

Did Poor Environmental Regulation Lead to China's Steelmaking Success?

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Has China's steel industry grown to its dominance today due to China's lax environmental regulations increasing competitiveness, or do other factors dominate? Five of the top seven steel manufacturers are now Chinese firms. China has become the steel making center of the world, overtaking the US, and producing about ten times more than the US in the first two months of 2015 [12].

As the steel industry in China is mainly domestic, its dominance does not result from 'pollution haven' status. Instead, there are a few plausible explanations. First is the idea that China has fewer costly environmental regulations, which allows the domestic industry to spend less and be more competitive. Another plausible explanation could be lower labor costs providing the same benefit. A third potential source of dominance is China's governmental policy. Could governmental policies and subsidies explain the dominance? Since this is an economic issue, it is reasonable to directly compare costs. The relative strength of each factor of Chinese steel dominance can be determined by the dollars and cents economic benefit provided.

1 Background on US and Chinese Steel Industries

The history of US Steel (the commodity, not the company) actually starts in Britain and Europe. Britain was the original large scale producer of iron, and was the home of Bessemer and his efficient steelmaking process. In fact, there are many parallels between the position of Britain and the US at the turn of the 20th century and the US and China today. At the turn of the century, Britain was the source of technical innovation in processing and manufacturing, and the US was the underdog that quickly caught and overtook Britain in tonnage. Like China today, the US at that time had cheaper means of production, in terms of land and labor. After a massive expansion of the industry in the US, which fed the fortunes of turn of the century titans such as Carnegie, eventually the same market forces that bolstered US steel production began to feed Chinese production. Although Mao attempted to build distributed steel production in 1958, the effort was a total failure, and it wasn't until Deng Xiaoping in the 1980's that China began to develop a modern steel industry. The gains in Chinese steelmaking have been just as breathtaking as those of Carnegie.

2 Impact of Steelmaking on the Host Countries

There is no way around it, steelmaking is a dirty, power-hungry process. Ignoring the environmental costs of mining, simply the smelting process introduces pollutants. The two large sources of pollution are the non-steel byproducts and the energy required to run the process. The while making steel, there are heavy

metal impurities that are drawn off in the form of ‘slag’ and dumped into massive pits. These can later runoff and pollute groundwater. However, these groundwater pollution affects are localized. A more modern concern is the affect of the energy consumption of the plants. Although steel foundries no longer burn their own fuel in plant, they are supplied by electricity, which especially in the case of China, comes from coal.

3 History of Environmental Regulation

A difficult question when detailing the growth of environmental regulation in the US and China is whether or not to take into account China’s later adoption of the steel industry. In this analysis however, the lag time between the US and China will not be considered, as the focus is the present competitive comparisons. It is important to remember however, that China has many fewer years in the industry and in the regulatory structures.

4 Costs of Environmental Regulation

4.1 United States

According to Tobey[11], pollution abatement costs as a percentage of total costs is 2.38% for steelmaking. He goes on to discuss how “The premise that trade suffers from the imposition of environmental policy has a strong element of a priori plausibility but, surprisingly, has little empirical support”. The study is an empirical one, rather than a model based approach.

This finding stands in contrast to the complaints from US steel trade groups. The American Iron and Steel Institute published a letter discussing how the EPA regulation would “create severe competitive disadvantages for the U.S. industry” [4]. When compared to the result of the Toby study, this seems like the natural push back every industry undergoes when faced with increasing regulation.

4.2 China

Chinese environmental are less stringent and less effective. The Alliance for American Manufacturing study, *An Assessment of Environmental Regulation of the Steel Industry in China* [3] has a list of issues with Chinese environmental regulation:

Chinas air and water pollution standards for steel production are substantially less stringent than comparable U.S. standards.

- Emissions controls for particulate matter from existing sintering machines are three times more stringent in the U.S. than in China; emissions controls for new sintering machines are more than four times more stringent in the U.S.
- Emissions controls for particulate matter from the ironmaking process are more than six times as stringent in the U.S. as in China.
- Emissions controls for particulate matter from blast furnaces during the steelmaking process are more than twice as stringent in the U.S. as in China for closed hood operations, and more than three times as stringent for open hood operations. For electric arc furnaces, the U.S. standard is more than ten times as stringent as the comparable Chinese standard.
- Limits on sulfur dioxide emissions are often so relaxed in China that steelmakers can satisfy the standards without installing expensive pollution control equipment.
- Water pollution standards governing discharges of oil, total suspended solids, and zinc from steel mills are generally much more stringent in the U.S. than in the China, although discharge standards for two other pollutants, cyanide and chromium, are more comparable.

Chinas enforcement and financial penalties are largely ineffective.

- Chinas environmental permit system for existing facilities is ineffective; it is not comparable to operating permits in the U.S. for both air and water pollutants, which contain detailed requirements specific to each steelmaking facility.
- The pollution discharge fees that China requires companies to pay are far too low to deter companies from violating pollution control limits. The amount collected in discharge fees is as little as 30 percent of what is actually owed, and a large portion of what is collected may be eventually returned to the companies for the stated purpose of improving environmental abatement programs. One of the countrys largest steel companies, Baosteel, paid about 18 cents per ton in discharge fees in 2007.
- The maximum amount a company can be fined for non-compliance with the environmental standards is around \$14,000 for most violations. Repeated offenses do not necessarily bring increased penalties,

so some companies choose to pay the occasional penalty rather than purchase or maintain expensive pollution control equipment. In the U.S., companies that violate the Clean Air Act may incur penalties of as much as \$32,500 per day of violation.

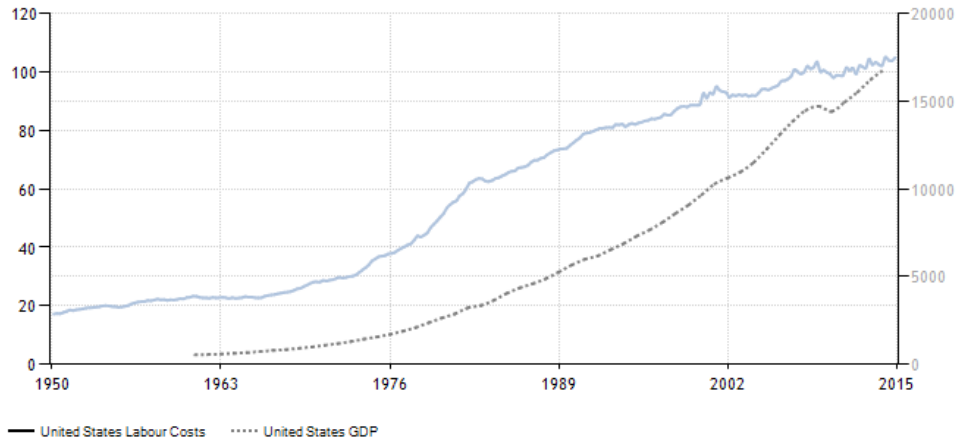
- Chinese law provides that companies should monitor their pollution levels, but the central government has failed to prescribe how frequently samples should be taken, and there are no specified sanctions for non-complying companies. In contrast, U.S. steelmakers must maintain continuous or periodic monitoring of their pollution discharges and report the information. The Chinese system relies on occasional inspections that cannot detect all violations and cannot determine whether the pollution control equipment is employed when the inspector is not present.
- The absence of effective monitoring in China means (1) that it is very difficult to detect companies responsible for pollution in excess of applicable standards; (2) that the government lacks data that would enable it to do reliable modeling of air and water quality; and (3) that the government can not adopt the needed standards that effectively reduce pollution, because it does not know the extent of reductions required in order to improve air and water quality in specific locations and regions.

The study goes on to conclude that “U.S. steel companies out spend their Chinese counterparts by around 80 percent per ton of steel on direct operation and maintenance expenditures to control air and water pollution.” Combining this number with the 2.38% pollution abatement cost cited in Tobey, Chinese firms spend 0.47% of total costs on pollution control.

5 History of Industrial Labor Costs

5.1 United States

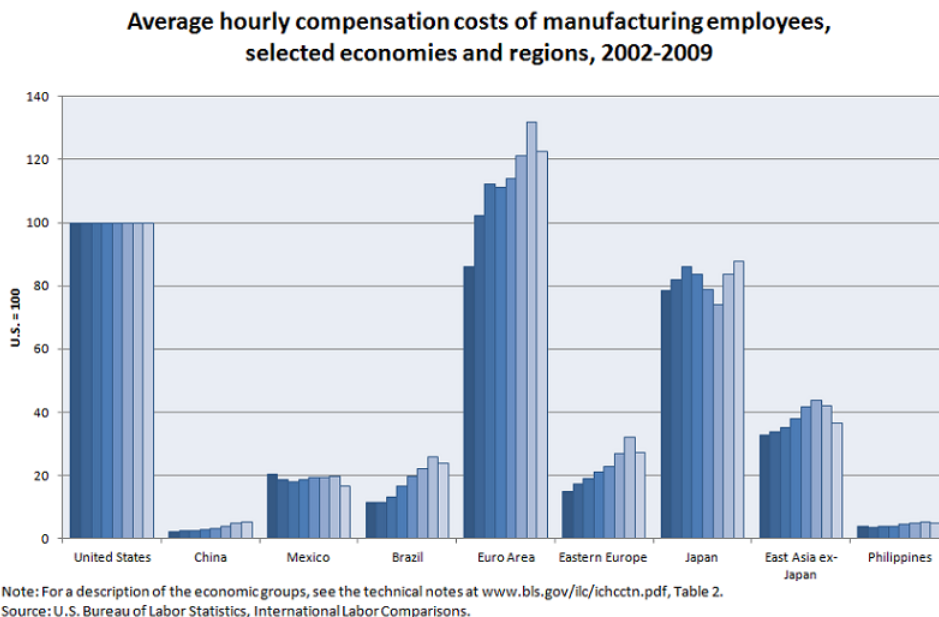
The United States has had the cost of industrial labor increase over the past 60 years. The Bureau of Labor Statistics has published data on industrial costs since 1950. The graph below shows labor costs compared to GDP in the US [2].



Although the numbers are unscaled, the shape of the graph relative to each other is descriptive. Notice how the labor costs and GDP curves are roughly parallel until about 1975. Parallel curves indicate productivity staying constant, or put in other words, labor is not becoming more expensive in real terms. The breakaway growth in the 1970s denotes a increase in the real cost of labor, and is reflected in the migration of steel away from the US that happened during that period. More recently, the United States has seen GDP catch up to wages, signaling a growth in productivity and a narrowing of the cost gap between the US and China. [6]

5.2 China

Although the United States is becoming more competitive, China has enjoyed 40 years of investment driven by lower wages. It is clear that the largest historical comparative advantage has been the low wages Chinese workers demand. Even in 2009, as wages in China were growing, they were more than 10 times below US wages. [7]



6 Costs of Labor

6.1 United States

In 2011, US steelworkers' mean annual salary was \$49,050 [10].

6.2 China

China does not have as reliable of reporting mechanisms for salary. Instead of a central, trusted, governmental source, a profile of a protest over worker's wages in China puts yearly wages at \$3960 [5].

7 History of Government Subsidy

7.1 United States

Government intervention in the US Steel markets started in with the price controls of World War I. These were the reverse of a traditional subsidy, as they capped the profitability of each ton of steel, while ordering massive quantities. After the war, executives from the industry complained that the price controls removed too much capital from the industry, crimping the growth of the sector.

During World War II, the government first changed the tax code, then when that was inadequate to increase production to the levels needed, directly took control of the operations of plants, built 29 directly, and built 20 in cooperation with private investment. In all, the government invested \$2.7 billion into the industry (\$37.55 billion in 2015 dollars).

Once again in 1952, the government felt that steel production was inadequate for the national defense. President Truman nationalized steel. When that decision was overturned by the supreme court, the government moved on to direct subsidy of the steel industry. In 1957, the government financed 45 percent of capital investment in steel. In 1960, it financed 60 percent. What is especially interesting about this governmental support is that although steel capacity grew on average 3.9 percent from 1950 to 1960, demand only grew 0.6 percent.

Eventually, pressures from outside the US (notably European and Japanese manufacturers), came to bear on the domestic industry. in the 70s and 80s, the legislation moved from direct investment in industries into protectionist measures, culminating in the Steel Import Quotas of 1989.

This history section is a paraphrasing of the material found in Prechel's paper in the *American Sociological Review* [8]. Also found in that paper is a table summarizing the history of US government intervention in steel, replicated below.

Table 1. State Business Policy that Affected the Steel Industry, WWII-1989

Legislation	Corporate Revenue Generating	Voluntary Agreements	Protectionist Legislation	Designed to Benefit	
				All Manufacturing	Steel Industry
Revision of the Internal Revenue Code (WWII)	×			×	
Defense Production Act of 1950	×			×	
Revenue Act of 1962	×			×	
1969-71 VRAs (1968)		×			×
Revenue Act of 1971	×			×	
1972-4 VRAs (1971)		×			×
Trade Act of 1974			×		×
Soloman Plan			×		×
Trigger Price Mechanism (1978)					
Trade Agreements Act of 1979			×		×
Trigger Price Mechanism (1980)			×		×
ERTA (1981)	×			×	
Steel Industry Compliance Act (1981)	×				×
Fair Trade in Steel Act of 1983			×		×
Steel Import Quotas (1984)			×		×
Steel Import Quotas (1989)			×		×

^a These laws are placed in this category because key components of them were written for the steel industry.

^b Although there were some revenue generating dimensions to the Soloman Plan, the most important aspect of this legislation was its protectionist dimensions.

7.2 China

The Chinese steel industry started with the same sort of price controls the United States had, although the Communist country had more onerous restrictions on free trade. As the country liberalized, the blocking statutes such as price controls were gradually reformed or removed. “In 1992,... major adjustments were made to the price of many commodities including ... steel” [1].

Government intervention continues, however. Recently, “China announced in January 2009 various tax incentives and subsidies for its auto and steel industries” [9]. Some often cited reasoning for the continued subsidy is to reduce price pressure and indirectly subsidize construction.

8 Benefit of Government Subsidy

US steel has not been subsidized to a great extent in recent years. China, on the other hand, has been showering money on the industry. An American Manufacturing publication in 2013 pegs China governmental energy subsidy to the steel industry at \$27 billion in since 2000 (approximately \$2 billion a year). Another source, *China Perspectives* places subsidies as 17 percent of China’s manufacturing advantage.

9 Analysis and Conclusions

Of the three factors studied, the affect of environmental regulation on prices was the weakest. Far more important was the low wages demanded by Chinese workers. Following that was the governmental subsidy given to the industry.

The governmental subsidies given to Chinese steel manufacturers may be “unfair trade distortions,” but they certainly have a parallel in US government intervention. The scope of Chinese governmental investment is similar to the help given to US manufacturers when it was decided that steel was a vital industry for the national defense.

This is wonderful news! The cost of environmental regulation is not onerous. China can maintain their competitive advantage without heavily polluting. Global regulations on steel manufacturing pollution can be enacted without causing undersupply.

References

- [1] M.W. Bell, H.E. Khor, and K. Kochhar. *China at the Threshold of a Market Economy*. International Monetary Fund: Occasional paper. INTERNATIONAL MONETARY FUND, 1993.
- [2] Trading Economics. United states labour costs, May 2015.
- [3] Alliance for American Manufacturing. An assessment of environmental regulation of the steel industry in china, March 2009.
- [4] American Iron and Steel Institute. Impact of epa regulation on steel’s competitiveness, March 2015.
- [5] Qiao Long. Thousands of steelworkers strike for higher pay in central china. *Radio Free Asia*, 2015.
- [6] United States Departement of Commerce. Labour costs — assess costs everywhere, May 2015.
- [7] United States Bureau of Labor Statistics. Manufacturing in china, June 2013.
- [8] Harland Prechel. Steel and the state: Industry politics and business policy formation, 1940-1989. *American Sociological Review*, 55(5):pp. 648-668, 1990.
- [9] S.E. Richard Baldwin. *The Collapse of Global Trade, Murky Protectionism and the Crisis: Recommendations for the G20*. Cepr.

- [10] Eric Strauss. Salary of steel plant workers, May 2011.
- [11] James A. Tobey. The effects of domestic environmental policies on.. *Kyklos*, 43(2):191, 1990.
- [12] Worldsteel. Crude steel production, March 2015.