MARKETS

MANUFACTURING: Mexico's Maquiladora Industries

Firms in countries such as the U.S. that face relatively high labor costs tend to use capital intensive production processes. Firms in less developed countries where labor is relatively cheap tend to use labor intensive production processes.

Some U.S. firms are getting it both ways. They complete part of the production process in the U.S. using capital intensive methods, then ship the unfinished goods to a plant in Mexico where they are worked on further by much lower cost workers using labor intensive methods.

When shipped back to the U.S., the firm must pay an import duty on the value added by the plant in Mexico.

RCA, for example, has a plant in Juarez where labor intensive assembly work is done on electronic components. Baxter Travenol Laboratories, a major U.S. manufacturer of hospital supplies, manufactures latex in the U.S. and ships it to its maquiladora in Mexico where it is made into surgical gloves.

Several clothing manufacturers manufacture cloth in the U.S., then ship the material to Mexico for fabrication.

Texas A&M economist Benito Flores, who has studied the maquiladoras intensively, says the program serves the interests of both Mexico and the U.S. More than 900 U.S. firms operate maquiladora plants; the plants are the third largest source of employment in Mexico, behind oil and tourism.

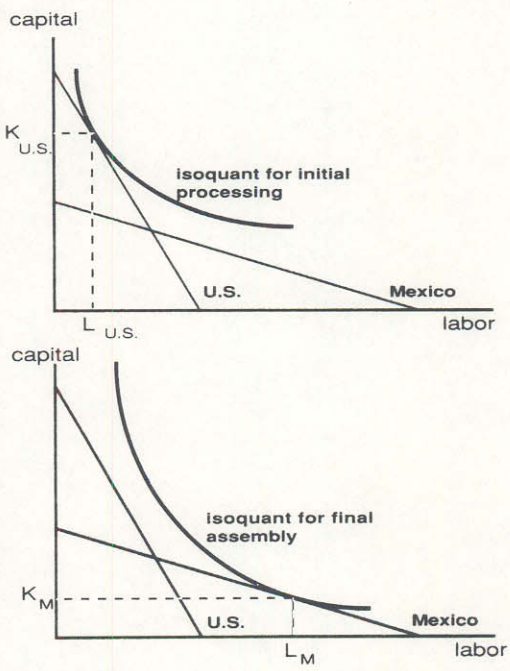
"Some aspects of production are best suited to capital intensive methods," he says. The U.S. has a comparative advantage in that type of production. "But other aspects," he adds, "lend themselves to labor intensive methods. By 'sourcing out' part of the production process to the maquiladoras, firms can save a great deal of money. The fact that they pay a duty on only the value added in Mexico provides another incentive."

Mr. Flores estimates that value added in production by the maquiladoras represents between 30 and 45 percent of Mexico's exports of manufactured goods. Employment in the maquiladoras soared by over 300 percent between 1973 and 1986, Mr. Flores says. Value added, measured in U.S. dollars, rose even more sharply—by more than 800 percent.

That suggests rising labor productivity. One factor in increasing productivity has been what economists call "learning by doing." Workers become more productive as they gain experience in their jobs. Samsonite has found that such learning generates spectacular gains. It estimates that a worker with one year of experience in sewing luggage is five times as productive as one who has worked at the firm's maquiladora plant for one month.

Under terms of the maquiladora program, goods shipped from U.S. plants to maquiladoras are required to be returned to the U.S. Firms in the U.S. are allowed to maintain full ownership of their maquiladora plants in Mexico.

The U.S. isn't the only high labor cost country taking advantage of the program. Mr. Flores notes that Japan has established maquiladora plants in Mexico as well.



The clearest way to see the advantage of the maquiladoras is with isoquant-isocost analysis. Both panels above show isocost curves for Mexico and the U.S.; the curves for both countries reflect the same total costs. The isocost curves for Mexico are much flatter, reflecting the fact that labor is relatively cheaper in Mexico. The isoquants are for two different stages of the production process. The isoquant in the top panel is for the initial processing of a good (say, the latex in hospital gloves). It is most efficiently done in the U.S. The lower panel shows the isoquant for final assembly. In the case shown, it is most efficiently done in Mexico. A firm facing such circumstances could achieve greater output at equal cost by sourcing the assembly phase of its operation to a maquiladora in Mexico.

ACADEMICS: Cite Values

Economists love to be cited. It pays.

We're not talking about being cited for zipping along at 63 miles per hour in a 55 zone. We're talking about being cited in academic journals.

When a scholar uses the work of another scholar in research, it is customary to cite that scholar's work. Presumably, the more often a professor's work is cited by other scholars, the more important it is.

MARKETS, *Continued from prev. page*

Many professors view being cited as a kind of professional recognition of the significance of their work. It is. But, as economist Arthur Diamond Jr. of Ohio State University points out in the Spring, 1986 issue of the *Journal of Human Resources*, that recognition translates into higher salaries.

Professors are expected to produce two basic products: teaching and research. These efforts are rewarded differently depending on the mission of the institution. Research-oriented colleges and universities, for example, can be expected to reward research efforts to a greater degree than they reward teaching excellence.

Several studies by economists of the determinants of faculty salaries show that publications boost salaries. Faculty members generally get higher pay by publishing more articles in scientific journals.

But Mr. Diamond points out that, while the number of publications is one measure of a scholar's research productivity, the number of citations is a measure of their impact. He argues that a count of the number of times a faculty member's work is cited by other scholars provides a rough measure of one form of human capital—the ability to do top-quality research at the frontiers of one's discipline.

A measure of citations is now readily available for faculty members. The *Science Citatiion Index* and the *Social Science Citation Index* provide listings of the articles citing a particular professor's work. One can, for example, look up Professor X and see a list of all the articles that have cited papers Professor X has written.

The citation indexes are designed to help researchers find relevant articles. If you know the names of some of the key scholars in an area, you can look up articles citing their work.

But they also make it easy to see how often a particular professor's work is cited. More and more, faculty committees that make recommendations for individual salaries each year are looking into the number of "cites" the professor got over the last year.

Mr. Diamond did a statistical analysis of salaries of full professors at the University of California at Berkeley to see if the number of citations mattered. He found that it did. After adjusting for other determinants of faculty salaries, including the number of articles published, Mr. Diamond found that the number of citations played a role as well. His analysis revealed diminishing returns to citations. For a professor with zero citations, the first citation had a marginal value (that is, it increased his or her wage) of $186. That diminished gradually. For a professor with ten citations, the eleventh was worth an extra $170. For a professor with 100 citations, the 101st was worth just $16.

The Marginal Value of a Citation

At Cites=	Diamond (full profs, Berkeley Econ 1961-79)	Hamermesh (full prof, 7 Depts. 1978-79)
0	$186	$478
10	170	426
100	16	-36

Mr. Diamond compared his results to those found by Michigan State University economist Daniel Hamermesh in a study of the salaries of 148 full professors of economics at seven universities for the 1978-79 academic year. Mr. Hamermesh found a similar declining scale of marginal values; his estimate suggests much higher marginal values than those of Mr. Diamond. The Hamermesh marginal values fall off much more rapidly, however. He calculates that the marginal value of the 101st citation was actually negative! Presumably, that result captures some of the impact of aging.

Even the more modest estimates obtained by Mr. Diamond from his study of salaries at Berkeley suggests that a citation has considerable value.If the boost in pay associated with an additional citation for a 45 year-old professor became part of his or her base salary throughout his or her career, the career vale of the first citation would be worth roughly $10,000!

AUTOMOBILES: GM Decides Smaller Is Better

General Motors, the largest industrial corporation in the world, wants to shink.

An analysis by Wall Street Journal reporters Jacob Schlesinger and Joseph White (June 6, 1988) estimates that the giant auto-maker may close as many as six of its factories and trim its 472,000 employees by 100,00 over the next five years.

GM chairman Roger Smith appears to be determined to attack a chronic problem at the company: low profits. Last year GM ranked 307th among U.S. industrial corporations in terms of profits as a percentage of sales (3.5 percent) and 336th in terms of profits as a percentage of total assets (4.1 percent).

The 80 year-old company has tried to increase profits by modernizing its facilities, restructuring its management, and diversifying its operations, all without success.

When Mr. Smith took over as chairman seven years ago, he launched a $50 billion modernization effort. He declared his intent to increase GM's share of the domestic market, then about 60 percent, to 70 percent. He promised to increase the company's share of the total market as well.

But a funny thing happened on the way to GM's rise to dominance. Chrysler survived. Ford, which had been limping along, turned into a veritable money machine. The number of foreign competitors in the market jumped dramatically as Korean and even Yugoslav cars entered the market. GM's share of domestic sales fell to 50 percent. Its share of the total U.S. market fell to 37 percent from 45 percent in 1981.

Industry analysts have long argued that the company, which is almost twice as big as Ford and more than four times as big as Chrysler, is simply too big. Its huge scale has created management inefficiency that hasn't been fixed by modernization and restructuring.

In terms of its auto production, GM's output per worker is lower than that of its chief domestic competitor. Ford produced 50 percent

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Association for Comparative Economic Studies: Contact Elton Hinshaw, (615) 322-2595;

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