Appendixes

APPENDIX A

Defining International Competitiveness

One of the immediate problems in analyzing international competitiveness is that no consensus exists on its definition. The term ‘‘competitiveness ” is not used consistently in public discussions; in fact, contradictory meanings are sometimes implied within the same article or report. This appendix attempts to bring order to the subject by explicitly setting forth several of these definitions.

Some definitions of competitiveness are rooted in economics and stress production costs and market prices. In other cases, the definitional origins are technology based, and terms such as “technology gap”’ are used. For example, if one nation’s superior technology enables it to manufacture products that are beyond the capabilities of other nations, the economists’ view of cost competitiveness is irrelevant. The United States possesses such an advantage in some products discussed in this report -e.g,, particular types of computers or integrated circuits. On the other hand, there are clear relationships between other types of technological developments and cost-based competitiveness measures. Superior manufacturing or process technology-as opposed to product technology-is one way to achieve low Costs,

International competitiveness is fundamentally related to the global structure of comparative advantage. Countries tend to export goods in which, for one reason or another, they are advantaged, and to import other items. The sources of a particular nation’s relative advantages tend to vary widely, but may include such factors as fertile agricultural land, abundant labor or capital supplies, large and affluent markets yielding possible scale economies, and unique technological capabilities. Clearly, with so many possible sources of advantage, any simple definition of competitiveness is likely to be incomplete, Still, for analysis to proceed, definitions are required.

The discussion below begins with perhaps the simplest of definitions, that having to do with relative costs. A country (or industry within a country) is internationally competitive if it can produce an item at lower cost than can others. Clearly. other matters are also important in competitiveness; but even ignoring them, some useful conclusions can be drawn. The discussion continues by developing alternative definitions and by considering how they relate to the comparative cost definition, if at all. For example, some observers claim that for a country to remain internationally competitive, it must be technologically superior in the development and production of manufactured products that can be exported. These products presumably would be either technically superior or cheaper than similar i terns made elsewhere. Such a definition is, therefore, closely related to those based on comparative costs.

The following sections treat these subjects in greater detail, with particular attention to the steel, electronics, and automobile industries.

Economic Framework—Comparative Advantage as a Descriptive Device

The discipline of economics provides a well-defined, if sometimes oversimplified, view of international competitiveness, one that flows directly from the notion of comparative advantage. In a comparative advantage framework, competitiveness is a matter of relative prices or, ultimately, costs of production and distribution. Simply stated, if one firm’s selling price in a particular location is higher than another’s, then the first firm is not competitive, all else equal, To be sure, all else may not be equal, However, the benefit of the comparative advantage framework is that it begins with a definition of competitiveness that most observers can accept as reasonable. In addition, using comparative advantage brings to the fore aspects of competitiveness that might otherwise be ignored in formulating public policies.

In a comparative advantage context, international pricing patterns should be closely related to production, distribution, and selling costs. These, in turn, are determined by considerations such as the prices of raw materials, purchased components, and other factors of production (labor, capital equipment, etc.), together with manufacturing technologies. Note that the available manufacturing technologies may give firms in some parts of the world cost advantages over producers elsewhere. For example, if all these technologies are labor-intensive, then nations with relatively inexpensive labor would normally be expected to be low-cost producers, assuming that the workers possess the necessary skills for

dealing with the technology. Low labor costs have been one of the factors leading to the strong competitive positions of Asian nations such as Japan and Taiwan in consumer electronics, where assembly processes have in the past been quite labor intensive (although the use of automation is now increasing),

In the broadest possible sense, therefore, nations tend to export items that best utilize their available resources, and import other products. Moreover, with flexible exchange rates, exports and imports are likely to be nearly equal in monetary terms. ' Therefore, in a real but limited sense, exports are required to finance imports. These simple statements lead to several conclusions that remove much of the confusion from popular discussion of trade issues:

1. It is not possible to "lose competitiveness" across the board. If a nation trades internationally, at least some of its industries must be competitive.
2. If a nation's overall productivity growth, however productivity be defined and measured, is lower than in other countries, this need not result in a loss of competitiveness for all industries if the exchange rate is free to adjust. instead, there will be a relative decline in real per capita income. To be sure, the effects may not fall uniformly on all industries. Industries for which productivity growth is lower than the national average will likely find themselves growing "less competitive' in the comparative advantage sense, For example, one of the problems of the U.S. steel industry—as discussed in chapter 4—has been wages that have risen more rapidly than output per man-hour. Although average productivity in man-hours per tonne of steel has increased at a respectable rate, and is still among the highest in the world, the labor cost content has increased more rapidly than in other countries, resulting in declining cost competitiveness for the American steel industry.
3. Capital investment in a particular industry aimed, for example, a t improving labor productivity may not make the industry (or firm) internationally competitive. This is true even in cases where the productivity gain exceeds that of foreign competitors, It is possible that the nation's overall productivity growth will exceed that of the industry (firm) in question, If that happens, the international competitive position of the industry (firm) may deteriorate, despite its best efforts at improving productivity.
4. When industries lose international competitiveness because of relatively rising prices, this may be a signal that resources should be internally reallocated within the country, unless prospective technological changes promise to yield productivity improvements which are greater than expected for the economy as a whole. Note the emphasis on the word internal; the productivity improvements may or may not be greater than those abroad.
5. If average productivity over all industries increases 'much faster in one country than in others, then it is likely that some formerly competitive industries in that country will become noncompetitive. This will be true even if their productivity improves faster than that of their overseas rivals.

The conclusions above can be extended in a number of ways. For example, competitiveness on an industrywide basis has been emphasized. In some industries, however, certain firms may be fully competitive in a relative price sense, while others face difficulties. The American steel industry presents a case in point, the efficiencies of different firms varying considerably. And too, individual firms may be competitive in some product lines, but not in others, For example, firms such as RCA and Xerox have dropped out of the computer sector while remaining highly competitive in other products (in this case, the principal competitors were domestic, not foreign).

The essential point is that—whether speaking of entire industries, of individual firms, or of product lines within firms—a loss of competitiveness often provides at least prima facie evidence that the industry (firm) has not kept pace with other domestic firms, not to mention industries abroad. Furthermore, it is by no means obvious that investment in new equipment or new technology will solve problems of competitiveness. This depends on the nature of the investment or technology, its impact on relative productivity, and the responses by both domestic and foreign rivals. In short, evolving patterns of comparative advantage in the world may leave no simple remedies for shifts in competitiveness.

The discussion above has left aside a number of other factors that can affect competitiveness, many of which are discussed elsewhere in this report. From an economic perspective, these addi-

Even in the United States, which might be considered a special case for a variety of reasons, the surplus on goods and services in 1979 was only about 2 percent of the value of exports

tional factors may introduce market distortions that give erroneous price signals in the global marketplace. For example, governrnents can provide otherwise noncompetitive industries with direct or indirect subsidies (direct payments. preferential allocation of credit, tax benefits). Another example of market (Distortions lies in the contraclictory effects of past U.S. Government policy in the areas of automobile fuel economy and prices for gasoline. By legislating corporate average fuel economy standards while con trolling oil prices a t relatively low levels, the Government created a conflicting set of market signals [ch. **6),** confusing consumers and perturbing corporate decisions. Dumping-selling exports at prices less than charged in domestic markets (or, under some circumstances, at less than cost) -also distorts prices, Such practices have been frequently alleged in steel and in consumer electronics during recent y'ears.

When distortions of these types exist, governments can attempt to offset them and improve the opera t ion of the market —e.g., by assessing antidumping duties intended to restore "normal" prices. In some cases, however, the market may be providing price indicators that are accurate from the standpoint of resource allocations," but have political}' unacceptable consequences. The political difficulty in decontrolling energy prices was, of course, responsible for the contraditory Government policies noted above

Conflicts between economic and political concerns that can be difficult to resolve may arise when noncompetitive industries appear essential to national security. This is one of the motives behind the support which various governments have, on occasion, provided to all three of the industries considered in this study: the importance of both the steel and automobile sectors to U.S. security have recently been vigorously argued. In still other cases, a reallocation of resources-away from noncompetitive industries and toward competitive ones-might cause massive employment dislocations. While in the long term, reallocation and restructuring might be desirable from an economic standpoint, in the short term the dislocations often appear politically and socially intolerable. The result may be public policy measures such as trade barriers that protect declining industries a t the expense of economic efficiency. As discussed elsewhere, it is desirable that policy decisions reflect the real costs of such alternatives.

Policy problems arising from technological change can also be difficult to resolve. New product and process technologies can affect different nations in markedly different ways. For example. the magnitude of the productivity increase that results from a particular manufacturing method —perhaps software-prograrnmable industrial robots-will not be the same for a 11 countries. This will be true even when the technology is widely available and all nations have the capacity to implement i I. Productivity increases will depend on factors such as the extent to which the new methods are applicable to the mix of products made i n each country, and the wage rates for the labor displaced. Furthermore, from a public policy standpoint, new technologies may have consequences that are difficult to predict. Thus a policy directed at improving the technology of a particular U.S. industry-e.g. a Government-sponsored R&D program—might result in new products or processes that are better suited to the economic environments of other countries.

Technology Gaps

A frequently cited source (of U.S. comparative advantage has been the abil i ty to generate "technology gaps" —technological leads over foreign compe t i tors. - often such ga ps ha ve not been so much i n funda men ta l knowledge o f t ech nology and science as in the abil i ty to commercia l ize this knowledge. American exports (including a Sriculture) have often been cha rac terized by continual new product 'process developments. Electronics, particularly semiconductors and computers, provides obvious examples.

More recently, there have been assertions tha t the U.S. lead in technology has t:ro(icd-in t ransfers of technology associated wi th direct exports, foreign investment by 11. S. firms, and licensing agreements wi th foreign firms. There have been claims that halting out flows of technology could reestablish the U.S. lead.

There seems little question tha t lagging countries can catch up by import ing technology. Historically, many of Japan's technical advances and commercial successes ha ve been associated w i t h such imports. Vir tua lly all t echnologies today :1 re rapidly diffused among industrialized nations, partly through licensing arrangements, but partly a 1s o by the abi 1 i ty of fir ms in the a (ii';] n ce i coun tries to quickly duplicate technologies developed elsewhere—a result o f the largely SC I f-sustaining

See, e.g., *Gaps in Technology. Analytical Volume* (Paris: Organization for Economic Cooperation and Development, 1968).

T. Ozawa, *Japan's Technological Challenge to the West 1950-1974 Motivation and Accomplishment* (Cambridge, Mass.: MIT Press, 1974).

near-parity in many fields of technology and science that now exists. This observation is not meant to imply that R&D efforts are futile, only that the benefits thus gained are likely to be short-lived, and that continuous effort is necessary to maintain them. It is difficult to safeguard purely technical advantages for long, unless coupled with stringent patent protection, closely held trade secrets, large capital requirements, or other non technical means of protection.

Alternative Perspectives on Competitiveness

Although the comparative advantage framework discussed above is commonly used in economics, international competitiveness can be approached in other ways. Some observers, for example, maintain that the United States is declining in industrial competitiveness virtually across the board—that somehow the economy is losing its vitality and ability to grow. The notion of an across-the-board loss in competitiveness is seldom defined with any precision; however, proponents of this view usually seem to refer to relative increases in productivity and level of technology in the United States as compared to other countries, For example, if the U.S. economy shows slower gains in labor (or total factor) productivity over time, this would be taken as evidence of a decline in competitiveness. Such a decline would lead to slower growth in per capita real income, again compared wit h other industrialized nations. The obvious example of a country losing competitiveness by this criterion is Great Britain.

Such a perspective would typically lead to public policy remedies directed at the more general dilemma—i.e., to macroeconomic policies—rather than industry-specific measures. From a purely economic point of view, sector-specific policies might be more appropriately justified by a dynamic comparative advantage analysis. This implies directing aid to sectors with strong future prospects rather than to failing industries.

Another alternative viewpoint treats market share— a common measure of performance for private corporations- as an indicator of competitiveness for nations. Markets can be defined globally, nationally, or regionally. In this view, a decline in market share is tantamount to a loss of competitiveness,

A major problem with global market share as a measure of competitiveness is that, for a country like the United States, losses in world market share are almost inevitable as other nations progress *economically.* Starting from a lower post-war base, growth rates in many o t her countries have been greater than in the United States, which has been left with a smaller part of the global economic pie. It is also possible to use market shares either w i thin the United States alone or in third countries as indicators of competitiveness. If economic growth rates in other countries are higher, U.S. firms might find themselves losing share to imports at home and a t the same time in export markets. Even i f the losses in market share were restricted either to the domestic market alone or to export markets, a decline could indicate a deteriorating ability to compete with overseas producers.

Technological Competitiveness

Rather than adopting economic measures, it is possible to view competitiveness in terms of an industry's technological capabilities compared to its overseas rivals. Technology gaps and their roles in competitive advantage were mentioned above, Comparisons might be made either in terms of an industry's product offerings or its manufacturing processes.

In the case of product technologies, useful measures are difficult to find, For example, a domestic industry might lead in some products but not others, the mix shifting continuously over time. How can competitive decline be assessed in such circumstances? one can, for example, count numbers of new products or numbers of patents. By either measure, the relative position of the United States has been declining in many industries. Yet counting new products or patents is known to be a highly imperfect indicator of technological competitiveness.[4]

In industries that are rapidly evolving technically, such as semiconductors, it is possible to quantify technology gaps by examining the timing of new product introductions—e.g., 16-bit microprocessors. Such indicators are inevitably very narrow, as well as being retrospective rather than current or prospective, In more mature industries, technology gaps have little meaning. the introduction of new process technology for making iron or steel does not depend on technological levels so much as capital for investment, which in turn depends on expected levels of profitability. This brings us back, essentially, to comparative advantage,

[4] W. B. Walker, *Industrial Innovation and International Trading Performance* (Greenwich, Conn.: JAI Press, 1979).

Capital goods suppliers—firms that produce machinery and equipment used in other manufacturing industries, also provide evidence of technological capability. Examples include transfer lines for making automotive components, or lithographic equipment for fabricating integrated circuits. The products of such industries can be viewed both as end products—whose rate of technological innovation might lead or lag that of other countries-or as process innovations that lower costs or improve product quality in the industries that use the equipment. In the latter case, technological differences between nations would appear as relative changes in the ability of the customer industries to compete on a cost or productivity basis, From a policy standpoint, this can be important, The Japanese semiconductor industry develops and manufactures a consider-able fraction of its own processing equipment, while in this country only a few of the larger vertically integrated firms do so. Thus, improvements in the relative efficiency of the U.S. semiconductor industry depend to a considerable extent on the abilities of a different, though related industry—the equipment suppliers, Although there are close associations between semiconductor firms and their suppliers, policy measures directed toward the former might not have the desired results.

Exchange Rates

In recent years, exchange rates in the industrial world have been for the most part free to adjust to prevailing market conditions. Governments do from time to time influence the prices of their currencies, but wholesale intervention is difficult and expensive. One consequence of more flexible exchange rates is that domestic industries may be price competitive at one time but not at another because of exchange rate shifts, Some observers believe that the American steel industry became competitive for a short period during the mid-to late 1970's as a consequence of a substantial readjustment of the dollar vis-a-vis other currencies. When such effects are present, measurement of the competitiveness of individual industries in a relative price sense becomes ambiguous.

Measures of Competitiveness

The preceding sections suggest a number of possible indicators of international competitiveness:

1. **Relative trends in labor productivity.**—A fairly simple method for determining an industry's ability to compete is to compare its labor productivity over time with that of other domestic manufacturing industries. A relative decline is evidence of a possible problem, as appears to be the case in sectors such as footwear and steel.
2. **Relative wage rate trends.**—Industries with slackening competitiveness often show relatively falling wage levels, again compared to other domestic industries, In other cases, relatively rising wages can be a *cause* of difficulty—e.g., if unit labor costs increase faster than in other industries. High wage rates in the U.S. steel and automobile" industries are one element in their present competitive difficulties, more important in steel because labor productivity in that industry has not increased as rapidly as in automobiles.
3. **Relative profitability trends.**—Declining competitiveness real' also appear as low relative profit levels. However, it is often difficult to apply such measures, particularly for industries populated by diversified companies where profitability and competitiveness can vary dramatically for different product lines. In addition, profit tability data can be influenced by differences in accounting conventions and tax policies. Japanese firms, for example, tend to report lower profits than American firms, partly because higher depreciation rates are permitted. They may also be permitted to take advantage of tax reserves not permitted U.S. firms.
4. **Import penetration ratios.**—The fraction of domestic consumption accounted for by imports can reflect changes in cost-based competitive advantage—but also shifting patterns of consumer demand, both here and abroad. The latter is one cause of increased sales of foreign cars in the United States. While import penetration ratios are good indicators of competitiveness, particularly if long-term trends can be established, they can be confounded by government policies (e.g., export subsidies), corporate strategies (forgoing certain markets), and various other factors.
5. **Process technologies,**—in some industries, such as steel, the characteristics of newer processes technologies are well known. Where

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Japanese Corporate Finance 1977-1980 (London: International Business Information Inc., The Financial Times Ltd., 1977).

this is the case, the potential impacts on international competitiveness can be inferred—e.g., by examining the effects of the prospective technologies on production costs in various parts of the world.

6, **Product technologies.—In** industries such as electronics. comparative costs may be only part of a more complex competitive situation. Unique product technologies and technology gaps have been important to the past strength of U.S. industries such as electronics and aircraft: informed technical judgments are needed to evaluate their significance.

There are other possible measures of competitiveness. Some are specific to particular industries, others more general: but competitiveness can be fully understood only on a sectoral basis. Government policies and regulations affect some industries more than others. Furthermore, international competitiveness cannot be analyzed in isolation from the corporate strategies of individual firms.

Economists have offered a variety of explanations for shifts over time in comparative advantage or in competitive advantage—none very satisfactory, Models based on factor proportions, the product life cycle, or demand similarity help to understand some cases but not others. Moreover, none of the models includes the effects of conscious intervention in economic processes by exogenous agents such as governments.

Still, if policies specific to particular sectors of the economy, as well as macroeconomic and other aggregate policies are to be improved, some idea of their potential effects is required. Assessing these effects, particularly across industries, requires the use of a comparative advantage framework. In many respects, a dynamic comparative advantage analysis would be idea 1. Japan long-term economic policies are examples of attempts to develop strategies within a context of dynamic comparative advantage, strategies that are anticipatory rather than reactive.