Removing Barriers to Exit

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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)

- Tang and Zannetos (1986) studies plant exit among US steel firms during 1970-1982
- 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)

Deily (1988) looks at plant exit barriers in US steel (1976-1986)

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?

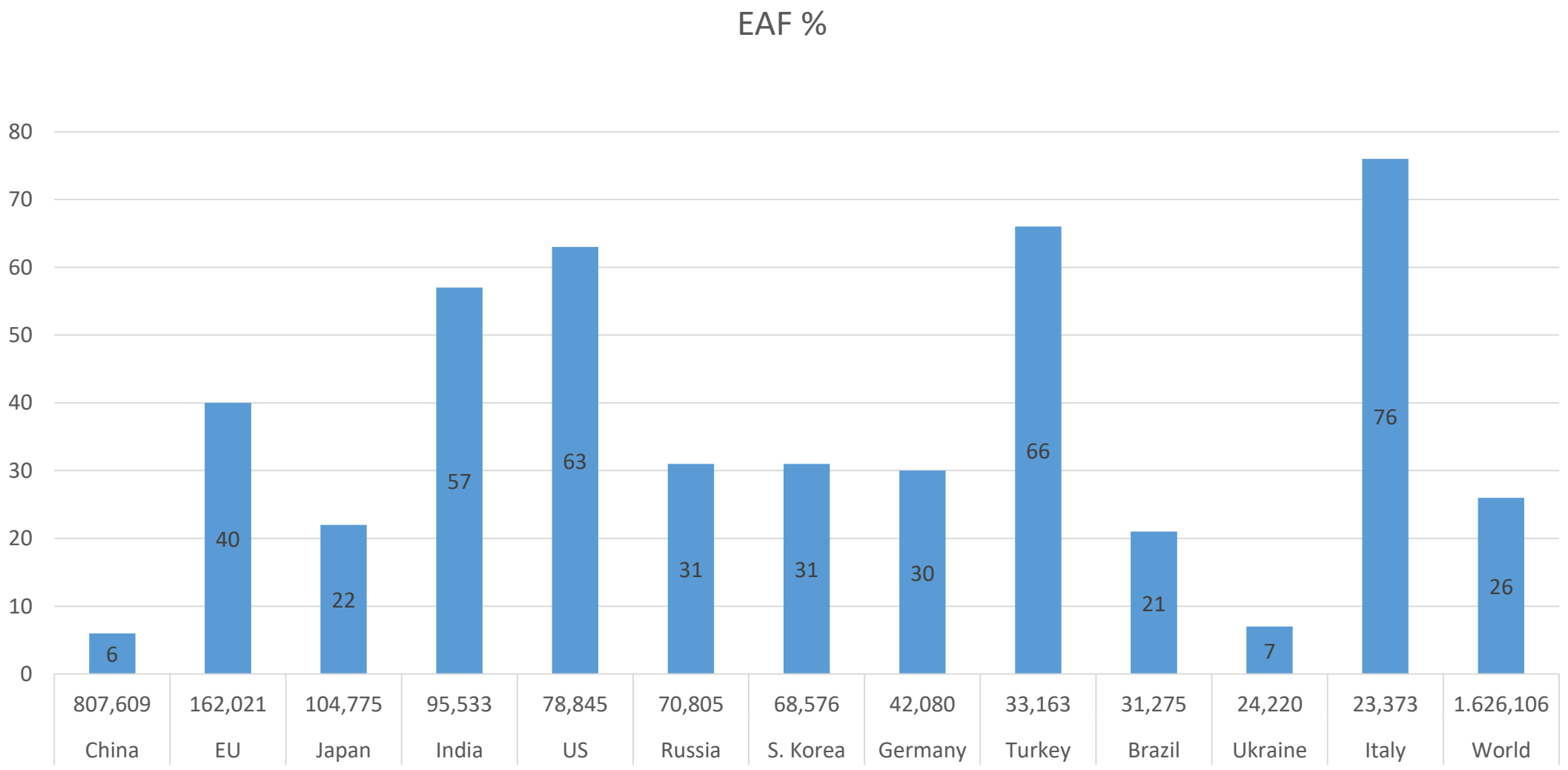
- Blonigen, Liebman, Wilson (RevIO, 2013) look at production-line shutdown within all US steel plants during 1978-2007.
- 284 production lines which include HR, CR, Galv, Plate, Wire rod
- What increases likelihood that a production line will shut down?
    1. Older production lines
    2. Non-modernized 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)

Variable	Exit	Non-Exit	Overall
Production Line Capacity (tons)	572,717	878,500	854,250 *
Firm Capacity Other Than Production Line (tons, 000)	14,300	11,900	12,100*
Age (years since startup)	38.6	27.8	28.7*
Modernize (=1 if production line was modernized)	0.07	0.35	0.25*
Integrated Steel	0.854	0.75	0.77*
Minimill	0.11	0.15	0.14*
Processor	0.02	0.10	0.08*
Production Line Foreign Owned	0.11	0.21	0.18*
AD/CVD duty	0.152	0.126	0.132*

EAF production share (2016) WorldSteel 2017

Country	Total Crude Steel (1,000 tons)	EAF %
China	807 609	6.3
EU	162 021	39.5
Japan	104 775	22.2
India	95 533	57.3
US	78 845	62.7
Russia	70 805	30.8
South Korea	68 576	30.7
Germany	42 080	29.9
Turkey	33 163	65.9
Brazil	31 275	21.1
Ukraine	24 220	7.0
Italy	23 373	75.7
France	14 413	33.9
World	1 626 106	25.7


EAF %
80
70
60
50
40
30
20
10
0
6
40
22
57
63
31
31
30
66
21
7
76
26
807,609
China
162,021
EU
104,775
Japan
95,533
India
78,845
US
70,805
Russia
68,576
S. Korea
42,080
Germany
33,163
Turkey
31,275
Brazil
24,220
Ukraine
23,373
Italy
1.626,106
World

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 fro 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)

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

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.

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