Bill serves and affects a variety of constituencies, including agricultural producers, lenders, rural citizens, the energy industry, importers and exporters, recipients of nutrition assistance through the Supplemental Nutrition Assistance Program (SNAP), and environmental advocacy groups. Many of these constituencies receive grants of government privilege, the costs of which fall primarily on taxpayers (Lusk 2015). Analysis by Vincent Smith (2013) indicates that cutting Farm Bill spending by $10 billion per year would have no measurable, long-run negative impact on the agricultural economy as a whole but would reduce the burden placed on taxpayers, who bear the brunt of the costs. Of course, there would very likely be short-run negative impacts on producers who currently benefit from Farm Bill programs.

Agricultural and environmental groups spend substantial amounts of money on political action committee (PAC) contributions, and it is important for the public to understand the extent of their influence. This paper examines the effects of political influence by environmental and agricultural interests, legislator ideology, and electoral incentives on the passage of the Agricultural Act of 2014.

Recent work on the political factors affecting support for agriculture has found that several elements are important for determining whether a legislator will vote to continue federal government support for agriculture. Studies that examine legislator preferences generally find that a preference for agriculture—as demonstrated by a previous career in agriculture, for example—increases legislators' propensity to vote for pro-agriculture policy (Bellemare and

Carnes 2015; Vesenka 1989). Generally, studies that do not use instrumental variables to account for endogeneity in PAC contributions do not find statistically or economically significant effects of PAC contributions on agricultural support (Bellemare and Carnes 2015; Vesenka 1989). Studies that account for endogeneity (Abler 1991; Stratmann 1991; Welch 1982) or use structural models (Gawande and Hoekman 2006) find more support for the notion that agricultural PACs influence legislators' support for agriculture. Meta-analysis by Stratmann (2005), who uses papers examining a range of interest group legislation reviewed by Ansolabehere, de Figueiredo, and Snyder (2003), indicates that PAC contributions do in fact influence legislators' voting behavior.

The rest of the paper is organized as follows. First, I briefly summarize the changes made to agricultural and food policy by the Agricultural Act of 2014. I then describe the conceptual and empirical models. A discussion of the data summary statistics and sources is then followed by an explanation of the identification strategy and results. The final section offers some conclusions.

The Agricultural Act of 2014

The most recent iteration of the Farm Bill, the Agricultural Act of 2014, cut funding (relative to the previous bill) for direct payments to farmers, conservation, and nutrition assistance. An increase in funding for crop insurance partially offset the cuts to direct payments.[1] These changes are discussed in more detail below. All information in the remainder of this section is taken from Chite's summary, published by the Congressional Research Service (2014). The Farm Bill is split into several titles, four of which are discussed here. The four titles of interest are Commodities (Title I), which provides support to farmers of specific agricultural commodities; Conservation

[1] Since the passage of the bill, commodity prices and farm sector profits have fallen, resulting in an increase in spending relative to original projections.

(Title II), which sets requirements regarding, and provides funding to, producers for conservation efforts; Nutrition (Title IV), which provides financial support for low-income individuals for the purpose of purchasing healthy foods; and Crop Insurance (Title XI), which provides crop insurance premium subsidies to farmers and reinsurance to private crop insurance providers.

Perhaps the most discussed aspect of the recent Farm Bill is the replacement of direct payments to farmers with a set of programs designed to assist producers with risk management. The Agricultural Risk Coverage (ARC) and Price Loss Coverage (PLC) programs were designed to provide aid to producers when either revenue (in the case of ARC) or commodity prices (in the case of PLC) falls below legislated thresholds. Of particular interest to southern producers is the exclusion of cotton from these programs. The existing dairy price support and income loss programs were repealed and replaced with margin protection programs that resemble insurance policies. Farmers with an adjusted gross income of $900,000 or above will no longer qualify for ARC, PLC, disaster payments, or conservation program payments. These and other changes amounted to a $14.3 billion decrease over the fiscal year (FY) 2014 to FY 2023 time period relative to projections by the Congressional Budget Office (CBO) based on the 2008 Farm Bill.

To partially offset the reduction in spending in the Commodities title, changes were made to the Crop Insurance title. Specifically, an areawide “shallow loss” insurance product was created to help fill the gap in coverage left by the new commodity support program. The primary area insurance product is called the Supplemental Coverage Option (SCO); it can be purchased for any crop for which crop insurance is available. One major difference between this insurance product and the new commodity programs is that with the SCO, the farmer is required to pay a premium to obtain coverage. While the SCO can be purchased for any of the major row crops, a separate areawide insurance product called the Stacked Income Protection Plan was created

specifically for cotton. Changes also were made to individual crop insurance. Farmers are now allowed to exclude low farm yields (actual yields less than 50 percent of the 10-year county average) from their coverage and premium calculations. The 2014 bill also requires farmers to comply with conservation and wetlands requirements in the Conservation title in order to receive crop insurance premium subsidies. These changes amounted to an increase of $5.7 billion relative to the CBO's 10-year projections of spending based on the 2008 law (Chite 2014).

Significant changes were made to environmental conservation policies in the 2014 Farm Bill. More than 20 conservation programs were consolidated into two comprehensive programs, and Conservation Reserve Program acreage is to be stepped down from 32 million acres in FY 2015 to 24 million acres in FY 2018. The Conservation Reserve Program provides financial compensation for producers who take some of their land out of production and allow native plants and wildlife habitat to develop. The Environmental Quality Incentives Program, which assists producers in applying conservation measures to land currently in production, was reduced by $500 million relative to the CBO baseline. Conservation spending was cut by $3.97 billion relative to the CBO's baseline spending projection.

The controversial cuts to the Nutrition title represented a compromise between the House and Senate. That is, the reductions in budgeted spending proposed by the House were larger than those proposed by the Senate, and the amount cut (relative to the 2008 Farm Bill) in the final bill is between the two proposals. The House bill would have cut nutrition spending by $39 billion over 10 years relative to the 2008 Farm Bill, while the Senate bill included only $3.94 billion in cuts. The final bill cut $8 billion from the Nutrition title relative to the CBO's 10-year baseline.

Overall, the changes made to farm support, nutrition assistance, and conservation programs in the Agricultural Act of 2014 were compromises. Cuts to direct payments were

smaller than in both the House and Senate versions proposed to the conference committee. Changes to long-standing legislation such as the Farm Bill are marginal. Votes on the bill do not determine whether farmers will receive support or whether nutrition programs will continue to exist—since the interwar period, the federal government has consistently provided a program of financial support for agricultural producers. Rather, a legislator votes on relatively small changes to a significant piece of legislation that will almost certainly continue for the foreseeable future. The reality of marginal change will inform the discussion in the next section. To my knowledge, this is the first paper examining attempts by agricultural interest groups to influence the passage of the Agricultural Act of 2014 and the first to examine the effects of PAC contributions by environmental groups on agricultural policy.

Model

In this paper, legislators are assumed to respond to three primary forces when deciding how to vote: PAC contributions, electoral incentives, and ideology.[2] The first two forces comprise the ways in which legislators interact with constituencies. PAC contributions are provided by interest groups to fund the election campaigns of legislators. Electoral incentives are provided by voters who may vote for another candidate in a future election if the legislator doesn't vote for policies the constituents want. As previous literature indicates (Bellemare and Carnes 2015), ideology is typically an important factor in determining a legislator's vote on a particular bill.

The influences of four constituencies on the passage of the Farm Bill are examined in this paper: environmentalists, the agriculture industry, rural households, and SNAP recipients. I

[2] It should be noted that support among the general public for farm programs is quite strong (Ellison, Lusk, and Briggeman 2010a, b). However, many policies affect the voting preferences of the general public, so their voting behavior is likely to be affected only slightly by agricultural concerns.

employ a mixed-process model with endogenous regressors to examine congressional voting behavior as a function of electoral incentives and PAC contributions associated with these constituencies and of the legislator's ideology.

Because the direction of causality between PAC contributions and legislators' voting behavior is ambiguous (Ansolabehere, de Figueiredo, and Snyder 2003), it is necessary to use an instrument to account for potential endogeneity. It is possible that a legislator will vote in favor of agricultural support because agricultural interests donated to his or her campaign. This is the standard case of vote buying. However, it is also possible that, during their campaigns, certain legislators signal their propensity to vote in favor of agricultural support to potential donors and thus secure additional campaign contributions. This potential for reverse causality implies a need for instruments to provide plausibly exogenous variation that will increase confidence regarding the causal effect of PAC contributions on the probability that a legislator will vote for agricultural support. Thus the identification strategy employed in this paper addresses that potential reverse causality or simultaneity.

Another potential source of endogeneity, unobserved heterogeneity, is more difficult to address. Cross-sectional observational data are employed in this paper to examine the relationships of interest. Because it is possible that other variables for which I don't have data might be correlated with the right-hand-side variables and affect legislators' voting behavior, I cannot claim the results are causal. The relationships measured in this analysis can be characterized as estimates of correlations (rather than causal relationships) between variables that may or may not be statistically significant.

Two conditions must be met for valid instruments: (1) the covariances between the instruments and endogenous variables are nonzero, and (2) the covariances between the

instruments and the (unobservable) error term in the reduced-form regression are zero (i.e., the exclusion restriction). The first condition is testable; a discussion of these tests is provided in the Model Identification and Results section. The second condition is not testable, but the intuition behind the choice of instruments is discussed later.

Previous work on the effects of PAC contributions on the passage of agricultural legislation by Chappell (1981), Stratmann (1995), and Welch (1982) have used election results and legislative seniority as instruments for PAC contributions. The justification for these instruments is straightforward: these variables do not directly influence a legislator's vote on the Farm Bill and almost certainly do not affect the vote through another mechanism.

While those studies use the percentage of the vote received by a given legislator in the most recent election, I use the legislator's vote share in the most recent election minus 0.5[3] and a binary variable for uncontested elections as instruments for PAC contributions. I use this approach because it captures the binary nature of uncontested elections, and because transforming the vote share more precisely measures how close the election is. Stratmann (2005) finds that the closeness of an election is an important predictor of campaign contributions. Ansolabehere, de Figueiredo, and Snyder (2003) note that PAC contributions for a legislator's campaign are also likely to be correlated with that legislator's "power." I use freshman status in the legislature as a measure of this power; specifically, a freshman legislator is expected to have less influence on the content and passage of legislation and so will receive smaller contributions from PACs. Stratmann (1995) uses membership on the agriculture committee as a proxy for legislator "power," but this method is problematic because it is likely to be correlated with the probability that a legislator will vote in favor of the Farm Bill. Thus, I use three instruments: the

[3] None of the observations of this variable are negative, indicating that all legislators won at least 50 percent +1 of the vote in their district or state.

previously discussed transformed vote share, a binary variable for uncontested elections, and freshman status in the legislature.

Previous work estimating the effects of PAC contributions on legislator voting behavior has used a simultaneous Probit-Tobit model developed by Chappell (1982). I employ a modified version of this model to analyze the passage of the 2014 Farm Bill.[4] The two PAC spending–dependent equations are specified as follows:

$$y_{1p} = \alpha_{0p} + \boldsymbol{D\alpha_{1p}} + \boldsymbol{E\alpha_{2p}} + \boldsymbol{R\alpha_{3p}} + \boldsymbol{X\alpha_{4p}} + \boldsymbol{L\beta_{1p}} + \beta_{2p}F + \epsilon_p, \quad (1)$$

where y_{1p} is the dollar value of PAC contributions from source p, D is a vector of indicator variables measuring legislators' ideology, E is a vector of electoral incentives, R is a vector of binary variables indicating the agricultural region in which a legislator resides, X is a vector of control variables, L is a vector of election results variables used as instruments, F is a binary variable equal to 1 if the legislator is in his or her first year as a federal-level legislator (i.e., if he or she is a "freshman"), used as an instrument for PAC contributions, ϵ is a mean-zero error term, and the rest are parameters to be estimated.

The vote-dependent equation is specified as follows:

$$y_2 = \gamma_0 + \boldsymbol{D\gamma_{1p}} + \boldsymbol{E\gamma_{2p}} + \boldsymbol{R\gamma_{3p}} + \boldsymbol{X\gamma_{4p}} + \delta_p y_{1p} + \varepsilon_p, \quad (2)$$

where y_2 is a binary variable equal to 1 if a legislator voted "Yea" for the 2014 Farm Bill and 0 if he or she voted "Nay", and y_{1p} are the two PAC contributions variables on the probability of

[4] It is common in applied microeconomics to start with a parsimonious model and add controls systematically to avoid Simpson's Paradox. Because of the relatively large number of variables of interest, the need to provide a detailed discussion of the instrumental variables, and space restrictions, I chose not to proceed in this manner in the manuscript. However, I employed this method and note that this method did not produce results materially different from the results presented in this paper.

voting "Yea" for the 2014 Farm Bill. The rest are parameters to be estimated unless they are previously defined.

Two variables are used to measure the influence of PAC contributions on legislator voting behavior: the dollar amount of contributions by (1) the agricultural sector and (2) environmental interests. Other forms of lobbying, such as face-to-face meetings, might be correlated with financial support; however, data on this type of lobbying are not available for individual legislators, only for individual lobbying groups and bills.

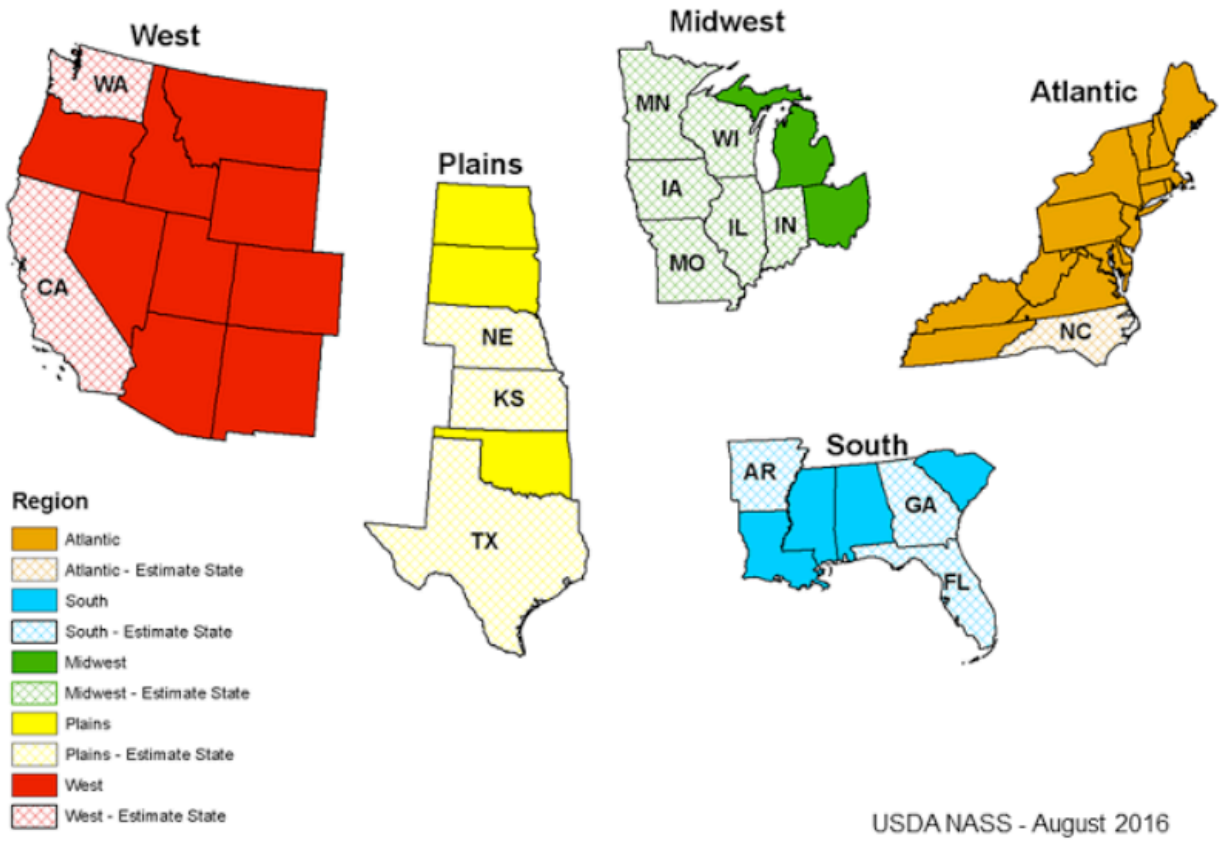
Three measures of electoral incentives are employed in the model. The proportion of households receiving SNAP assistance in the legislator's district or state measures the intensity of electoral incentives from these recipients. The percentage of the population in the district (for House members) or state (for senators) living in a rural area is used to measure electoral incentives from voters concerned with agricultural issues.

The ideology measure is taken from GovTrack. The measure uses cosponsorship patterns to develop a numerical index of the left-right political spectrum, which runs from 0 to 1. If two legislators often cosponsor each other's bills, their index values are similar. The index is evenly split into five binary variables to capture any nonlinearity in the ideological influence on legislators' voting.

Control variables include the legislator's party affiliation and sex as well as an indicator variable for senators and binary variables for the legislator's agricultural region using the ARMS III Farm Production Expenditure Regions map (figure 1). Party affiliation controls for the average probability that a legislator will vote for or against the bill solely because of his or her party affiliation. The Senate binary variable controls for average differences in voting behavior owing strictly to membership in the House or Senate. The agricultural region variables control

for average regional effects not captured by the electoral incentive variables. The major divisions in agricultural production do not occur at the state level but at the regional level. As figure 1 shows, the ARMS III Farm Production Expenditure Regions map divides the country into five groups: West, Plains, Midwest, Atlantic, and South. Agricultural practices are, to some extent, homogeneous within each of these five regions. Because of this intraregional homogeneity, which guides subsidies and other policies, the politics associated with agriculture are also assumed to be homogeneous within each region.

Figure 1. ARMS III Farm Production Expenditure Regions



Note: US Department of Agriculture (USDA) surveyors oversample in agriculturally important "Estimate States" in order to ensure state-level representative data.

Source: USDA National Agricultural Statistics Service, "ARMS III Farm Production Regions Map," August 2016.

To interpret the results discussed later in this paper, it is necessary to determine the marginal changes to policy made by the 2014 Farm Bill. Because the 2014 Farm Bill represents more than two years of delay in passing what was originally the 2012 Farm Bill, we can be confident about what policy would have been in place had the final version not passed. Although the 1938 Agricultural Adjustment Act, the 1948 Commodity Credit Corporation Charter Act, and the 1949 Agricultural Act make up the permanent agricultural policy that remains in effect until repealed, the recurring legislation known as the Farm Bill temporarily replaces said legislation and implements new policy (Novak et al. 2015, 81). Technically, if a Farm Bill fails to pass, this older legislation will take effect; however, because of delays in the passage of the 2014 Farm Bill, provisions from the 2008 law were continued.

Reversion to the old permanent legislation is highly unlikely, so it is reasonable to assume that, had the 2014 Farm Bill not passed in what became its final form, the provisions from the previous bill would likely have been carried forward another year. This likelihood implies that a legislator's vote to pass the 2014 Farm Bill is a vote to make the marginal changes in policy and spending described in the previous section relative to the policies and spending associated with the 2008 Farm Bill. The Farm Bill determines federal agricultural, conservation, and food policy, a range of policy that implies that determining the drivers of a legislator's vote on the bill is complex. The model specified in this section accounts for many factors potentially affecting these policy goals and allows for determination of the correlations between them, as well as the probability that a legislator voted in favor of the bill.

Data

Data on legislators' votes were taken from the GovTrack database (table 1). Of the 517 legislators who voted on the final bill, 319 voted in favor of its passage. Less than half (247) of those voting were Democrats, and 65 were members of the agricultural committee in their respective houses. Women accounted for 95 of the 517 legislators voting on the bill.

Table 1. Summary Statistics

	Units	Mean	Standard deviation
Yea vote	binary indicator	0.617	0.487
Agricultural PAC contributions	thousand dollars	94.11	138.2
Environmental PAC contributions	thousand dollars	11.62	40.70
Ideology			
Far left	binary indicator	0.119	0.324
Left	binary indicator	0.288	0.453
Centrist	binary indicator	0.098	0.297
Right	binary Indicator	0.313	0.464
Far right	binary indicator	0.183	0.387
Percentage of households receiving SNAP	percentage	13.37	5.620
Share of rural households	percentage	21.00	18.49
Vote share in recent election	percentage	61.46	13.73
Ran unopposed in recent election	binary indicator	0.024	0.155
Freshman status	binary indicator	0.224	0.417
Agricultural region			
Atlantic	binary indicator	0.301	0.459
West	binary indicator	0.241	0.428
Plains	binary indicator	0.117	0.321
Midwest	binary indicator	0.188	0.391
South	binary indicator	0.153	0.360
Senator	binary indicator	0.188	0.391
Democratic Party	binary indicator	0.480	0.500
Female	binary indicator	0.183	0.387

Note: PAC = political action committee.

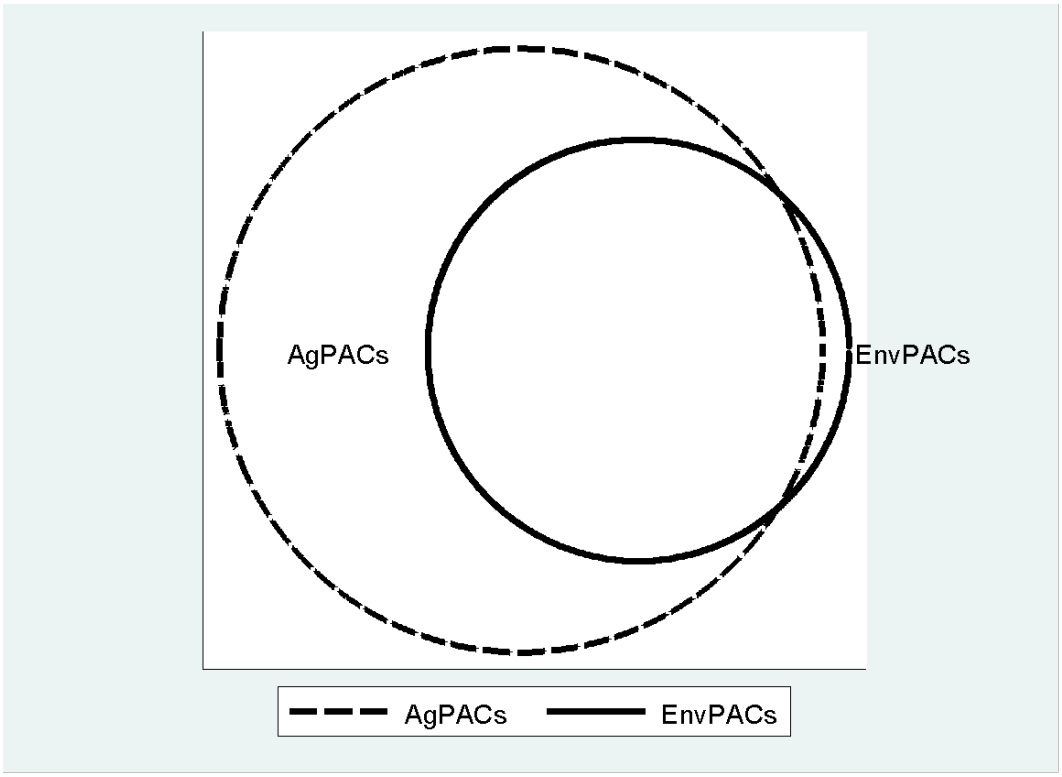
Two measures of electoral incentives are used in the analysis. The percentage of households in rural areas in each district or state is used to measure electoral incentives from

voters who are involved in, or benefit directly from, agricultural production. These data are taken from the 2010 census. The share of households in each district or state receiving SNAP benefits in 2013 is used as a measure of electoral incentives for the Nutrition title. These data are taken from the US Department of Agriculture (USDA) Food and Nutrition Service.

Data on PAC spending by agriculture and environmental interests are taken from the Center for Responsive Politics' Open Secrets database for 2015.[5] These data include spending by agricultural and environmental interest groups for the legislator's most recent reelection before the passage of the 2014 Farm Bill. For most House members, data from the 2012 election were used. Data for senators are from the 2008, the 2010, or the 2012 election. On average, agricultural PAC contributions are much higher per legislator ($94,110) than are contributions from environmental PACs ($11,620). However, agricultural PAC contributions are also more widely dispersed, whereas environmental PAC contributions are more targeted. Of the 517 legislators voting on the final bill, 264 did not receive money from environmental PACs. All but two legislators received agricultural PAC money. Figure 2 diagrams the relationship between agricultural and environmental PAC contributions to representatives and senators. Although lower spending overall by environmental PACs might limit their ability to influence legislation, the fact that they target their funds to specific legislators may make their spending more effective at the margin.

[5] Examples of agricultural PACs include, but are not limited to, the Farm Credit Council, the Crop Insurance Professionals Association, and the Texas Farm Bureau. Examples of environmental PACs are the League of Conservation Voters, the Sierra Club, and Ocean Champions. See Center for Responsive Politics, "Political Action Committees," OpenSecrets.org, 2015 data, https://www.opensecrets.org/pacs/.

Figure 2. Venn Diagram Depicting the Number of Legislators Who Received PAC Contributions



Note: AgPACs = agricultural political action committees; EnvPACs = environmental political action committees.

As previously discussed, it is necessary to control for potential endogeneity in the relationship between PAC contributions and legislators' votes on the Farm Bill. Thus, the following data are used to construct instrumental variables: Data on the percentage of votes cast in favor of the legislator in the most recent election before 2013 are taken from the *New York Times* online database of election results. A binary variable for those legislators who ran unopposed is also included. Legislator ideology data are taken from GovTrack. The ideology index developed by Tauberer (2012) assigns a score for each legislator along the liberal-conservative spectrum, based on cosponsorship behavior. Legislators who cosponsor similar bills are grouped together, while those who cosponsor different bills are farther apart on the spectrum.

The index is on the interval [0,1], with lower scores relating to left-wing ideology and higher scores relating to right-wing ideology. I divide the data into five groups: far left, left, center, right, and far right. The groups are defined by the intervals [0,0.2], [0.2,0.4], [0.4,0.6], [0.6,0.8], and [0.8,1], respectively. Of the 517 legislators who voted on the final bill, 62 are in the far left category, 147 are in the left category, 51 are in the center category, 162 are in the right category, and 95 are in the far right category.

Model Identification and Results

The three equations that make up the model specified in the previous section are estimated simultaneously using a mixed-process model and limited information maximum likelihood estimation. First, though, a standard two-stage least squares model with White-corrected standard errors is estimated to implement a bevy of identification tests. Because this analysis employs an instrumental variables approach, it is necessary to first estimate the endogenous variable–dependent equations separately to check for identification of the instruments. Thus, each PAC donation–dependent equation (specified in equation 1) is estimated separately, and the results can be found in table 2. The Sanderson-Windmeijer chi-squared test of excluded instruments (Sanderson and Windmeijer 2016) is employed to determine whether the three instrumental variables are jointly statistically significantly different from zero. The results of these tests, both significant at the 1 percent level, indicate that the model is not underidentified.

Table 2. First-Stage Regressions of Agricultural and Environmental PAC Contributions on Instruments and Exogenous Variables

	Agricultural PAC contributions	Environmental PAC contributions
Vote share in most recent election[a]	−0.525	−0.478[c]
	(0.507)	(0.206)
Ran unopposed in most recent election[a]	−29.48	11.12
	(29.06)	(11.43)
Freshman status[a]	−45.26[d]	6.214
	(13.60)	(3.965)
Far left ideology	−58.91[d]	27.98[d]
	(21.14)	(8.185)
Left ideology	−30.06[b]	7.400
	(15.55)	(4.859)
Right ideology	32.76	−0.777
	(30.93)	(3.754)
Far right ideology	13.92	−3.289
	(35.31)	(4.310)
Senate	171.28[d]	28.98[d]
	(21.55)	(7.203)
Democratic Party	−15.00	10.74c
	(31.32)	(4.883)
Agricultural Committee	141.11[d]	−7.466[b]
	(29.66)	(3.873)
Female	1.362	−5.491
	(9.351)	(4.106)
Agricultural regions		
West	23.44[b]	5.578
	(11.91)	(5.966)
Plains	35.02[b]	−2.266
	(18.40)	(4.417)
Midwest	28.95[c]	−2.969
	(13.18)	(3.839)
South	21.35	−0.595
	(16.06)	(3.567)
Percentage of SNAP recipients	2.376[c]	−0.463[c]
	(0.917)	(0.221)
Share of rural households	−0.169	0.144[c]
	(0.393)	(0.093)
Constant	24.55	5.953
	(28.81)	(3.948)
Sanderson-Windmeijer F-Test of Excluded Instruments	10.00	9.87
p-value	0.006	0.007

Note: PAC = political action committee.
[a] Indicates that this is used as an instrumental variable in the full model.
[b] Denotes statistical significance at the 10 percent level. Standard errors are in parentheses.
[c] Denotes statistical significance at the 5 percent level. Standard errors are in parentheses.
[d] Denotes statistical significance at the 1 percent level. Standard errors are in parentheses.

It is also necessary to determine whether the equations are weakly identified. The Sanderson-Windmeijer F-test of weak identification (Sanderson and Windmeijer 2016) is employed for both PAC spending–dependent equations, and values of 4.83 and 4.76 are found for the agricultural-PAC-spending-dependent and environmental-PAC-spending-dependent equations, respectively. Using critical values from Stock and Yogo (2005), it is clear that weak identification is a problem for both endogenous variables.

In light of this problem, the Anderson-Rubin joint Wald test (Anderson and Rubin 1949), which is robust to the presence of weak instruments, is implemented on the estimation of equation 2. The test results in a p-value of 0.003, indicating that the endogenous regressors are jointly statistically significant. Although this information is important, functional form issues necessitate the use of a mixed-process model, which is discussed later.

Finally, overidentification and endogeneity tests were performed. The value of the chi-squared-distributed Sargan test of overidentification (Sargan 1958) is 0.90, with a p-value of 0.3427. This failure to reject the null indicates that the model is not overidentified. The endogeneity test is defined as the difference between two Sargan test statistics: one in which the PAC contributions regressors are treated as endogenous, and another in which they are treated as exogenous. The test is distributed chi-squared and the null hypothesis is that the variables can be treated as exogenous. The p-value is 0.0097, indicating that the PAC contributions regressors cannot be treated as if they are exogenous.

With endogeneity and instrument validity addressed, the following discussion focuses on model selection. Chappell's (1982) Probit-Tobit model addressed an important problem regarding analysis of PAC contributions: interest groups often donate to relatively few candidates, such that there are many zeroes in the data. More than half (51.41 percent) of the

legislators received no campaign contributions from environmental PACs. Although it is possible that those zeroes represent the true value the PAC would prefer to donate to a given candidate, it is likely that, if they could, they would donate a negative dollar value. Thus, it is necessary to use a Tobit model to account for this truncation in the data.

In contrast to the contributions made by environmental PACs, all but two legislators received agricultural PAC contributions in the two- to six-year period leading up to their most recent election before the 2014 Farm Bill was passed. Contributions from agricultural PACs ranged from $500 to $1.521 million. Given the range of donation amounts across nearly all of the legislature, these values almost certainly represent the true value the PACs preferred to donate. Thus, there is no justification for using a Tobit estimator to model agricultural PAC contributions.

Equations 1 and 2 are estimated as a system with limited-information maximum likelihood using a mixed-process estimator. The agricultural-PAC-donation-dependent (1), environmental-PAC-donation-dependent (1), and vote-dependent (2) equations are estimated using ordinary least squares, Tobit, and Probit, respectively. As discussed previously, agricultural practices are different across the country but are somewhat homogeneous within each region. Thus, in addition to controlling for regional effects with dummy variables based on the ARMS III Farm Production Expenditure Regions map (figure 1), I cluster the standard errors on these regions.[6] This treatment of the errors allows for independence of the errors across regions but assumes homogeneity within regions. Clustering at the state or district level is not appropriate because agricultural production and practices—and thus agricultural policy and politics—are regional phenomena.

[6] All the regressions of the full system were estimated with and without clustered standard errors. In every case, the significance of the estimates was higher (i.e., p-values were lower) with the clustered errors. Thus, the results of the nonclustered error regressions are not presented.

Table 3. Average Marginal Effects of Ideology, Electoral Incentives, and PAC Contributions on the Probability of a Legislator Voting "Yea" for the 2014 Farm Bill

	Full legislature	House only	Ag PACs only	Environmental PACs only
Agricultural PAC contributions	0.0023[b]	0.0039[c]	0.0024[c]	
	(0.0009)	(0.0007)	(0.0008)	
Environmental PAC contributions	0.0021[b]	0.0176[c]		0.0022[c]
	(0.0011)	(0.0059)		(0.0006)
Far left ideology	−0.1212	−0.2389[c]	−0.0626	−0.2974[c]
	(0.1526)	(0.0427)	(0.1254)	(0.0714)
Left ideology	−0.0990	0.0009	−0.0844	−0.1817[b]
	(0.0654)	(0.0673)	(0.0527)	(0.0781)
Right ideology	−0.0563	−0.0145	−0.0580	7.62e−06
	(0.0585)	(0.0567)	(0.0568)	(0.0906)
Far right ideology	−0.1915[c]	−0.1302	−0.1928[c]	−0.2185[b]
	(0.0315)	(0.0988)	(0.0359)	(0.0902)
Senate	−0.3546[c]		−0.3196[b]	−0.0317
	(0.1123)		(0.1358)	(0.0397)
Democratic Party	0.1205[a]	−0.1136	0.1506[b]	0.0753
	(0.0703)	(0.0991)	(0.0599)	(0.1210)
Agricultural Committee	−0.0914	−0.0170	−0.1214	0.2149[c]
	(0.2107)	(0.1613)	(0.1780)	(0.0722)
Female	0.0391	0.0778	0.0304	0.0474
	(0.0647)	(0.0639)	(0.0585)	(0.0762)
Agricultural regions				
West	0.0819	−0.0474	0.0864[a]	0.1586[c]
	(0.0512)	(0.0403)	(0.0514)	(0.0296)
Plains	0.0480	0.0101	0.0364	0.1487[c]
	(0.0513)	(0.0394)	(0.0449)	(0.0129)
Midwest	0.1535[a]	0.1182[c]	0.1445[a]	0.2600[c]
	(0.0879)	(0.0448)	(0.0828)	(0.0076)
South	0.1346[b]	0.0810[c]	0.1245[b]	0.2162[c]
	(0.0620)	(0.0311)	(0.0592)	(0.0059)
Percentage of SNAP recipients	−0.0064	0.0020	−0.0081[b]	−0.0023
	(0.0043)	(0.0043)	(0.0037)	(0.0046)
Share of rural households	0.0067[c]	0.0004	0.0068[c]	0.0077[c]
	(0.0021)	(0.0023)	(0.0023)	(0.0023)

Note: PAC = political action committee.
[a] Denotes estimate significance at the 10 percent level. Standard errors are in parentheses.
[b] Denotes estimate significance at the 5 percent level. Standard errors are in parentheses.
[c] Denotes estimate significance at the 1 percent level. Standard errors are in parentheses.

The three-equation system defined previously is estimated using limited information maximum likelihood, and the marginal effects are reported in table 3. I estimate three other regressions to determine the robustness of the results. The first robustness check consists of

estimating the system of equations for both houses of Congress separately. However, because of the small size of the Senate, the estimation failed to converge. Thus, only the results of the House are reported in the second column of table 3. Two other regressions are estimated, each with only one endogenous PAC donation variable. These regressions are estimated to determine whether the measured effects of PAC contributions are biased because of the inclusion of both endogenous regressors. These results are found in columns 3 and 4 in table 3 and are discussed later.

The interpretation of the magnitude of average marginal effects is difficult, owing to their nonlinearity. Thus, adjusted predictions of a "Yea" vote on the 2014 Farm Bill are computed for variables of interest with statistically significant marginal effects. These results can be found in tables 4 and 5 and are discussed in detail later.

Legislator Ideology

With the exception of the far right, estimates of the marginal effect of ideology on the probability of voting in favor of the 2014 Farm Bill are not statistically significant. The adjusted predictions of voting "Yea" on the 2014 Farm Bill by ideology can be found in table 4. The 97 far-right legislators had an adjusted probability of voting for the bill of 50.45 percent, compared with a 73.14 percent probability for centrists. Thus, holding all other variables at the mean, a far-right legislator was 22.69 percentage points less likely to vote in favor of the bill than a centrist.

Given that the relevant alternative to passing the bill was continuing the policies defined in the previous bill, we can interpret the final vote as an indication of the legislators' preferences for the specific changes the bill made relative to the 2008 Farm Bill. Barnaby and Russell (2016) note that, since the passage of the 2014 Farm Bill, attempts by right-of-center legislators have been made to cut funding from crop insurance in an effort to reduce government spending.

Because the 2014 Farm Bill increased funding for crop insurance, far-right legislators most likely voted against the 2014 Farm Bill because of its increased funding for crop insurance.

Table 4. Adjusted Predictions of a "Yea" Vote on the 2014 Farm Bill for Five Legislator Ideologies, Holding All Other Variables at Their Means

	Adjusted prediction (%)	Number of observations
Far Left	59.13	63
Left	61.80	153
Center	73.14	52
Right	66.80	166
Far Right	50.45	97

The results of the House-only regression indicate that the unwillingness of far-right legislators to vote in favor of the bill was confined to the Senate. That is, the effect of far-right ideology on the Farm Bill vote is not statistically significant using only House of Representatives data, so the estimate from the full legislature regression applies only to the Senate. In the House, far-left legislators were less likely to vote in favor of the bill than were centrists. This result is an indication of the unpopularity of the cuts to the SNAP program.

The results indicate that ideology is only an important factor for determining the passage of agricultural legislation at the extremes of the ideological spectrum. Those near the center were statistically no more or less likely to vote in favor of the bill. The following discussion of the effects of electoral incentives and PAC contributions provides more context.

Electoral Incentives

Electoral incentives were also expected to be correlated with legislators' votes. Since the majority of the budget of the 2014 Farm Bill is dedicated to the Supplemental Nutrition Assistance Program, legislators might be influenced by the use of this program in their district or state. Bellemare and Carnes (2015) use poverty as a proxy for electoral incentives from SNAP recipients. I use data on the percentage of households that receive SNAP benefits in a district (for representatives) or state (for senators) as a measure of electoral incentives to increase funding for SNAP. This is a more direct measure of the effect of the SNAP program on the legislative process. The estimate of the marginal effect of SNAP participant households on the probability of voting in favor of the bill was not statistically significant, and its effect is uncertain.

The share of rural households in a district or state is a proxy for the intensity of the electoral incentive associated with the public's dependence on farm programs. In addition to the general dependence of rural communities on the agricultural sector, Ifft, Kuethe, and Morehart (2015) find that direct payments to farmers of the sort found in previous bills but repealed and replaced with risk-based policy in the 2014 law were capitalized into cropland values. This increase in agricultural land values provides a financial gain to current landholders outside of agriculture as well, since higher land values increase the value of collateral for rural lenders, improving the health of the rural economy. It is common practice for rural lenders to require farmers to purchase crop insurance, with its significant subsidies from the Farm Bill, as a form of collateral to back their annual production loans. Rural development funding and conservation subsidies also provide benefits to the agricultural community as a whole. Thus, the broader rural community has a significant stake in the provisions of the Farm Bill and is likely to pressure legislators to vote in a manner consistent with their interests. This is done

either by voting for a candidate who is likely to support agriculture or by threatening to vote out a candidate who does not.

The marginal effect of the share of rural households on the probability of a vote in favor of the 2014 Farm Bill is 0.0067 (table 3) and is statistically significant at the 1 percent level. The adjusted predictions of a "Yea" vote on the 2014 Farm Bill at the minimum, 25th percentile, median, 75th percentile, and maximum of the share of rural households are found in table 5. Holding all other variables at their means, the adjusted predictions range from 45.06 percent to 93.13 percent for minimum (0 percent) and maximum (76.49 percent) values of the share of rural households, respectively.

Table 5. Adjusted Predictions of a "Yea" Vote on the 2014 Farm Bill across the Distributions of Key Variables, Holding All Other Variables at Their Means

	Share of rural households (%)	Agricultural PAC contributions	Environmental PAC contributions[a]
Minimum	45.06	36.32%	59.29%
	(0)	($0.00)	($0.00)
25th percentile	47.84	41.28%	59.82%
	(3.33)	($18,100)	($2,000)
Median	58.25	48.26%	60.97%
	(15.79)	($42,750)	($6,418)
75th percentile	73.10	67.35%	63.95%
	(35.17)	($111,501)	($18,059)
Maximum	93.13	100%	100%
	(76.49)	($1,521,020)	($569,471)

[a] Since more than half the environmental PAC contributions are zero dollars, the 25th, 50th, and 75th percentiles were calculated using only observations greater than zero.
Note: Numbers in parentheses are the values of the independent variables at the indicated points on the distribution.
PAC = political action committee.

The magnitude of the effect of rural household share is large; the difference in the probability of voting in favor of the 2014 Farm Bill of otherwise average legislators living in the least rural and most rural areas is 48.07 percentage points. The probability that legislators in the least rural districts would vote in favor of the bill was less than 50 percent, but it is virtually certain that they would vote for the bill in the most rural areas. Comparing two otherwise identical legislators with rural household shares at the 25th and 75th percentiles, I find a difference in probability of voting in favor of the bill of 25.26 percentage points, from 47.84 percent at the 25th percentile to 73.1 percent at the 75th percentile. This is an economically significant difference because the probability is less than 50 percent at the 25th percentile and is nearly 75 percent at the 75th percentile.

At the median (15.79 percent rural household share), there is a 58.25 percent probability that the legislator voted in favor of the bill. This result indicates that even legislators in areas with a small minority of rural households are more likely than not to vote in favor of proagriculture legislation. As noted previously, the approach used in this paper does not allow for the determination of causal effects. However, there is a statistically significant, positive, and politically significant association between electoral incentives and the Farm Bill vote. There is a substantially higher probability that a legislator will vote in favor of the bill if his or her constituency is above the median rural household share.

Results of the House-only regression indicate that electoral incentives are different between the two houses of Congress. For legislators in the House, the percentage of rural households at the district level did not have a statistically significant effect on the probability that the legislator would vote for the bill. This result indicates that the statistically significant effect measured in the full legislature is only relevant in the Senate. However, this does not

significantly alter the implications of the effects measured in the full-legislature regression, because the distribution of rural household shares in the Senate-only data is similar to the distribution of the data used in the full-legislature regression.

The positive association between the share of rural households and the probability of a "Yea" vote on the 2014 Farm Bill is difficult to reconcile with the reduction in farm program spending relative to the baseline. It is unlikely that the percentage of rural households is picking up the effect of relatively modest cuts to the nutrition program, because the percentage of SNAP households is also controlled for in the model. It is possible that this effect is a result of the relatively modest cuts to farm support programs in general relative to the House and Senate bills. Additionally, Congress indicates that the roll call vote record during 2013 leading up to final passage gave no clear indication that the bill would pass in early February 2014.[7] Legislators may have been apt to vote in favor of the bill so that future iterations of the bill did not further erode agricultural support.

Political Action Committee Contributions

Agricultural and environmental PACs spent a combined $55 million on the campaigns of senators and House members leading up to their most recent elections before the final vote on the 2014 Farm Bill. These contributions are rational, given that legislators are in a position to vote for legislation that benefits these interest groups. Thus, even if—owing to data restrictions—I cannot prove the existence of a causal relationship that amounts to "vote-buying" behavior by PACs, it is unlikely that rational PAC donors would donate to these campaigns if they did not

[7] See the bill history for the Agricultural Act of 2014, H. R. 2642, 113th Cong. (2014), available at https://www.congress.gov/bill/113th-congress/house-bill/2642/all-actions?q=%7B%22roll-call-vote%22%3A%22all%22%7D.

expect some benefit in return (Bellemare and Carnes 2015). The data and techniques used in this paper to minimize unobserved heterogeneity imply that the following results are at least suggestive of a causal relationship.

PAC contributions from both agricultural and environmental PACs are positively associated with the probability of voting in favor of the bill. Coefficients of 0.0023 (agricultural PACs) and 0.0021 (environmental PACs) are estimated and are statistically significant at the 1 percent level. A t-test indicates that the two coefficients are statistically different from one another (p-value 0.001), but the magnitudes are similar from an economic perspective. Given that there is a statistically significant relationship between PAC contributions and vote probability, a discussion of the adjusted predictions across the distributions of PAC donation sources follows.

Robustness checks for the estimates of the effects of PAC contributions on the 2014 Farm Bill vote generally support the results of the full model. The House-only regression (table 3) yields a higher-magnitude effect for both agricultural and environmental PAC contributions than in the full legislature. The effects are statistically significant and, given the results in the full legislature model, indicate that the effects of both agricultural and environmental PAC contributions are lower in the Senate. However, the direction and significance of the estimates is still the same as in the full legislature regression.

Because the primary model in this paper includes two endogenous variables, it is important to determine whether the results are dependent on the inclusion of both variables. Thus, table 3 reports the results of two regressions in which one of the PAC donation variables is omitted. The estimates are statistically different—at the 0.001 level of significance—from those in the full-legislature model, but they are economically very similar. This result indicates that the

primary results of this study are not, in fact, dependent on the specification of the endogenous variables in the model.

The positive correlation between PAC contributions from both sources and the probability of a vote in favor of the 2014 Farm Bill indicates that the final bill was preferable for both groups relative to the expected result of a temporary extension of the 2008 Farm Bill. For agricultural interests, an extension of the 2008 Farm Bill would have meant continued commodity support absent from the 2014 bill, but negotiating power would likely have deteriorated such that support in a future version of the 2014 legislation would have been weaker than in the version that passed. Support among legislators of both major parties for agricultural subsidies is expected to decline in the future (Barnaby and Russell 2016).

Adjusted predictions that an otherwise average legislator would vote in favor of the 2014 Farm Bill range from 36.32 percent at the minimum agricultural PAC donation amount ($0) to 100 percent at the maximum amount ($1,521,020), a difference of 63.68 percentage points. The median donation amount ($42,750) is associated with a 48.26 percent probability of voting in favor of the bill. Thus, legislators receiving donation amounts in the bottom half of the agricultural PAC donation distribution are more likely to vote against the 2014 Farm Bill than to vote in favor of it. Contributions in excess of $49,000 are associated with a greater than 50 percent chance that a legislator voted in favor of the bill. Finally, an increase in contributions of $93,401 from $18,100 (25th percentile) to $111,501 (75th percentile) is associated with an increased probability of voting in favor of the bill of 26.07 percentage points, from 41.28 percent to 67.35 percent. Although these findings are not proof of a causal relationship between campaign contributions from agricultural PACs and pro-agriculture votes, they are certainly indicative of such a relationship. It is possible that other confounding factors that affect this

relationship have been omitted from the model, but I have controlled for many major factors that are likely to affect the legislator's decision to vote for or against the 2014 Farm Bill.

Though conservation spending was reduced in the 2014 Farm Bill relative to the 2008 bill, the positive correlation between environmental PAC contributions and the probability of voting in favor of the 2014 bill is consistent with two other major changes to the bill. The 2014 Farm Bill significantly reduced subsidies for commodities by eliminating direct payments to farmers. Further, under the 2014 bill, farmers are required to file a conservation plan for their operation in order to receive crop insurance premium subsidies. Premium subsidies range from 40 percent to 60 percent and represent a significant reduction in per-acre production costs. Reductions in commodity support and crop insurance premium subsidies are major goals of environmental lobbying organizations (Weir 2016; Weir and Cox 2016).

As evidenced by the adjusted predictions in table 5, the estimated effects of environmental PAC contributions on the 2014 Farm Bill vote are smaller than the effects of agricultural PAC contributions. Because more than half of the legislature received no money from environmental PACs, the 25th, 50th, and 75th percentiles of environmental PAC donation amounts are calculated using only donation amounts above zero. Holding all other variables at their means, the adjusted prediction at the minimum donation amount ($0) is 59.29 percent, while the prediction at the maximum amount ($569,471) is 100 percent, a difference of 40.71 percentage points. Over the same percentile range, agricultural PAC contributions are associated with an increased probability of a vote in favor of the bill of 63.68 percentage points. The 25th, 50th, and 75th percentile environmental PAC donation amounts ($2,000, $6,418, and $18,059, respectively) are associated with adjusted predictions of 59.82 percent, 60.97 percent, and 63.95 percent, respectively. Thus, an increase in environmental PAC contributions from the 25th to the

75th percentile is associated with a much smaller increase in the probability of voting in favor of the bill than for agricultural PAC contributions—4.13 percentage points for the former and 26.07 percentage points for the latter.

Given that those adjusted predictions are calculated at the means and that the distributions of agricultural and environmental PAC contributions are different, it is useful to examine the adjusted predictions and the associated changes in the probability of a "Yea" vote at given dollar amounts. Table 6 shows the adjusted predictions for agricultural and environmental PAC contributions of $25,000 and $125,000, holding all other variables at their means. The changes in predicted probability of a "Yea" vote on the 2014 Farm Bill associated with this $100,000 increase in contributions were 25.62 percentage points for agricultural PACs and 16.76 percentage points for environmental PACs. This result indicates a higher degree of influence for agricultural PACs than for environmental PACs. I expected the higher degree of targeting of funds from environmental PACs to make their contributions more effective at the margin. The fact that their contributions are actually *less* effective implies that, perhaps, environmental groups did not favor the changes made to agricultural policy by the 2014 Farm Bill as much as agricultural groups did.

Table 6. Adjusted Predictions for PAC Contributions of $25,000 and $125,000, Holding All Other Variables at Their Means

	Agricultural PACs	Environmental PACs
$25,000	46.85%	73.8%
$125,000	72.47%	90.56%
Change (percentage points)	25.62	16.76

Note: PACs = political action committees.

Conclusion

This paper examines the effects of legislator ideology, electoral incentives, and agricultural and environmental interest group PAC contributions on the passage of the 2014 Farm Bill. The Farm Bill affects many constituencies and functions as a grant of government privilege to agricultural producers, conservation advocates, and those requiring food assistance. Although the data and model employed in this paper do not allow for positive proof that these relationships are causal, the use of instrumental variables and several control variables thought to be related to the legislators' vote decisions increase my confidence that the estimates indicate causal relationships.

This study indicates that, of the three factors examined, legislator ideology plays a relatively minor role in determining agricultural policy. Legislators on the ideological extremes—both left and right—are somewhat less likely to support agricultural support policies, but only those on the far right have a statistically significantly lower probability of voting in favor of such legislation than do other legislators. This observation indicates that budgetary concerns are most likely the primary ideological issue because, as Barnaby and Russell (2016) note, such concerns dominate current efforts to reduce agricultural support.

A more important factor, as indicated by the results of the analysis, is the size of rural constituencies. The findings of this study indicate that legislative incentives provided by agricultural residents (i.e., their preference for agricultural support policies given the direct and indirect positive effects such policies have on rural communities) are effective in increasing the probability that legislators will vote in favor of agricultural support policies, specifically the 2014 Farm Bill. As rural populations continue to shrink across the United States, an important source of political support for agricultural policy will also diminish.

Meta-analysis of the campaign contributions literature by Ansolabehere, de Figueiredo, and Snyder (2003) indicates that, while findings are mixed across laws, legislatures, and interest groups, statistically significant effects of campaign contributions by agricultural interest groups are relatively consistent. This paper contributes to the literature on the effects of PAC contributions on agricultural legislation by (1) estimating the effects of recent efforts by agricultural interests and (2) determining whether and in what direction PAC contributions by environmental interests affect such legislation. My findings indicate a positive and economically significant relationship between agricultural and environmental PAC contributions and legislation designed to support agriculture and conservation interests. Additionally, I find that agricultural PACs donate more and appear to have more influence than environmental interests. Rational campaign donors obviously perceive some benefit from the campaign contributions they provide to legislators. This paper identifies the practical size of the effect these contributions may have.

Future research in this area should focus on disaggregating the influence of agricultural interest groups on the policy process. Given the regional policy disagreements that led to a choice of Title I policies for farmers, an examination of the regional or commodity-based influence on agricultural policy will inform producers, policy analysts, legislators, regulators, and the public on the degree to which specific groups exert influence over the political process.

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