

economic commentary

competitive advantage, which was basically an updated version of Abernathy's findings.⁴ Using wage rates from the Bureau of Labor Statistics, the CBO included both manufacturers' pay rates (\$17.55 in the United States and \$7.74 in Japan) and suppliers' rates (\$11.06 in the United States and \$6.23 in Japan). The CBO report increased the figure for the number of hours required to build a subcompact car in the United States and used the Abernathy measure of relative productivity to obtain a Japanese cost advantage of \$2,473. From this, \$400 of transportation and customs duties was subtracted to obtain a landed-cost advantage of \$2,073, based on 1979 data updated with the August 1982 exchange rate of 255 yen/\$1.

There have been a number of criticisms of Abernathy's work.⁵ His study may have been weakened by relying on 1979 data. U.S. plants were in a slump in 1979, while Japanese plants were operating near capacity. Idle plant costs thus were assigned to the production of U.S. cars. Comparing the two systems in the same phase of the business cycle perhaps would have yielded more representative data.

4. "Domestic Content Legislation and the U.S. Automotive Industry," Subcommittee on Trade of the Committee on Ways and Means, U.S. House of Representatives, August 16, 1982, pp. 34-38.

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Abernathy's use of industry-wide averages also has been questioned. Japanese cost estimates ranged between \$4,180 and \$4,679 per unit, while U.S. costs ranged from \$5,537 for General Motors to \$6,889 for Chrysler. As General Motors held about one-half of the domestic market, a sales-weighted average would reduce the Japanese cost advantage from Abernathy's \$1,436 to roughly \$857 per unit. This figure might be even lower if Japanese plants were compared with new U.S. plants that build models to compete directly with Japanese cars.

Finally, Abernathy's figures were based on the observation that the Japanese could build a car with approximately one-half the labor hours used in U.S. production. This observation has been extended to include the suppliers, although the actual labor content of automobile components is unknown. Because the observed data are less than one-half the total and the Japanese advantage might not exist in the unobserved portion of the industry, the cost advantage might be overstated.

5. Jose A. Gomez-Ibanez and David Harrison, Jr., "Imports and the Future of the U.S. Automobile Industry," *AEA Papers and Proceedings*, (May 1982), pp. 319-23.

Conclusion

The Japanese cost advantage in automobile production could range from \$560 to \$2,000 per car, depending on costs of labor and resources, productivity levels, industrial structure, and exchange rates. To abate the Japanese cost advantage, the U.S. auto industry could improve its productivity and reduce labor costs: appreciation of the yen would also aid in reducing the advantage. Assuming an average Japanese landed-cost advantage of \$1,000, the yen (at the May 1984 exchange rate of 231 yen/\$1) would have to appreciate about 23 percent against the dollar to eliminate the advantage.

To rely on exchange rates, quotas, or other similar devices to equalize the Japanese competitive advantage is merely a postponement. Until U.S. auto producers come to terms with costs, productivity, industrial structure, and managerial practices, the Japanese will still retain the competitive advantage. Public policy that encourages a competitive solution to the Japanese cost advantage would allow the U.S. auto industry to remain a strong and vital contender in both domestic and world automobile markets.

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The Japanese Cost Advantage in Automobile Production

by Susan A. Loos

Over the past ten years, U.S. automobile producers have lost substantial ground to the Japanese in the small-car market. A major reason for the success of Japanese manufacturers is that they enjoy a fundamental cost advantage in automobile production. While estimates of this cost advantage vary widely, an accurate determination of the advantage is extremely important to U.S. auto makers if they are to compete successfully in the small-car market. If the Japanese cost advantage were as small as \$500 per car, then U.S. producers could close the gap by slightly improving productivity, instituting minor wage restraints, and taking advantage of moderate dollar depreciation. However, if the Japanese cost advantage were as large as \$2,000 per car (as some analysts estimate it to be), then U.S. producers must fundamentally alter their production technology and labor-cost structure. Even a large dollar depreciation against the yen would not close such a gap by itself.

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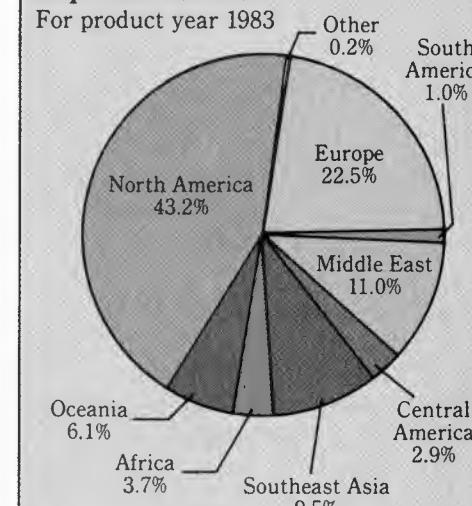
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The Japanese Advantage

An island nation with few mineral resources, Japan imports most of the raw materials needed for automobile production. Efficient use of these imported resources is essential to maintaining a competitive cost advantage in international markets. This necessity has shaped both the structure and the managerial practices of the Japanese auto industry.

Vertical integration. One possible source of the Japanese cost advantage is the vertical structure of its automobile industry. *Vertical integration* enables each manufacturer to control the entire process of automobile production—from obtaining raw materials to final assembly. Although this form of industrial organization occurs in other countries, Japanese auto manufacturers are unique in the number of layers in the chain of supply. Large companies, such as Mitsubishi, complete only major operations and subcontract lesser technological processes to small suppliers. These small suppliers generally subcontract to yet smaller companies, until the companies at the lowest level might have as few as three workers who would be responsible for drilling or fitting a single part.

Chart 1 Where Japan Exported Vehicles
For product year 1983



SOURCE: *Automotive News, 1984 Market Data Issue*, April 25, 1984, p. 84.

This structure allows production assignments to be very specific, and defects are easily traced to their source. The larger companies often help suppliers improve their technology, thus increasing the efficiency of both supplier and manufacturer. Suppliers tend to locate their operations near the parent company, lowering production costs by minimizing transportation costs. The immediate use of supplied parts also decreases inventory expenses.

In contrast, the growth of the U.S. auto industry was characterized by abundant, inexpensive natural resources and low transportation costs. U.S. auto makers obtained parts directly from many suppliers and were not concerned about how far these suppliers were located from the assembly plant. In addition, U.S. producers maintained large inventories to prevent delivery delays. In recent years, both transportation and inventory costs have increased and have become a handicap, causing U.S. producers to re-examine and start to trim some of these production costs.

Managerial practices. Certain managerial practices could also contribute to the Japanese cost advantage. Japanese manufacturers use the third shift for repair and preventive maintenance of the line, which increases up time; in the United States, the third shift is used for production.

Japanese auto workers are given greater responsibility for quality of production than their American counterparts, being permitted to stop the line, for example, when necessary to avoid defects. This lack of defects in Japanese automobiles contributes to their being perceived as quality products.

Employee involvement is also believed to increase productivity. Japanese managers elicit suggestions from their workers, thus leading to improvements in the manufacturing process. Japanese management also encourages a sense of common purpose among employees. The difference between the wages of managers and workers in Japan is also smaller than in the United States, and there are fewer

layers of management altogether in Japan. As a result, there seems to be improved communication and a non-adversarial relationship between management and labor. Japanese employees are said to exhibit concern for the long-term success of their company, which tends to encourage high productivity and quality.

Production costs. Another factor that contributes to the Japanese cost advantage is the cost of labor. Auto workers in Japan earn only one-half of what their U.S. counterparts earn, providing a significant advantage to Japanese manufacturers. Since it is unlikely that U.S. producers can reduce wages by one-half, they are forced to find other ways to reduce costs.

The costs of capital and raw materials also contribute to the Japanese cost advantage. There is some evidence that steel prices have, in the past, been lower in Japan. Hatsopoulos (1983) suggests that the cost of capital also is lower in Japan. Banks provide funds to Japanese companies at an artificially low cost during their fast-growth period when capital is most needed. As the industries mature and their rate of growth slows, companies begin to retire their debt. Japanese auto manufacturers thus have virtually unlimited access to funds for capital investment per unit of labor—about \$110,000 of total assets (plant, equipment, and working capital) per Japanese employee, compared with \$40,000 per employee in the United States.¹

Exchange rate. The rate of exchange between the dollar and the yen also contributes to the Japanese cost advantage. High valuation of the dollar in the last few years has proved to be disadvantageous to U.S. producers. High dollar valuation makes Japanese goods relatively less expensive than U.S. products, since more yen value can be purchased with the same dollar value. If the cost gap were large, depreciation of the dollar would have little effect on the cost advantage. However, exchange rates vary frequently and cannot be controlled by producers, thus simply augmenting or reducing a significant advantage rather than creating or eliminating one.

Import quotas. The size of import quotas and the level of tariffs also affect the Japanese cost advantage. Import quotas add to the cost of an automobile, as U.S. consumers bid up the price of limited available units. This reduces the Japanese advantage and makes U.S. auto prices more competitive. In the same way, the current 2.9 percent tariff on imported automobiles increases the cost of Japanese units, further reducing the cost advantage. (In recent studies, freight and insurance costs generally have been lumped with this tariff cost.)

Cost Comparisons

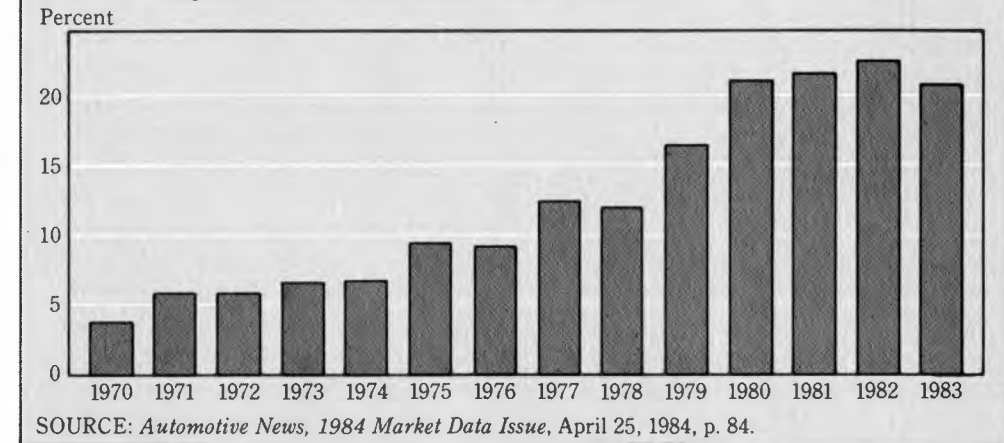
Direct comparison of prices of U.S. and Japanese vehicles can be a misleading measure of cost advantage. Prices reflect many components that are not determined by cost alone. It is not known how U.S. manufacturers spread their costs

over different car size groups, for example. To increase total profits, a manufacturer might maintain a higher profit margin on a more popular model. It is also uncertain how much of the Japanese cost advantage is passed on to consumers and how much returns to the manufacturer in the form of profits. In addition, variations in the options available on Japanese and U.S. products make direct comparisons difficult. Since the two industries are structured very differently, comparisons of U.S. and Japanese automobile parts suppliers also present problems. Accounting practices also vary between countries and firms.

As there obviously are different approaches to analyzing the Japanese cost advantage, readers should note the analysts' assumptions and adjustments, especially when examining the results of more than one study. Different studies emphasize one factor more than another, for example, or ignore certain elements completely. Data taken from a given period might reflect unique conditions that bias results. The reader should know whether the author assumes that productivity in the two countries is the same or different. Also, exchange rates should be compared with current figures to accommodate changes that may have occurred after completion of a study. Keeping these elements in mind, in the following section we examine some recent studies.

In a 1980 report to Congress, Assistant Secretary of Commerce Abraham Katz identified fuel economy and price as "two principal considerations" of Japanese competitiveness.² Most of the Japanese cost advantage was attributed to

Chart 2 Import Penetration into U.S. Car Market



lower labor costs. Comparing the 1979 hourly Japanese pay rate of \$6.85 (including fringe benefits) with the 1979 hourly U.S. rate of \$13.72 (including fringe benefits), the labor differential accounted for a Japanese cost advantage of \$860 per car. Allowing for lower Japanese steel prices and for freight and insurance, and using the 1979 average exchange rate of 218 yen/\$1, the Japanese landed-cost advantage was estimated at \$560 per car. (*Landed-cost* is the cost after transportation and tariff costs have been deducted from the initial cost advantage.) The March 1980 exchange rate of 250 yen/\$1 yielded a Japanese landed-cost advantage of \$670 per car. Both the \$560 and \$670 figures were based on the assumption that productivity was roughly equal in the Japanese and U.S. auto industries. Calculations did not account for differences in the costs of energy, capital, or other production factors that might have varied between Japan and the United States in 1979.

Abernathy (1981) identified compensation rates, productivity, and industry structure as the major sources of the Japanese cost advantage.³ Abernathy looked at the industry as a whole, using data from 1979. Japanese wage rates were known to be approximately 50 percent of U.S. compensation rates, and labor productivity in Japan was about 18 percent higher than in the United States in 1981. Abernathy used this information, and the 1979 exchange rate of 218 yen/\$1, to find a ratio of the relative labor costs per unit. Using the relative labor-cost ratio and U.S. data based on industry averages, the Japanese cost advantage was found to be roughly \$1,690. The landed-cost advantage was estimated at \$1,436, compensating for administration, capital, and transportation costs. The \$254 difference was estimated from annual reports, staff reports of U.S. companies, and memoranda from panel members.

In August 1982 the Congressional Budget Office (CBO) published an estimate of the Japanese

1. George N. Hatsopoulos, *High Cost of Capital: Handicap of American Industry*, Waltham, MA: Thermo Electron Corporation, April 26, 1983, p. 34.

2. Statement of Abraham Katz, Assistant Secretary of Commerce for International Economic Policy, in *World Auto Trade: Current Trends and Structural Problems*, before Subcommittee on Trade of the House Ways and Means Committee, March 18, 1980, pp. 231-34.

3. The work of James E. Harbour is considered in sections of this *Commentary* devoted to Abernathy. See also William J. Abernathy, James E. Harbour, and Jay M. Henn, "Productivity and Comparative Cost Advantages: Some Estimates for Major Automotive Producers," draft report to the U.S. Department of Transportation, February 1981; William J. Abernathy, Kim B. Clark,

and Alan M. Kantrow, "The New Industrial Competition," *Harvard Business Review*, vol. 59, no. 5 (September/October 1981), pp. 68-81; and *The Status of the U.S. Auto Industry: A Study of the Influence of Technology in Determining International and Industrial Competitive Advantage*, Washington, DC: National Academy Press, 1982, pp. 169-88.