Removing Barriers to Exit

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OECD Workshop on Facilitating structural adjustment in the steel sector
17 September 2018 Paris, France
Background

• Distinguish between barriers to exit at firm level, plant level, production line level
• Exit if cash flow from exit exceeds cash flow from operating
• Sale of assets – closing costs > (price - cost)*q
• Assuming negative profits and negative cash flow from closure
• Steel equipment and other assets has low resale value → closing costs > asset resale
• Exit if net closing costs < operating losses
• What deters exit?
• Lower costs → capital-intensive industry with economies of scale
• Higher prices → expansion or trade protection?
• Lower resale value of steel capital
• Higher exit cost
• As long as cost of exiting is greater than the cost of operating, a firm will not exit
Literature

Harrigan (1982) looks at firm exit in mature and declining industries

• Exit more likely:
  a. Excess capacity within industry
  b. Losses
  c. capital requirements if not operating at minimum efficient scale (MES)
  d. age of plant

• Barriers to exit (relevant to steel):
  a. presence of strong consumer industry, especially if strategic importance
  b. Shared facilities, especially if declining product is a commodity-like
  c. Impact of labor severance costs uncertain
  d. Impact of managerial emotional attachment as exit barrier not tested
Literature (con’t)


• Exit more likely if:
  1. Lower plant production capacity
  2. Smaller blast furnaces
  3. Exposure to minimill products

• Minimills are less capital intensive and therefore have lower switching costs.

• Deily (1991) studies plant exit by integrated steel firms (1977-87)
  Plant exit more likely for a) small plants, b) competition with minimills, c) plants that don’t use EAFs
Literature (con’t)


Major exit barriers:

1. High fixed costs for capital with low resale value
   → lowers cost of operating and benefit of exit
2. Durability of steel capital (often >20 years)
3. High labor-related exit cost
   a) severance pay (4-8 weeks wages)
   b) supplemental unemployment benefits
   c) pension payments (increase if shutdown)
      • US Steel closing cost (1979): $415M of $650M for 11,000 workers
         →$37,000/worker
      • Wharton Econometrics (1987) estimate: $54k/worker is 72% of closing cost.
What causes exit?


• 284 production lines which include HR, CR, Galv, Plate, Wire rod

• What increases likelihood that a production line will shut down?

  1. Older production lines
  2. Non-modernized lines
  3. Smaller production lines
  4. Higher firm capacity other than production line → facilitate mergers to enable exit?
  5. Integrated company → facilitate shift towards EAFs to rationalize industry?

• trade protection did not seem to reduce likelihood of production-line exit (VER, AD/CVD)

• Foreign ownership also didn’t increase exit (emotional attachments vs. increased technology)
Table 4. Means and Differences of Selected Variables by Exit Status (Blonigen, Liebman, Wilson (2013))

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exit</th>
<th>Non-Exit</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Line Capacity (tons)</td>
<td>572,717</td>
<td>878,500</td>
<td>854,250 *</td>
</tr>
<tr>
<td>Firm Capacity Other Than Production Line (tons, 000)</td>
<td>14,300</td>
<td>11,900</td>
<td>12,100 *</td>
</tr>
<tr>
<td>Age (years since startup)</td>
<td>38.6</td>
<td>27.8</td>
<td>28.7 *</td>
</tr>
<tr>
<td>Modernize (=1 if production line was modernized)</td>
<td>0.07</td>
<td>0.35</td>
<td>0.25 *</td>
</tr>
<tr>
<td>Integrated Steel</td>
<td>0.854</td>
<td>0.75</td>
<td>0.77 *</td>
</tr>
<tr>
<td>Minimill</td>
<td>0.11</td>
<td>0.15</td>
<td>0.14 *</td>
</tr>
<tr>
<td>Processor</td>
<td>0.02</td>
<td>0.10</td>
<td>0.08 *</td>
</tr>
<tr>
<td>Production Line Foreign Owned</td>
<td>0.11</td>
<td>0.21</td>
<td>0.18 *</td>
</tr>
<tr>
<td>AD/CVD duty</td>
<td>0.152</td>
<td>0.126</td>
<td>0.132 *</td>
</tr>
<tr>
<td>Country</td>
<td>Total Crude Steel (1,000 tons)</td>
<td>EAF %</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>807 609</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>EU</td>
<td>162 021</td>
<td>39.5</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>104 775</td>
<td>22.2</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>95 533</td>
<td>57.3</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>78 845</td>
<td>62.7</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>70 805</td>
<td>30.8</td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>68 576</td>
<td>30.7</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>42 080</td>
<td>29.9</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>33 163</td>
<td>65.9</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>31 275</td>
<td>21.1</td>
<td></td>
</tr>
<tr>
<td>Ukraine</td>
<td>24 220</td>
<td>7.0</td>
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<tr>
<td>Italy</td>
<td>23 373</td>
<td>75.7</td>
<td></td>
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<tr>
<td>France</td>
<td>14 413</td>
<td>33.9</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>1 626 106</td>
<td>25.7</td>
<td></td>
</tr>
</tbody>
</table>
EAFs vs. BOFs

• Minimills are less capital intensive:
• BOF average cost per ton of capacity = $1,100
• EAF minimill cost per ton of capacity ≤ $300
• More flexibility during periods of low demand
• Pursue legislative tax break/subsidy to replace BOFs with EAFs?
• Reduce carbon output and soften hardship of job losses
• Specialized skills as exit barrier – Switching them to EAFs may reduce pain of capacity reduction.
• China has increasing steel scrap although many Chinese BOFs are fairly new.
• Although subsidy could reduce switching costs, risk of technology leapfrogging still remains (ex: McLouth steel)
Labor-related barriers to exit

- If labor-related closing costs are major exit barrier, firms need assistance with layoffs.

- In US, firms can transfer liabilities to Pension Benefit Guaranty Corp. (PBGC), a federal agency that insures defined-benefit plans.

- 40 million workers insured by PBGC but currently provides benefits to 840,000.

- PBGC funded by insurance premiums from covered companies as well asset recovered from bankrupt companies and investment income.
Labor-related barriers to exit (cont)

• Bethlehem Steel bankruptcy in 2001 had $7.8B in pension obligation to 92,200 workers and retirees.
• Firm had only $3.5B, but in 2002, PBGC covered $3.7B of the remaining $4.3B obligation. Was PBGC’s largest claim in history.
• Maximum guarantee $65,000 a year
• 4 of top 10 PBGC claims (1975-2016) have been integrated firms: Bethlehem (3), LTV Steel (83,800 workers), National Steel (35,200), and Weirton Steel (9,800)
• Projected insolvency from multi-employer pension plans in 2025 if premiums don’t increase
Labor-related barriers to exit (cont)

• China's plan to reduce production by 100-150 million tons may cost between 400,000-500,000 jobs.

• In recent years, state-owned steel mills have been shut down and dozens of small privately-owned plants in the area have gone bankrupt.

• Exit barrier due to subsidies: subsidized energy prices, loans, rent, have all reduced production costs, making exit less likely.

• Reducing or removing these subsidies and increasing pollution-abatement costs has increased cost and exit.

• Severance payments range from minimal to generous with government grants.

• Around $15B allocated towards retraining and early retirement programs for steel and coal workers in 2017.
Conclusion

1. Exit barriers in steel include high fixed cost for capital that is durable and has low resale value
   a. encourage mergers could help reduce firms’ share of inefficient capital which may facilitates shutdown of inefficient plants/production lines.
   b. Consider policy to encourage switch to EAFs, which will increase flexibility to negative demand shocks

2. Exit barriers in steel due to labor-related exit costs
   a. Develop or improve safety net covering financial obligations
   b. Retraining due to skill-specificity of steel labor
### Appendix: marginal effects from Blonigen, Liebman, Wilson (2013)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Marginal Effect</th>
<th>Z-statistic</th>
<th>Mean of X</th>
<th>Hypothetical Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Production Line*</td>
<td>0.0144</td>
<td>2.34</td>
<td>3.23</td>
<td>0.0123</td>
</tr>
<tr>
<td>Modernize Dummy Variable</td>
<td>-0.0144</td>
<td>-2.22</td>
<td>0.369</td>
<td>-0.0144</td>
</tr>
<tr>
<td>Production Line Capacity*</td>
<td>-0.0187</td>
<td>-2.57</td>
<td>13.22</td>
<td>-0.0199</td>
</tr>
<tr>
<td>Firm Capacity Other Than Production Line*</td>
<td>0.0375</td>
<td>4.03</td>
<td>15.39</td>
<td>0.1876</td>
</tr>
<tr>
<td>Integrated Dummy Variable</td>
<td>0.0274</td>
<td>2.43</td>
<td>0.834</td>
<td>0.0274</td>
</tr>
<tr>
<td>Galvanized Dummy Variable</td>
<td>-0.0445</td>
<td>-2.47</td>
<td>0.308</td>
<td>-0.0445</td>
</tr>
</tbody>
</table>

Note: *Indicates variables in log form. Dummy variables marginal effects are differences in the probabilities with and without the dummy effect. Hypothetical effect equals the impact of a one standard deviation change of the continuous independent variables on the probability that a production line will survive. For dummy variables, the hypothetical effect is equal to the marginal effect.
References


