Measuring the contribution of coal to Indiana’s economy

F.T. Sparrow

F.T. Sparrow & Associates
West Lafayette IN

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Two Pathways

- Directly, through the jobs and income associated with coal mining, felt primarily in the Southwest region of the state
- Indirectly, through the industry attracting effect of low electricity prices attributable to low coal prices, felt statewide
The Direct Effect

- In 2007, Indiana’s coal mining industry:
  a) Employed 2968 people at 44 mines in 9 counties
  b) Mined 34.231 million tons of coal valued at $985 million
  c) This represents 0.1% of state employment, and 0.47% of state GDP, about 1% of southwest regional employment
The Indirect Effect

- The direct effect understates the full regional impact, as workers and owners locally spend their earnings.
- This full impact is measured by a regional multiplier, which measures the full spending impact of each direct effect dollar.
- The value of the regional multiplier for coal mining in Indiana is currently 2.2.
- Thus, the full impact of coal mining on Indiana’s economy is $2,167 million, not $985 million.
What determines the Multiplier?

- The fraction of additional income that is saved, rather than spent
- The fraction of spending spent outside the region: the value of "location quotients" — the larger the region, the larger the multiplier
- Thus, if either all the income is saved, or all spent outside the region, the multiplier would be 1, e.g., limited to the direct impact
- Multipliers are available from the BEA for all states, collections of states, and all industries
The Impact of Lower Electricity Prices

- Our coal is used primarily to generate electricity.
- As a result, our electricity, at 6.46¢/kwh, is among the cheapest in the nation; only Idaho (4.92), Kentucky (5.43), West Virginia (5.04) and Wyoming (5.27) are significantly cheaper (2006 data).
- As a further result, we have attracted many electricity intensive industries to our state — steel minimills, aluminum melters, foundries, chemicals and motor vehicles, to name a few.
- Minor impact on location of less electricity intensive industries; they are more interested in a reliable source of electricity, which Indiana also has, because of grid, reserve margins, IURC.
How to relate availability of Indiana coal to this advantage?

- **A two step process:**
  
  a) First, estimate the impact on our price advantage if Indiana had no coal, and had to import it
  
  b) Then estimate the impact of this decreased advantage on our Industrial mix
What would be the impact on our cost advantage, if Indiana had to import rather than mine coal?

- Given generators now using Indiana coal have scrubbers, most likely coal imported would be other high sulfur Illinois basin coals.
- These coals cost $4.80/ton more than our coals, primarily because they are mined underground (EIA).
• This translates into an increase of $0.22/million btu in the cost of coal

• This could easily double, given that new mines would have to open to accommodate the new demand

• Assuming an average heat rate of 10,000 btu/kwh for coal plants, and given the fact that only 60% of our generating stations would have to substitute, this implies that electricity prices would increase between 0.12 to 0.24¢/kwh, or between 2 and 4%, based on an average cost of 5.7¢/kwh for Indiana industrial customers
What does such an increase do to our cost advantage relative to neighboring states?

- It would reduce our cost advantage relative to Illinois by 11%, Michigan by 13%, Wisconsin by 18%, and Ohio by 30%.
- What impact would such a reduction in our cost advantage have on Indiana’s economy?
How to measure this effect?

• Many ways, mostly involving time consuming statistical methods — regressing shares of state industrial output for electric intensive industries against state relative electricity prices, and the like.

• A crude but quick way to get an approximate effect:
  a) attribute the over-representation of electricity intensive industries in Indiana to lower electricity costs
  b) Estimate the contraction in those industries output necessary to reduce their share of state industrial output to national average shares
  c) Attribute the difference between actual and reduced output to lower electricity prices, reduce the reduction to 10 to 30% of the total to reflect only partial elimination of cost advantage
Focus on Three Industries – Primary Metals, Motor Vehicles, Chemicals

- What reduction in output would be necessary for each to have the national average share of Industrial output in Indiana?
- Table 1 gives the results
<table>
<thead>
<tr>
<th>Industry</th>
<th>U.S. %</th>
<th>Indiana $$ and %</th>
<th>Indiana $ if US %</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Metals</td>
<td>3.8%</td>
<td>$5498e6, 8.75%</td>
<td>$2387e6</td>
<td>$3111e6</td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>6.6%</td>
<td>$10231e6, 16.3%</td>
<td>$4146e6</td>
<td>$6085e6</td>
</tr>
<tr>
<td>Chemicals</td>
<td>13.4%</td>
<td>$12874e6, 20%</td>
<td>$8418e6</td>
<td>$4456e6</td>
</tr>
</tbody>
</table>

- First column is nationwide % of industrial output for each industry
- Second column is Indiana output and % of Indiana industrial output
- Third column is industry output if it contacted to national % of industrial output (State industrial output is $12874e6)
- Fourth column is the reduction necessary to remove over-representation
- Total reduction is $13652e6 to remove over representation attributed to lower electricity prices
- This reduction will at least double because of the multiplier effect to $27300e6
- But — switching to imported coal would remove only 10 to 30% of this over-representation
- Therefore, an estimate of the impact of elimination of Indiana coal availability on industrial output would be between $2730 to $8190e6
Summary

- If we add the direct and indirect economic effect of coal mining — $2167e6 — to the lower electricity cost impact range of $2730e6 to $8190e6, we get a range of approximately $5000 to $10000e6 for the total impact of Indiana coal on Indiana’s economy.

- This translates into between 2.3 to 4.9% of Indiana Gross Domestic Product.
What’s Next?

- A joint Illinois/Kentucky/Indiana study to estimate the impact of the Illinois basin coal deposits on our region
- Would involve:
  a) the use of more reliable regional, rather than state multipliers, or better yet, direct measurement
  b) a more sophisticated method of estimating the impact of lower electricity prices
- Would likely have more impact on our elected officials than separate studies, could pave the way for further three state collaboration