Gas Price Differentials in Australian Cities: Transport Costs or Trade Barriers?

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Problem

"the lack of access to transportation, particularly on the key north to south transport routes, is a barrier to entry in the southern states, contributing to the lack of gas supply ... in the southern states"

- Australian Competition and Consumer Commission, Gas Inquiry, Dec 2017

Lack of pipeline access could be contributing to higher prices, along with:

- new LNG plants linking to international prices;
- moratoria on onshore gas reducing supply;
- new coal seam gas resources that are costly.

Model

Barriers to shipping south would mean gas users in Melbourne, Sydney and Adelaide pay a premium over and above transport costs.

I model transport costs to find evidence of this.

\[ p_{BA} - p_{MA} = \text{transport cost}_{BM} + \text{south premium}_{BM} + \epsilon_{BM} \]

Price differentials depend on the direction of flow.

\[ p_B - p_M = \beta_0 + d_b C_b - d_a C_a - d_c C_c + d_f C_f - \alpha_M + \epsilon_{BM} \]
\[ p_B - p_S = \beta_0 + d_b C_b - d_a C_a - d_c C_c - C_e - \alpha_S + \epsilon_{BS} \]
\[ p_B - p_A = \beta_0 + d_b C_b - d_a C_a - C_e - \alpha_A + \epsilon_{BA} \]

where: \( d_p \) is the direction on pipeline \( p \)

\( C_p \) is the cost on pipeline \( p \)

\( \alpha_i \) is the premium in hub \( i \)

The cost of flowing gas on pipeline \( p \) depends on capacity utilization:

\[ C_p = \beta_1 \frac{\text{length}_p}{\text{Capacity}_p} - \frac{\text{Flow}_p}{\text{beta} u_p} \]

Preliminary Results

The lack of access to transportation may be contributing an average of $0.64 to prices in southern cities, or 8 per cent.

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Mean $ \alpha_i $</th>
<th>Price Difference</th>
<th>Price Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mean $ -0.55 $</td>
<td>Melbourne  $ 8.32 $</td>
</tr>
<tr>
<td></td>
<td></td>
<td>min $ -8.03 $</td>
<td>Adelaide    $ 8.25 $</td>
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<tr>
<td></td>
<td></td>
<td>max $ 5.48 $</td>
<td>Sydney      $ 8.00 $</td>
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</tbody>
</table>

Price and quantity are market outcomes determined simultaneously by supply and demand. The regressors, \( d_b u_b \), are endogenous. Weather is an exogenous demand shifter, and is used as an instrument.

MLE estimator by Kutlu (2010 Economic Letters), a Battese-Coelli estimator with endogenous regressors. Assumes \( \alpha_i \) is drawn from a half-normal distribution.

Data is daily prices and quantities from Australian Energy Market operator, Oct 2016 to Apr 2018.