Commodity Price Shocks and Rural Mortality

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Commodity Price Shocks and Rural Mortality

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Overview
Agricultural producers are entrepreneurs whose welfare and livelihood depend on market conditions, weather, and the biological process of the product they produce. Many, if not all, of these factors are typically out of the control of the producer during the production process. Unpredictable agricultural conditions can result in decreased incomes for those individuals, which can cause sudden, unexpected welfare losses. We posit that those welfare losses are likely to translate into higher mortality rates, though we cannot test the precise mechanism whereby this might happen (e.g., stress-related illnesses, suicide, stress-related accidents).

Motivation

• Headlines across the nation read...
  
  Suicide is Rising among American Farmers as They Struggle to Keep Afloat
  
  Farmers in America are facing an economic and mental health crisis
  
  Why are America’s farmers killing themselves?

• Farmers face a unique set of risk factors that adversely impact their mental health and place them at greater risk of suicidal behaviors
• 91% of farmers think financial issues impact their mental health

Objective
Examine the effect of internal and external farm conditions, including commodity price shocks, on rural mortality in the Midwest

Data

• The Midwest region was selected due to its large percentage of rural counties whose economy depend on agriculture
• Data was collected across 13 Midwest states from 1968 to 2016 for corn, soybeans, and wheat in 1,130 counties
• CDC death and suicide data was collected
• Commodity acres harvested, yield, and prices data were gathered through NASS Annual Agricultural Surveys
• Weather data was compiled for days over 30°C and annual precipitation

Model

The fixed effects model accounted for county-level clustering and was regressed for counties, i, as:

\[
\text{Mortality rate}_i = \beta_0 + \beta_1 \log(\text{commodity price})_i + \beta_2 \text{Commodity Acres}_i + \beta_3 \text{commodity yield}_i + \beta_4 \text{year}_i + \beta_5 \text{days over 30°C}_i + \alpha_i + \epsilon_i
\]

Commodity price = Annual average price received per bushel
Commodity Acres = Portion of land dedicated to commodity
Commodity Yield = Average per acre yield
Precipitation = Annual accumulated rain as of July 1st
Days over 30°C = Total annual days in given year over 30°C

Results

Separate analyses were conducted for each commodity for using the model. Results are shown in Table 1.

Key Findings:
• Commodity prices have a strong, negative relationship with mortality rates at the county-level and had the most significant impact on mortality
• Commodity yields were also statically significant for soybeans and wheat yields, however in other models yields were not a significant factor
• Total commodity acres and weather were not associated with having significant impacts on mortality

Table 1: Regression Results

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Corn</th>
<th>Soybean</th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.0152**</td>
<td>-3.68</td>
<td>0.0029</td>
</tr>
<tr>
<td>Commodity Price</td>
<td>-0.0005**</td>
<td>-18.3</td>
<td>-0.0006**</td>
</tr>
<tr>
<td>Commodity Acres</td>
<td>-0.0004</td>
<td>-0.87</td>
<td>-0.0007</td>
</tr>
<tr>
<td>Commodity Yield</td>
<td>-0.06e^-5</td>
<td>-1.02</td>
<td>0.01e^-3**</td>
</tr>
<tr>
<td>Year</td>
<td>0.01e^-04**</td>
<td>6.84</td>
<td>0.05e^-04**</td>
</tr>
<tr>
<td>Cumulative Precipitation</td>
<td>0.06e^-06</td>
<td>0.88</td>
<td>0.05e^-06</td>
</tr>
<tr>
<td>Days over 30°C</td>
<td>-0.01e^-05</td>
<td>-1.93</td>
<td>0.04e^-05</td>
</tr>
</tbody>
</table>

n = 44,303 total observations
** Significant at the 1 percent level
* Significant at the 5 percent level

Conclusion and Discussion

• Our findings help support the assertions that media and rural community members have made, that low commodity prices are associated with higher mortality rates
• Suicide data is available, but consistency in reporting is not reliable. More work on this is being completed at a state level in Minnesota.

References