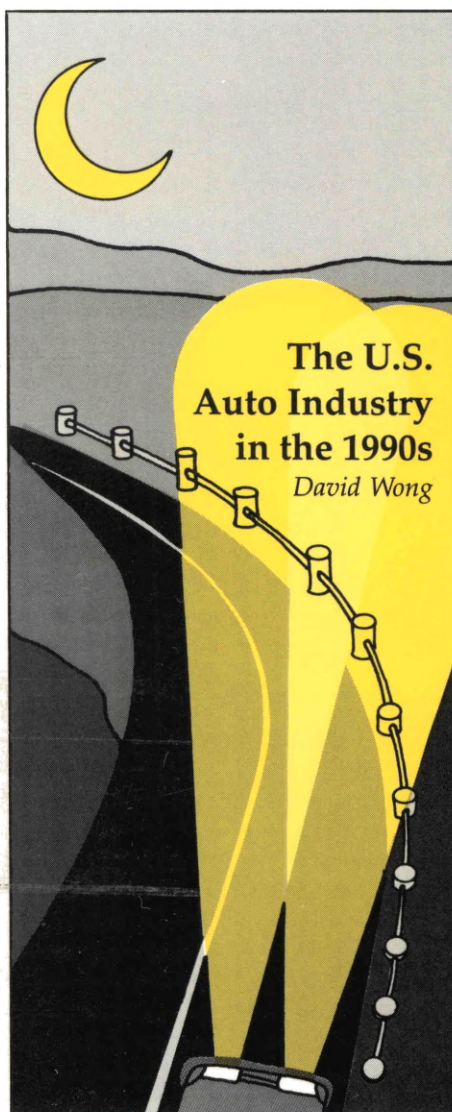
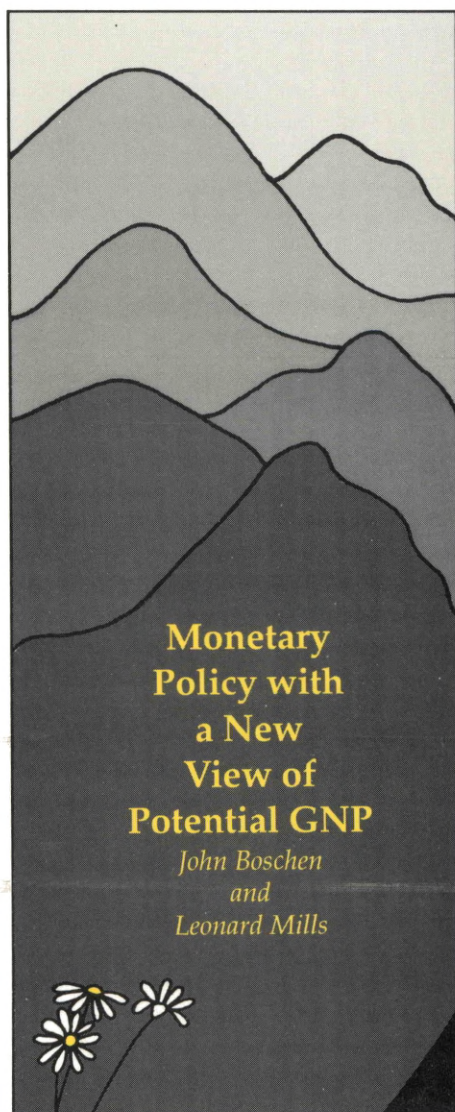


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MONETARY POLICY WITH A NEW VIEW OF POTENTIAL GNP

John Boschen and Leonard Mills

Lately some economists have raised the possibility that potential GNP follows a variable path—not the smooth upward one traditionally assigned to it. They also think that many of the fluctuations we actually see in GNP simply reflect a shift in potential GNP. If this new view of potential GNP is correct, then policymakers may have some rethinking to do.

THE U.S. AUTO INDUSTRY IN THE 1990s

David Wong

In a dull market last year, U.S. auto sales were the slowest since 1984 and almost 1 million units off the 1985-88 average. And as if a shrinking market were not problem enough for them, the Big Three domestic automakers continued to lose market share to foreign competitors. Will the current weakness in the auto industry persist? And will the Big Three's woes hurt U.S. manufacturing output and employment in the 1990s?

Monetary Policy with a New View of Potential GNP

*John Boschen and Leonard Mills**

An important goal of U.S. macroeconomic policy has been to keep the economy operating close to the potential level of real GNP—the total amount of goods and services the economy can supply when its factories and workers are fully employed. The economic rationale for this goal is clear-cut. If actual GNP falls below

potential GNP, losses in real production and employment occur. On the other hand, real output levels above potential GNP cannot be sustained indefinitely and may put upward pressure on the price level.

In their attempts to keep the economy operating close to potential GNP, policymakers face an important practical problem: even though they have data on actual GNP at their disposal, they cannot directly observe potential GNP. Until recently, potential GNP was generally thought to follow a smooth upward trend. With potential GNP growing smoothly, abrupt

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swings in actual GNP could be interpreted as "gaps" between the actual and potential levels. However, some economists have recently raised the possibility that potential GNP follows a much more variable path. In their view, fluctuations in economic growth need not reflect gaps between actual and potential GNP. They may simply reflect actual GNP and potential GNP moving together.

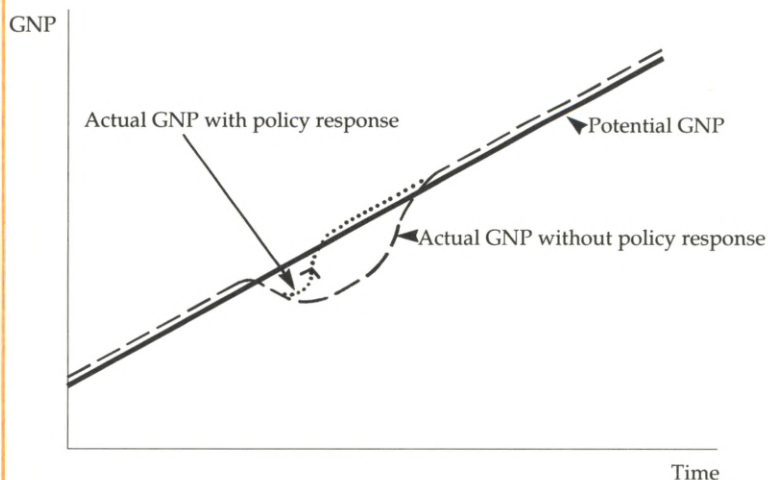
This new view challenges monetary policies that attempt to minimize the gap between actual and potential GNP. For monetary policy to be successful in a world of highly variable potential GNP, policymakers need more information on the sources and duration of macroeconomic fluctuations. Indeed, if policymakers do not have this information, a monetary policy designed to smooth actual GNP could inadvertently widen, rather than close, the gap between actual and potential GNP.

THE TRADITIONAL VIEW: POLICYMAKERS SHOULD LEAN AGAINST CHANGES IN ACTUAL GNP

The traditional view assumes that potential GNP grows gradually, but that shifts in aggregate demand make actual GNP fluctuate erratically. Thus policymakers see themselves as smoothing aggregate demand to keep actual GNP in line with aggregate supply, hoping to avoid gaps and the problems they create. Consider these traditional GNP stabilization scenarios:

- Firms reevaluate their sales outlook and slow their rate of investment spending. Aggregate demand slumps and actual GNP falls below potential. Seeing the slowdown in GNP, the Federal Reserve engages in expansionary monetary policy, lowering interest rates and increasing money growth in order to stimulate aggregate demand. Because lower interest rates induce firms to invest more, this policy restores output and employment to potential levels (Figure 1).
- Consumers become overly optimistic and begin buying goods at a faster rate than the economy can produce in the long run, leading to upward pressure on the price level. Seeing the rapid increase in GNP, the Fed engages in restrictive monetary policies, raising interest rates and slowing money growth, to slow the economy's rate of spending to a more sustainable pace. Thus, the Fed mitigates the inflationary pressure

FIGURE 1
**In the Traditional View,
Monetary Policy Can Close Gaps**



that the demand surge could create and promotes its goal of price stability.

In both scenarios, smoothing fluctuations in actual GNP promoted the Fed's goals because potential GNP was growing steadily.

BUT...CHANGES IN ACTUAL GNP MAY BE DUE TO SHIFTS IN POTENTIAL GNP

The theoretical impetus for a new view of variable potential GNP comes from the real business cycle (RBC) theory of economic fluctuations.¹ Unlike other macro theories, the RBC theory claims that all fluctuations in actual GNP are due to shifts in potential GNP.

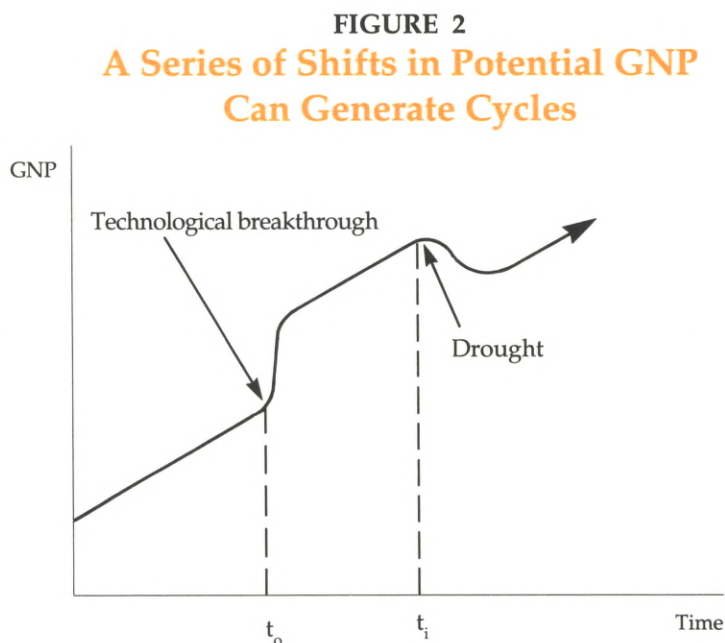
The RBC model is based on two fundamental ideas. The first idea is that changes in aggregate-supply factors are not smooth. For example, because labor force and productivity growth fluctuate significantly, growth in potential GNP can shift erratically from year to year and even from quarter to quarter.

The second fundamental idea is that the economy is always operating at its potential. According to the RBC theory, market prices adjust rapidly enough to insulate the economy from aggregate-demand shifts and to keep its resources fully employed. Although employment and out-

put may fluctuate, these fluctuations do not represent harmful gaps because the economy always maintains full employment.²

A critical point in the RBC model is that even an economy driven solely by shocks to potential GNP can experience ups and downs as adverse shocks follow beneficial shocks. For example, suppose the economy initially experiences a beneficial supply shock—a technological breakthrough, say, that raises the level of potential and actual real GNP. Then comes an adverse supply shock, perhaps a long-term drought in the Midwest. Potential GNP shifts down again, lowering actual GNP. A series of unexpected, frequent shifts in potential GNP could generate what looks like “cyclical” behavior in actual GNP (Figure 2).

²The idea in the RBC theory that economic fluctuations do not reduce people's welfare is discussed extensively in Robert E. Lucas, *Models of Business Cycles* (New York: Basil Blackwell, 1987).



¹For useful summaries, see Carl Walsh, “New Views of the Business Cycle: Has the Past Emphasis on Money Been Misplaced?” this *Business Review* (January/February 1986), and the symposium on “Real Business Cycles,” *Journal of Economic Perspectives* (Summer 1989).

IF POTENTIAL GNP IS VARIABLE, POLICYMAKERS MAY HAVE TO DO SOME RETHINKING

If the RBC theory could explain all of the fluctuations in the economy, then monetary policy would be straightforward. Monetary policy is thought to be a factor that influences only aggregate demand. Hence, monetary policy has no impact on output in the RBC view; it affects only prices. Thus, policymakers need only worry about inflation.

But policymaking is more difficult if only part of the RBC model is correct: potential GNP shifts erratically, but, contrary to the RBC theory, monetary policy can affect the gap between actual GNP and potential GNP. Thus, a monetary policy that smooths actual GNP fluctuations could have some undesirable repercussions if the sources of the fluctuations are shifts in potential GNP. Two examples follow:

- A sudden decline in productivity reduces both actual and potential GNP. If the Fed does not respond, actual GNP falls toward its new, lower potential path. But if the Fed misinterprets the decline in actual GNP and engages in expansionary monetary policy, it would drive output above its potential level, creating additional inflationary pressures (Figure 3).
- A technological advance makes potential GNP grow faster than is generally recognized. If the Fed does nothing,

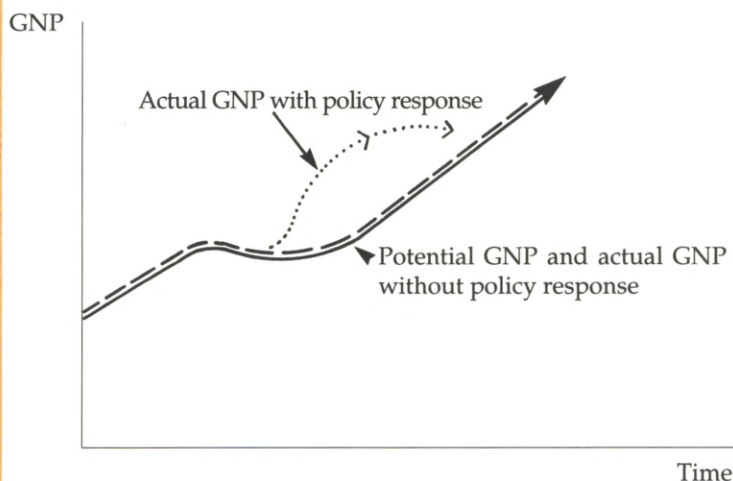
real GNP rises to its new, higher potential. But if the Fed runs a tighter monetary policy, it pushes actual output below potential and creates unnecessary losses in production and employment.

In both of these examples, the policy response to the movement in actual GNP widened the gaps because potential GNP had shifted. But policymakers did not recognize this shift.

IDENTIFYING SHIFTS IN POTENTIAL GNP IS DIFFICULT

Because recognizing shifts in potential GNP is important to setting appropriate policy, economists have recently attempted to estimate the variation in actual GNP growth that is due to shifts in the growth of potential GNP. The major problem these studies face is that potential GNP is not directly observable. Consequently, identifying movements in potential GNP involves making some assumptions about its behavior. The real business cycle assump-

FIGURE 3
According to the New View, Monetary Policy Could Inadvertently Open Gaps



tion that all movements in real GNP are due to movements in potential GNP is one possibility. But recent studies have made a variety of less extreme assumptions to identify changes in potential GNP. Interestingly, all of the recent estimates of the variation in real GNP that can be attributed to shifts in potential GNP are greater than the traditional estimates.

The Traditional Method. The traditional approach to estimating potential GNP is to assume that growth in potential GNP is a constant number—for example, the commonly used assumption of 2.5 percent per year. A slightly more sophisticated version of the constant-time-trend assumption allows slight adjustments to the growth rate on a few occasions. An example of the traditional assumption is the Federal Reserve Board's measure of potential GNP, which increases smoothly over time, albeit at a slightly diminishing growth rate.³

Using Long-Term Information. A newer method associates changes in potential with long-run GNP fluctuations. This association seems reasonable because the potential level of GNP is determined by the supply of productive resources, and changes in these resources are likely to be persistent. In studies by Olivier Blanchard and Danny Quah, Matthew Shapiro and Mark Watson, and John Judd and Bharat Trehan, a key assumption is that demand disturbances can influence the economy's level of output only for a short time.⁴ Thus, any long-term fluctuations in GNP are associated with supply shifts. Because aggregate supply shifts

could also be behind some of the transitory movements in GNP, this approach places a lower bound on the variation in actual GNP that is due to potential GNP movements.

A similar approach to estimating potential GNP that focuses on long-term movements in GNP is to assume that permanent shifts common to several macroeconomic variables must be caused by the same permanent supply shocks. By estimating the correlations between the long-term movements in GNP, consumption, and investment expenditures, researchers Robert King, Charles Plosser, James Stock, and Mark Watson have been able to isolate permanent movements in GNP.⁵

Using Exogenous Information. A different method that has been used recently is to link shifts in potential GNP to a set of exogenous variables. This approach is used by John Boschen and Leonard Mills, who isolate fluctuations in GNP explained by a set of observable variables thought to determine potential output. This set included population growth, oil price shocks, and marginal tax rates.⁶

Edward Denison has studied a more comprehensive set of variables in attempting to explain long-term economic growth.⁷ This list includes many exogenous forces that may cause

³This potential GNP series is from Jeffrey J. Hallman, Richard D. Porter, and David H. Small, "M2 Per Unit of Potential GNP as an Anchor for the Price Level," Staff Study 157, Board of Governors of the Federal Reserve System (April 1989). For the methodology underlying these estimates, see Peter K. Clark, "Okun's Law and Potential GNP," Board of Governors of the Federal Reserve System (October 1982).

⁴Olivier Blanchard and Danny Quah, "The Dynamic Effects of Aggregate Demand and Supply Disturbances,"

American Economic Review (September 1989); Matthew D. Shapiro and Mark W. Watson, "Sources of Business Cycle Fluctuations," *NBER Macroeconomics Annual* 1988; and John P. Judd and Bharat Trehan, "Unemployment-Rate Dynamics: Aggregate-Demand and -Supply Interactions," *Federal Reserve Bank of San Francisco Economic Review* (Fall 1989).

⁵Robert King, Charles Plosser, James Stock, and Mark Watson, "Stochastic Trends and Economic Fluctuations," Working Paper from the Rochester Center for Economic Research (November 1989).

⁶John Boschen and Leonard Mills, "Tests of the Relation Between Money and Output in the Real Business Cycle Model," *Journal of Monetary Economics* (November 1988).

⁷Edward F. Denison, *Trends in American Economic Growth, 1929-1982* (Washington, D.C.: The Brookings Institution, 1985).

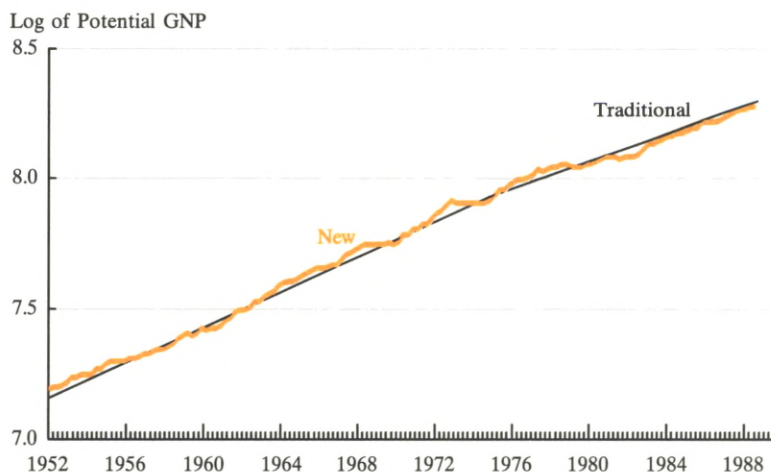
changes in capital, labor, and the productivity of these inputs. Denison's measure of potential GNP is measured annually. A quarterly approximation can be constructed by measuring movements in labor supply and worker productivity.⁸ The variability in this measure of potential GNP is representative of the variability in the other, newer estimates, but contrasts sharply with the traditional view of the relatively stable path for potential GNP (Figure 4).

Shifting Potential GNP Helps Explain

Actual GNP Growth. The traditional measure of potential GNP assigns only about 1 percent of the variation in actual GNP growth to fluctuations in potential GNP (see *Percentage of Variance in Quarterly Real GNP Growth...*). In contrast, all of the more recent estimates of potential GNP indicate that shifts in potential GNP explain a large part of the movements in actual GNP. The recent estimates range from a low of 27 percent to a high of 72 percent. The high estimate is from the Shapiro and Watson study, which differs from the others mainly in that it attributes a large amount of quarterly GNP movements to labor supply fluctuations

⁸This measure of potential GNP is the log of population over age 20 plus the log of labor productivity in the nonfarm business sector. The difference between this series and the log of actual real GNP is stationary around a linear trend over the period 1952:Q1 to 1988:Q4. The linear trend was included in the measure of potential GNP used in the figures.

FIGURE 4
New Measures of Potential GNP Are More Variable than Traditional Measures



(roughly 46 percent of the total variation). In contrast, Judd and Trehan attribute about 2 percent of quarterly GNP movement to labor supply, and Boschen and Mills attribute 5 percent to this variable. Overall, the consensus from this recent research is that, although the majority of the variation in quarterly GNP growth is from transitory components, a substantial portion is due to the more long-lasting shifts in potential GNP.

Because the newer estimates of potential explain a larger percentage of the variation in real GNP than the more traditional measures, the gaps between potential and actual GNP are smaller. Moreover, the gaps do not appear to last as long as in the traditional view (Figure 5, p. 10).

CONCLUSION

A new view of economic fluctuations has grown out of recent research that builds on the theory of real business cycles: growth in poten-

Percentage of Variance in Quarterly Real GNP Growth Due to Variability in the Growth of Potential

Method	Percent
<u>Traditional</u>	1
<u>Isolating Long-Run GNP Fluctuations</u>	
Blanchard and Quah	36
Judd and Trehan	36
King, Plosser, Stock, and Watson	54
Shapiro and Watson	72
<u>Examining Exogenous Variables</u>	
Boschen and Mills	27
Simple Growth	38

TECHNICAL NOTES: Each of the studies attempts to estimate the fraction of current-quarter real GNP growth that can be explained by changes in potential GNP. Many of the studies provide a range of estimates depending on different assumptions. The estimate reported for each study is the one corresponding to the set of assumptions that is most similar to the other studies.

Traditional: Ratio of the variance of growth in potential real GNP (from Hallman, Porter, and Small) to the variance of actual real GNP growth. Sample period is 1952:Q1 to 1988:Q4.

Blanchard and Quah: 1-quarter-ahead horizon, average of Tables 2A and 2C, pp. 666-67. The estimates in these tables allow for the stochastic trend in real GNP that is consistent with the other recent studies.

Judd and Trehan: Exhibit 1B, p. 28.

King, Plosser, Stock, and Watson: 1-quarter-ahead horizon, Table 6.

Shapiro and Watson: 1-quarter-ahead horizon, Table 2, p. 128

Boschen and Mills: Average of the combined effects of oil, population growth, and tax rate shocks, Table 3, p. 367.

Simple Growth: One minus the ratio of the variance in growth in the series (actual GNP - linear trend - population over age 20 - labor productivity in the nonfarm, business sector) to the variance in actual real GNP growth. All series are logged. See Footnote 8.

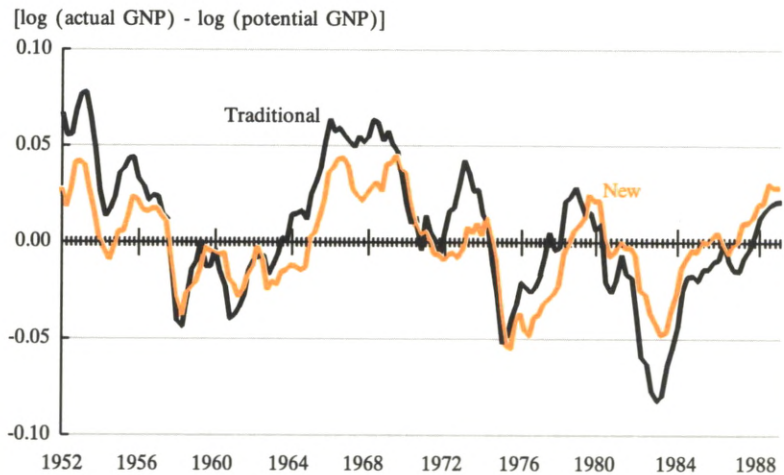
tial GNP is highly variable and causes the fluctuations we see in actual GNP. While many economists feel that the real business cycle view is extreme, it has reminded economists that there are many possible sources of fluctuations in real GNP, including shifts in potential

GNP. And although the estimates differ slightly, recent evidence suggests that actual GNP movements that are due to variation in potential GNP are surprisingly large.

This idea that potential GNP is variable questions the traditional rationale for GNP

stabilization policies that assume steady growth in potential output. If potential GNP is highly variable, policymakers should be aware that attempts to smooth changes in actual GNP growth could widen, rather than close, the gap between actual and potential output if changes in potential GNP are not recognized. Moreover, such lack of recognition would thwart the goal of price stability. Policymakers can lessen the likelihood of this error by gathering as much information as possible about the sources and duration of the observed fluctuations in real GNP.

FIGURE 5
New Measures of the "Gap" Are Smaller than Traditional Measures



The U.S. Auto Industry in the 1990s

*David Wong**

U.S. auto sales ended the 1980s on a dull note. Sales of passenger cars and light trucks slackened in early 1989 before tumbling in the fourth quarter. At 14.6 million units, U.S. auto sales for 1989 were the slowest since 1984 and almost 1 million units off the 1985-88 average. And while it appears that sales have bottomed out, sales in the first half of 1990 remained

below year-earlier levels.¹

Even as the market was shrinking last year, the Big Three domestic automakers—General Motors, Ford, and Chrysler—continued to lose market share to foreign competitors. The Big Three domestics' share of the U.S. passenger car market fell 1.7 percentage points in 1989, to

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¹Unless otherwise noted, auto sales in this article refer to sales of passenger cars and light trucks. Light trucks, which include pickups, passenger vans, jeeps, and other utility vehicles, gained popularity among households during the 1980s and now account for almost one-third of auto sales.

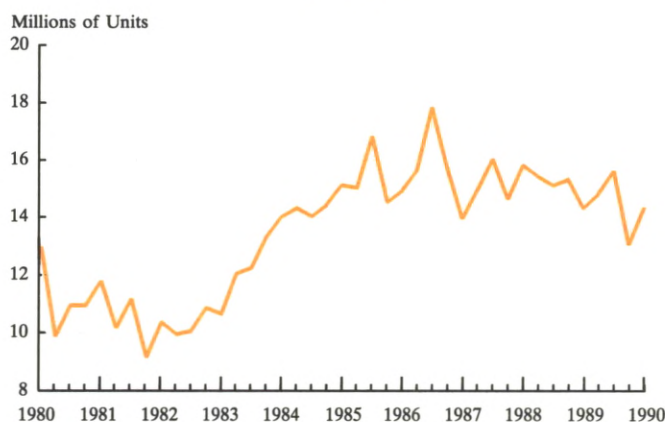
63.8 percent.² As each percentage point of the market represents about \$1.5 billion in sales, such a decline is notable, especially since the Big Three had a commanding 80 percent of the U.S. car market only a little over a decade ago.

These developments have raised concerns about the U.S. auto industry and what its recent weakness will mean for the economy during the new decade. The stakes are high because the auto industry remains an important source of jobs and economic output. The auto industry accounts for over 2.5 percent of GNP, employing 850,000 people, or 4.5 percent of all manufacturing workers.

Clearly, weakness in the auto sector can have repercussions throughout the economy. Indeed, the weakness in the auto industry set the stage for the current slow-down in overall economic growth that

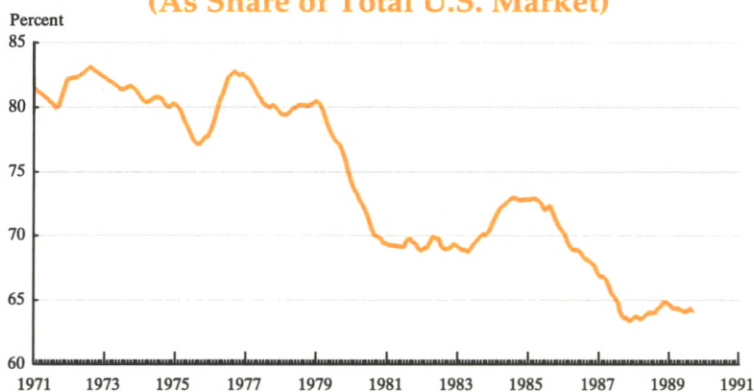
became evident in the second half of 1989. For all of 1989, output of motor vehicles and parts fell 12 percent while auto employment declined 50,000. These declines contributed to

FIGURE 1
Retail Sales of Cars and Light Trucks
(SAAR)



SOURCE: DRI

FIGURE 2
Big-Three Car Sales
(As Share of Total U.S. Market)



Note: 12-Month moving average
Excludes imports bearing Big Three nameplates.

²These figures include only domestically produced Big Three vehicles. Including the "captive imports"—imported vehicles that bear Big Three nameplates—would raise the Big Three's market share to 67.2 percent in 1989.

last year's sluggish growth of overall industrial production and the decline in manufacturing employment.

Of course, this is not to say that the weakness in autos has singlehandedly slowed growth in the overall economy; the direction of influence also runs the other way, as slow overall economic growth and slow auto sales clearly feed on one another. Nonetheless, it remains clear that the auto sector's woes have contributed to slower growth overall. Will the current weakness in the auto industry persist? And will the woes of the Big Three hurt U.S. manufacturing output and employment in the new decade?

SALES WILL REMAIN WEAK IN THE SHORT RUN

In thinking about the auto industry's current sales slump and its prospects for recovery, it helps to distinguish between short-term (cyclical) and long-term (trend) factors. Much of the current weakness in auto sales is due to a confluence of short-term factors that are not expected to persist beyond another year or two.

To begin with, recent auto sales appeared particularly weak because they followed a four-year period of brisk sales fueled by strong growth in income. These years of strong sales were partly a rebound from the very weak auto sales of the early 1980s, when the economy suffered back-to-back recessions.

Even after the economy had rebounded smartly from the last recession, GNP growth continued at a robust 3.6 percent annual rate during the 1985-88 period. This growth is high compared with average growth of 2.7 percent over the 20 years 1969 to 1988, and it helped stimulate auto sales. In 1989, however, GNP growth slowed to 2.6 percent, and most private forecasters expect it to decelerate even further in 1990 to about 2.0 percent, then rebound in 1991 to near 2.5 percent.³ Although growth in real disposable income remained quite strong

in 1989, it too is slowing as GNP growth slows. The slower growth for the overall economy is one reason why auto sales and production have weakened relative to the 1985-88 period.

A second factor fueling auto sales since the 1981-82 recession was the expanded use of debt financing in automobile purchases as lenders offered longer loan maturities with smaller down payments. The average repayment period on new-car loans underwritten by auto finance companies was stretched out to 56.2 months in 1988, up from 45.9 months in 1983. Over the same period, the average down payment on a car loan offered by these lenders fell to only 6 percent, from 15 percent.

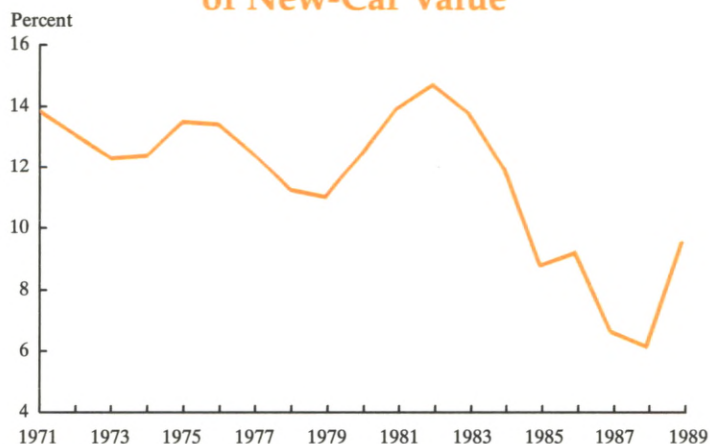
To a certain extent, the trend toward lower down payments and extended loan maturities witnessed during much of the 1980s may be warranted because quality improvements have extended vehicle longevity.⁴ In addition, relatively high real interest rates prevailed during much of this period, leading borrowers to opt for longer loan-repayment periods to keep their monthly installments down.

The increased use of financing bolstered auto sales during much of the 1980s. But clearly this source of strength in sales could not be sustained indefinitely, as there are obvious limits to the size of the down payment and the length of the loan-repayment period. In fact, there is evidence that the trend toward easier credit requirements was carried too far and

³The GNP growth rates are measured fourth quarter over fourth quarter. Unless otherwise noted, all the projections cited in this article are taken from two market forecasting firms: DRI/McGraw Hill (DRI) and Laurence H. Meyer & Associates (LHM&A).

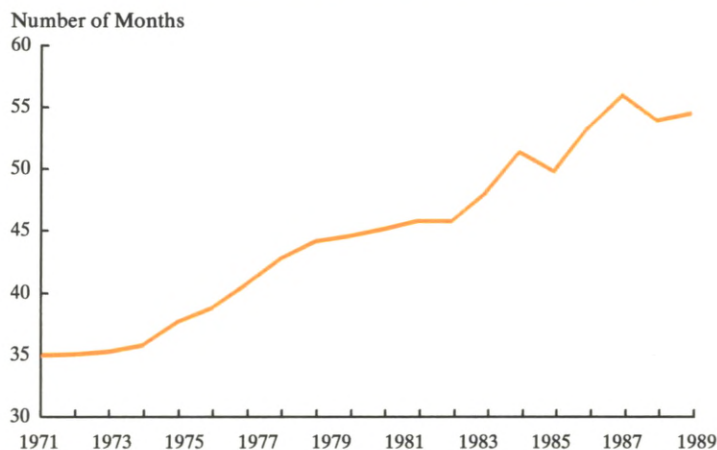
⁴Evidence on the improved longevity of cars includes the trend of an advancing car age. Between 1974 and 1988, the average age of cars increased steadily to 7.6 years, up from 5.7 years. At the same time, the proportion of the total stock of cars that is very old—over 10 years—increased dramatically to 30 percent in 1988, up from only 15 percent in 1975.

FIGURE 3
Amount of Down Payment as a Percentage of New-Car Value



SOURCE: Federal Reserve Bulletin; G19

FIGURE 4
Average Maturity on New-Car Loan



SOURCE: Federal Reserve Bulletin; G19

ership. Negative equity results when protracted amortization allows the value of the collateral—in this case, the car—to fall below the outstanding balance of the loan. A person with negative equity in his car faces increased temptation to default. While going into default would cause the person to lose his car—not to mention his credit standing—he could still come out ahead because he also would have rid himself of the loan, which has a higher value than the car.

Negative equity can be detrimental to auto sales for two related reasons. First, heightened awareness that negative equity is an invitation to default has led lenders to begin tightening up loan requirements, reversing a previous stimulus to sales. In fact, in 1989, the average down payment increased while average loan maturity fell—a reversal of the previous trend.⁵ Second, a per-

subsequently had to be checked, reversing a previous source of growth in auto sales.

This point is underscored by the increased incidence of negative equity in automobile own-

⁵In 1989, the average repayment period on new-car loans dipped to 54.2 months while the average down payment increased to 9 percent, a reversal of the 1980s' trend of increased debt use.

son with negative equity in his present vehicle would find buying a new one less affordable. The reason is that, with negative equity, the cash that the person can obtain by trading in his car will not be sufficient to pay off the existing loan. Thus, after selling his car, the person still must come up with extra cash to retire his existing loan—in addition to making the down payment on the new car.

SALES WILL GROW MODERATELY IN THE LONG RUN

A combination of short-term factors has resulted in a period of slower auto sales that began in 1989. Once these cyclical factors have run their course, however, sales should improve.

Farther out, the long-term factors that will prove critical to auto sales are demographics and income growth. Two opposing demographic factors will be at work during the 1990s. Slower growth in the driving-age population (the population 16 and above) and in income will restrain growth in sales, but a larger proportion of the population will be in their prime car-buying years. The net effect is that sales will continue to grow during the new decade, but at a moderate pace.

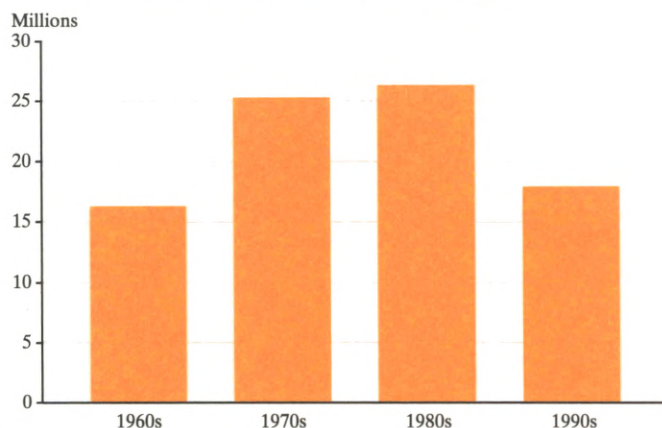
The driving-age population grew rapidly during the late 1960s and in the 1970s as the sizable baby-boom generation entered adulthood. The growth rate of the driving-age population started to slow during the 1980s, as the baby-bust generation succeeded the baby-boom

generation. The growth rate of the driving-age population averaged only 1.1 percent annually during the 1980s, compared to 1.9 percent during the late 1960s and the 1970s. For the 1990s, the driving-age population is projected to grow at an even slower rate, 0.8 percent.

Naturally, slower growth in the driving-age population portends slower growth in the demand for autos. In addition, because the driving-age population and the working-age population overlap substantially, the same demographic shift also implies that the working-age population will be growing slowly as well. The slower growth of the work force also points to slower growth in output and income. Several private forecasters project that real GNP will grow at an annual rate of about 2.2 percent during the 1990s, while real disposable income will grow 1.8 percent, down from the 1980s' growth rates of 2.6 percent and 2.8 percent, respectively.

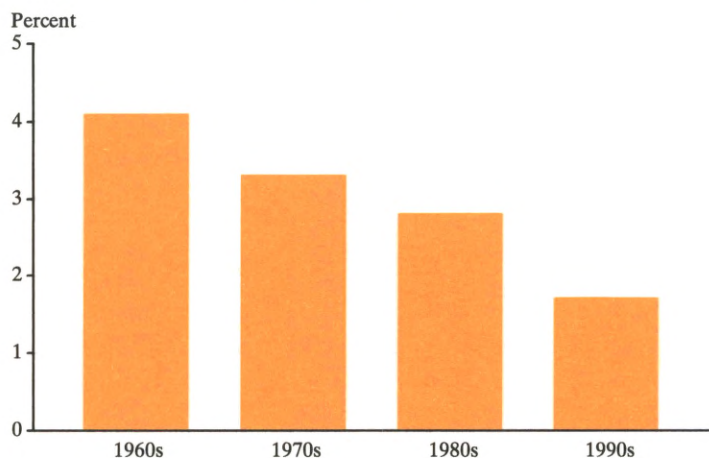
Although slower growth rates of the driving-age population and real disposable income will mean a period of sluggish growth in auto

FIGURE 5
Growth in Driving-Age Population
(Decade-Over-Decade Change)



NOTE: Data for the years 1988 to 2000 are population projections by the Bureau of the Census.

FIGURE 6
Growth of Real Disposable Income



SOURCE: DRI

sales, the maturing of the population could partially mitigate this effect. Over the next 20 years, the same baby-boom generation that led the rapid growth of the driving-age population in the late 1960s and the 1970s will be entering the 45-to-64 age group, a point at which earnings and expenditures on consumer durables, such as automobiles, typically reach their peaks. In principle, this shift in the age composition of the population should spur auto sales. However, the effect will not be large. A back-of-the-envelope calculation suggests that it should increase auto sales only by about one-half of 1 percent by the end of the decade compared to otherwise.⁶ On net, therefore, demographic

⁶To get an idea of the effects of the shift in the age composition on auto sales through the year 2000, we conduct the following exercise. Taking the auto sales figures for some base year, say 1988, we ask what sales would have looked like in that year if it had had the population composition projected for the year 2000. The difference between the

trends portend a period of moderate growth in auto sales during the 1990s.

Besides demographics and income growth, other long-term factors also suggest that the 1990s will be a period of slow growth in auto sales. In sharp contrast to the 1970s, oil prices remained generally stable and even declined during much of the 1980s, which contributed to auto sales. For the 1990s, industry analysts generally agree that rising demand for oil, especially

in the newly industrializing countries, will lead to higher gas prices and dampen auto sales. Moreover, oil prices are sensitive to geopolitical factors, and any large upward shock to oil prices is sure to depress auto sales.

Barring major shocks to the economy, such as oil price hikes or severe economic downturns, annual auto sales during the 1990s are

actual and projected 1988 sales reflects the effects of the shift in the age composition of the population. It should be noted that the result thus obtained is not sensitive to the choice of the base year.

To carry out this exercise, we need to know the propensities of the various age groups to purchase automobiles. These propensities can be calculated from the size of each age group and from the number of cars they bought in the base year. The number of cars each age group bought in the base year can be calculated from data from the *Newsweek Survey of New Car Buyers*, while the size of each age group is taken from the Census Bureau. This exercise suggests that the shift in the age composition of the population alone should add about one-half of 1 percentage point to total auto sales in the 1990s.

projected to average about 15.4 million units,⁷ only modestly higher than the annual average of 15.1 million units for the years 1984 to 1989.⁸

THE BIG THREE COULD SEE FURTHER MARKET EROSION

At the same time that U.S. auto sales are growing only moderately, foreign automakers, in particular the Japanese, are continuing to make inroads at the expense of the Big Three. The Japanese automakers began to make a serious dent in the U.S. market in the 1970s, and this trend accelerated in the 1980s. The factors behind this development are complex, but the quality of Japanese cars—whether real or perceived—has been one of the keys. The Japanese are making an even stronger commitment to the U.S. market by expanding production facilities—popularly known as “transplants”—here in the United States.

The transplants are a recent—and mostly Japanese—development, but they have experienced phenomenal growth. In 1983, trans-

plants accounted for less than 1 percent of U.S. passenger car sales. In 1989, their share had increased to almost 8 percent. Likewise, transplant capacity has grown from negligible in the early 1980s to about 2.2 million vehicles in 1989.

There are two reasons why Japanese automakers are increasingly producing in the United States: import restrictions and production costs. Foreign automakers can use transplants to get around present and future barriers to exporting autos to the United States. Such barriers have been an important factor for the Japanese since their auto exports to the U.S. are capped by quotas set under the Voluntary Export Restraints Agreement, while sales of Japanese transplant products in the U.S. do not fall under such restrictions. In both 1988 and 1989, the quotas were set at 2.3 million vehicles; but helped by their U.S. production, car sales of Japanese automakers exceeded this number in both years.

A second reason why the Japanese are increasingly producing in the U.S. is that production cost differentials between the two economies have narrowed. One industry analyst has estimated that as of late 1989 an auto can be built at a transplant for \$200 less than one built in Japan and delivered in the United States.⁹

The attractiveness of producing in the U.S. has led a host of Japanese automakers to build or expand transplant capacity here. As a result, the projected increase in transplant capacity that will be coming on line over the next few years far exceeds the projected sales growth for the industry as a whole. Transplant capacity in North America is projected to increase from 2.2 million in 1989 and 3.1 million in 1993 to over 3.7 million by the year 2000.¹⁰

⁹According to *Automotive News*, November 29, 1989.

¹⁰The projections for transplant capacity were provided by Chrysler corporate economist Van Bussmann, whose help is gratefully acknowledged.

⁷DRI projects average annual sales of 15.35 million cars and light trucks over 1990-2000. We adjust this figure upward for the shift in the age composition of the population. Using 0.5 percent as the adjustment factor (which would be on the high end) results in a sales projection of 15.43 million units.

⁸The projected sales for the 1990s look more favorable if we compare them to the entire decade of the 1980s, when sales averaged a much lower 13.5 million units. However, the early 1980s were a period when auto sales were extremely sluggish because of a series of severe shocks to the economy that included the 1979 oil price hike, a recession in 1980, and the plunge in economic activity in 1981-82. As a result, the auto industry was battered during the early 1980s and did not begin to recover until well into 1983. Since our projection for auto sales during the 1990s does not take into account any unforeseen economic disturbances, it compares favorably with the 1980s as a whole. But compared with 1984-89, auto sales during the 1990s will average only 2 percent higher. By contrast, sales during the 1970s averaged over 11 percent higher than in the 1960s, and, despite the severe downturns, sales during the 1980s were still over 6 percent higher than in the 1970s. In any case, the message remains that auto sales for the 1990s will be only moderately higher than levels seen in recent years.

Clearly, by expanding transplant capacity more rapidly than the projected growth in overall demand, the Japanese automakers are raising the stakes in their bid to wrestle market share from the Big Three. For their part, the Big Three are not likely to concede market share easily. Thus, the expansion in new production capacity is setting the stage for a fight for market shares that could set in motion a process of attrition among the older, less efficient production facilities. As a whole, industry analysts agree that the transplants have the upper hand in this contest because they tend to be more cost-effective facilities. For example, compared to Big Three labor, transplant workers are relatively new hires with lower beginning wages, and the transplants tend to be newer production facilities tailored for modern production techniques.

In addition to the increased presence of transplants, other industry trends also pose a challenge to the Big Three. Specifically, many of the demographic groups that are key to the contest for market shares in the 1990s favor Japanese automakers. The result could be continued Japanese penetration of the U.S. automobile market.

Compared to buyers of Detroit makes, buyers of Japanese cars tend to be younger, better educated, and in professional or managerial jobs. A 1988 survey revealed that buyers of Japanese makes have a median age of only 34, compared to 44 for the Big Three customers.¹¹ In fact, fully 76 percent of buyers of Japanese makes are 44 years of age or under, compared to only 52 percent for buyers of domestics. Thus, relative to older car buyers, today's younger car buyers have a preference for Japanese makes over Detroit's models. This fact threatens the Big Three because brand loyalty is widely believed to be established early.

One may be tempted to argue that younger customers favor a Japanese car only because they have lower incomes and therefore tend to shop for smaller, economy models. When these car buyers grow older and have higher income, so the argument goes, they will "graduate" to purchasing large, luxurious Detroit models. While this argument may apply to certain car buyers, it cannot readily be generalized because, as a group, buyers of Japanese makes are not only younger but have a higher median income as well. Because income typically rises over much of the life cycle until retirement age nears, this implies that customers who have higher expected lifetime earnings have a relative preference for Japanese cars.

In fact, as the Japanese continue to broaden their offerings of larger, more luxurious vehicles, the young buyers today—those between the age of 25 to 44—could trade up to larger cars without buying from the Big Three. As noted above, this particular age group—the baby-boom generation—is sizable. Over the next 10 to 20 years, this group will be entering the prime car-buying years. Because this age group has been more receptive to Japanese imports than have older groups, it could increase import penetration of the U.S. market. Seen in this light, the Japanese automakers' recent entrance into the luxury market demonstrates excellent timing, as the demographic trends strongly favor the growth of this market segment during the 1990s.

In the contest for U.S. market shares during the new decade, the Japanese have already captured a sizable share of the U.S. market even without establishing a strong presence in several important market segments, such as luxury cars, light trucks, and passenger vans. As already noted, Japanese production of luxury cars is still in its infancy. Sales of light trucks and passenger vans were a key growth area in the U.S. auto market during the 1980s and should continue to be an important market segment in the 1990s. Currently, the U.S. imposes

¹¹The survey results cited here are from the *Newsweek* Survey of New Car Buyers.

DOMESTICS, IMPORTS, TRANSPLANTS, AND CAPTIVE IMPORTS

Not long ago, it was easy to tell the difference between a domestic vehicle and an import. Toyotas were imported while Chevrolets were American as apple pie. With the proliferation of transplants, captive imports, and joint ventures between the Big Three and foreign manufacturers in U.S. auto manufacturing, the distinctions between domestics and imports—and American and foreign—are becoming increasingly obsolete. Is the Honda Accord an import or a domestic? How about the Dodge Colt? Or the Geo Prizm? Or the Nissan Maxima? Or the Ford LTD, for that matter?

Yes, the Ford LTD is still a Big Three domestic. And the Nissan Maxima remains a Japanese import. As for the other cars mentioned, there are no hard and fast rules as to how they should be categorized. The Honda Accord is built in both Japan and the U.S.: the U.S. version is a transplant, while the Japanese version is an import. The Geo Prizm is built in the U.S. and marketed by GM's Chevrolet Division, and it should properly be classified as a domestic. The Prizm is sometimes referred to as a transplant, however, because it is a product of the New United Motor Manufacturing Corporation (NUMMI), a joint venture between GM and Toyota, operating under Japanese management. In fact, the Geo Prizm is built at the same plant as the Toyota Corolla, although Toyota also imports Corollas from Japan. The Dodge Colt, which is built by Mitsubishi in Japan, is a captive import: an imported car that bears a Big Three nameplate. Another captive import is the Ford Festiva, which is built in South Korea by Kia Motor Corporation.

Currently, foreign automakers operate seven assembly plants in the U.S., three of which are joint ventures with the Big Three. In addition to the GM-Toyota joint venture, Ford-Mazda and Chrysler-Mitsubishi also have joint-venture facilities. In addition, Honda, Nissan, Toyota, and Fuji-Isuzu all have individual manufacturing facilities in the United States.

production is projected to increase much faster than the projected increase for transplant passenger car production—from 200,000 units in 1989 and 575,000 units in 1993 to 825,000 units by 2000.¹² At the same time, the Japanese are also gradually establishing a presence in passenger vans.

TRANSPLANTS COULD BOOST DOMESTIC MANUFACTURING

The outcome of the market-share contest between the Big Three and the transplants remains to be seen, but without question the battle will be fierce. The Big Three may well be able to recapture lost market share, or they could lose further ground. What seems certain is that heightened competition will translate into good deals for the car shopper.

Even if the Big Three should continue to lose market shares, this does not necessarily imply that U.S. auto production and employment will erode, as transplants will continue to add to domestic output. In fact, even when the market share of Big Three domestics was decreasing in 1988 and 1989, the share of imports was also falling because imports were partly supplanted by transplant output. Imports' share of the U.S. car market is expected to either hold steady or decline slightly during the 1990s, as Japanese automakers turn increasingly

a 25 percent tariff on imports of two-door trucks. Thus, light trucks appear a logical candidate for transplant production in the coming years. In fact, transplant capacity for truck

to supplying the U.S. market with transplant

¹²See Footnote 10 for data sources.

production.¹³

Currently, transplant products have lower domestic content, so a transplant product typically involves less domestic value-added compared to a Big Three domestic product. However, the transplants have increasingly sourced from U.S. producers for supplies. For example, both Toyota and Honda have announced plans to increase the domestic content of their transplant vehicles to 75 percent by 1991, up from between 50 to 60 percent in 1988.¹⁴ This trend is consistent with continued Japanese expansion into fully integrated production facilities in the United States. In fact, the Japanese automakers have already expanded their U.S. operations beyond auto assemblies into building engines and opening design studios and engineering-and-research facilities.¹⁵

So while industry analysts generally agree

that the transplants will continue to make inroads in the coming years at the expense of the older plants, this will not be as damaging to U.S. auto employment and production as it may first appear. Experience has shown, however, that the transition to increased transplant production could create painful adjustment problems.

The majority of the transplants are located in the rural Midwest and the mid-South, distant from the traditional stronghold of U.S. auto manufacturing. As a result, the dislocations at the local level resulting from layoffs and shutdowns at the older plants have not been eased by the transplants. A complete assessment of the impact of U.S. auto industry restructuring must take these costs into account.

CONCLUSION

The recent slump in U.S. auto sales is primarily a cyclical phenomenon resulting from a combination of slower economic growth, more restrictive terms of auto loans, and the payback to a sustained boom period in sales. Once these short-term factors have played themselves out, auto sales should rebound. However, slower growth rates for population and income during the 1990s mean that growth in sales will remain moderate. At the same time, foreign automakers have been stepping up their manufacturing presence in the United States. The expansion of foreign transplants in the face of moderate overall growth in sales will mean heightened competition for the Big Three. But while Big Three sales and production may suffer during the decade, such decreases could be more than offset by increased transplant production. On net, while U.S. auto manufacturing may increasingly adopt a foreign flavor, in terms of aggregate output and employment the outlook is far from pessimistic.

¹³For example, DRI projects the import share to fall from almost 29 percent in 1989 to just over 25 percent by the mid-1990s and to below 25 percent by 2000. On the other hand, LHM&A projects import share to decrease only marginally by 2000. In either case, though, import share is not expected to rise.

¹⁴Honda, in particular, has stated that its goal is to make its U.S. operations self-reliant, able to design, engineer, and assemble cars in the United States.

¹⁵Among transplants, examples of increased integration of design and manufacturing facilities in the U.S. include the following: Honda already builds engines at its Ohio plant, with plans to eventually provide almost all of the engines for Honda's North American operations. Toyota also has facilities to build engines near its assembly plant in Kentucky. Besides assembly and engine plants, Japanese automakers are building design studios and research facilities. Nissan has an engineering center in Michigan, where a Toyota technical and research facility is also located. Several Japanese automakers have design studios and engineering facilities in Southern California. Honda's first station wagon will be a product of its integrated transplant operations, as it will be designed, made, and sold in the United States.

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