Components of Competitiveness

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There are various ways of looking at economic competitiveness. Some of the popular conceptions of America's relative position are clarified by examining the concept in terms of wage cost, productivity, profit margins, and exchange rates. A quantitative approach is laid out and examined in relation to similar measures for other countries. Also some relationships between competitiveness and the external deficit on current account for the United States are analyzed.

THERE IS SIMULTANEOUSLY GLOWING PRAISE AND RIDICULE of U.S. economic performance. Some things are highly praiseworthy. Many jobs have been created in recent years; the overall growth rate has been strong when measured on a world scale; the unemployment rate is relatively low and has been declining; inflation is under control; migrants from all over the world seek out the United States; and the system of higher education excels. These assets and accomplishments are real and could be recited at even greater length, but the gains have been won at a considerable cost. Economic life is like that; nothing comes without significant effort and cost.

The main costs that have been incurred in realizing these achievements are the existence of a very large trade and payments deficit; the existence of a large fiscal deficit; a change in national status from world creditor to world debtor (the largest); the existence of a troubled financial system; the occurrence of large-scale financial volatility (the stock market plunge of October 1987); the existence of significant poverty in the midst of plenty; and a deteriorating infrastructure. The list, like the first one, could also be considerably lengthened, but a key item has already been cited, at the top of the list, namely, the external deficit on international trade and payments accounts.

This deficit is highly undesirable, no mater how strongly some people might argue that it does not matter and that the good features continue to appear. Any thinking person knows that the external debt cannot be built up endlessly and that annual negative balances with the rest of the world in excess of $150 billion cannot continue indefinitely, without there being a "day of reckoning."

The issue of competitiveness is plainly illustrated by the existence of the external deficit and our lack of success in turning it from negative to zero or small positive values. In the first place, this deficit, as well as the internal federal deficit, is not normal. The long run normal position for these two balances in the U.S. economy is near zero (Table 1); only recently have they become so large, and it is this recent change in the situation that provides a warning that United States is not competitive. If this history were extended back to the turn of the century, we would find that the normal situation, with values near zero, prevailed, apart from involvement in two world wars.

The consequences of the enlarging imbalance are that export activities, with associated jobs, have been displaced. Total employment has not fallen; it has changed significantly. We have continued to be a high consumption–low savings society by drawing on imports from the rest of the world. At the same time, we have had to rely on the flow of capital financing from the rest of the world in order to cover our fiscal deficit because our domestic savings are not large. It can be seen that many things are interrelated—the external payments deficit, the internal fiscal deficit, high domestic consumption, low domestic saving, and the turbulence of the near financial panic of 19 October 1987, which indicated that the interconnected system of imbalances is not indefinitely sustainable.

As I shall point out, the foreign exchange value of the dollar is changing (depreciating) in order to bring the external accounts into

Table 1. Current account and federal budget deficit or surplus, 1955 to 1987 (in billions of dollars) (*6*).

Year	Current account	Deficit or surplus
1955	−.49	−2.70
1956	2.36	4.47
1957	4.74	1.18
1958	.77	−7.24
1959	−1.36	−7.86
1960	2.83	.25
1961	3.83	−3.47
1962	3.38	−7.23
1963	4.41	−4.76
1964	6.81	−5.92
1965	5.41	−1.60
1966	3.03	−3.79
1967	2.59	−8.70
1968	.59	−15.18
1969	.42	5.44
1970	2.32	−11.88
1971	−1.45	−24.80
1972	−5.78	−17.37
1973	7.07	−7.95
1974	1.92	−10.88
1975	18.13	−75.40
1976	4.17	−56.60
1977	−14.49	−51.05
1978	−15.49	−44.18
1979	−.95	−27.91
1980	1.84	−76.18*
1981	6.87	−78.74*
1982	−8.64	−125.69*
1983	−46.28	−202.53*
1984	−107.09	−178.26*
1985	−116.43	−212.11*
1986	−141.46	−212.60*
1987	−160.67	−156.00*

*Year ended 30 September (fiscal year).

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better balance, but other adjustments are taking place too. Some sectors of the economy are growing and absorbing workers from other sectors. The share of labor force in service-producing sectors is rising, and in goods-producing sectors is falling, particularly in manufacturing. This will be seen to have important consequences for productivity and well-being of the working population.

Not only in the United States, but over the entire industrial world, there is a shift from goods-producing to service-producing activities. In some cases, primary production (agriculture and extractive industries) are losing people while gains are being made in services. In the United States, however, manufacturing and other goods-producing activities are declining in importance in the labor market, but not in terms of production. Manufacturing's share of output has remained remarkably steady (*1*).

When it is asserted that the United States is a high consumption–low savings society, it is important to elaborate a bit on the concepts. At the personal (household) level this is strikingly so. The share of spendable income saved by the aggregate of households has fallen to only 3 or 4 percent; it has been between 8 and 10 percent. But total national domestic savings consists of business and government savings too. Government savings, by virtue of the large fiscal deficit position, makes only a large negative contribution, whereas business saving is quite large. If personal saving were much larger, it would not be necessary to rely so heavily on the inflow of foreign financial capital because domestic households could compensate for federal dissaving. But as long as people want to live well, import a great deal, spend much, and save little, we have a national economic problem. This problem shows up in the form of competitiveness because American consumers want imported goods and services as a major part of their consumption. We have deteriorated in international competitiveness, and domestic goods are being "crowded out" by foreign goods. That is the essence of our large trade deficit.

A Four-Factor Analysis

In the final analysis, competitiveness is determined by relative prices, for given products, between country pairs. If the U.S. price is lower than those of Japan, Germany, the United Kingdom, France, Italy, Hong Kong, Taiwan, South Korea, and others, when measured in common currency units, then we are competitive. Relative price for a product or service of given quality fixes "the bottom line." That is straightforward enough. But in order to understand the price relatives and in order to recommend appropriate policies for reaching or maintaining competitiveness, it is useful to show how the price relatives are determined. For the U.S. price, a four-factor decomposition is useful; it is not unique (because there are other ways to decompose a total price), and some approximations may be involved, but this particular decomposition is useful: Unit cost (wage rate) × reciprocal of (labor) productivity × profit margin × enchange rate (L/\$) = price in local foreign currency, where L stands for "local" currency unit, to be compared with the U.S. dollar unit (\$).

Unit cost refers here to cost per unit of productive factor input. A productive factor is a composite of labor, capital, materials, and fuel. The most important productive factor in making up cost of U.S. goods production is labor. It is also the most available as a statistical series; therefore in much of what follows, the analysis will be in terms of wage rate. This is a sense in which the above relation is approximate. A composite productive factor's reward—not just the labor factor's reward—should be the first term in the expression, to be fully accurate. Nevertheless, the analysis can go far in terms of the labor factor alone.

The second term is the reciprocal of labor productivity. If the wage rate is quoted as wage per hour, then the corresponding productivity measure should be output per hour; otherwise we may have wage per person and output per person, as a poorer approximation. The product of wage rate and reciprocal of labor productivity provides a measure of unit labor cost, an important efficiency measure. As labor productivity rises we have an offset to wage cost; the reciprocal falls, and unit labor cost falls. To become competitive, a country should try to hold down its unit labor cost and may do so on two fronts, either through wage restraint or through productivity enhancement, or through a combination of both.

The profit margin is in the form of a percentage mark-up over cost, in this case unit labor cost. The more profit restraint that we find, the lower will be price; conversely, high profit margins can contribute to lack of competitiveness.

Finally, the exchange rate converts costs (with mark-up) from a domestic price quotation in dollars (\$) to a foreign price quotation in local currency (L). As the dollar depreciates, this factor falls and contributes to a lower price to foreign buyers. Many countries have tried to cover up lack of cost effectiveness by depreciating their currency in order to become more competitive. In a sense, the exchange rate, where it can be controlled or manipulated, becomes a "crutch" whereby a country tries to gain in competitiveness. Much of the world criticism of the United States at the present time is that we are relying too heavily on dollar depreciation to become more competitive and should actually be paying more attention to technological factors such as productivity or reward factors such as wage rate and profit margin.

Also, we frequently cite foreign manipulation of profit margins toward the low side as attempts to thwart the effects of dollar depreciation, enabling foreigners to keep their prices in the U.S. market from rising as much as dollar depreciation (local currency appreciation) would, by itself, dictate.

The four-factor decomposition of competitiveness is, of course, an analytical simplification that can be quantified. Behind these factors lie many important social and institutional forces that have much to do with competitiveness. Dedication to the buildup of a country's export position, as exemplified by MITI and JETRO for Japan, education of a population toward a strong work ethic, parsimonious living, and strong technological education are among the background factors that make an economy competitive. These factors influence productivity, wages, and profit margins. In this article, I focus primarily on the objective factors that are directly measurable.

These are the four-factor elements of competitiveness. Let us now turn to their measurement to see how U.S. competitiveness is working out in practice.

America's Relative Position

It is difficult to obtain reliable estimates of export prices for many countries and, in particular, estimates for the United States are not among the best in the world. A poor substitute is the statistical series on unit values. A unit value is obtained as the ratio of the current price expenditures to a physical measure, such as tonnage. They seem to tell a reasonable statistical story even though their theoretical soundness in terms of index-number construction is dubious. In Table 2, unit values of U.S. exports (on a 1980 base) are listed side-by-side with the average of those of all industrial countries (including the United States) since 1960. Both indexes are denominated in U.S. dollars; thus, the exchange conversion in this four-factor array is taken care of. It is evident that the U.S. index, on a base of 100 in 1980, was consistently two to six points higher than the industrial country average during the 1960s. The spread became less competi-

tive for the United States as our current account balance deteriorated until the dollar fell significantly after 1977. We became more competitive at the "bottom line"; the external accounts turned to balance and then to surplus. During the 1980s, however, our competitiveness fell markedly, and the trade gap widened. The dollar started to fall at the beginning of 1985, and the ratio of our export prices to those of the industrial world as a whole decreased, but as is evident in Table 1, the current account deficit widened. The response has been much weaker than in the 1977 to 1978 period. Prices have indeed moved toward a better competitive position, and it is worthwhile analyzing why our trade figures have not responded very much.

In 1977–78 the current account moved from a comfortable surplus position to a significant deficit of $14 billion to $15 billion per year (Table 1). The dollar depreciated by almost 10% during a 24-month period, and the balance changed to almost zero in 1979 and to surplus by 1980. The response was reasonably quick and satisfying. That dollar depreciation was enough to restore balance. Now we are at a stage where the dollar has depreciated by more than 40% during a 3-year period, and the current account has not yet improved on an annual basis. It is possible that the monthly values have started to improve, but not by large enough amounts to bring us at all near balance in the immediate future.

Until the imposition of the oil embargo and the increase in energy prices in 1973–74, the United States had enjoyed a merchandise trade surplus as well as a current account surplus (including services or so-called invisibles trade), but after the unsettling effects of large energy import costs, the merchandise balance turned negative. It was fully compensated for by an invisibles (services) surplus. Ordinarily, when the dollar fell, overseas earnings of interest and profits would respond strongly in dollar units and contribute to current account surplus or balance. Again, in the present situation, overseas interest and profits are responding favorably, but the new element in the situation is that the United States is a net debtor nation; our interest payments to foreigners for debt service are very large. This means that we cannot rely on competitiveness in financial capital services, as before; this is one reason why dollar depreciation is less potent.

Table 2. Export unit values for the United States and the average for all industrial countries (100 in 1980) (*6*).

Year	Industrial	United States
1960	28.1	31.3
1961	28.2	31.8
1962	28.1	31.6
1963	28.5	31.6
1964	28.8	31.9
1965	29.3	32.9
1966	30.0	33.9
1967	30.2	34.6
1968	29.9	35.1
1969	30.9	36.2
1970	32.4	38.2
1971	34.2	39.4
1972	37.5	40.7
1973	45.3	47.4
1974	56.4	60.5
1975	62.8	67.6
1976	62.6	69.9
1977	67.7	72.4
1978	76.3	77.4
1979	88.1	88.1
1980	100.0	100.0
1981	96.2	109.2
1982	92.7	110.4
1983	89.8	111.6
1984	87.5	113.1
1985	87.2	112.2
1986	99.3	112.5
1987	100*	116*

*Estimated

It means that the United States must return to basics and strive for improvement and eventual balance on merchandise account. This would be a return to a traditional position for our trading sectors. It gives more meaning to our analysis of competitiveness in terms of improved economic efficiency. Critics, both inside and outside the United States, remark that the United States should not rely so heavily on dollar depreciation for improving its external position and regaining competitiveness. We should improve our efficiency and introduce some austerity on the side of import demand.

First, let us consider economic efficiency. That concept concerns unit costs and productivity, the first two of my four factors. As shown in Table 3, among 12 industrial countries, the United States had the second lowest percentage increase in manufacturing hourly compensation, at 3.3%, during 1986; the Netherlands was lower at 2.4%. In 1985, the United States ranked fourth among 12 countries, but was quite low at 5.3%. The United States has shown wage restraint lately. During the latter part of the 1970s, we were very low on a comparative scale but high in an absolute sense at 9.5% wage gains per year. During the 1960s we were also low. In the industrial world, the United States has not been particularly high in the matter of wage costs.

Our greater problem has been with manufacturing productivity. We grew fastest among the 12 industrial countries in 1986 (3.7 percent) and second fastest in 1985 (5.1 percent). Our performance during the 1970s was, however, dismal. During the period 1973 to 1979, the U.S. productivity growth rate in manufacturing was only 1.4%, the worst except for the United Kingdom. We were also low, at 3.2 percent, during the period 1960 to 1973. At present we are on a good recovery path, but before this recent change our performance has been extremely poor, both relatively and absolutely.

There are disputes among quantitative economists about the reasons for our productivity slowdown, but I attribute it to our handling of the energy problem. My interpretation is that we found ourselves to be wasteful users of energy at the time that the price rose by very large jumps in 1973 and 1974 and again in 1979 and 1980. We set about, as a nation, to become more energy efficient, and energy productivity did improve steadily after 1973. This coincided with the period during which labor productivity slowed. It took the United States about a decade to become energy efficient through conservation and technical change—insulation, control of automotive speed, improvement of miles per gallon in the fleet, lowering of heating thermostats, improving engines or motors, and generally watching consumption.

Many of the conservation activities relate directly to manufacturing and personal use of energy, but in our economy, energy is so widely used in many other sectors (nonmanufacturing and nonpersonal) that significant secondary effects are also involved at the national level. For example, the productivity of transportation of manufactured products, or of raw materials for manufacturing, was restrained by the speed limit. That is why the trucking industry objected strongly to the restrictions. Also, thermostat control and insulation were as effective in the workplace as in the home; therefore, the national attempt to become energy efficient affected productivity throughout the whole economy.

The contribution of energy efficiency to production changes, together with labor efficiency, can best be studied in production function analysis of the form $X = F(KLEM)e^{\rho t}$, where X is gross production, K is capital stock input, L is labor input, E is energy input, M is materials input, ρ is (neutral) total factor productivity change, and t is chronological time. In my opinion, other econo-

mists have often not approached the production function analysis carefully enough to disentangle the subtle interrelationships among the inputs and gross production, but calculations from census data on industrial establishments substantiate the general claim that national adjustment to the energy situation was significantly associated with the productivity decline (*2*). In a comparative production function study between the United States and Japan, Kumasaka found that labor productivity growth was reduced in both countries after the 1973–74 oil shock and again after the 1979–80 oil shock (*3*). For both countries, the adverse productivity affects were greater in the earlier than in the later period, but the "learning process worked more favorably for Japan than for the United States following the second oil shock.

If we combine the data on changes in manufacturing wage rates and productivity, we can obtain estimates of changes in unit labor costs. These figures can then be converted to changes measured in U.S. dollar units. The United States is then found to be the most efficient performer in 1986 and at about the middle of the industrial world in 1985. For the early 1980s, we ranked tenth among 12 industrial nations. In the 1970s, we were competitive as far as unit labor costs are concerned.

In Table 3, unit labor costs are presented both in terms of U.S. dollars ($) and in local currency units (*L*). The latter measure simply combines wage costs with productivity (reciprocal) but does not take exchange rates into account. In 1986, U.S. cost changes were low when measured in local, as well as in dollar, currency units. We ranked second to Japan in 1985, in local units, but compared much less favorably in dollar units. During the 1970s, when our productivity gains were relatively poor, we performed better, in a comparative sense, when high wage increases are factored into the unit labor cost measure of competing countries.

In a study of an earlier period, using general production functions for individual manufacturing industries in Japan and the United States, Tange found that estimates of cost competitiveness between the two countries provided good indicators of relative export performance (*4*). She found that technical progress (measured by total factor productivity change) was higher in individual Japanese industries than in the comparable U.S. industries. She also found that the estimated rate of technical progress was inversely correlated with percentage changes in average cost in each country. She found, further, that intercountry differences in manufacturing export growth between Japan and the United States were significantly and negatively correlated with intercountry differences in average cost change.

The data in Table 2 on export unit values show that American competitiveness declined during the 1970s, after the first oil shock, except when the dollar fell. But unit labor costs tell only part of the story because other costs—capital, material, and energy costs—are also significant and profit margins are also important. Separate data are not available on profit margins, but it is thought that many countries have been willing to reduce their markup factors by significant amounts during this recent period of dollar depreciation in order to retain their foothold in the American market. The prices of many import goods have not risen in the American market by the full amount of currency appreciation among supplying countries. Import prices rose by only 7.4 percent from 1986 to 1987, whereas the dollar was depreciating by about 40 percent.

Manufacturing does seem to be getting more efficient. Both the United States and the United Kingdom made serious efforts to streamline operations in high-cost and mature industries. These efforts appear to be generating gains in economic efficiency and competitiveness. Such gains are not as apparent in other sectors as in manufacturing. The overall economy gains in productivity are not as strong as those in manufacturing. In services, productivity is difficult to measure, but, in general, there is evidence that service sectors show much less productivity improvement (*5*).

Agriculture is a sector where the United States has been competitive. We generally ran large trade surpluses in agricultural products to help offset trade deficits elsewhere. For a while the agricultural trade balance went into deficit, partly as a result of world overproduction (relative to demand), partly as a result of protectionism abroad, and partly as a result of smaller deliveries to the Soviet Union and China. Meanwhile, other efficient producers captured some of our markets in grains and soybeans. It is a difficult process

Table 3. Annual percentage changes in wages, productivity and unit labor costs in manufacturing for 12 countries (*7*).

Period	United States	Canada	Japan	France	Germany	Italy	United Kingdom	Belgium	Denmark	Netherlands	Norway	Sweden
						Hourly compensation						
1960–1973	5.0	6.2	15.1	10.0	10.3	13.5	9.2	11.0	12.2	12.9	10.0	10.5
1973–1979	9.5	12.0	12.8	16.2	9.5	20.6	19.4	14.0	14.0	11.6	13.4	14.2
1979–1986	6.4	7.9	4.8	11.7	5.8	15.2	10.3	7.2	7.8	4.7	9.9	9.6
1985	5.3	5.0	4.9	8.1	6.0	10.4	6.6	6.9	6.4	5.1	8.7	12.0
1986	3.3	3.9	3.5	4.5	4.7	4.3	7.4	3.7	5.9	2.4	9.7	7.4
						Output per hour						
1960–1973	3.2	4.5	10.3	6.5	5.8	7.5	4.2	6.9	6.4	7.4	4.3	6.4
1973–1979	1.4	2.1	5.5	4.9	4.3	3.3	1.2	6.0	4.2	5.5	2.1	2.6
1979–1986	3.5	2.3	5.6	3.1	2.7	4.3	4.5	5.5	1.7	3.7	2.2	3.0
1985	5.1	2.5	7.3	3.1	4.1	1.5	3.8	3.0	−0.2	3.2	1.1	3.8
1986	3.7	−0.2	2.8	1.9	1.5	1.2	3.5	2.6	1.3	−0.3	−0.6	0.2
						Unit labor costs ($)						
1960–1973	1.8	1.3	6.6	4.1	8.0	6.1	3.7	5.8	6.6	7.7	7.2	5.3
1973–1979	8.0	6.9	10.8	11.5	11.6	10.0	15.2	12.7	11.9	11.7	13.4	11.5
1979–1986	2.8	3.0	3.0	1.1	0.6	1.6	0.2	−4.3	−0.4	−1.8	1.9	−1.1
1985	0.2	−2.9	−2.7	2.0	−1.5	0.1	−0.2	1.0	4.2	−1.6	2.1	3.7
1986	−0.4	2.4	42.6	32.9	39.8	31.9	17.4	34.3	36.8	39.2	28.2	29.3
						Unit labor costs (L)						
1960–1973	1.8	1.6	4.3	3.3	4.3	5.6	4.8	3.8	5.5	5.2	5.4	3.9
1973–1979	8.0	9.8	6.9	10.8	4.9	16.7	17.9	7.5	9.4	5.8	11.1	11.2
1979–1986	2.8	5.5	−0.8	8.4	3.0	10.4	5.6	1.6	5.9	1.0	7.6	6.4
1985	0.2	2.4	−2.3	4.8	−1.8	8.8	2.8	3.8	6.6	1.8	7.6	7.8
1986	−0.4	4.1	0.7	2.5	3.1	3.0	3.7	1.1	4.5	2.7	10.4	7.2

to win back the lost markets, but it is happening gradually, and the agricultural balance is again in surplus, although it is modest in size.

We must also look to the side of imports in order to explain the persistence of the trade deficit. Americans appear to have developed a high propensity to import. On average, imports of goods and services used to account for less than 5 percent of gross national expenditure. That was the situation in 1960. Last year they exceeded 10 percent of gross national expenditure. When the economy is prosperous and income is rising, imports tend to go up at a fast rate; this has led some economists to become discouraged at the slow progress with which the trade balance seems to improve when the exchange value of the dollar falls. They conclude that the only way to reduce the deficit by significant amounts is to go through a recession, in which reduced levels of income and gross national product will lead to markedly reduced imports. This is a counsel of despair, but it cannot be fully refuted at this stage of the present adjustment process.

Two other developments have made the realization of progress in import restraint difficult, namely a tendency of U.S. enterprises to "outsource," that is, obtain materials (raw, partially fabricated, and fully fabricated) abroad, where they are more cheaply available than at home; and a tendency to import oil on an increasingly large scale in the absence of a specific national energy policy. Low costs abroad make foreign sourcing attractive; the United States is simply not competitive in many lines of activity, especially when foreign wage standards are relatively low and when some foreign currencies are tied to the dollar in such a way as to keep foreign costs low when figured in U.S. currency units.

The newly industrialized economies of the Far East and also Latin America have kept their currencies closely linked to the dollar. In the case of the strongest economies (Taiwan and South Korea), pressure from the United States has forced them to allow their currencies to appreciate during the past year or more. When the currencies do appreciate, export volume to the United States tends to slow down.

In the case of oil imports, since many conservationist measures were relaxed (such as speed limits, tax benefits for energy conservation, and gas mileage standards for cars) at the same time that oil prices fell on world markets, we experienced a surge in oil imports. Attempts, therefore, to achieve national competitiveness in external trade have had some success on the export side but are confronted with adverse movements on the import side, and the main economic sign of lack of competitiveness (trade deficit) remains stubbornly large.

Policies for Improvement

What is to be done in order to make strong gains in competitiveness? The pure market-oriented approach would be to let the dollar depreciate more until it finds a low enough level that our exports would increase rapidly while our imports would be greatly reduced. There probably is such a level, but that could mean much more depreciation than we have already experienced. If there were some assurance or high level of confidence that we could reach this point in a dynamically stable way, this could be a viable policy, but it runs a severe risk. There is abundant evidence that a large additional drop in the dollar could trigger another crash on financial markets that could cause a serious panic, even more serious and dangerous than that of 19 October 1987. Market forces could make for higher interest rates if foreign capital shuns dollar investments. There would be a significant U.S. recession and a danger that it would spread worldwide. The recession solution is, in a formal sense, an option that would cut into imports to such an extent that our external accounts could be moved toward balance, but I would reject this approach.

The exchange value of the dollar can be allowed to decline, fairly close to the linear or semilog linear path that it has followed for 3 years—subject to intervention—which has indeed kept markets orderly, apart from last October, an event that could have been moderated by more skillful execution of economic policy.

Another policy approach would be strong pursuit of international policy coordination. Instead of risking a domestic recession in order to reduce imports, it would be sensible to try to convince partner countries to pursue policies to grow more vigorously. This would enhance the acceptability of U.S. exports and would, in a sense, make us more competitive. There are many possible mixtures of American and partner fiscal and monetary policies that could serve to reduce our trade deficit and correspondingly lower major surplus positions elsewhere, thus bringing the world economy toward a more balanced system of relative trade positions. These coordinated policies can be worked out very well in computer models of the world economy but are very difficult to pursue because of the unwillingness of some major partners to participate fully—and also because of the unwillingness of U.S. authorities to pursue an adequate degree of fiscal austerity.

As was indicated above, the wage factor and other cost factors are important in making up a final competitive price for our exports. A policy of wage restraint, which has been successfully followed by Japan and other strong exporting nations, could be designed for U.S. application, but this approach has worked only partially in achieving a goal of competitiveness.

Technology policy to improve productivity and overall cost efficiency should be of primary importance. Tax credits for research and development, enhanced public support of education and research, vigorous market research among potential overseas buyers, worker training programs, and many other direct activist public policies can contribute to better productivity trends. There is no reason why the United States cannot produce high-quality goods at world competitive prices, and a strong technological thrust can help achieve that result.

Broadly speaking, I have characterized the United States as a high consumption–low savings economy. We should be encouraged to try to become a high savings–high investment economy. Tax reform was poorly structured by taking away investment incentives in the form of tax credits and accelerated depreciation. Those features should be restored as quickly as possible because physical capital formation is an important source of technological improvement. It is simultaneously antirecessionary and helpful for restoring competitiveness.

Some policies to stimulate savings were attempted, but were not successful in the main in bringing forth more savings at the personal level. There are many more policies that were not tried or even considered and that bear some hope for improving the level of American savings. On an international competitive scale, the United States should move competitively toward the strong savings habits of other countries.

Conclusion

The United States has lost ground in international competitiveness, but there are signs of reversal of some aspects of our deterioration. Manufacturing productivity gains and steady unit labor costs have recently been quite favorable. This process needs to be extended for several years. Dollar depreciation has helped, but should not be relied upon excessively. Dollar depreciation should be held to an orderly and steady dynamic path. Above all, we should

avoid financial turbulence like that of 19 October 1987.

Competitiveness is not purely a matter of being able to price exports favorably on the world markets. Competitiveness on the side of import restraint is equally important, and shifts toward a more moderate propensity to consume (higher propensity to save) and higher levels of investment activity are needed.

Fiscal prudence should be blended with technical competitiveness (cost effectiveness) in order to achieve an overall balanced degree of competitiveness among the world economies. There are ways and policies of doing this all together, but it requires a high degree of government support, activity, and guidance. Given the precarious state of economic imbalance that has developed, a total recuperation of American competitiveness will not come about in a passive way by waiting for market forces to carry out the full adjustment.

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7. Data compiled from various volumes and years of the *Monthly Labor Review*.

Technology and Competitiveness: A Key to the Economic Future of the United States

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The United States still is a leader in technology and innovation, but American industry has been slow to translate that advantage into commercial success. A major contributing factor is the low status accorded manufacturing in this country and a lack of teamwork among scientists, engineers, and managers. However, there are encouraging signs that these key players in the innovation cycle are recognizing the need to work together to improve products and manufacturing processes and to restore the competitive position of the United States.

AFTER DECADES OF UNQUESTIONED LEADERSHIP IN INDUSTRY, science, trade, and other endeavors, the United States is confronted with a painful new reality. A new group of competitors, equipped with strong manufacturing and marketing skills, are eager to challenge the U.S. position in the global marketplace.

Evidence of a decline in U.S. competitiveness is all around us—in trade deficits that have continued to rise despite the drop in the dollar, in slow productivity growth, in stagnant real wages, and in a declining share of world markets, even for high-technology products. These ominous trends have added new urgency to the national quest for competitive renewal. The stakes are high. They are nothing less than the continued ability to provide a rising standard of living.

That was one of the main points that the Commission on Industrial Competitiveness made in a report submitted to President Reagan in 1985 (*1*). The commission cited four causes for the decline of American competitiveness: (i) failure to develop our human resources as well as other nations; (ii) inadequate incentives for savings and investment; (iii) trade policies that do not address the new realities of international commerce; and (iv) shortcomings in our commercialization of new technology.

In this article, I focus on the technology issue—the area that most directly concerns the science and engineering community—by exploring how U.S. industry can become more competitive through better development and deployment of technology. My discussion will revolve around four key points.

- How America's competitive decline is eroding our standard of living
- The link between technology and productivity—the cornerstone of competitiveness
- The importance of manufacturing in the innovation cycle
- The key role scientists, engineers, and industry can play in bringing about a competitive renaissance in the United States

Competitiveness and Standard of Living

The Commission on Industrial Competitiveness defined competitiveness as "the degree to which a nation, under free and fair market conditions, produces goods and services that meet the test of international markets while simultaneously maintaining and expanding the real incomes of its citizens" (*1*, p. 6). How effective has U.S. industry been in meeting the test of international markets? Trade statistics present a sobering picture. The United States did not register a merchandise trade deficit in this century until 1971. Since then, the deficit has risen dramatically, and despite the decline of the dollar, it has remained high. In 1987 alone, it was $171 billion—a deficit of more than $700 for every person in this country.

Deterioration was most pronounced in manufactured products, which account for three-fourths of U.S. trade. However, even high-tech products, which currently account for 40% of U.S. trade in manufactures, posted a deficit in 1986—the first ever (*2*). And in 1987, despite another drop in the exchange value of the dollar, the United States posted only a modest surplus ($590 million) in high-tech trade.

As a result of the trade imbalance, the United States has gone from a current account surplus of $6.3 billion in 1981 to a deficit of $140 billion only 5 years later. In 1982, we were a net creditor, with $150 billion of foreign assets. By 1986, we had become a net

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