

Shifting Gears: Ford Motor Company in Mexico

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Summary:

This case was written for use in an undergraduate course in international economics or economic development. The students will find previous knowledge of microeconomics and macroeconomics useful. It is designed to motivate discussions of direct foreign investment.

Detail is drawn from the decisions by Ford Motor Company in establishing and outfitting its plant at Hermosillo, Mexico. This decision is placed in the context of the Mexican legal environment for auto production and the gyrations of the international economy during this period. It provides a useful microeconomic exercise, but may serve as well as the basis of simulated negotiations between Ford Motor and the Mexican government.

Contents:

Parts A, B and C
Instructor's notes

Note from the author:

I am pleased to be able to distribute this case study on the Internet, and have no objection to faculty use of the case in educational settings. I ask two things: (1) that the cases not be resold to students, and (2) that you contact me at the above address with an evaluation of the case study and your success with it in the classroom.

The administrators and fellows of the Pew Faculty Fellowship in International Affairs have been a continuing source of inspiration to me as I have developed this and other cases. Thanks to all of them for their support.

Shifting Gears: Ford Motor Company in Mexico (A) The Dilemma

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Ford Motor Company faces an important decision as the new year of 1984 begins. Its operations in Mexico that have been quite profitable for many years are threatened with closure by the Auto Decree of 1983 issued by the Mexican government. This decree will require a substantial change in the way Ford operates in Mexico. Your division, the Strategic Planning Division of Ford, has been asked to develop recommendations for modifying or terminating Ford's presence in Mexico. Your recommendations should mesh as well with your strategy for global competition and profitability.

Ford's Global Strategy

The Ford Motor Company has established a global strategy for automobile production and distribution. As early as 1929, Ford had assembly plants in 21 countries; in 1931 it opened its first fully integrated manufacturing complex overseas in Dagenham, England. By the early 1970s, the European market equalled that of the US in size, and Ford of Europe became a profitable subsidiary of Ford. During the US recession of 1980-1982, the parent Ford Motor Company relied upon loans from Ford of Europe to remain liquid.

Ford also in 1979 purchased a 24 percent stake in Toyo Kogyu, the Japanese producer of Mazda cars. It has taken advantage of this latter link in servicing Pacific markets. In Australia and Taiwan, for example, Ford sold the Toyo Kogyo GLC and 626 models as the Ford Laser and Telstar.

Foreign sales yield less revenue per unit than US operations because the cars produced for foreign markets are smaller. Table 1 illustrates this, and provides a comparison with other automakers.

In 1979, Ford initiated development of the Escort as a "World Car" with world-wide sourcing of components. Figure 1 illustrates this global sourcing strategy. This was expected to lower costs substantially, as in the examples cited in Table 2. The plan was also to produce the same car from the same components in both Europe and the US, but in the end only two components were used in common: ashtrays and an instrument panel brace.

The Mexican Auto Market.

Ford Motor Company has long been interested in the Mexican auto market. In 1925, Ford was the first to open an automobile assembly plant in Mexico, and in following years other US producers as well as Mexican firms began assembling vehicles. Nevertheless, by 1960, 53 percent of domestic demand for passenger cars was supplied by imports. Further, 80 percent of the value of parts used in domestic assembly was also imported. Exports amounted to \$200,000 in value, while imports of autos and parts were valued at \$119.3 million. 65 percent of the exports and 86 percent of the imports were of the US market.

The Mexican Automotive Decree of 1962 banned auto imports, in effect forcing automakers to assemble cars in Mexico if they wanted to service that market. The result is a highly inefficient Mexican auto

industry, with the seven producers protected from outside competition. Nonetheless, the sector's significant trade imbalance persisted, as indicated in Table 3.

In 1972 a new Automotive Decree required automakers to balance any imports by exports containing at least 40 percent of auto parts not made by the car manufacturer. This decisively favored foreign producers, but trade imbalances in the sector continued. The 1977 Auto Decree created a new balance-of-payments mechanism, requiring each auto maker to increase exports in order to balance its imports and payments abroad by 1982. It also increased maquiladora incentives by allowing up to 20 percent of the compensating exports of car producers to accrue through the value added of maquila plants.

Not only must Ford balance its foreign exchange account, but it also has a \$500 million foreign exchange obligation to clear. This obligation was contracted in the boom years of 1980 and 1981 when Ford, along with other car companies, obtained permission to increase its imports of components over the then-permitted levels in order to meet demand for cars. In return for this, Ford agreed in 1981 to balance out the amount through increased exports over the three years 1984-1986.

The Mexican demand for automobiles boomed along with the world market for petroleum. From 1977 to 1981 Mexican auto production (equal to domestic consumption plus a minor export share) grew at an average of 25 percent annually. It peaked in 1981 at close to 600,000 units, with automotive GDP representing 7.1 percent of total manufacturing GDP. The debt crisis and fall in world oil prices also led to a fall in demand: from 1981 to 1983, passenger car sales fell 43 percent. Table 4 illustrates the macroeconomic forces at work in Mexico during this period.

The government passed the Auto Decree of 1983 at that time. Automakers are to abandon some inefficient assembly plants and focus on big, modern plants for economies of scale. The 1983 decree also prohibits the manufacture of eight-cylinder cars after November 1984, prohibits companies from running a foreign exchange deficit, and stipulates that by 1987 all cars manufactured in Mexico must have at least 60 percent local content. By 1987 each manufacturer will be able to make only one type of car and five versions of that type unless they export over half their output and are self-sufficient in foreign exchange. The government is also insisting that companies produce "austere" cars, meaning cars without such extras as air conditioning, for at least one-fifth of their output in 1984.

Car and Truck Sales (in thousands of units)
first ten months of year

	1982	1983
Volkswagen	105	61
Ford	73	40
Nissan	56	43
Chrysler	67	32
General Motors	43	25
Renault	18	16
VAM (American Motors cars)	17	3

Source: Mexican Motor Industry Association

The industry in Mexico has had little incentive to modernize because the market is so small. The industry produced only 600,000 cars in its best year, 1981, and those cars were spread over 19 lines and 47 models. Some of the Mexican cars were more than 100 percent more expensive than their counterparts abroad. "It is impossible for Mexico to be competitive with an average production of only 13,000 cars per line, compared with almost 100,000 units per line in other countries", says Miguel Angel Rivera, the director-general of Mexico's heavy industries.

There have been statistical studies of Mexican demand for automobiles; one is reported in Table 4. The Ford Topaz is considered a compact car, while the Taurus is a luxury car by Mexican standards. The income elasticities of demand indicate that auto demand is quite responsive to increases in income.

Current Mexican production conditions.

Cars built in Mexico must overcome a reputation for shoddy workmanship to be accepted in world markets. The reputation hasn't affected domestic sales because of the lack of competition from imports. A Ford plant in Cuautitlan, a suburb of Mexico City, illustrates the problems. It is one of Mexico's most modern plants, and assembles the Topaz model. Sophisticated robots don't weld body panels; instead, workers struggle with bulky welding guns to tack together body parts. There are no miles of conveyors that deliver thousands of parts to assemblers at precisely the right moment; at several work stations parts are carried by hand, and workers simply shove the partly completed cars toward the next work station. Before the finished cars are driven off to a nearby parking lot (minus rear-view mirrors that were missing during assembly on that day and must be added later), quality inspectors test them without the benefit of sophisticated diagnostic devices. A final touch is given by workers who apply some decorative striping with brushes soaked in old Coca-Cola cans.

The lack of automation and the nearly constant need to solve problems that crop up in this operation far override the value of cheap labor. While workers at Cuautitlan in 1983 are paid less than \$3.00 per hour compared with the \$23.00 per hour of US assembly-line workers, a Ford official estimates that production costs run nearly 30 percent higher here.

What Ford incurs as higher costs it recovers in higher prices. A 1984 Topaz rolling off the Cuautitlan assembly line carries a base price equivalent to \$7875, or about 265 weeks of pay for the average Mexican worker. In the US, a Topaz with substantially more standard equipment and anti-pollution gear costs \$7474, or about 27 weeks of pay for the average US worker.

"The industry could cut its costs 50 percent through productivity improvements, but instead the companies just look for price increases", argues Jose Gonzales Prado, director-general of Mexico's Quality Control Institute. "There isn't any pressure on the companies to cut costs." The Mexican government estimates that overall the US auto makers earn 30 percent more in Mexico than on the same cars in the US.

According to the MIT International Automobile Program report written at this time (and published in 1985), "there is little economic advantage to Mexican production except in the cases of a few minor parts with high labor content....For the future, it is clear that the leverage LDC [less developed country] government have in negotiating with the assemblers will depend on the size and growth prospects of their domestic markets."

Maquiladoras.

Maquiladoras are in-bond assembly plants that manufacture, process or assemble raw materials, parts or components imported temporarily into Mexico. They take their name from the Spanish word *maquila*, which in colonial times was the toll millers collected for processing someone else's grain. The finished or semi-finished products are then exported back to the country of origin or a third country. "For Mexico", notes Leon Opalin, senior economist and sub-director of international trade for Banco Nacional de Mexico, "the in-bond industry means jobs, foreign exchange earnings, and technology transfer -- all critical elements of the country's economic recovery and development efforts."

The maquiladora program was begun in 1966. At the end of that year, there were 12 maquiladora plants operating in Mexico with a total employment of 3000. By 1984, there were 650 plants employing some 194,000 people. In the 1980-82 period, the industry was Mexico's second most important generator of foreign exchange, netting an average of \$860 million annually.

According to Dennis Hodak, manager of corporate development of General Electric de Mexico, maquiladoras have grown so rapidly because "growing competition has forced more and more US companies to look for lower-cost manufacturing opportunities. The (US) automotive industry for example has recently discovered the maquiladora industry, and with full force."

Maquiladoras perform a wide variety of services, although the following sectors are most prominent in 1984: electronics assembly (106 operating plants), electric equipment and appliances (65 plants), automotive industry parts and components (52 plants), textiles and wearing apparel (98 plants), and furniture manufacture (68 plants). These five sectors account for 82.2 percent of employment and 80.6 percent of re-export value added.

Presidents Reagan and de la Madrid declared their support for Mexico's in-bond assembly industry during their heads of state meeting on August 14, 1983, and the current legal framework covering in-bond industry activities in Mexico is the decree issued by President de la Madrid on August 15, 1983. This codified a series of previous government policy directives. Maquiladoras are generally established as Mexican corporations. However, under the terms of a general resolution of the National Foreign Investment Commission, companies operating under this program can be 100 percent foreign-owned. In-bond plants also operate under much more favorable foreign exchange regulations than other manufacturing companies in Mexico. Restrictions are for all intents and purposes minimal.

Close to 90 percent of the 650 operating in-bond plants are located in cities on Mexico's northern border. In recent months, Mexican government officials both publicly and in private have expressed their interest in seeing more plants set up in non-border locations, albeit still in cities in northern tier states.

US tariff laws have been modified especially to accommodate the production sharing practice. Under these regulations, import duties are imposed only on the value added to the finished or semi-finished product when re-exported to the United States. (Value added can be defined as the difference between constructed wholesale value in Mexico and the cost of raw materials or components brought into the country from north of the border.) Table 6 provides details on the comparative costs and productivity of US and maquiladora assembly plants, while Table 7 lists a breakdown of the contributions of various components of the assembly plant to value added. The percent of value added attributed to Mexican input supplies is remarkably small, reflecting that these plants are truly for assembly of foreign inputs.

The US Automobile Market

US automobile demand has been in a slump with the recession of 1980-1982. The appreciation of the US dollar relative to foreign currencies has further discouraged purchase of US-made autos: imported automobiles represented 29 percent of domestic sales in 1982 as compared to 23 percent in 1979. These two features together have had a devastating effect on domestic auto production, which fell from 9.4 million units in 1979 to 5.9 million units in 1982.

The US had in the progressive trade liberalization sponsored by the General Agreement on Tariffs and Trade lowered its tariff on imported automobiles to 3 percent in 1973. In 1981 the US and Japan negotiated a voluntary export restraint agreement whereby the Japanese government accepted responsibility for limiting passenger car exports to 1.76 million units beginning 1 April 1981. This was a drop of 7.7 percent from the previous 12-month period. The agreement was to hold imports at the same level in the two succeeding years. Negotiations with Japan were initiated in late 1983 to extend this voluntary restraint.

General Motors Corporation (GM), Ford's chief competitor in the US market, recently announced that it would begin a joint venture with Toyota for small-car production in California. This plant would use Toyota management and production techniques and produce cars for both GM and Toyota lines. Chrysler Corporation brought suit against this venture, alleging that it violated US antitrust law.

Dealing with the Mexican Government

The Mexican government has not been easy to deal with, either for Ford or for other foreign corporations. Government decrees have changed the rules of operation quite frequently, as illustrated for autos in previous sections. This situation has become worse recently as the Mexican government's efforts have been focused on servicing an unmanageable burden of international debt. (It is in this context that the requirements for trade balance by firm have become popular.) On the other hand, the bureaucrats within the government have shown themselves in the past to be flexible in interpreting the governmental decrees.

Ford's decision.

Your task is to present the board of directors of Ford Motor Company with a list of options for dealing with the present crisis in Mexico. Lay these options out clearly and concisely, and choose your preferred option. You will be expected to defend this choice before the board of directors.

TABLE 1^a

Estimated Revenue Per Unit Produced
(Vehicle and Parts Revenue Divided by Units Produced),
In Current Dollars

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Toyota (export vehicles)	2,245	2,377	2,472	2,434	2,567	3,270	3,814	4,049	4,235	4,238	4,688	4,823	nr
V W (excludes Audi)	2,450	2,745	2,944	3,326	3,775	3,492	4,513	4,899	5,322	5,859	6,427	7,030	7,363
Ford Germany	2,841	2,970	3,389	3,392	4,439	4,180	4,438	4,820	5,151	5,279	5,620	5,984	6,138
General Motors Worldwide	3,107	nr	nr	nr	nr	nr	nr	5,672	6,221	6,895	7,488	8,634	9,077
General Motors N.A.	3,429	3,556	3,821	3,936	4,432	4,961	5,353	5,897	6,399	6,967	7,717	9,032	9,981
Ford Worldwide	2,839	3,040	3,311	3,584	4,094	4,738	4,996	5,461	6,196	6,867	7,694	8,039	7,916
Ford North America	nr	nr	3,633	3,848	4,223	4,867	5,202	5,782	6,360	6,934	7,695	8,514	9,000
Production Revenue Per Car, West Germany (VDA)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4,640	4,927	5,379	5,848	n.d.	n.d.
Average Retail-Transaction Price of U.S.,-Produced Cars Sold in U.S. (BEA)	3,708	3,919	4,034	4,180	4,523	5,083	5,504	5,985	6,481	6,906	7,630	8,940	9,880

NOTES: The revenues reported in this table are total motor-vehicle revenues, including revenues for replacement parts, divided by the total number of motor vehicles produced. For General Motors worldwide, Ford worldwide, Volkswagen, and Toyota's exported motor vehicles, these revenues are routinely reported in corporate annual reports (except that Toyota stopped this practice in 1982). In the case of GM's and Ford's North American operations these data are reported in some years but in other years only total corporate revenues (including aerospace and other non-motor-vehicle activities) are reported. To develop a continuous data series, the average ratio of motor vehicle revenues to total revenues in the years in which these figures are reported was multiplied by total corporate revenues in the years in which only this figure was available. Marks and yen were converted to dollars at \$1 = 215 yen and \$1 = 2.4 marks. The VDA data showing the average producer revenues per unit for the entire German industry are shown to provide a cross-check on the corporate data. Similarly, average retail-transaction prices for U.S.-produced cars sold in the U.S., as determined by the Bureau of Economic Analysis of the U.S. Department of Commerce, are shown as a cross-check on North American producers' revenues as reported in corporate statements. nr = not reported; n.d. = no relevant data available.

^aSource: Altshuler *et al.* .

TABLE 2^a

Cost Savings in U.S. Auto Manufacture from Remote Sourcing of Auto Components in Low-Wage Countries (1980)

COMPONENT	LABOR COST SAVING	ADDITIONAL SHIPPING COST	NET SAVING	NET SAVING/ VALUE ADDED	CHEAPEST COUNTRY
Engine	\$89.00	\$44.00	\$45.00	20%	Korea ^b
Transmission	55.00	21.00	34.00	29%	Korea ^b
Body Stampings (set)	90.00	64.00	26.00	12%	Mexico
Starter Motor	3.03	1.65	1.38	35%	Korea
Radiator	.97	1.14	-.17	--	Mexico
Coil Spring	1.61	1.41	.20	6%	Mexico
Wiring Harness	1.00	.59	.41	25%	Mexico

Source: Derived from published and unpublished data including Rath and Strong, Harbour and Associates, U.S. Department of Transportation, Transportation Systems Center, and company data.

^aSource: Altshuler et al. .

^bThese components are cheaper when sourced in Korea than in the United States but not necessarily cheaper than when sourced in Japan. Japanese wages are much higher than Korean, but total labor (direct plus indirect) is probably much lower.

TABLE 3^a

Mexican Automotive Trade Balance,
1960-1990
(Millions of US Dollars)

Year	AUTOMOTIVE EXPORTS				AUTOMOTIVE IMPORTS			AUTOMOTIVE Trade Balance	U.S.A./TOTAL		AUTOMOTIVE/NATIONAL		
	Total	Vehicles	Engines	Autoparts	Total	Vehicles	Autoparts		Exports To (%)	Imports From (%)	Exports (%)	Imports (%)	Balance (%)
1960	0.2	0.0		0.2	119.3	86.5	32.7	-119.1	65.4	86.4	0.0	10.1	26.6
1965	0.8	0.1		0.8	182.6	131.7	50.9	-181.7	63.8	87.0	0.1	11.7	39.7
1970	26.6	0.2		26.4	219.7	166.4	53.3	-193.1	67.7	88.8	2.1	9.4	18.6
1975	184.0	9.6	35.4	139.0	807.3	189.6	617.6	-623.3	73.9	65.4	6.0	12.0	17.1
1980	366.2	128.7	32.7	204.8	1,896.7	657.7	1,239.0	-1530.4	66.9	66.3	2.4	10.1	41.4
1981	339.5	113.0	61.5	164.2	2,219.4	681.6	1,537.8	-1879.9	69.1	73.5	1.7	9.3	41.7
1982	420.2	79.2	191.3	149.6	1,192.8	213.4	979.4	-772.6	62.8	77.9	1.9	6.1	NS ^b
1983	940.6	124.2	602.8	213.6	397.9	33.5	364.5	542.7	72.4	68.1	4.4	5.4	3.9
1984	1,303.6	145.9	640.2	317.5	684.6	97.5	587.1	619.0	74.2	68.5	5.8	7.1	4.8
1985	1,426.8	140.7	1,039.2	246.9	993.2	135.0	858.2	433.5	85.5	72.0	6.6	7.1	5.8
1986	2,083.1	545.8	1,152.7	384.6	728.9	91.3	637.7	1,354.2	86.4	75.0	12.8	5.0	32.0
1987	2,839.2	1,207.0	1,179.6	452.5	1,135.8	108.6	1,027.2	1,703.4	87.7	75.1	14.7	8.9	23.0
1988	3,335.3	1,452.0	1,371.9	511.4	1,909.7	225.8	1,683.9	1,425.6	81.8	81.1	15.5	9.9	78.6
1989	3,477.7	1,674.4	1,335.9	467.4	3,951.1	161.3	3,789.9	-473.4	84.1	75.9	15.3	15.6	18.2
1990	4,635.0	2,691.0	1,478.4	465.7	4,936.8	345.3	4,591.5	-301.8	89.9	77.5	17.2	15.9	7.3

Source: Calculated with data from INEGI, Banco de Mexico and SECOFI.

^aSource: Berry, Grilli and Lopez-de-Silanes.

^bNon significant.

TABLE 4

Mexican Economic Performance 1980-83

	1980	1981	1982	1983
Growth in real gross domestic product	8.3	8.8	-0.6	-4.2
in per capita terms	5.0	5.9	-3.0	-6.3
Consumer price inflation (annual average)	26.3	27.9	58.9	101.9
Real Investment growth	14.9	13.9	-17.3	-24.2
Real Consumption growth		7.4	-2.5	-5.4
Real wage growth		3.8	0.7	-22.8
Average nominal lending interest rate	28.1	36.6	46.0	63.3

Lustig (1992, pp. 22 and 40-41), International Financial Statistics

Table 5

Demand for Automobiles in the Mexican Market

Demand curves are specified for three types of automobiles: popular, compact and luxury. They take the form:

$$d_t = \alpha + \beta y_t + \gamma i_t + \delta_p p_{pt} + \delta_c p_{ct} + \delta_l p_{lt}$$

The quantity demanded in year t (d_t) of each of the types of autos is specified in logarithmic terms, as is the real national income of Mexico (y_t) and the relative prices (p_t) of the three types. The interest rate on borrowing (i_t) is given in percent.

The luxury cars are assumed not to be substitutes for the popular or compact cars, but these latter two are assumed to be substitutes in consumption for each other.

Econometric estimation yields the following estimates for Mexico:

	Popular Autos	Compact Autos	Luxury Autos
α	3.30	-5.69	-2.64
β	3.40	3.98	4.55
γ	-0.17	-0.87	-0.51
δ_p	-2.80	1.08	0.0
δ_c	1.08	-1.49	0.0
δ_l	0.0	0.0	-1.55

Symmetry of price elasticities is imposed in estimation. Standard errors for these estimates are:

	Popular Autos	Compact Autos	Luxury Autos
α	4.81	5.05	4.29
β	1.33	1.51	1.26
γ	0.39	0.19	0.36
δ_p	0.91	0.62	
δ_c	0.62	0.51	
δ_l			0.44

Source: Berry, Grilli and Lopez-de-Silanes (1992).

Table 6

Comparing Production Costs: early 1980s

	1980	1981	1982	1983
Value added per employee (US \$ thousands)				
Mexican assembly plants	6.4	7.5	6.7	5.5
US durable goods sector	41.0	44.7	49.2	53.4
Hourly wage				
Mexican assembly plants (in pesos)	26.3	32.9	65.5	86.0
US manufacturing sector (in dollars)	7.3	8.0	8.5	8.6
Exchange rate (pesos per US dollar)	23.0	24.5	55.0	120.1

Source: Grunwald and Flamm (1985, pp. 155, 160), Economic Report of the President.

Table 7

Components of Value Added in Mexican Assembly Plants, 1981

Component	Percentage
Wages and salaries	63.0
Materials and supplies	2.0
Rents and utilities (including transport, maint.)	19.0
Profits (including taxes)	16.0
Total	100.0

Source: Grunwald and Flamm (1985, p. 155)

Sources for information in case

The information in this case study is drawn from a large number of sources. Rather than footnote every figure and statistic, I provide a listing by section of the sources used. The full citation of each source can be found in the bibliography.

Ford's Global Strategy: these data are taken from Altshuler et al. (1985), Womack et al. (1991) and Chislett (1984). Figure 1 is drawn from the World Development Report of the World Bank for 1987.

The Mexican Auto Market: the information of this section is drawn from Berry et al. (1992) and Nag and Frazier (1984). The quote from Angel Rivera is taken from the latter article.

Current Mexican Production Conditions: the information and the quote by Gonzales Prado are drawn from Nag and Frazier (1984). Altshuler et al. (1985, p. 193) provided the final quote.

Maquiladoras: This information is drawn from Christman (1984) and from Grunwald and Flamm (1985). The quotes by Opalin and Hodak are reported in Christman (1984).

The US Automobile Market: This information is drawn from Altshuler et al. (1985) and from Chislett (1984).

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FIGURE 1^a

Global Manufacturing: The Component Network for the Ford Escort (Europe)

^aReprinted from the *World Development Report 1987*.

Shifting Gears: Ford Motor Company in Mexico (B) The Announcement

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Ford Motor Company announced on January 10, 1984 that it would invest \$500 million in an auto plant in Hermosillo, Mexico -- 150 miles from the Texas border. The plant would build cars designed by the Toyo Kogyo Company of Japan, and would sell those cars in the US market. The plant would employ about 3000 workers when it reached its capacity of 100,000 cars per year in 1986. It was believed to be the largest single investment in the Mexican motor industry.

Mr. O. B. Marx III, Ford's new managing director in Mexico, said the car would draw on Ford's "worldwide resources" and that the Japanese content would be "significant", particularly in the field of components. This approach mirrored its policy in the Pacific region. In Australia and Taiwan, for example, Ford sold the Toyo Kogyo GLC and 626 models as the Ford Laser and Telstar.

Its Mexican plant is to be wholly owned and managed by the US company.

As an incentive for this investment the government has agreed to extend the period within which the balanced-trade obligations of Ford should be met. With this extension, Ford could comply with the requirements from its export earnings of \$260 million a year after 1986. The Mexican government also has waived the domestic content requirements for the plant so long as it exports the great majority of its output.

Meanwhile, Ford is taking advantage of the provision in the 1983 Decree which allows manufacturers in 1984 and 1985 to set off up to 20 percent of their foreign exchange commitments against exports of non-automotive products. Ford is exporting lead oxide, zinc and honey.

The Plant

Hermosillo was a great success in terms of productivity and quality. Mexican workers embraced "lean production" with the same speed as American workers at the Japanese-inspired production facilities in North America and at Ford's own US and Canadian plants. However, the plant failed to meet its cost targets, because it was assembling its cars entirely from parts shipped from Japan. As the yen strengthened, using Hermosillo as a way around the US-instigated quota on Japanese auto imports suddenly made no sense.

Ford's Decision

The board of directors would like an evaluation of this strategy as of 1989. Should Ford continue the Hermosillo operations as they presently stand, or should the strategy be modified? You will be expected to defend your recommendation.

Sources: Womack, et al. (1991), Auerbach and Cody (1992), Berry et al. (1992).

Table 1

How Three Continents Make Cars

	Average (in 1989) for auto plants in:		
	Japan	US	Europe
Performance:			
Productivity (hours per car)	16.8	25.1	36.2
Quality (defects per 100 cars)	60.0	82.0	97.0
Layout:			
Factory space (per sq. ft. per car per year)	5.7	7.8	7.8
Size of repair area (as percent of assembly space)	4.1	12.9	14.4
Stocks (for eight sample parts)	0.2	2.9	2.0
Employees:			
Workforce in teams (percent)	69.3	17.3	0.6
Suggestions (per employee per year)	61.6	0.4	0.4
Number of job classifications	12.0	67.0	15.0
Training of new workers (hours on average)	380.0	46.0	173.0
Percent of process automated:			
Welding	86.0	76.0	77.0
Painting	55.0	34.0	38.0
Assembly	2.0	1.0	3.0
Source: Economist, 17 October 1992			

Table 2

Mexican Economic Performance 1984-90

	1984	1985	1986	1987	1988	1989	1990
Growth in real gross domestic product	3.6	2.6	-3.8	1.7	1.3	3.3	4.4
in per capita terms	1.5	0.6	-5.5	-0.1	-0.5	1.5	2.6
Consumer price inflation (annual average)	65.4	57.7	86.2	131.8	114.2	20.0	26.7
Real Investment growth	9.0	12.2	-10.4	6.8	10.9	9.5	13.6
Real Consumption growth	3.3	3.6	-2.3	-0.2	1.8	6.3	5.7
Real wage growth	-7.1	-2.8	-5.9	-1.9	-1.3	9.0	2.9
Average nominal lending interest rate	48.6	60.2	86.7	96.0	69.2	45.0	34.8
Exchange rate (thousand pesos/dollar)	0.17	0.26	0.61	1.38	2.27	2.46	2.81
Exchange rate (yen/dollar)	237.5	238.5	168.5	144.6	128.2	138.0	144.8

Lustig (1992), International Financial Statistics

Shifting Gears: Ford Motor Company in Mexico (C)
Postscript

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The Mexican government dramatically altered its strategy at the end of 1989. It reduced its local-content requirements on individual products and relaxed its rules about the import of finished cars and trucks while retaining its requirement that companies making and selling cars in Mexico balance their trade by exporting as much as they import. (Imports of vehicles were restricted to 15 percent of total domestic production. This increased to 20 percent in 1993.) It also provided tax exemptions to a class of subcompact cars ("popular" cars), but required the producer to reduce its profit margin.

Ford Motor Company turns out Mercury Tracers and Ford Escorts for sale in the United States in a plant in Hermosillo that was judged in a 1990 MIT study as the highest-quality auto assembly operation in the world. Three-fourths of the value of those cars -- including brakes, fuel tanks, electronic components for the instrument panel, interior trim and parts of the seats -- now comes from the US. "It is, in fact, creating jobs in the United States", said Victor M. Barreiro, president and general director of Ford's Mexican operation.

Shifting Gears: Ford Motor Company in Mexico

Instructor's Notes: Patrick Conway

The vision thing.

This case is designed to convey the economic issues related to foreign direct investment through consideration of a specific opportunity faced by Ford Motor Company. Three key features of direct foreign investment decisions:

1. difference in relative production costs is one (but not the only) rationale for such investments;
2. foreign investment allows foreign sourcing of production processes -- it is not necessary (or desirable) to produce all parts of the final good in the same country;
3. the investment decision is one that is made for a multi-year horizon, and is thus dependent upon expectations about how that environment will change. With foreign investment, that environment includes trade restrictions, exchange rates and international competition.

Options for Ford Motor.

The students are asked to prepare options for the Ford Motor Company in the aftermath of the Mexican Auto Decree of 1983. These options should include:

1. Do nothing. Is the status quo sustainable? Some may argue for negotiations with the government to overturn or amend the decree.
2. Pull out of Mexican market. Benefits: zero. Costs: positive accounting losses due to write-off of plants.
3. Increase exports from existing plants. Benefits: Retain half the profits per year presently earned in Mexico. Costs: if quality remains poor for these products, then there may be losses involved in selling the product below cost.
 - a. This strategy suggests minimizing these latter costs through specializing production for export in those plants most competitive. Here students can explore the notion of maquiladoras and the international integration of production. Link to reading from Grunwald and Flamm (1985, ch. 2).
 - b. The text provides evidence that the Mexican market remains profitable (p.3). However, that market is in severe recession at present (p. 2, Table 4). According to the MIT study, this is the appropriate market for evaluating profitability (p. 3).
4. Invest in export-quality productive facilities. Benefits: meet government requirements. Costs: Fixed investment costs plus possibly high training costs.
 - a. Table 7 suggests that a final assembly plant would have to import its components from elsewhere for the most part -- the maquiladora model then becomes relevant to the decision. It is also consistent with the World Car concept. It does, however, open the decision to exchange-rate risk (as brought home forcefully in part B).

b. If this plant reaps the efficiency gains discussed in the case, it will experience increasing profits over time. The higher quality products may be more attractive to the domestic market as well. Otherwise, it may remain as a "loss-leader" to justify the continued high profits in the Mexican market.

The Environment.

An obvious concern for any strategy that leads to continued participation in the Mexican market is the continuity of Mexican regulatory policy. If decisions are made subject to the Auto Decree of 1983, what happens should the government reverse itself in one or more details of that policy?

Analysis.

Their analysis should be based on the microeconomics of the firm. The natural decision criterion would be that of net present value, since the decision to invest is one with a many-period payoff. (Although the specific figures necessary are not explicit in the study, that is a useful framework to stress.) There are two markets to consider: that of Mexico and those outside Mexico (the US market being the most natural of these).

Pacing the Case.

When I taught the case, part A took up a full 50-minute period (and could have usefully gone 10 minutes further). At the end of the period, we voted on a preferred option and I handed out part B. The next period we spent roughly 15 minutes reviewing the conclusion of the previous class and examining why Ford Motor chose differently from us. Then another 15 minutes went to the options facing part B and to a choice of strategy. I then handed out the Postscript.

We spent the balance of the second period analyzing the social (as opposed to firm) welfare implications of the case. Is this exporting jobs? The case is a nice lead-in to those discussions.

Accompanying materials.

To explain the notion of international integration of assembly, I used the following handout with fixed-coefficient production technologies. I presented the problem to the students and asked them to minimize production costs.

International Integration of Assembly: Example

Computer production: two steps.

	Total cost (\$)	
	US	Mexico
Computer chip-making:		
50 capital		
10 labor		
Computer assembly:		
20 capital		
40 labor		
Total production:		
70 capital		
50 labor		

Factor costs in the two countries:

US: wage = \$20
 capital rent = \$10

Mexico: wage = 20 pesos
 capital rent 100 pesos

Exchange rate: 4 pesos = \$1

- (1) What is the cost-minimizing assignment of production?
- (2) Suppose that the exchange rate for Mexico depreciates to 6 pesos per dollar. Does this change your answer?