Asymmetric Production Effects of Payment Supports: Evidence from the 2008 Farm Bill

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Selected Poster prepared for presentation at the 2015 Agricultural & Applied Economics Association and Western Agricultural Economics Association Joint Annual Meeting, San Francisco, CA, July 26-28

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Do support payments to producers have asymmetric effects?

- Government support payments to producers continue to affect crop selection and acreage decisions. Much of the research on these outcomes centers on whether and by how much extra land gets planted due to insurance subsidies and other supports.
- We ask whether the impact of supports to producers is symmetric around zero. In other words, do support increases drive the same size effects as support reductions?
- Knowing how producers respond to positive and negative changes in supports can help us appreciate the persistent effects of government farm programs.

Exploiting policy changes in the 2008 Farm Bill

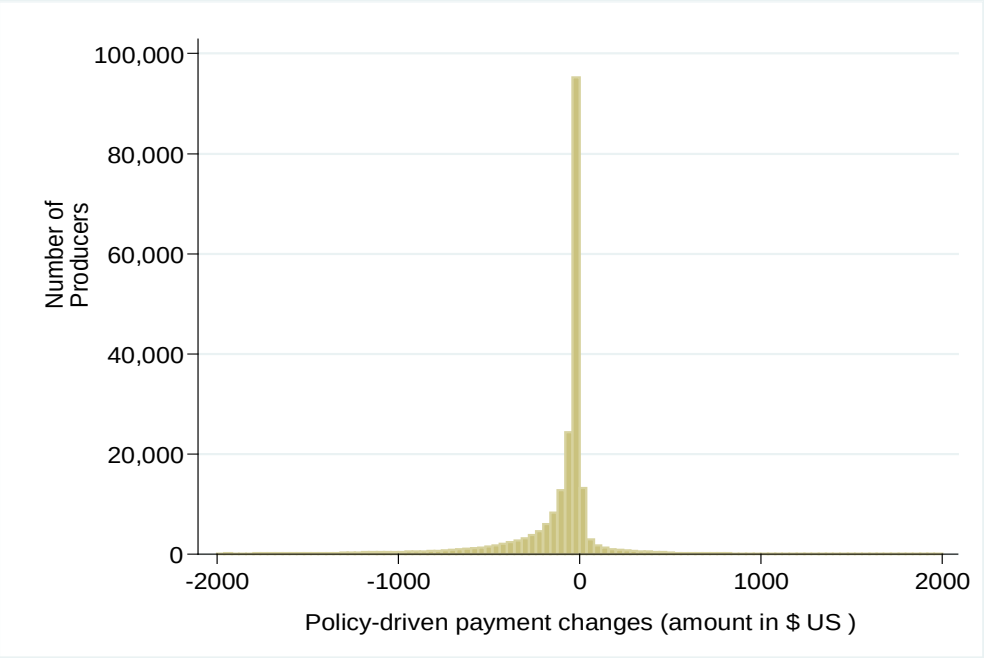
- Several changes to the direct payment rules appeared in the Farm Bill of 2008.
  - Elimination of three entity rule
    - Number of entities associated with an operator became unlimited, but maximum total payment capped at $40,000.
  - Reduced Income Limits
    - Maximum income eligible for supports reduced from $2.5 million to $1.25 million
  - Ten Base Acres
    - Eliminated direct payments paid to any farm with fewer than 10 base acres
  - New payment formula
    - Payment = No. of acres x program yield x commodity payment rate x 83.3%. (It used to be 85%.)
- Taken together, these changes caused some producers' payments to rise and others' payments to fall.
- Using these exogenous shocks, we can cleanly identify producers' response to positive *and* negative payment changes.

What data do we use?

- USDA's Farm Service Agency (FSA) collects data from all program participants, including acreage in each crop, base acres, and the direct payments they received.
- Data are collected at the "FSA farm" level which are then linked to owners and operators. Since owners/operators make decisions, not "FSA farms", we aggregate to the owner/operator level and allocate acres based on percentage ownership.
- We use two years of data, 2008-2009, straddling before and after the policy change, covering a sample of 13 diverse states.[1]
- This results in 230,558 observations.

[1] California, New York, Michigan, Minnesota, Wisconsin, Florida, Washington, Texas, Georgia, Arizona, North Dakota, Idaho, Oregon

Summarizing the FSA data



Distribution of direct payment changes from 2008 to 2009

producer-level	average level in years		average change
	2008	2009	
total crops acres	535.15	540.46	5.31
direct payments (US$)	6,240.53	5,920.95	-319.58
base acres	329.38	326.08	-3.30
non-base acres	161.86	171.65	10.03

Summary statistics of per-operator acreage and direct payments, 2008-2009, for all producers in 13 states.

Identifying the exogenous portion of the payment change

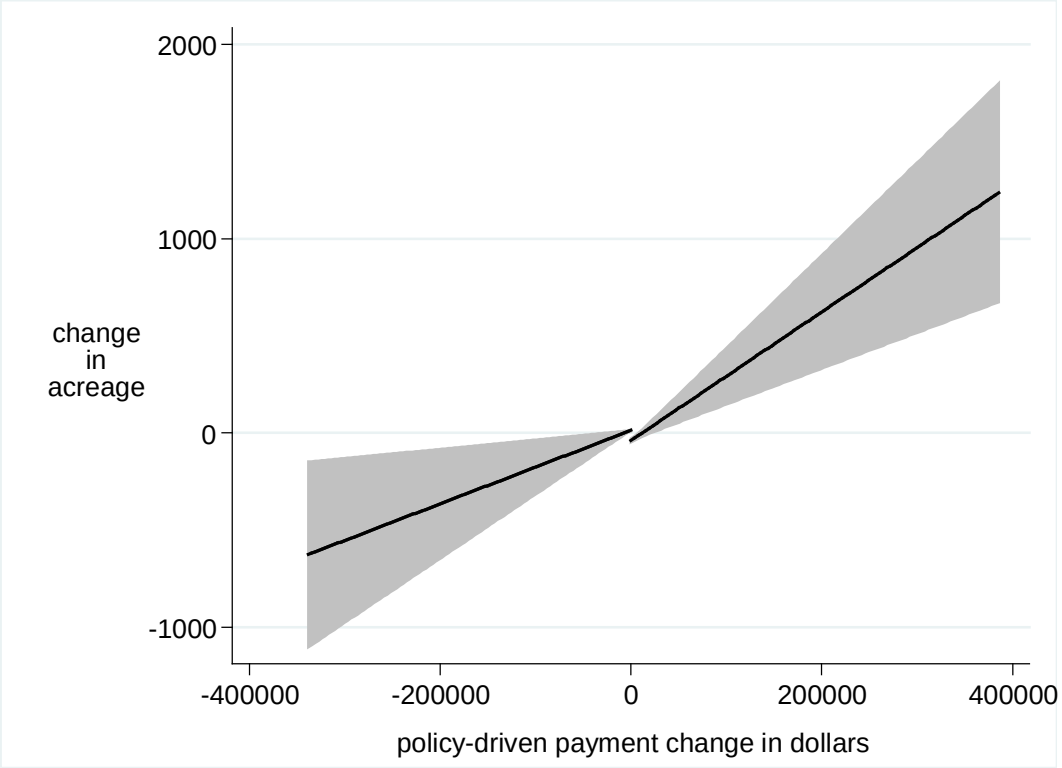
- However, FSA data do not reveal what fraction of the payment changes are due to policy. Plus, producers buy and sell their base acres which also changes their payments. How can we elicit the payment change attributable strictly to the policy change?
- Payment changes can be expressed completely in terms of base acre changes and some unexplained portion.

$$\Delta direct\ payments_i = \beta_1 \cdot \Delta base\ acres_i + \varepsilon_i$$

- Thus, the term ε_i embodies all the changes attributable to policy. Estimating this equation, we can recover the residuals, and use them as our "policy" variable, call it *Δpolicy.*

	mean	Std. dev	No. of obs
Δpolicy	-$261.97	4505.5	230,558

First glance at the data



Plotting the asymmetric effects of payment changes against acreage change with 95% confidence intervals.

Estimating the effect of the policy change on crop area

- We estimate in first differences the producer-level response of crop area to change in direct payments

$$\Delta croparea_i = \beta_0 + \beta_1 \Delta policy_i + \beta_2 \Delta basepayment_i + \delta + \Delta u_i$$

- $\Delta policy$ is the policy-driven change in direct payments (our explanatory variable of interest)
- Controls include $\Delta basepayment$, the payment change due to ordinary base acreage adjustments and δ, a dummy to capture state-level unobservable effects.

Summary of results

- The base model just runs the acreage model on payments, without distinguishing positive from negative
- Model II separately captures positive and negative payments.
- Models III and IV regress on just positive and negative payments, respectively.
- Results show a statistically significant effect of positive payments that is greater than the negative payments.

	(I) Base Model	(II) Positive & negative payments	(III) Subsample of positive payments	(IV) Subsample of negative payments
Δpolicy	0.002*** (0.0005)		0.009*** (0.001)	-0.005*** (0.0007)
Δpospolicy		0.008*** (0.001)		
Δnegpolicy		-0.005*** (0.001)		
Δbase acreage payment	0.083*** (0.001)	0.084*** (0.001)	0.084*** (0.001)	0.083*** (0.001)
state effects	yes	yes	yes	yes
constant	-57.78*** (31.77)	-91.08*** (31.85)	-101.30*** (79.14)	-92.09*** (35.39)
R-square	0.06	0.06	0.17	0.04
no. of observations	230,558	230,558	32,656	196,818

Significance levels are ***, **, and * for 1%, 5%, and 10% respectively.

Conclusions

- This is the first evidence of asymmetric effects in the literature on payment support programs.
- These effects might relate to traditional theories of loss aversion and reference point bias.
- Alternative explanations include the logistical and technical challenges of downsizing acreage versus expanding.
- Extensions to this research will require expanding the time period and geographic scope to obtain more generalizable results.