ESTIMATES OF THE INCIDENCE OF AGRICULTURAL SUBSIDIES USING SOIL-CLIMATIC REGIMES

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ESTIMATES OF THE INCIDENCE OF AGRICULTURAL SUBSIDIES USING SOIL-CLIMATIC REGIMES

NATHAN P. HENDRICKS and KRISHNA POKHAREL

INTRODUCTION

- Economists have long recognized that the incidence of government subsidies differs from the initial recipient of such subsidies. In particular, even though farm operators may receive the subsidy, nonfarm landowners may adjust rental rates to capture the benefits of the subsidies.
- Standard economic theory predicts that nonfarm landowners capture all of a purely decoupled subsidy but only capture a portion of a purely coupled subsidy (i.e., a subsidy directly tied to production).
- Nonfarm landowners may not capture all of the benefits of direct payments due to family relationships in the rental agreement, market power, rigidity in contractual arrangements, and direct payments are not purely decoupled.
- We exploit the fact that cotton and rice receive substantially higher direct payments per acre than other field crops. Intuitively, our empirical strategy compares cash rental rates in counties that have similar market returns, but who grow a different set of crops because the soil and climate of the region are relatively better suited for that set of crops.

RESEARCH OBJECTIVE

Econometrically estimate the portion of direct payments in the U.S. that accrue to nonfarm landowners through adjustments in the cash rental rate.

DATA

- County-level data on cash rental rates and average direct payments per acre
- Calculate expected market returns for each county as the 2008-2012 average across major crops using a trend crop yield estimated from NASS yield data, NASS state-level prices, and total cost of production (excluding cash rent) for each crop obtained from ERS, USDA
- Restricts the analysis to the following four Farm Resources Regions: Northern Great Plains, Heartland, Prairie Gateway, and Mississippi Portal

MODELS

Second-stage Regression:

\[
rent_i = \beta_0 + \beta_1 g_{0i} + f \left( E_{returns_i} \right) + \epsilon_i
\]

where \( g_{0i} \) is the predicted direct payment obtained from the first stage regression. First-stage Regression:

\[
g_{0i} = \alpha_0 + \alpha_1 \text{CottonRice}_{i} + g \left( E_{returns_i} \right) + u_i
\]

SCATTER PLOTS

PAYMENTS, RETURNS & RENTS

Cost Rental Rate

Average Returns per Acre

Share of Crop Acres Planted to Cotton/Rice

Direct Payments per Acre

ECONOMETRIC RESULTS

OLS Bivariate Results

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Payments</td>
<td>1.595** 0.209</td>
</tr>
</tbody>
</table>

R^2 = 0.902, p < 0.01, ** p < 0.05, *** p < 0.001

OLS Results

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Quadratic</th>
<th>Cubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Payments</td>
<td>0.655** 0.680** 0.709**</td>
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</tr>
<tr>
<td>Average Returns</td>
<td>0.327** 0.395** 0.447**</td>
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</tr>
<tr>
<td>Ereturns1</td>
<td>0.003** 0.003** 0.003**</td>
<td></td>
</tr>
<tr>
<td>Ereturns1 * Ereturns2</td>
<td>0.000 0.000 0.000</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.680** 3.412** 3.707**</td>
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</tr>
</tbody>
</table>

\[ R^2 = 0.608, 0.719, 0.720 \]

Standard errors in parentheses. ** p < 0.01, * p < 0.05

Instrumental Variable Results

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Quadratic</th>
<th>Cubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Payments</td>
<td>0.759** 0.559** 0.529**</td>
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</tr>
<tr>
<td>Average Returns</td>
<td>0.208 0.230 0.240</td>
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<tr>
<td>Ereturns1</td>
<td>0.011 0.011 0.011</td>
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</tr>
<tr>
<td>Ereturns1 * Ereturns2</td>
<td>0.001** 0.001** 0.001**</td>
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</tr>
<tr>
<td>Intercept</td>
<td>3.498** 3.286** 3.345**</td>
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</tr>
</tbody>
</table>

\[ R^2 = 0.608, 0.719, 0.720 \]

Standard errors in parentheses. ** p < 0.01, * p < 0.05

・Bivariate OLS estimates are statistically biased upward as expected.
・Controlling for expected returns decreases the incidence estimate.
・IV estimates when using quadratic or cubic controls for expected returns are the smallest, suggesting OLS still biased.
・IV estimates indicate that nonfarm landowners capture a majority of the subsidy in the long run.

KEY FINDING

The results show that roughly $0.55 of every dollar of direct payment on rented land accrues to landowners in the long run.

ACKNOWLEDGMENTS

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