

Lecture 13 Infant Industry Protection

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Reference: Feenstra and Taylor, 2017, CH9.5

The infant industry argument is one of the oldest arguments used to justify the protection of industries from international trade. First formulated by Alexander Hamilton and Friedrich List at the beginning of the 19th Century, the case for infant industry protection has been generally accepted by economists over the last two centuries.

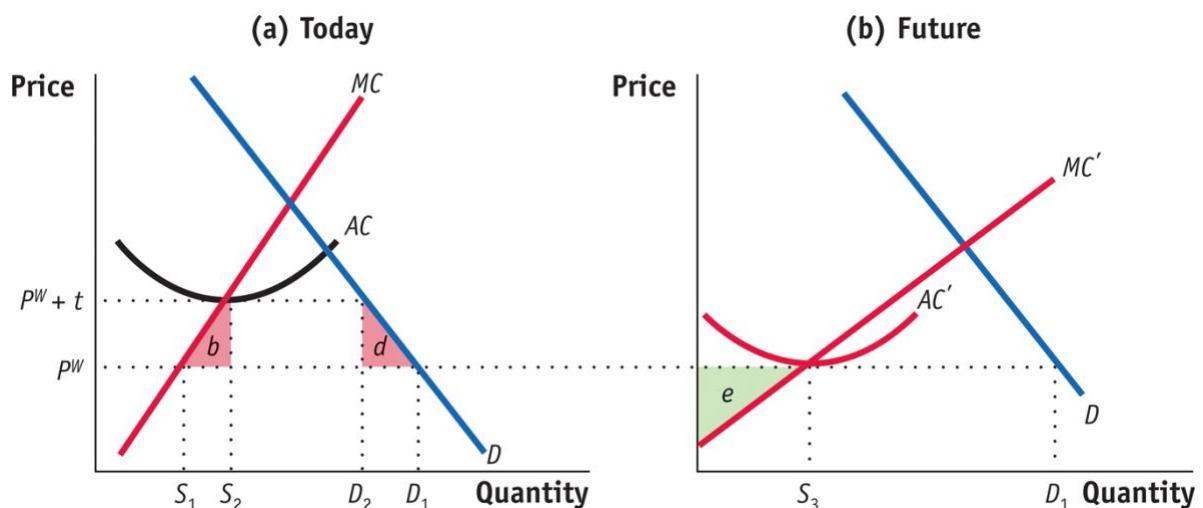
—M.J. Melitz, 2005

It is a historical fact that some of the world's largest market economies began their industrialization behind trade barriers: The United States had high tariff rates on manufacturing in the 19th century, while Japan had extensive import controls until the 1970s.

—P. Krugman

I. Theory and Model

1. Definition: An infant industry is a firm that requires protection to compete at world prices today. When a government applies a temporary tariff, it expects that costs for the firm or the industry overall will fall due to learning, thereby allowing it to compete at world prices in the future.
2. Assumptions: To more formally develop the case for infant-industry protection, we begin by assuming that Home is a small-importing country facing fixed world prices. We know from previous analysis that a Home monopolist will behave like a competitive firm under free trade.
3. Equilibrium Now: In panel (a), situation today, the industry would produce S_1 , the quantity at which $MC = P^W$. Because P^W is less than average costs at S_1 , the industry would incur losses at the world price of P^W and would be forced to shut down. A tariff increases the price from P^W to $P^W + t$, allowing the industry to produce at S_2 (and survive) with the net loss in welfare of $(b + d)$.



4. Equilibrium Future: In panel (b), producing today allows the average cost curve to fall through learning to AC' . In the future, the firm can produce the quantity S_3 at the price P^W without tariff protection and earn producer surplus of e .
5. Note that here a tariff is more effective at ensuring this goal than a quota, as a quota would encourage less output to be produced at a higher price and presumably less knowledge learned. All of this would lead to greater deadweight losses. So we conclude that tariffs are a better trade policy to encourage maturation of the infant firm.
6. Welfare from protection: To analyze the effect of the tariff on welfare, we need to compare the deadweight loss today due to the tariff and the future gain in producer surplus. The deadweight loss $(b+d)$ caused by the tariff protection imposed today is not justified if e is less than $(b + d)$.
7. The condition can be summarized as requiring the present value of the firm's future surplus without the tariff to be greater than zero: $PV = e - (b + d) > 0$. In other words, the infant firms must be able to produce without losses without a tariff at some point in the future. And the present value of the future surplus must be positive.

II. Case Studies: Two developing and two developed countries. U.S.-imposed tariffs in the heavyweight motorcycles industry; Solar panel industry policies in the United States, Europe, and China; A ban on imports of computers in Brazil; and Tariffs and quotas in the auto industry in China.

1. U.S. Tariff on Heavyweight Motorcycles: 1983-1987

- 1) Partly due to a global price war between Honda and Kawasaki, two Japanese motorcycle producers, inventories of imported heavyweight cycles increased substantially in the United States during the early 1980s. As a result of lagging productivity and fierce competition from the Japanese producers, Harley-Davidson faced deep financial problems. In 1983, Harley-Davidson filed for Section 201 protection with the ITC.
- 2) In its determination of the source of injury to the industry, the ITC found that the glut of Japanese inventories contributed to the low prices set by those companies and caused the losses incurred by Harley-Davidson. Upon the recommendation of the ITC, President Ronald Reagan placed import tariffs on heavyweight motorcycles (over 700 cc).

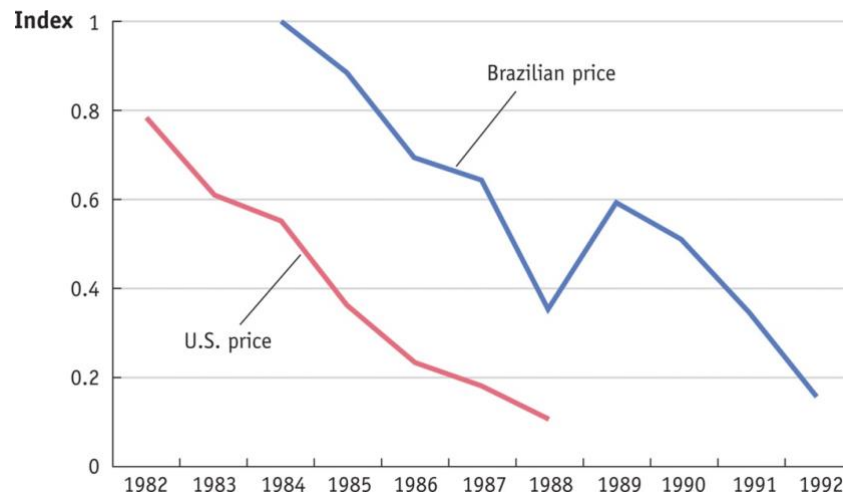
Year	Import Sales (\$ millions)	Import Quantity	% Fall in Imports (from 1982)	Tariff (%)	Net Loss/ Average Sales (%)	Deadweight Loss (% millions)
1982	452	164,000				
1983	410	139,000	17	45	3.8	16.3
1984	179	80,000	69	35	12.1	38.4
1985	191	72,000	78	20	7.8	25.2
1986	152	43,000	116	15	8.7	26.4
January–March 1987	59	14,000	98	15	7.3	6.3
Total, 1983–1987						112.5

- 3) The tariffs, which became effective April 16, 1983, were initially high (45%) but set to decline annually over the next 5 years (35%, 20%, 15%, and 10%). Although the tariffs were not scheduled to end until April 1988, Harley-Davidson petitioned the ITC to end the tariff after the 15% rate expired in 1987 because it had successfully restored profit through new product lines and lower production costs.

- 4) **Calculation of Deadweight Loss** The deadweight loss relative to import value in 1983 is measured as $\frac{1}{2} \times 0.17 \times 0.45 = 0.038$ or 3.8%. The deadweight loss in 1983 is the average import sales over 1982 and 1983 times 3.8%, which is $(452+410)(1/2)(0.038) = \16.3 million. Summing up the annual net losses over the tariff's 4-year period gives a total deadweight loss of \$112.5 million.
- 5) **Future Gain in Producer Surplus** To evaluate the future gains in producer surplus, we can examine the stock market value of the firm around the time that the tariff was removed. By this calculation, the future gain in producer surplus from tariff protection to Harley-Davidson (\$131 million) exceeds the deadweight loss of the tariff. (H-D's initial public offering in July 1986 was 2 million shares at \$11 per share. In June 1987, H-D issued an additional 1.23 million shares at \$16.50 per share. H-D's \$70 million debt. After the second stock offering, H-D's stock price increased to \$19 per share. With the higher stock price, the future gain in producer surplus is estimated to be \$131 million, which clearly exceeds the loss in consumer surplus.)
- 6) **Was Protection Successful?** Our calculations imply that the tariff protection increased welfare for the United States because the deadweight loss is less than the future gain in producer surplus. However, there are doubts as to whether the heavyweight motorcycle tariff was indeed successful.
- 7) **Critical test: If A implies B, then Not B implies Not A** (If the hypothesis is "raining implies cloudy," then the testable implication would be "not cloudy, not raining.") To test the hypothesis that protective tariff saved H-D, we need to imagine the counterfactual that H-D could have failed without the protection. (If Harley-Davidson had not been able to survive without the tariff, then the protection was successful.)
- 8) This may have been the case because the company was on the verge of bankruptcy a week before the tariff protection. However, H-D's chairman stated that the tariff did not offer much protection because Japanese producers downsized their motorcycles to 699 cc to evade the tariff.
- 9) Is H-D still alive? How is it doing today? It seems like it is getting into trouble now. (NYSE: HOG)

2. Computer industry in Brazil: 1977-1990s

- 1) Between 1977 and the early 1990s, the Brazilian military government protected its domestic computer industry through a **ban on imports** of personal computers (PCs) and computer parts. In addition, it **prevented foreign firms from producing computers** in Brazil.
- 2) **Import substitution policy:** Brazilian firms reverse-engineered IBM PCs and used locally supplied parts to produce the computers. Due to a combination of the time requirement to reverse-engineer the product and the use of higher-cost inputs from local suppliers, the cost of production was greater in Brazil than the United States.
- 3) **Computer prices in Brazil:** Computer prices, adjusting for improvements in speed, storage, and so forth, are shown in figure below for Brazil and the United States for 1982 to 1992. The effective price of computing power fell rapidly in the United States between 1982 and 1988. Brazil, however, did not achieve the same low prices as the United States during the same period. More specifically, by 1992, Brazil was able to achieve the effective prices of computers that the United States had already established in 1988. This large gap in prices between Brazil and the United States indicates that Brazil would not have been able to successfully produce computers without the tariff protection.



- 4) The calculations show that computer prices in Brazil were nearly twice as high as those in the United States in 1984. In the same year, the \$29 million gained in producer surplus by Brazilian computer producers did not outweigh the loss of \$80 million in consumer surplus. The net loss of \$51 million (CS – PS) accounted for 0.02% of the Brazilian gross domestic product (GDP) that year. The net loss peaked at 0.06% of GDP along with sales in 1986. The future gains of area e could not be accounted for as the industry never produced without the tariff in place.

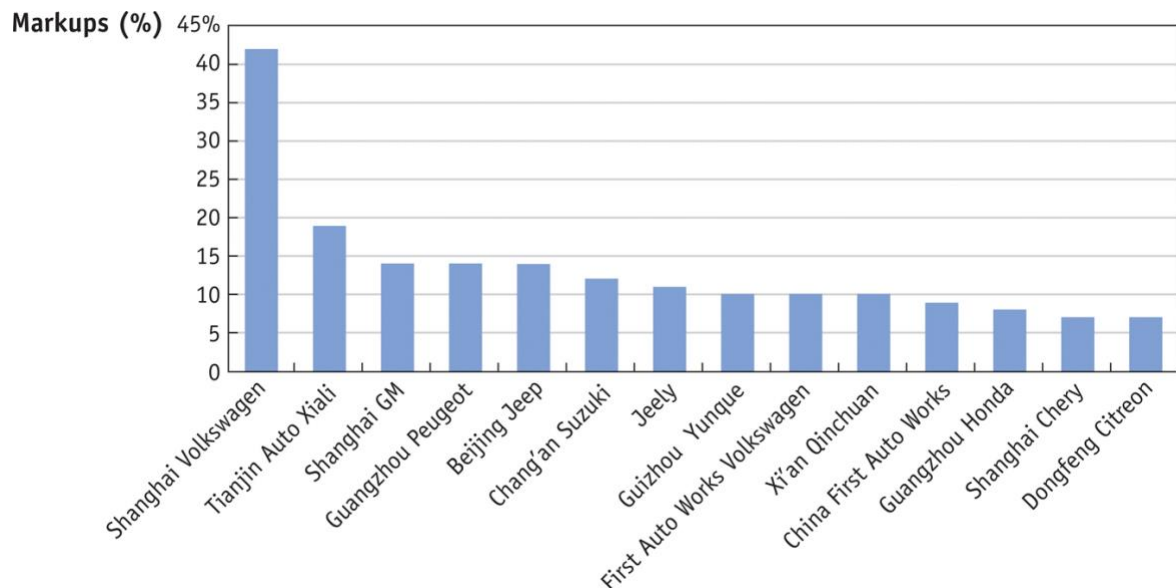
Year	Sales (\$ millions)	Brazil/U.S. Price (%)	Producer Surplus Gain (\$ millions)	Consumer Surplus Loss (\$ millions)	Net Loss (\$ millions)	Net Loss (% of GDP)
1984	126	189	29	80	51	0.02
1985	384	159	70	179	109	0.04
1986	746	143	113	277	164	0.06
1987	644	119	50	112	62	0.02
1988	279	127	29	68	39	0.01

- 5) The losses due to the protection of the Brazilian computer industry weigh heavily on both producers using computers for production and individual users. The increasing dissatisfaction prompted Fernando Collor de Mello to promise an end to the infant-industry protection during his presidential campaign. The failure of the Brazilian computer industry to effectively compete without import tariffs illustrates the difficulties involved in nurturing an infant industry through temporary protection.

3. Automobile industry in China: 1980-2010

- 1) Before its accession to the WTO on December 1, 2001, China protected many of its industries, including the automobile industry, with high tariffs and strict quotas. Tariffs on automobiles fell from 260% in the early 1980s to 25% by the middle of 2006, and in 2009, the tariff on automobile parts was reduced from 25% to 10%, due to the increase in demand.
- 2) In 2009 China overtook the United States as the largest automobile market in the world. Strong competition among foreign firms located in China, local producers, and import sales have resulted in new models and falling prices.

- 3) Production in China: Beginning in the early 1980s, China permitted a number of joint ventures between foreign firms and local Chinese partners (e.g., American Motors Corporation and a local Beijing firm in 1983, then Germany's Volkswagen and France's Peugeot, and local Chinese partners followed in Shanghai and Guangzhou, respectively). Various regulations, combined with high tariff duties, helped at least some of the new joint ventures achieve success.
- 4) Cost to consumers: The high tariffs imposed by the Chinese government approximately doubled the import prices, which severely restricted the foreign cars sold in China. Automobile imports ranged from a high of 222,000 cars in 1993 to a low of 27,500 in 1998. However, although tariffs increased the import prices, the quotas also affected domestic production, particularly when the firm enjoyed market power, as in the case of Volkswagen in Shanghai.
- 5) As shown in the figure, Shanghai Volkswagen had the highest markups, at an average of 42% during 1995 to 2001, with Tianjin Auto at a distant second, at 19%. In addition to setting higher prices, Shanghai Volkswagen exercised its monopoly power by producing outdated models. This example illustrates how protection can create significant consumer losses as well as suppress innovation and introduce inefficiencies in the market.



- 6) Automobile Markups by Firms in China, 1995–2001. This diagram shows the percentage markups (price over marginal cost) applied to automobiles sold in China from 1995 to 2001, by various producers. The highest markup was charged by Shanghai Volkswagen, which had a local monopoly in Shanghai.
- 7) Foreign Production in China: Foreign auto firms have entered the Chinese market, challenging the Shanghai Volkswagen monopoly. General Motors opened plants in 2009 and has become a leading producer of autos in China. Its success was illustrated by being able to offset much of the losses it experienced in the American market during that year. Ford and other auto makers from Europe and America have joined the effort to enter this market. This move is helped by the consumer preferences in China to purchase locally produced foreign models, believing them to be of higher quality. This has created additional incentives for many Chinese firms to emulate foreign maker's

production techniques in order to produce quality autos. Such an effort by Chinese firms helps explain their interest in purchasing failing production plants in foreign countries.

- 8) **Infant-Industry Protection?** Justification for infant-industry protection requires that average costs fall enough to be able to drop the protection and still compete in the global market at world prices. To date, this has not occurred as tariffs are still imposed, although they are lower than in the past. Thus, we are unable to assess whether the infant-industry protection is warranted.

4. Solar panel industry

- 1) **Consumption subsidies:** Subsidies to consumers who install solar power panels in their homes should not be viewed as a form of infant-industry protection to the solar panel industry because subsidizing them is a way of addressing the externalities from generating electricity through burning fossil fuels. By subsidizing citizens who invest in sources of electricity that do not require emits of carbon dioxide, governments are able to limit pollution. So such subsidies on their own should not be justified on the grounds of infant-industry protection.
- 2) **Production subsidies:** In the United States, the government gives tax breaks and low-interest loans or loan guarantees to companies that produce solar panels. One example of a loan guarantee was to the U.S. company Solyndra, which received a \$535 million loan guarantee from the U.S. Department of Energy in 2009. But Solyndra subsequently went bankrupt in 2011, and President Obama was widely criticized for this loan guarantee. This example illustrates how difficult it is to know whether a company protected by some form of infant industry protection will actually become profitable in the future.
- 3) **Subsidies in China:** Another example of unsuccessful cases of infant-industry protection occurred in China. The Chinese also pursued similar trade policies for solar panels via export subsidies. Export subsidies act much like import tariffs and carry deadweight losses. Infant-industry protection is considered successful if once the export subsidy is removed, the industry remains profitable under world prices and the deadweight loss is less than its future profits. In China's case, the subsidies resulted in excess capacity in the industry and ultimately the bankruptcy of Suntech Power Holdings—a key Chinese firm in the industry.
- 4) **Import Duties in Europe and the United States:** Import duties were applied by SolarWorld, a German firm with subsidiaries in the United States. These duties were applied in the EU and U.S. in the form of antidumping measures. The German firm increased production as a result of the measures, just as predicted, but, again as predicted, it came at a cost to consumers, who in this case were companies that purchased panels for installation. So higher prices protected the producers and employees of the solar panel industry but it raised the price of panels to installers of panels.
- 5) **Successful infant industry protection?** Ultimately, the protections led to the installers producing their own panels to avoid the higher prices of SolarWorld. This is a unique case of technology transfer. Remember, for an infant industry to be successful, one condition is that learning occurs that results in lower costs. In this case, SolarCity, an installer of panels, purchased Silevo, a company that uses a new panel production technology that lowers costs. Silevo was subsidized by the State of New York. It remains to be seen if SolarCity will be able to produce at lower costs in the large-scale operation that it plans using the Silevo production technology. Can SolarCity become profitable without the New York subsidies, particularly since homeowner subsidies may

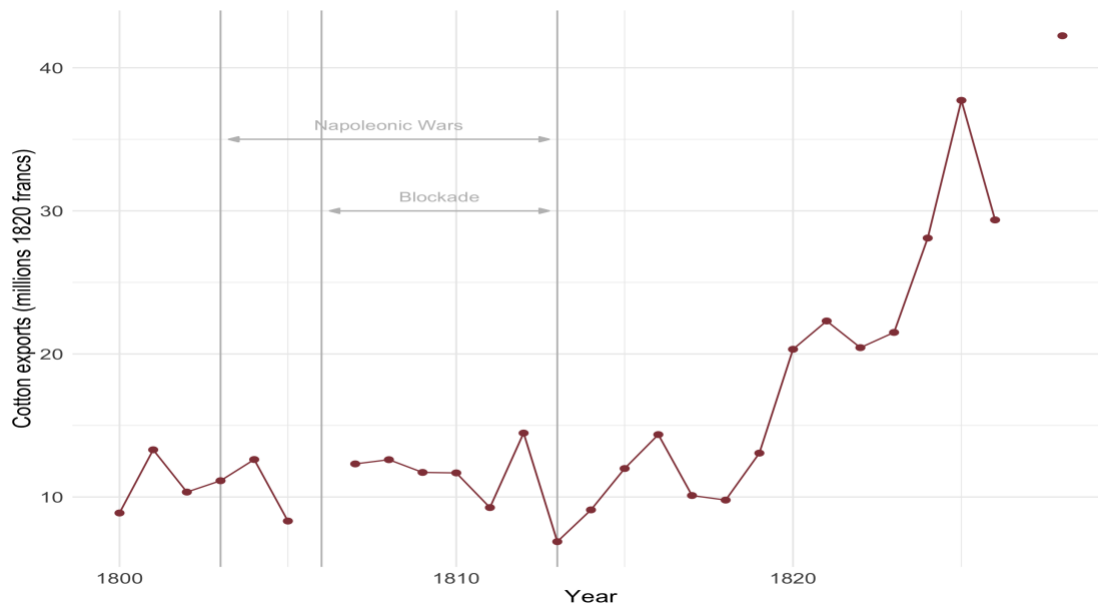
be reducing demand for installations? If it can become profitable, then it would be an example of a successful case of infant-industry protection. (On August 1, 2016, SolarCity accepted Tesla Motors' offer of 2.6 billion and later became a subsidiary of Tesla, Inc.)

III. Other evidence

1. Juhász, Réka. 2018. "Temporary Protection and Technology Adoption: Evidence from the Napoleonic Blockade." *American Economic Review*, 108 (11): 3339-76.

Author Reka Juhasz found a mixed record of success for infant-industry policies when she looked at recent history. "In Southeast Asia, places like South Korea and Taiwan, industrial policy coincided with these spectacular growth miracles," Juhasz said in an interview with the AEA. "Whereas in Latin America, it coincided with economic stagnation."

France's infant cotton industry growing up: France's cotton industry struggled in international markets before Napoleon's blockade. During the blockade, its cotton industry, especially in the north, developed the know-how to become competitive. And after the blockade was lifted, France's cotton exports steadily grew throughout the 19th century.



This paper uses a natural experiment to estimate the causal effect of temporary trade protection on long-term economic development. The author finds that regions in the French Empire which became better protected from trade with the British for exogenous reasons during the Napoleonic Wars (1803-1815) increased capacity in mechanized cotton spinning to a larger extent than regions which remained more exposed to trade. In the long run, regions with exogenously higher spinning capacity had higher activity in mechanized cotton spinning. They also had higher value added per capita in industry up to the second half of the nineteenth century, but not later.

2. Connolly, Michelle, and Kei-Mu Yi. 2015. "How Much of South Korea's Growth Miracle Can Be Explained by Trade Policy?" *American Economic Journal: Macroeconomics*, 7 (4): 188-221.

South Korea climbs the GDP standings, 1955–2010. South Korea's real GDP per capita grew at an average rate of 6.6 percent per year from 1961 to 1995. One of the poorest countries in the world after the Korean War, South Korea is now among the wealthiest.

Michelle Connolly and Kei-Mu Yi highlight three key changes in trade policy during this period that they think may have played a significant role in Korea's development. The first came in the early 1960s when Korea created a tariff exemption that lowered tariffs on intermediate inputs (like car engines) and capital goods (like automatic looms), but only on the condition that these were used to produce final goods like cars or clothes for export to other countries. It was illegal to use these imports to make goods for South Koreans to consume. (Export-led industrial policy)

According to the authors, Korea implemented many other policies focused on physical and human capital, output, and trade. For example, government investment in schools, roads, and other infrastructure increased substantially. Credit subsidies and reduced direct and indirect tax rates were provided to exporters. Finally, Korea has had episodes of targeted industrial policy designed to build up particular industries, such as shipbuilding.

Readings

Tyler Smith, 2018, Testing the infant-industry argument: Can trade protection jump-start an industry? <https://www.aeaweb.org/research/infant-industry-napoleonic-blockade>

Tyler Smith, 2019, Does trade policy really matter? Britain's protectionism in the 1930s may offer insights for policymakers today. <https://www.aeaweb.org/research/british-interwar-protectionism-imperial-imports>

Tim Hyde, 2015, Can trade policy drive economic development? The role of trade in South Korea's economic growth miracle <https://www.aeaweb.org/research/can-trade-policy-drive-economic-development>

de Bromhead, Alan, Alan Fernihough, Markus Lampe, and Kevin Hjortshøj O'Rourke. 2019. "When Britain Turned Inward: The Impact of Interwar British Protection." *American Economic Review*, 109 (2): 325-52.

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Connolly, Michelle, and Kei-Mu Yi. 2015. "How Much of South Korea's Growth Miracle Can Be Explained by Trade Policy?" *American Economic Journal: Macroeconomics*, 7 (4): 188-221.

Marc J. Melitz, 2005, When and how should infant industries be protected? *Journal of International Economics*, 66, pp. 177–196

Anne O. Krueger and Baran Tuncer. 1982. An Empirical Test of the Infant Industry Argument *The American Economic Review*, Vol. 72, No. 5, pp. 1142-1152

Robert E. Baldwin, 1969, The Case against Infant-Industry Tariff Protection, *Journal of Political Economy*, Vol. 77, No. 3, pp. 295-305 (11 pages)