

COMPETITIVENESS  
OF U.S.  
AGRICULTURE  
★  
AND THE  
BALANCE OF PAYMENTS  
★

CAST OCTOBER 1995



The Science Source for Food,  
Agricultural, and Environmental Issues

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The Science Source for Food,  
Agricultural, and Environmental Issues

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# Foreword

Following a recommendation by the CAST National Concerns Committee, the CAST Board of Directors authorized preparation of a report on competitiveness of U.S. agriculture and the balance of payments.

Dr. Maury E. Bredahl, Department of Agricultural Economics, University of Missouri, Columbia served as chair for the report. Two highly qualified scientists served as task force members and participated in the writing and review of the document. Their expertise is in the field of agricultural economics.

The task force met and prepared an initial draft of the report. They revised all subsequent drafts of the report and reviewed the proofs. The CAST Executive and Editorial Review committees reviewed the final draft. The CAST staff provided editorial and structural suggestions and published the report. The authors are responsible for the report's scientific content.

On behalf of CAST, we thank the authors who gave of their time and expertise to prepare this report as a contribution by the scientific community to public understanding of the issue. We also thank the employers of the authors, who made the time of these individuals available at no cost to CAST. The members of CAST deserve special recognition because the unrestricted contributions that they have made in

support of CAST have financed the preparation and publication of this report.

This report is being distributed to members of Congress, the Department of Agriculture, the Food Safety Inspection Service, the Centers for Disease Control and Prevention, the Congressional Research Service, the Food and Drug Administration, the Environmental Protection Agency, the Agency for International Development, the Office of Technology Assessment, and the Office of Management and Budget, and to media personnel and institutional members of CAST. Individual members of CAST may receive a complimentary copy upon request for a \$3.00 postage and handling fee. The report may be republished or reproduced in its entirety without permission. If copied in any manner, credit to the authors and to CAST would be appreciated.

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# Interpretive Summary

## Findings

The United States has a large and persistent balance of trade deficit; this deficit, however, does not necessarily indicate that U.S. firms are becoming less competitive in international markets. Any trade deficit must be matched by a foreign capital surplus—if U.S. imports exceed exports, more investment capital must be flowing into the United States than is flowing out. So, the trade deficit is as much an indicator of the lack of domestic savings by individuals and governments as of a lack of competitiveness.

The United States has a large and persistent agricultural and food trade surplus; this surplus does not necessarily indicate that U.S. farmers and food processors are becoming more competitive in international markets. The peak level of exports was reached in the early 1980s, and the U.S. share of international markets for commodities and food products has declined over the past several years. Not until 1994 did the level of exports reach the level of the early 1980s. This loss in market share is taken by many as evidence of the declining competitiveness of the U.S. food and agricultural sector.

The United States, which exports primarily commodities with low value added, has been falling behind the rest of the world in exporting processed food products with high value added. United States exports of processed food products have grown, but the growth in world trade of such products greatly exceeds the growth in U.S. exports, so the market share of the United States is falling.

The decline in the market share of the United States is partially explained by the tendency of large U.S. firms to invest in foreign countries rather than to export. These U.S. food multinationals are more likely to access foreign markets through their subsidiaries than by exporting from their U.S. operations. Small and mid-sized firms are much more likely to access foreign markets through exports.

As trade barriers for agricultural products fall, opportunities for trade in differentiated food products will increase. Lower trade barriers could slow the growth of multinational food firms or encourage them

to export rather than move production facilities abroad.

Analysis of agricultural competitiveness is facilitated by dividing agriculture into four activities: the production of undifferentiated primary commodities; the production of differentiated primary commodities; the conversion of primary commodities into semiprocessed products; and the conversion of primary and semiprocessed products into consumer-ready products.

The importance of the determinants of competitiveness vary across these production and processing activities. Natural resource endowments and cost reducing technologies are crucial for competitiveness in international commodity markets. They are less important in international markets for semiprocessed and consumer-ready products, markets in which product characteristics and nonprice factors are more important. Quality enhancing technology, product innovation, regulatory environment, and trade policies play more important roles in those markets. Often competitiveness in international product markets requires that characteristics desired in the final product must be imparted at the farm level.

Certain factors affect competitiveness of all activities. Trade policies and domestic regulations can have a profound impact on international competitiveness. These may be warranted to overcome market imperfections, but they may have detrimental effects on competitiveness of individual firms.

## Conclusions

U.S. agricultural producers and food processors will need to focus on adding value to agricultural products in a way that meets the needs and desires of an increasingly diverse group of consumers around the world. If they do not focus on consumer need, the United States will be relegated to supplying homogeneous commodities that are transformed into value-added food products in foreign countries.

Universities cannot facilitate the transition to the global economy if their researchers focus on research for homogeneous products. In allocating research

resources, we must consider the potential for adding value, the process of international diffusion of technology, and the private versus public benefits from research. Closer attention must be paid to the end use of products and to the means of tailoring product characteristics to those uses.

The major problem with research on differentiated products is that it often generates private benefits for individual firms, and consequently the Land Grant university system has shied away from research of this type. Although research on cost-reducing technologies that can be extended to thousands of farmers does not generate concern about Land Grant universities' use of public resources to generate concentrated private benefits, such research could be exhibiting diminishing returns over time relative to the returns on research concerning the consumer oriented products. If returns do diminish, the Land Grant university system must change its research agenda as well as its stance toward research benefits if it is to reap substantial economic payoffs.

As the food industry continues to consolidate and to privatize throughout the world and becomes ever less farm-resource intensive, the Land Grant university system will be forced either to deal with additional questions concerning private versus public bene-

fits from research or simply to withdraw from the growing market for research topics with firm-level consequences. Today, major agribusinesses are not looking for farm-level technologies to decrease their ingredient cost by a fraction of a cent per pound; rather, they are looking for new technologies with which to deliver products at a time and place and in a form that will improve their competitiveness in the world economy.

Whereas government policies, like the research system, have a substantial role in creating the competitive environment that firms operate in, the extent to which policy can stimulate competitiveness is limited. Subsidies seldom confer competitive advantage on a sector. The tendency of farmers and of food processors to produce for government programs clearly reduces the competitiveness of the U.S. food system. Governments should do more to provide infrastructure that widely benefits the agricultural sector and foster competition among producers of differentiated products. Governments also should fund or conduct basic research to help an industry stay at the leading edge of technology, especially when research benefits are difficult for individual firms to internalize.

# Executive Summary

## Introduction

Problems associated with the merchandise trade deficit and the idea that the United States has lost its competitiveness in international markets are themes that have been discussed in the nonagricultural sector and now are being discussed increasingly within the agricultural sector. These concerns are symptomatic of three perceived problems with respect to agricultural trade: (1) the United States is losing its ability to compete with other food exporters; (2) the United States is exporting its resource base; and (3) U.S. firms are investing overseas rather than exporting agricultural products.

Despite increased U.S. agricultural exports, which grew from \$8 billion in 1970 to \$45 billion in 1990, U.S. share of the world market shrank from 21% in 1974 to 14% in 1990. The United States has been slower than the rest of the world to increase exportation of high-valued food products. But despite the loss of market share to the rest of the world, U.S. exports of high-valued food products have expanded rapidly. These increased exports usually involve value-added activities because more processing is involved in these products. Despite greater U.S. high-valued food exports, the U.S. market share in processed food exports has fallen behind the market shares of such European Union countries as France and The Netherlands.

The United States is home to a number of the world's largest food processing companies that not only export food products but also process foods throughout the world through subsidiaries. On average, U.S. food multinationals export only 3.5% of their output, yet their foreign affiliates account for more than 25% of their sales. United States food multinationals had 673 different foreign affiliates in 1991, and these affiliates sold \$81.8 billion of food from their foreign operations. Much of this foreign investment by U.S. food multinationals is *horizontal* in nature—the subsidiaries are performing the same tasks overseas as they perform in the United States. There is little trade in semiprocessed food products between parent firms and their affiliates.

An important although sometimes misleading indicator, the value-added, measures contribution or success of the agricultural sector. *Value-added* refers to the value that an activity adds to the resources consumed in the production of a given output. Items with high value-added are not necessarily associated with high profits or wages, but such products are a source of economic surplus, which can be used to pay high returns for production factors such as labor.

## Competitiveness

A new body of literature on competitiveness deals with some of the limitations of classical economic theory. International trade theory has little to say about value added or why one firm exports a high proportion of its output while another does not.

Economic theory has a host of subdisciplines providing insight into competitiveness arguments, each subdiscipline with focused notions that elucidate certain trends in agricultural trade. A competitive sector has high returns to its productive factors, its output is growing rapidly, and its market share is increasing. No one subdiscipline, however, explains all aspects of competitiveness.

## Determinants of Competitiveness

Macroeconomic theory deals with America's declining factor productivity trends, which are brought on by declining propensities to save by individuals, governments (through large budget deficits), and firms. The merchandise trade deficit is simply a reflection that the United States is a net importer of savings. Thus, foreigners export to the United States and leave the dollars that they earn from those exports in the United States to make up for an American savings shortfall. This savings shortfall means that investment is lower than it otherwise would be, and thus long-run productivity and economic growth are affected.

International trade theory has quite a lot to say about the reasons that nations export certain products and import others, the effects of trade policies

and other government interventions, and the returns to production factors under various trade regimes. This theory is especially helpful in identifying differences among sectors wherein specific institutions and government policies play an important role. Frequent recent additions to this theory have been made due to its empirical failure in many instances, especially when markets are not perfectly competitive, economics of scale exist, and products are not homogenous.

The business strategy literature has much more to say about why certain firms and industries succeed on a global basis while others do not. It also contains more prescriptions related to appropriate policies for a given sector and indicates whether such policies will affect firms positively. But this literature has less general applicability because conditions differ so greatly among sectors. Case studies are important in it, and results are very difficult to generalize. Therefore, most explanations of reality are very specific to the firm or the sector studied and may not have much direct relevance to other cases.

## Misunderstandings

Despite widespread quotation from these bodies of literature, there still are many misunderstandings about how the international economy works and what its relationship is to the performance of U.S. industry (and specifically to that of agriculture). One of the most serious misunderstandings concerns the trade deficit and what it means to the U.S. economy. Because exchange rates are determined by market forces, any trade deficit must be matched by a capital surplus—if the United States imports more than it exports, there must be more dollars flowing into the United States for investment than leave the United States for investment. These currency flows are dominated by capital flows, so the trade deficit is more an indicator of a savings shortfall than a lack of U.S. firm competitiveness. When considering policies that would affect the value of the dollar, the Federal Reserve Board first considers a change in U.S. interest rates, which influences decisions on how much money is invested in the country. United States exports and imports are affected by the value of the dollar, but they have little effect on the dollar's value.

Production costs across nations are not the relevant measure of competitiveness for a sector. The cost of producing one good relative to another is more important than absolute production costs because key economic decisions are made on the basis of giving up one product so that another can be produced. This is especially true when there is a residual productive

factor (such as land) whose value is determined after all other production costs are subtracted. In the long run, the rate of return for producing goods will be equated among goods, or productive factors will move from one sector to another. Production cost comparisons cause even more trouble if more encompassing measures of economic activity such as value-added are not considered.

## Four Economies of Agriculture

A useful taxonomy for an analysis of agricultural competitiveness divides agriculture into four economies based on the characteristics of ultimate products: the production of undifferentiated primary commodities; the production of differentiated primary commodities; the conversion of primary commodities into semiprocessed products; and the conversion of primary and semiprocessed products into consumer-ready products. These different product categories lend themselves to quite different issues regarding determinants of competitiveness. Furthermore, the elements determining competitiveness have different ramifications for different product categories.

## Determinants of Agricultural Competitiveness

Macroeconomic policies chiefly affect competitiveness by affecting factor productivity and investment level. In recent years, technical progress clearly has made less of a contribution in the United States than in other countries. This difference is due partly to market forces (prices and government policies) and to competitive pressures. It is well known that nations and companies will innovate to conserve scarce resources. Firms also will have increased incentive to innovate if they face fierce competition from other companies. These technical changes will tend to decrease costs for undifferentiated goods and to introduce more characteristics for differentiated products.

Economic infrastructure can be crucial to the success of an enterprise or industry. These infrastructure needs differ by sector but certainly confer advantages to certain industries in which costs are lowered or product quality is improved. The well-developed grain transportation network in the Midwest gives U.S. producers a significant advantage over other grain producing countries. The U.S. agricultural research and extension system provides benefits to U.S. agriculture through higher-yielding, more pest-resistant cultivars and hence lower production costs. Cor-

ollary benefits accrue to livestock and forestry producers.

Government intervention in the form of trade policies and domestic regulations can have a profound impact on international competitiveness. Tax/subsidy policies, health and sanitation regulations, safety guidelines, competition policies, and environmental requirements are a few of the many categories of government involvement that are important in agriculture. Furthermore, marketing institutions established by the government can help or hinder competitiveness for particular agricultural subsectors. These policies and regulations may be warranted to overcome market imperfections, but they may have detrimental effects on the competitiveness of individual firms.

Product characteristics and differentiation are becoming increasingly important in agricultural trade. This observation is borne out by the rapid increase in high-valued food trade throughout the world. United States agricultural producers will need to focus on adding value to agricultural products in a way that meets the needs and desires of an increasingly diverse and international group of consumers. If the United States does not focus on consumer needs, then American producers will lose markets to producers from other countries. Trade liberalization should help make differentiated food products cheaper and more accessible to foreign customers. Multinational food firms processing food in the country where consumption ultimately occurs might become the increasingly predominant structure of the world's food industry.

Currently, the largest firms are much more likely to access foreign markets through investment in processing facilities than through exports from their home country. The 20 largest U.S. multinationals are 14.7 times more likely to reach a foreign market through a foreign affiliate than through exports from

the United States. As trade barriers for agricultural products fall, though, opportunities for trade in differentiated food products will increase. For example, food trade expanded tremendously when trade barriers fell as a result of the United States–Canada Free Trade Agreement.

## Increasing Competitiveness

These trends in the world food market have tremendous implications for the Land Grant university system and for the U.S. federal government. Universities cannot facilitate the transition to a new world-economy if they focus on research for homogeneous commodities. These markets are shrinking relative to markets for processed foods. Yet processed food markets are dominated by large agribusinesses striving to capture profits that can be enhanced through Land Grant research. Universities must either become more involved in research with more potential proprietary benefits or be content to perform research with lower economic payoffs.

The government's role in assisting its firms might be to get out of their way in some instances. Subsidies seldom are a good way of conferring competitive advantage on a sector. Governments should do more to provide infrastructure that widely benefits the agricultural sector and ensures that resulting advantages are conferred on the industry without trying to channel agriculture into one enterprise instead of another. The government should foster through health, safety, and welfare regulations competition among producers of differentiated products so that resource returns and prices reflect their true costs and benefits. Finally, the government also may fund or conduct basic research to help an industry stay at the leading edge of technology, especially when research benefits are difficult for individual firms to internalize.

# 1 Introduction

The potential contribution of high-value added agricultural exports to decreasing the U.S. balance-of-trade deficit seems at first blush a fairly straightforward issue; ultimately, however, it is complex indeed. To facilitate discussion, this monograph is divided into four chapters. The first chapter introduces three problems perceived with the future of agricultural trade and reviews both the unfavorable U.S. balance of trade and the linkage of value-added exports to the reduction of this deficit. The second chapter introduces the paradigm of competitiveness and develops the determinants of competitiveness. Fundamental misunderstandings of these concepts also are illustrated. The third chapter applies this conceptual framework to the evaluation of agricultural competitiveness and to the assessment of critical competitiveness issues in international agricultural markets. The final chapter develops within that framework an appropriate role for colleges, universities, and governments.

Dissatisfaction with available research and conceptual models prompted the authors of this report to organize a conference under the sponsorship of the International Agricultural Trade Research Consortium. Much of this report draws from the papers presented at that conference. The intent of the organizers was to bring together experts in the areas of international trade and finance, agricultural trade, and business strategy and management. The desired outcome was a more comprehensive theory of food trade; and although notable progress was made, much remains to be done.

## Three Perceived Problems

Three problems generally are perceived with regard to the past and the future of U.S. food and agricultural trade.

1. Industries in the United States, and especially agricultural industries, have become increasingly less competitive in international markets, a trend leading to decreased exports, lost jobs, and diminished revenues for farms and agribusinesses.

2. The United States has exported its base of natural resources in the form of bulk agricultural commodities instead of the products of additional labor, in the form of value-added products, which other competing agricultural countries and especially the European Union (EU) export.
3. United States food processors have invested in foreign countries rather than in the United States and consequently have exported less from the United States.

## Loss of Competitiveness

One of the factors cited most frequently as evidence of lost competitiveness is the persistence and size of the U.S. *merchandise trade deficit*, i.e., the difference between the import value and the export value of goods. The U.S. balance of trade for the nonagricultural sector became negative in the early 1970s, and this deficit continued to grow until fiscal year (FY) 1986, when it peaked at about \$160 billion (Figure 1.1.) From then until 1992, the deficit declined grad-

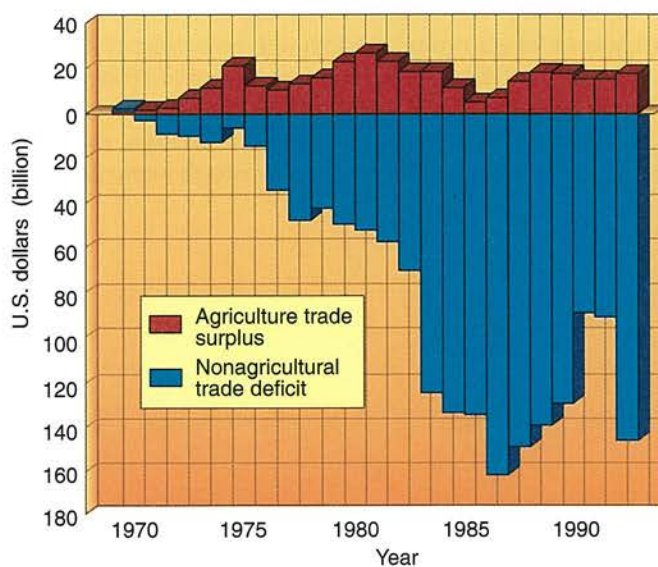


Figure 1.1. Merchandise trade balance for nonagricultural and agricultural sectors (Bredahl et al., 1994).

ually, but in recent years it has moved upward again.

In contrast, the U.S. balance of trade for the agricultural sector has been positive over the entire period. The agricultural balance of trade increased from approximately \$1 billion in FY 1970 to a peak of almost \$27 billion in FY 1981. Subsequently, the agricultural surplus shrank until FY 1987, when a gradual expansion began that reached \$18 billion in FY 1993. So the agricultural sector has significantly decreased the U.S. trade deficit ever since FY 1970.

Until the mid-1980s, the agricultural trade surplus was driven largely by the price and the volume of raw commodity exports. The growth in agricultural trade surplus since then can be traced primarily to increased high-value product exports; in recent years, increased exports of fresh and processed fruits and vegetables, fresh and frozen meat (mainly beef), and manufactured food products have accounted for much of the increase in the agricultural trade surplus.

This change in the composition of food exports is seen in a highly favorable light because it is perceived that more value is added to the U.S. economy than would have been added by exports of raw unprocessed agricultural commodities. Logically, an even greater contribution to decreasing the merchandise balance-of-trade deficit might be made if exports of high-value added products were promoted by changes in government programs and in private-sector business strategies and priorities. This proposition will be explored.

Changes in market share can be used to measure the competitiveness of individual firms. For example, the Canadian Competitiveness Council uses the "ability to profitably maintain market share" as its criterion for competitiveness (van Duren et al., 1994). The use of such changes as an indicator of competitiveness has less meaning at a national level, however, and can be misleading, especially if firm-level solutions are proposed for national economies. At the national level, shares in international markets are determined by a host of factors such as exchange rates, interest rates, and national trade policies, all of which are outside the range of decisions available at the firm level. So the growth of international markets and of national market share can indicate the relative effects of macroeconomic and other forces on trade.

Deterioration of national market share causes concern among political supporters of a sector and among members of the popular press and for these reasons alone points to the need for further analysis. The enactment of ill-advised policies based on erroneous popular perceptions is costly to the nation because

such policies tend to address symptoms and not causes of diminished competitiveness.

Notwithstanding, trade data can be used to identify key trends in U.S. market share and trade composition. The value of world agricultural trade expanded more than sixfold from 1970 to 1990, growing from \$50 billion to more than \$312 billion<sup>1</sup> (Figure 1.2.). The value of U.S. agricultural exports expanded dramatically as well, from \$8 billion to \$45 billion. But most of this growth had been realized by 1981, when the value of U.S. agricultural exports reached \$45 billion and they had captured approximately one-fifth of the international food market.

From 1981 to the mid-1980s, the value of U.S. exports fell precipitously to \$28 billion, and U.S. market share slipped to 13%. Although the value of U.S. agricultural exports has expanded since the mid-1980s, U.S. share of the international agricultural market has remained well below that realized in the 1970s: the United States held about 14% of that market in 1990 compared with 21% in 1974. If it had maintained its 1974 share, exports in 1990 would have been well in excess of \$65 billion.

As the volume and the value of global food trade

<sup>1</sup>Many different data sets are used in the analysis of agricultural trade patterns. The agricultural trade database of the U.N. Food and Agricultural Organization is the only one allowing measures of global trade in agricultural products. It has, however, many limitations and allows many different interpretations. The data used in this report draw on that base, with some important qualifications. First, *intra-EU trade*, i.e., trade among the member countries of the European Union, is excluded, and only trade with third countries is included. Second, trade in products that the United States does not produce, e.g., coffee and tropical products, are excluded.

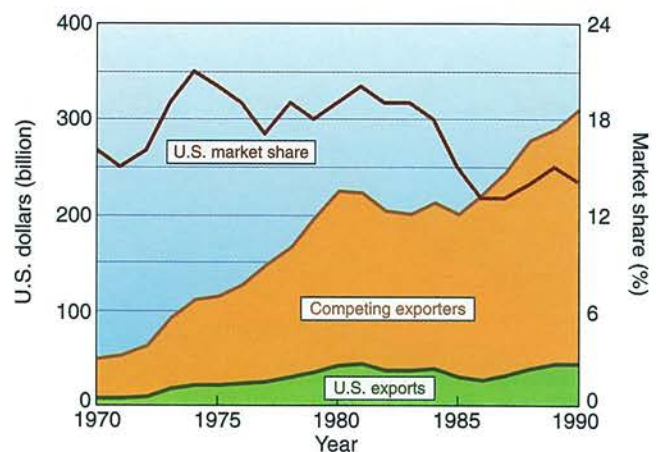


Figure 1.2. Value of global food trade, U.S. exports, and U.S. market share (Bredahl et al., 1994).

have grown, the composition, or *mix*, of products traded, e.g., the combination of commodities and high-value products, has changed as well. Trade of both types has increased significantly since 1970: trade in commodities increased fourfold—from \$13 billion to \$56 billion; trade in high-value products increased almost eightfold—from \$38 billion to more than \$250 billion (Figure 1.3). *Commodity trade* includes relatively homogenous raw, unprocessed products such as wheat, corn, and soybeans; *high-value trade* includes relatively heterogenous high-value unprocessed products such as fresh fruits and vegetables, semiprocessed products such as fresh and frozen meat, and highly processed products such as manufactured food.<sup>2</sup>

The downward trend in the U.S. share of commodities in global agricultural trade began in the mid-1970s and is not new. Commodity trade accounted for as much as 30% of trade value in that decade but for less than 20% in the late 1980s. Change in the composition of global food trade is the result of income growth in developing countries, which has led to increased demand for meat and other semiprocessed products and for *consumption-ready*, i.e., manufactured, food products. Growth also reflects liberalization of key import markets in developed countries, e.g., beef and pork markets in Japan. Some analysts argue that such growth also reflects the subsidization of processed product exports by developed countries and especially by the European Union.

<sup>2</sup>An arbitrary export unit value is selected to divide trade into these categories. A price of \$400/ton often is used.

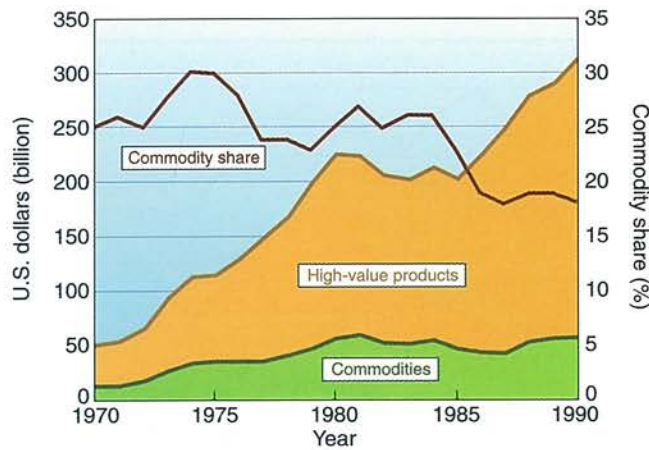


Figure 1.3. Value of global trade in commodities and high-value products, and share as commodity trade. (Bredahl et al., 1994).

The United States always has been dependent on commodities for the lion's share of its exports (Figure 1.4), 70% of which were accounted for by commodities in the mid-1970s. This dependence on commodities held until the mid-1980s, when the importance of high-value products began to increase. By 1990, commodities' share in the value of U.S. agricultural exports had fallen to about 45%. Even with such a fall, however, a much larger proportion of the value of U.S. agricultural exports continues to be made up of commodities than is common in other developed nations.

Based on trade value, the U.S. share of the global trade in commodities and in high-value products has fallen since the 1970s (Figure 1.5). In that decade, the

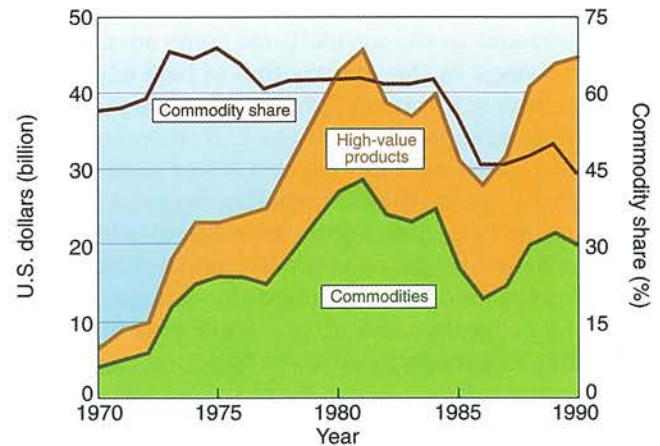


Figure 1.4. Value of U.S. exports as commodities and high-value products, and share as commodities (Bredahl et al., 1994).

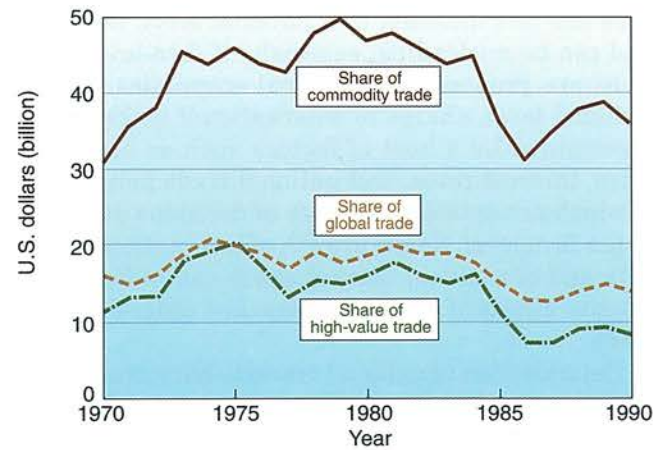


Figure 1.5. United States market share of global food trade, and of high-value and commodity trade (Bredahl et al., 1994).

United States captured as much as half of international commodity trade; in 1985, 31%; and in 1990, less than 40%. In the earlier period, it had captured as much as one-fifth of high-value product trade; but in 1990, it captured less than 10%.

The U.S. share of the global commodity market has been quite volatile, and the long-term trend is not obvious. A significant erosion of U.S. market share is perceived, however, and the trend in U.S. market share of high-value product trade is unambiguously downward. So although the United States has decreased its dependence on commodities as noted, growth in high-value product exports simply may reflect growth of the international market and may mask a potential erosion of competitiveness in that market as well.

### Exporting Commodities Rather Than Products

Several pieces of evidence support the perception that the United States is exporting the wrong kinds of products. First, the export unit value for the United States is significantly below the global average for agricultural trade. (*Export unit value* is, simply, the value divided by the quantity of exports [Figure 1.6].) Although unit values move together and reflect macroeconomic forces such as exchange rate, clearly the unit value of U.S. exports is well below the world average and significantly below that of EU exports.

For the 20-year (yr) period shown in Figure 1.6, U.S. unit values were slightly less than two-thirds of the world average and less than half of the EU unit values. Any trend in the relation across export sour-

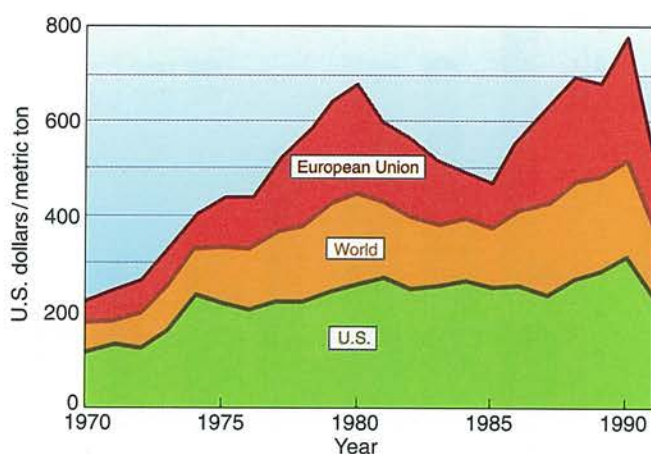


Figure 1.6. Export unit value of food exports for the European Union, world trade, and the United States (Bredahl et al., 1994).

es tends to be obscured by exchange rate changes as each unit value is converted from national currencies to U.S. dollars. But expressing export unit values in another currency such as the European Unit of Account or the Special Drawing Rights of the International Monetary Fund does not alter the conclusion that exports from the United States are significantly less valuable than those from most other developed countries.

Another way of looking at the composition of food trade is from the perspective of processing level. Agricultural trade often is divided into four categories: bulk commodities, products with an intermediate level of processing, highly processed products, and high-value unprocessed products. (The data here are not strictly comparable to those used in the foregoing discussion, but the discrepancy between sets is not great.) Figure 1.7 indicates the dependence of U.S. agriculture on the export of bulk commodities, which account for approximately half of the value of U.S. exports.

Because the proportion of exports made up of highly processed products has increased significantly since 1985—having grown from 10 to 23%—and because the proportion of exports in the two other categories has held fairly constant, the growth in proportion of exports of highly processed products indicates a switch from the export of raw commodities to that of more value-added products. But this positive evaluation must be tempered by the fact that the United States still is well behind its principal competitors and is perceived as catching up.

Increasing the level of export processing is considered desirable because the value added to the domes-

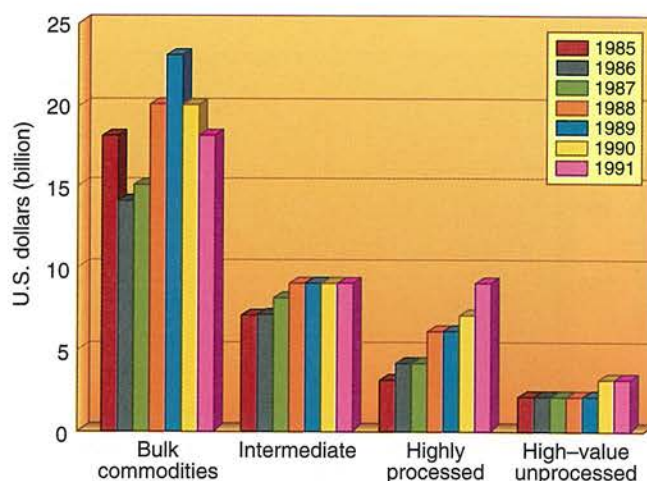


Figure 1.7. United States agricultural exports, by processing level (Bredahl et al., 1994).

tic economy increases with processing level. Schluter and Edmonson (1989) concluded that “exporting processed agricultural products rather than raw commodities benefits society much more than just the increased value of the commodities themselves. Processing adds to the value of the products and generates greater business activity, more jobs, higher personal income, and greater tax revenues.” The researchers also found that “processing wheat worth \$1 million would generate as much as \$9 million in business activity, 109 full-time jobs, \$1.9 million in personal income, \$160,000 in federal personal income taxes, and \$199,000 in federal corporate income taxes. Processing other commodities could yield even greater economic benefits.”

The assumptions underlying their analysis led to the maximum benefit that could be derived from further processing; actual increases would be significantly smaller. Nonetheless, the analysis substantiates the perception that the United States is exporting the product of its land rather than the product of its labor.

Other data provide a different perspective on the U.S. position in international markets for manufactured food.<sup>3</sup> Global trade in manufactured food products grew from \$16 billion in 1962 to slightly more than \$200 billion in 1990 (Figure 1.8.). United States

<sup>3</sup>This paper uses the U.S. Census Bureau definition of *manufactured food*, *standard industrial classification 20*, which is different from the categorization of processing just mentioned. *Manufactured food* is an agricultural product that has undergone processing. The difference between manufactured food value and the sum of semi-processed and highly processed food values is not great.

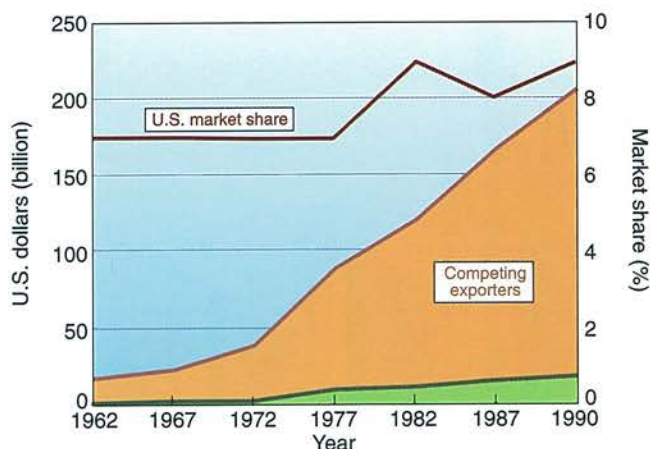


Figure 1.8. Global manufactured food trade, U.S. exports, and U.S. market share (Bredahl et al., 1994).

exports of manufactured food increased from \$2.2 billion in 1970 to slightly more than \$20 billion in 1991. As discussed, however, this growth primarily reflected growth in world markets in these products, and not significantly improved U.S. competitiveness. Market share held by the United States increased only slightly, from 7% in the 1960s and the 1970s to approximately 9% in 1990. Thus, the most important factor in the increase in U.S. manufactured food exports was growth of the international market.

The perception that the member states of the European Union have outperformed the United States in the international market for manufactured food is supported by their gain in market share. Almost across the board, the northern countries of the European Union have increased market share—and sometimes dramatically so. France and The Netherlands are the world’s largest exporters of manufactured food products and together hold almost 20% of the market (Figure 1.9). Especially striking is the growth in their market share since the early 1960s: France’s grew from approximately 4 to almost 10%; and The Netherlands’s, from slightly less than 6 to almost 10%. In total, the six EU member countries represented in Figure 1.9 increased their share of the international manufactured food market from about 20 to more than 37% from 1962 to 1990.

### Investing Abroad Rather Than Exporting

The United States is the home of a number of the world’s largest food processing companies, e.g., Philip Morris—which owns Kraft and General Foods, and RJR–Nabisco. These global companies export from

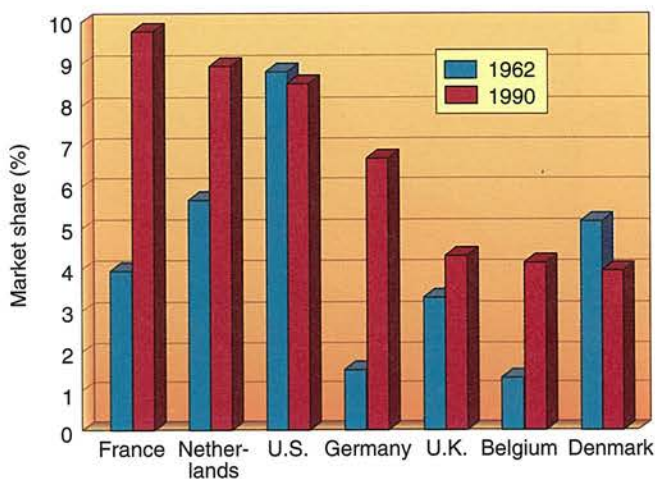


Figure 1.9. Shares of the international manufactured food market in 1962 and 1990 (Bredahl et al., 1994).

the United States and process foods in other countries through their subsidiaries. International trade is only one aspect of their global marketing efforts. The largest U.S. food multinationals on average export only 3.5% of output, yet foreign affiliates account for more than 25% of total sales (Handy and Henderson, 1994).

The low level of exports relative to production and the importance of foreign affiliates give rise to several perceptions. One that is common is that these multinational firms invest in foreign countries because wages there are lower than in the United States. Another is that the export subsidies for manufactured food products in other developed countries induce U.S. firms to invest and to export from there.

*Foreign direct investment*, or an investment made in another country to obtain a lasting, or ownership, interest in its economy, is critical to the U.S. food industry. In 1991, U.S. firms had 673 different foreign *affiliates*, or subsidiary businesses in which a firm has long-term interest, and had assets in food processing facilities totaling \$61.6 billion. United States multinationals produced \$81.8 billion of food in those foreign operations, or more than four times the amount of U.S. manufactured food exports for the same year. These foreign operations employed more than 464,000 workers and so contributed greatly to foreign economies.

Foreign direct investment is described as *vertical* when investment is in a stage of production different from that in the home country. For example, a soap manufacturer may invest overseas to guarantee a reliable source of semiprocessed vegetable oils and other ingredients for use in production in the home country. Vertical foreign direct investment leads to *intrafirm trade*; that is, to sales from the foreign subsidiary to the home company, and complements international trade by stimulating trade in semiprocessed products.

Although not large, intrafirm trade by U.S. multinational food companies does account for 50% of the exports—10% of the output—of their foreign affiliates. Most exports from foreign affiliates of U.S. companies go to other foreign countries rather than to the United States. Intrafirm trade in the food industry, however, is small relative to that in other economic sectors.

Foreign direct investment is described as *horizontal* when the investment is at the same stage of processing as occurs in the home country. Horizontal investment allows firms to reach consumers in a foreign market directly. The vast majority of foreign direct investment in the food processing sector is

horizontal, and most is made in the European Union, which accounted for 55% of U.S. foreign affiliate sales in 1988. Latin America and Canada also were important recipients of U.S. foreign affiliate sales and accounted for 13 and 12.5%, respectively.

## Value-Added Exports and Trade Balance

A significant increase in the export of high value-added food products is agriculture's perceived contribution to decreasing the balance-of-trade deficit. Such exports are seen as providing employment and income in rural areas while contributing to the solution of a considerable problem at the national level. The concept of adding value may be viewed or analyzed from two perspectives: the national or aggregate level and the firm or industry level. Factors important in the analysis of value-added production at the national level are taken as fixed, or predetermined, at the firm and industry level, and vice versa. In both instances, however, the starting point must be an understanding of what is being measured.

The *value added* is, simply, the value that an economy adds to the resources consumed in producing a level of output. It includes payments to what are termed *production factors*, e.g., land (rentals), labor (wages), capital (interest), and management or ownership (profits.) It also includes payments in the form of indirect business taxes. These factors are the components of Gross National Product (GNP). So, at this level, the concept of added value neither contributes to economic analysis nor points to needed refinements in it. Growth of GNP depends on (1) increases in the efficiency, or productivity, with which resources are used; (2) increases in the amounts and improvements in the quality of resources available and their growth over time; (3) improvements in the infrastructure provided by the public sector; and (4) policies of the institutions governing economic activities. Factors such as market strategy and investment, which are under the control of firms, are taken as given and excluded from this macroeconomic analysis.

At the firm and industry level, the term *value added* takes on a different meaning, for factors determining the value added at the national or aggregate level are taken as beyond the firm's control; interest rates, exchange rates, taxes, and regulations, for example, are taken as given. Profits are maximized through investment decisions and business strategies and are subject to those and other factors directly influenced by government policy. To analyze only the

factors affecting added value at the national or the firm level is systematically to ignore the forces critical to international competitiveness.

The meaning of adding high value at the firm or industry level must be kept firmly in mind, as must the importance of factors both macroeconomic and microeconomic. High value-added products do not necessarily yield either high wages or profits or low production costs, high prices, or high sales values. The products are, however, the source of economic surplus and as such can be used to pay high wages—or high taxes, for that matter—or to realize high profits and investment returns.

Analyzing the value added at the firm or industry level introduces important factors that often are ignored. Figure 1.10 illustrates clearly that the value added can be enhanced by increasing the price at which output is sold. Such an increase can be accomplished, for example, by the production of differentiated items from which consumers gain greater satisfaction and so are willing to pay more for or by strategic management and marketing decisions. Clearly, a number of industries in other countries have increased the value added to their products and hence, through appropriate strategic marketing and management decisions, are able to pay higher wages and to realize greater profits.

Perfectly, or purely, competitive economic models

do not take into account the decisions of firms to increase value added and, so it is argued, to improve the economic welfare of a nation. Most economic analysis treats product differentiation in imperfectly competitive models and concludes that national welfare is diminished by such a market structure.

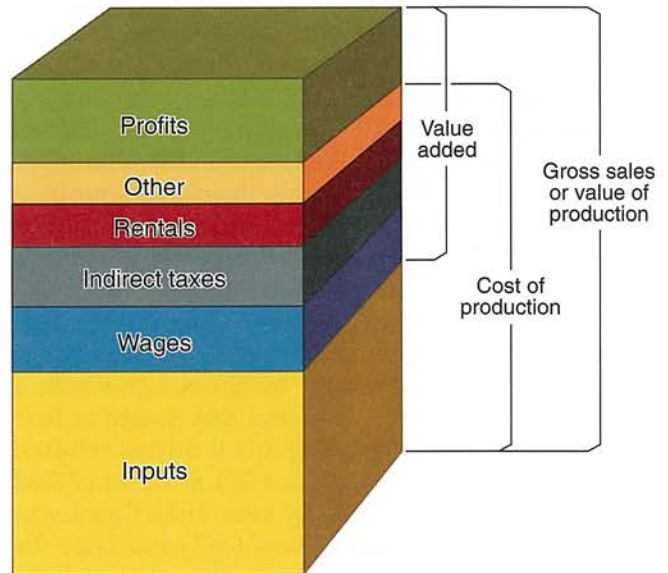


Figure 1.10. The concept of value added and other measures of economic performance (Bredahl et al., 1994).

## 2 Determinants of Competitiveness

### Introduction

With a few notable exceptions, conceptual models and empirical studies to synthesize for this report were curiously lacking. Many studies bemoaned the fact that the unit value of food exports from the United States was less than that of world trade in food products or of the European Union. But there was no convincing explanation of why. Other studies dismissed the issues raised here outright. North American farmers were argued to be the most efficient in the world, and given the richness of our natural resource endowment, the exportation of unprocessed bulk commodities was deemed natural and expected, because such is the outcome predicted by the principle of comparative advantage. Those studies focused on crop production almost to the exclusion of other types of food production, and conclusions often were based on absolute advantage, not on relative costs as is dictated by the theory of comparative advantage.

Not only was the received theory often misused and therefore the source of numerous ill-founded conclusions, but the underlying theory and modeling were deficient inasmuch as they could not explain real-world trade flows. Theory and empirical models do not explain readily why the United States is the largest exporter *and* the second largest beef importer or why the European Union is the second or third largest importer *and* exporter of beef. Taiwan and Denmark, two small nations with few natural resources, have been the largest suppliers of pork to Japan, holding about 80% of that market. The United States and France, two nations with large cereal and oilseed surpluses, have not been important in international pork and poultry markets. Yet traditional trade theory suggests that nations export products utilizing their most abundant and cheapest resource.

The paradigm of competitiveness and of competitive advantage contributes to understanding the global pattern of production and trade in food products. Several areas of economic analysis—macroeconomics, trade theory, and microeconomic and business strategy—contribute to delineating the determinants

of competitiveness. The next chapter analyzes them in international food markets.

### Competitiveness

What does it mean to say that a nation's agriculture has lost its competitiveness? Or, more broadly, that a nation has lost its competitive advantage in international markets? The notion of competitiveness, or competitive advantage, can be a useful way of identifying issues and potential analytical concepts. Many definitions of *competitiveness* have been proposed that depend on (1) the level of analysis, e.g., on whether the unit of observation is nation, sector, or firm; (2) the good analyzed, e.g., on whether a commodity or a differentiated product is considered; and (3) the intent of analysis, e.g., on whether the goal is policy prescription, sector productivity growth, or export performance (Abbott and Bredahl, 1994).

What we should mean by competitiveness, and thus the principal goal of our economic policy, is the ability to sustain, in a global economy, an acceptable growth in the real standard of living of the population with an acceptably fair distribution, while efficiently providing employment for substantially all who can and wish to work, and doing so without reducing the growth potential in the standard of living of future generations (Landau, 1992, p. 6).

Seeking to explain 'competitiveness' at the national level, then, is to answer the wrong question. What we must understand are the determinants of productivity and the rate of productivity growth. To find answers, we must focus not on the economy as a whole but on *specific industries and industry segments* (Porter, 1990, p. 6).

A competitive industry is one that possesses the sustained ability to profitably gain and maintain market shares in domestic and/or foreign markets (Agriculture Canada, 1991, p. 3).

The first definition addresses factors broadly determining national competitiveness and policy evaluation of national economic policies; the second suggests that analysis at the national level does not contribute to the understanding of competitiveness; the third is adopted pragmatically to define sector performance in the same way that businesses measure success.

Competitiveness can be equated with individual health (White, 1994). A noncompetitive sector is analogous to a sick individual. Recognizing that the individual is sick is a short first step; the diagnosis of and cure for a specific malady is crucial. Detailed analysis of the potential causes of noncompetitiveness and information about how it best can be treated are required, as are two levels of analysis. Macro-level, sectorwide forces driving the performances of the national economy and of the food and agricultural sector must be analyzed first; and the forces driving firm decisions to produce, to invest, to innovate, and to adopt technology, second.

It is useful to establish a continuum of economic theories and subdisciplines, ranging from elegant but highly aggregated macroeconomic analysis to the detailed case studies of firm strategists. As one moves from one level to the next, theories and concepts become at the same time more detailed and complex yet less precise and elegant. Each level identifies a subset of determinants of performance in international markets. A common misunderstanding illustrates the importance of each level.

### Macroeconomic Concepts

Certain policies and economic forces affect all sectors of the economy more or less equally. Macroeconomic policies affect interest rates, taxes, and exchange rates. Each in turn affects consumption, investment, and the real prices of imports in the domestic market and of exports in foreign markets. These effects should be identified because policies may be proposed to address sector ills when symptoms have macroeconomic causes.

A bothersome misconception addressed by the macroeconomic perspective is that trade alone can balance the trade account. High U.S. interest rates and economic growth attract foreign investment. Large U.S. government deficits must attract foreign capital because the domestic savings rate is so low. And foreign borrowing must be matched by a trade deficit.

One lesson for competitiveness is that making U.S. industry more efficient will not alter two driving forc-

es behind our trade deficit—a burgeoning government deficit and a low U.S. domestic savings rate—that require the attraction of foreign savings. A second lesson is that macroeconomic forces can have a profound impact on the fortunes of U.S. economic sectors; this is seen to be especially true for agriculture.

### Macroeconomic Policies

Lack of competitiveness is perceived as manifesting itself in declining exports and worsening trade balance. Figure 2.1 shows merchandise imports and exports from 1975 to 1992. The *merchandise trade deficit* is, of course, the difference between the value of imports and exports. Rapid growth in the trade deficit occurred in the late 1970s and in the 1980s, after several years of steady but small trade surpluses.

Imports grew very rapidly in the early 1980s, expanding from \$250 billion in 1980 to \$338 billion in 1985. Exports on the other hand actually declined, falling to about \$200 billion in 1983. Merchandise exports did not reach their 1980 level until 1987. In 1985, exports began expanding rapidly, and the merchandise trade deficit has declined from its peak of about \$160 billion in 1987. A trade deficit of \$100 billion, however, persisted into the early 1990s. These movements in trade reflect the impacts of monetary and fiscal policies and also a fundamental weakening of U.S. competitiveness. Macroeconomic policies affect exchange rates, which in turn influence the price of imports in the domestic market and of U.S. exports in foreign markets.

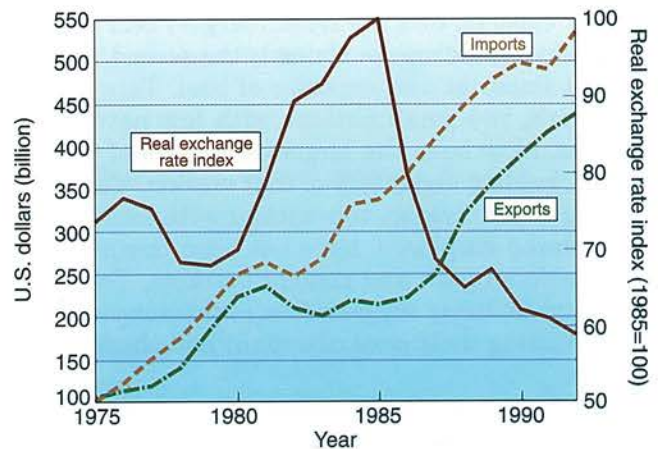


Figure 2.1. United States merchandise imports and exports and a real exchange rate index. Increasing index values indicate a strengthening of the dollar (Bredahl et al., 1994).

An exchange rate index that takes into account U.S. and foreign inflation also is shown in Figure 2.1. Clearly, macroeconomic policies in the United States and in other countries led to an exchange rate more favorable to imports than to exports in the early 1980s, but the opposite was true after 1985. Noteworthy is the lag between exchange rate changes and an improved trade balance, with the turnaround not coming until 1988.

Just as they affect merchandise import and export prices, macroeconomic policies generally affect agricultural and food trade. Figure 2.2 shows both the value of agricultural exports from 1976 to 1992 and a real exchange rate index. It is generally accepted that agricultural exports are affected negatively by a strengthening of the dollar, but with a lag. The key to evaluating competitiveness is separating microeconomic effects from macroeconomic forces.

**Productivity**

Problems with the competitiveness of U.S. exports, and fears that the United States was exporting the natural resource base instead of the product of labor were noted first in macroeconomic and trade data. Slower growth in U.S. *labor productivity*—i.e., GDP per worker, deteriorating *trade*, and international comparisons of productivity and trade trends suggested these problems in the mid-1980s or earlier. In 1985, returns to labor in the United States had been declining at 1.16%/yr since 1966, while those returns were increasing in Germany at 1.72%/yr and in Japan at 2.18%/yr (McCorriston and Sheldon, 1994). Relative export prices received by the United States

had declined at 1.66%/yr over this period, and had decreased at only 0.8%/yr in Germany, while increasing 1.44%/yr in Japan. The United States also had lost market share in export markets at a rate of 1.72%/yr, while Germany’s market share had increased slowly and Japan’s rapidly again. Lost market share and low prices led to decreased export revenues and hence to presumed loss of competitiveness.

Macroeconomists have focused on labor productivity trends in the United States, on trends in the United States relative to those in other countries, and on the factors contributing to economic growth. Figure 2.3 shows the components of U.S. economic growth from 1960 to 1993 and, in particular, contributions from increasing labor force participation and from increasing productivity. The figure illustrates a substantial reduction in the contribution of productivity growth relative to that of increases in the size of the workforce after 1975, with productivity declines recorded in the recession of 1982–1983. This scenario has improved considerably since 1985, however, with productivity again contributing to economic growth although at a rate slower than in the late 1960s and early 1970s. In short, the cause for alarm has abated.

Lau (1994) showed that both real (deflated) economic output/labor hour and stock of capital (machines)/worker have grown more slowly in the United States than in Japan, West Germany, the United Kingdom, or France. Although labor productivity was higher in the United States than in the other four countries in the 1960s, the United States has been overtaken by West Germany and France, and Japan is expected to catch up soon if trends continue. Lau sought to explain these trends by decomposing

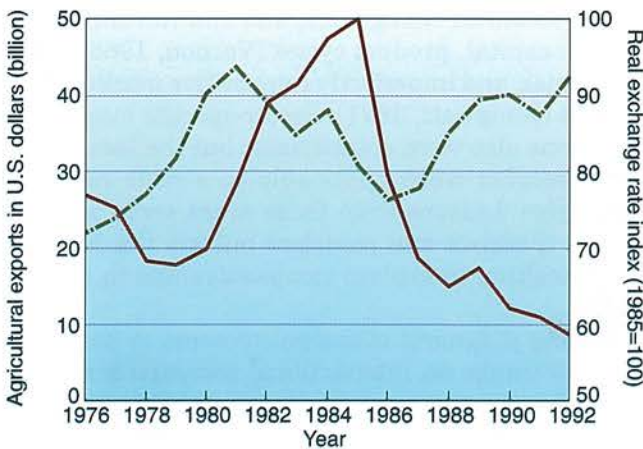


Figure 2.2. United States agricultural exports and a real exchange rate index. A strengthening of the dollar is indicated by an increase in the index (Bredahl et al., 1994).

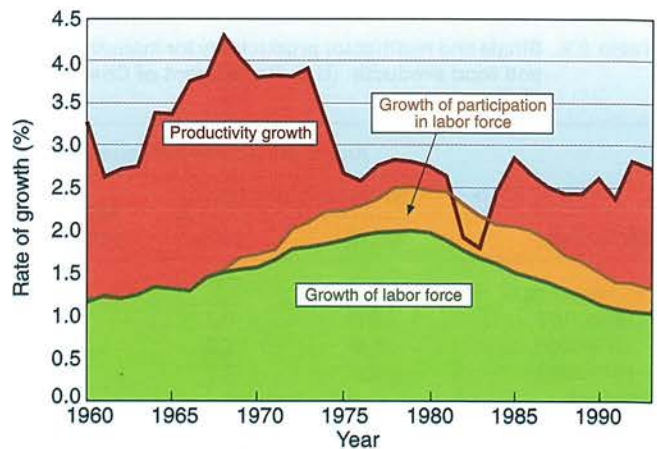


Figure 2.3. Sources of growth in U.S. economic output (Bredahl et al., 1994).

growth into the contributions of labor, capital, and technical progress and by estimating the annual rates of growth in technical progress, by country.

Table 2.1 presents his results. In the United States, technical progress made the smallest contribution toward economic growth, and the lowest rate of growth in technical progress was realized. The United States depended on increases in the labor force far more than other advanced economies did; and it was this relative trend in technical progress, as related to investment trends, which generated the worst fears concerning U.S. competitive position in world markets.

Economists also have used multifactor productivity growth to take into account trends in all production inputs. This measure considers—in addition to labor and capital—energy, materials, and services inputs to production. Table 2.2 reports U.S. Bureau of Labor Statistics data, for both manufactured goods and food products, regarding estimated growth in labor and capital and in multifactor productivity. These data show the slowing of U.S. productivity

growth since the early 1970s, as well as the dependence on labor productivity growth relative to that on the efficiency of other inputs. When growth to 1988 rather than to 1985 is considered, the data also pinpoint the worst problems as having occurred in the late 1970s, with some improvement after 1979. Productivity growth also is seen as slower for food products than for manufactured goods although the general trends are very similar.

### Trade Theory Concepts

Trade theory, which is only an extension of the macroeconomic approach, raises important questions not apparent from the macroeconomic framework. What should (will) be imported/exported? When are trade policies appropriate, and when counterproductive? Is there a special role for trade policy, apart from sectoral or macroeconomic policy? The basic theoretical trade model predicts that nations benefit from free trade and that factor endowments are important explanations of observed trade patterns. The principle of comparative advantage is a powerful tool in understanding patterns of production and trade. These basic principles are remarkably robust. Other principles, such as factor price equalization, of the basic theoretical model quickly fall apart when it is extended to many goods and factors.

The most useful insight arising from the trade literature comes from the empirical failure of standard models and not from their success. Determinants—other than natural resource endowments—that influence trade patterns include domestic demand conditions, product differentiation (Krugman, 1991; Porter, 1990), natural resources (Kenen, 1965; Vanek, 1959), technical change (Hayami and Ruttan, 1971), human capital, product cycles (Vernon, 1966), scale economies, and imperfectly competitive market institutions (Bhagwati, 1971). Sector-specific market institutions also were emphasized, but the lessons derived seldom were applicable to a wide range of industries. Lessons from these areas serve as caveats for theorists and modelers but are the grist for those seeking to explain competitiveness in specific cases.

Basing judgment of competitiveness or comparative advantage on international comparisons of the costs of production across nations probably is the most blatant violation of trade theory. In the study of comparative advantage, *relative*, not *absolute*, costs must be compared. Thus, while the United States may be the low cost producer of corn, other countries may produce and export corn if costs are low relative to

**Table 2.1. Relative contributions of the sources of economic growth for selected countries (Lau, 1994)**

Country	Capital (%)	Labor (%)	Technical progress (%)
France	28	-4	76
Germany	32	-10	78
Japan	40	5	55
United Kingdom	32	-5	73
United States	24	27	49

**Table 2.2. Single and multifactor productivity for manufacturing and food products (U.S. Department of Commerce, 1989)**

Sector/Year	Annual productivity growth rates		
	Single factor productivity		Multifactor productivity
	Capital	Labor	
Manufacturing			
1949-1973	0.2	2.7	1.6
1973-1988	-0.8	2.5	0.9
1979-1988	-0.4	2.7	1.6
Food and kindred products			
1949-1973	1.6	2.7	0.8
1973-1988	0.2	2.6	0.3
1979-1988	0.6	2.4	0.7

their costs for other goods.

In their analysis of the international competitiveness of cereals and oilseeds, Barkema et al. (1991) concluded that, in the short run, Argentina and Thailand can produce and ship corn to Rotterdam and/or Japan more cheaply than the United States can. Argentina, Australia, Canada, France, and the United Kingdom can produce and ship wheat to Rotterdam and/or Japan more cheaply than the United States can. No country can produce and ship soybeans more cheaply. Comparative advantage means relative, not absolute costs must be compared. Whereas Argentina may be the low cost producer (supplier) of corn, other countries may produce and export corn if returns (costs) are high (low) relative to *their* returns from (costs of) producing goods.

But can the international comparison of production costs be dismissed so cavalierly? Can it be true that a comparison of the cost to deliver a product to a foreign destination is of little value in the determination of competitiveness? The critical factor is the time period of analysis. Certainly, being competitive in a given market next week or next month, or perhaps even in 2 yr, depends on the ability to deliver a comparable product at a competitive price. Over the long run, and allowing markets and production to adjust, it is relative costs and returns that matter.

Sharples and Milham (1990) developed this practical operational definition: “. . . being competitive is the . . . ability to deliver goods and services at the time, place, and form sought by overseas buyers at prices as good as or better than those of other potential suppliers whilst earning at least opportunity cost returns on resources employed.” They noted that although Australia is a low-cost producer of mutton and wool, a survey of sheep farmers found a rate of return of only 1.3%. During the same period, Australian government bonds yielded a rate of return of 3.9%, so these sheep farmers would have been better off investing in government bonds than expanding or even maintaining their operation.

But even if Australians can produce wool more cheaply than, say, French farmers can, wool production might continue in France if its farmers have no better alternative available. An extreme example makes this point even more clear. An important policy question is the appropriate economic development strategy for many Sub-Saharan African countries. These countries have poor quality land, and their farmers use primitive technologies and face adverse weather patterns. But no good economic alternatives exist, and so the nations must pursue a development strategy emphasizing agriculture. This strategy is

valid although such farmers are much less efficient than U.S. farmers. Comparing the efficiency of U.S. and African farmers suggests that African countries should rely on the United States for food, but the critical question is what they would export to pay for those food imports.

Being competitive or having a comparative advantage is not an either/or proposition. Both change with the level of production and resource use. Popular analysis often suggests that a product for which a country is a high-cost producer should disappear from the production (and hence export) mix of that country. Modern economic analysis suggests that resource productivity and marginal cost differ with level of output, so that a country likely will regain its competitiveness as production decreases.

### Microeconomics/Business Strategy Concepts

A *microeconomic*, or business strategy, approach represents the most disaggregated and detailed level of analysis. Microeconomics relies on profit and utility maximization paradigms. Business strategy relies on an even larger set of issues, at times freeing itself of the theoretical constraints of microeconomic theory. Although encountering difficulties in the examination of intersectoral links and cross-product comparisons, this approach is the one most likely to identify for a given sector the appropriate policy and its probable success or failure.

One emerging empirical lesson is that constraints and advantages seldom are absolute. In both high- and low-wage nations, production of certain goods, e.g., computers, can persist for a variety of reasons, such as the segmenting of markets and the various levels of service and reliability demanded. If technical change passes them by, national economies with an inherent advantage also can stagnate and lose an industry. Generalizations regarding what is sufficient to guarantee competitiveness are quite elusive, and complex explanations arise for specific successes or failures. Although case studies are illuminating in retrospect and can highlight important issues, they do not lead to generalizable answers.

Assessments often focus on production costs as a criterion, when value added would be a better measure of the success or failure of a firm/product in trade. As explained earlier, *value added* counts the returns to labor, capital, and the government, i.e., those entities to whom the concerns of competitiveness are properly directed. This perspective reflects the broader concern reflected in the competitiveness debate, which goes beyond simply whether firms are

successful by also asking to whom benefits are distributed. With that said, analysis of U.S. industries based on the value added has been very limited because such data are collected much more rarely in the United States than in Europe.

### Summary

Each area of the continuum of useful concepts contributes to identifying the determinants of competi-

tiveness. These determinants, ranging from factor endowments and trade theory, to marketing and distribution channels and microeconomics and business strategy, are summarized in Table 2.3. Selection of research and development projects—public and private, and analysis of macroeconomic and other policies and of competitive advantage are eased by recognizing the broad coverage of factors determining competitiveness.

**Table 2.3. Determinants of competitiveness**

Determinant	Competitive factors
Factor endowments and natural resources	Natural resource advantages are of particular importance to agricultural commodities because soil, climate, and other natural conditions can determine where crops may be grown successfully.
Technology	Country-specific advantages determined by technology serve as the fundamental basis for a competitive advantage. Technical change may be cost reducing and/or quality enhancing.
Investment	The means by which technical change and industrial evolution are accomplished is investment. Market and technical factors affect investment strategies.
Human capital	Human resources are critical to competitiveness of specific products or sectors. Few enterprises require truly unskilled labor. Expertise is critical to an enterprise, but it need not be offered from the same nation that produces the final good sold.
Managerial expertise	Case studies point to firm failures when all signals seem to point to success, because of mistakes made by management.
Product characteristics	Tastes and preferences differ across or within nations, and successful business strategies can be designed around serving market niches in addition to broad market demands. Other nonprice factors such as reliability, maintenance, and service can be important components of product characteristics to both processors and final consumers.
Firm strategy and industry structure	There may be several successful firm strategies. Cost leadership is one option whereas serving market niches may not demand the lowest production cost.
Input supply	Few enterprises are completely integrated vertically. Relationships between producers and their input suppliers can be critical to the success of a firm or a product.
Marketing and distribution channels	The system to market products and especially to penetrate export markets can be crucial to the success of firms.
Infrastructure and externalities	Governments are responsible for the necessary infrastructure including public works, utility regulation, education, and other public goods. Often the determining factor is external benefits accruing not to a single enterprise but rather broadly to many possible ventures.
Regulatory environment	The government sets the rules of the game under which a firm must proceed, and these can be exceedingly specific and complex, constraining a firm's decisions and opportunities.
Trade policy	Trade policy is a special case of the set of regulations imposed on a firm and relates to products crossing borders. In agriculture, it is the set of domestic policies (or at least domestic objectives), more than the trade policies, which determine the environment within which firms compete. A critical yet unanswered question is when trade policy <i>per se</i> is an appropriate strategy for government.

# 3 Determinants of Agricultural Competitiveness

## Introduction

To identify the determinants affecting competitiveness in international food markets and to apply the theoretical concepts, this chapter draws from each of the areas discussed in Chapter 2. In turn, analyses and examples drawing from macroeconomic, trade theory, and microeconomics/business strategy are developed. The chapter concludes with a discussion of the four economies of agriculture and the factors affecting competitiveness in each economy.

## Technical Change

Hayami and Ruttan (1971) pioneered the work finding that technological change is in part determined by market factors, or, in short, that nations and companies innovate to conserve scarce resources. These market factors include input prices, product prices, and government policies. And different cultures develop different technologies and therefore demand different products.

The United States has more space than most other countries, and as a result U.S. houses are more spacious, as are lots and office buildings. Refrigerators also are more commonplace and much larger in the United States than in other countries. In Europe, space, including refrigeration space, is quite limited, and for this reason Europeans developed ultra-high temperature milk, which has a nonrefrigerated shelf life far beyond that of fresh milk. Ultra-high temperature milk is common in Europe but has never been popular in the United States: Americans simply have not required the same innovation that Europeans have.

Competitive pressure also can influence the extent of technical change. If firms compete based on product price and characteristics, competitive pressures naturally will force firms to innovate. Thus, a major conclusion of Porter's (1990) work was that one of the most important factors determining a firm's international competitive position is how much competition the firm faces in its domestic market. The more competition domestically, the more competitive the firm

will be internationally. For example, Kalaitzandonakes et al. (1994) found that productivity in Florida fresh vegetables facing significant competition from Mexico grew faster than productivity in vegetables facing minimal competition did.

Usually, technology is mobile across countries although lags may occur. The product lifecycle hypothesis describes a technological innovation, or a new product development, as having four stages (Vernon, 1966): (1) when the technology is adopted by the firm and used for goods consumed domestically; (2) when the technology is adapted to exported products; (3) when other countries begin to adopt the technology and to erode the innovating firm's market share overseas; and (4) when the other countries become so efficient that they export to the innovating country.

During this cycle, the technology, or product, has moved from a *higher differentiated status*, at which only certain firms or countries can use it, to a *non-differentiated status*, at which all countries can use it and output prices fall. This seems a depressing scenario for the innovating firm, yet Vernon (1966) argues that by the time other countries have adopted the technology, the firm already is beginning to adopt its next technological change, which will again differentiate it from other firms.

Nonagricultural examples, e.g., computers and computer chips, abound of the product lifecycle. The only way in which U.S. companies can compete internationally is to concentrate on the highest-quality new technology products that other countries cannot mimic. If U.S. firms are to succeed in the lower-quality spectrum, they must invest overseas to take advantage of lower-cost production factors. Firms constantly are innovating to stay ahead of their rivals, and the ultimate beneficiary, of course, is the consumer.

Government regulations can affect technological transfer between countries. The Japanese have restricted exports of Wagyu cattle in an attempt to keep other countries from providing beef that meets Japanese tastes. Likewise, the Chinese have restricted exports of Meishan pigs, which have much larger litters than other pigs do. Sometimes these regulations

work; usually they fail. And although it still is illegal to export tobacco seed from the United States, U.S. tobacco cultivars are found throughout the world.

## Infrastructure

Economic infrastructure—including utilities, roads and other transportation facilities, educational facilities, and supporting industries and services—can be crucial to the success or failure of an enterprise and so figures in location and investment decisions of firms. These often overlooked inputs to production and processing also are components of cost and can confer competitive advantages when special complementary services are nearby. The infrastructure components that matter to an activity can differ greatly and depend very much on industry specifics. Economies of scale are likely in the creation of such facilities and services. Competitive advantages conferred by infrastructure are best explained and illustrated by examples.

One obvious example of an infrastructure advantage for U.S. agricultural commodity exports is the well-developed transportation network of the Midwest. A complex system of road, rail, and river transportation services is available for the low-cost movement of grains and soybeans from dispersed production locations to ports for export. This system includes sophisticated grain handling equipment, which contributes to system efficiency. Although Brazil may produce soybeans at a lower cost on the farm than the United States does, much of that advantage is lost because Brazil lacks an efficient river and rail transport system to move beans from farm to port. Low transportation costs in the United States mean both that delivered cost at importers' ports is competitive and that farmers realize a higher percentage of the price ultimately paid by foreign consumers.

A second example of a competitive advantage due to infrastructure is the benefits to agriculture of the U.S. agricultural research system, which has led to increasing yields and has maintained resistance to pests and hence low production costs on the farm. Current research is investigating new food processing methods designed to lower cost and to enhance product quality. One important part of this system is the Land Grant system, which often concentrates on basic research that confers benefits widely and that may be hard for private economic agents (firms) to capture. Product development efforts are much easier for firms to *internalize*, i.e., to realize profits from, than applied research is, which occurs both at

the firm and the university or public level. Thus, the public system has helped society to realize the substantial social payoffs available from agricultural research whereas the private sector has focused on implementing that research for profit.

Infrastructure specifics can be especially important to high-value agricultural exports. Supporting services such as market intelligence aid in the definition of desired product characteristics; knowledge of processing methods—especially of those needed to tailor products to foreign consumer preferences and an efficient marketing and distribution system can keep food products competitive and profitable in foreign markets.

## Government Policies

Government intervention in an economy, e.g., in the form of trade policies and domestic regulations, has a profound impact on the competitiveness of a product in foreign markets. Taxes, subsidies, regulations affecting cost, product characteristics, processing methods, or marketing and distribution options determine a firm's economic environment and profits.

It is now widely recognized that domestic economic and agricultural policies can have important effects on trade, and for this reason recent efforts to liberalize trade policy in the Uruguay round of the General Agreement on Tariffs and Trade (GATT) addressed domestic agricultural policy reforms in addition to border measures. Trade policies tax or subsidize exports or imports, causing costs and returns to differ between domestic and international markets.

Domestic regulations may affect all firms equally when there are a single worldwide technology and a homogeneous product, but production methods and preferences for specific product characteristics often are country specific. Much like border measures, policies prohibiting certain production techniques or defining acceptable product characteristics may serve to protect domestic industries or may favor one exporting nation over another. Many trade disputes lodged under GATT involve not border measures per se but domestic regulations with discriminatory trade impacts.

Economists divide policies into *tariff barriers*, which tax imports of a product, and *nontariff barriers*, including quotas and technical regulations. Although the former are far more transparent in their economic effects, the latter—especially in the form of technical regulations—have significant effects on food and agricultural trade. One objective of GATT

has been to transform nontariff barriers into the more transparent tariff measures, which subsequently are more amenable to reduction. This strategy has worked well in decreasing protection of industrial goods in international trade and thus increasing trade over time.

A difficult issue is which domestic or trade regulations imposed on food imports are necessary to protect the health, safety, and welfare of citizens and which are disguised forms of protection for domestic industries. It is at times argued that the writers of import regulations do not utilize scientific evidence adequately. The U.S. ban on beef imports from countries in which cattle are infected by foot-and-mouth disease illustrates this problem.

Only canned beef imports from Argentina, an infected country, are permitted in the United States. The United Kingdom also wishes to protect its herds from this disease, but interprets the scientific evidence differently. The United Kingdom policy permits imports of boned cuts, based on the evidence that the disease is carried only in bones. Hence, Argentina, despite its status as a foot-and-mouth infected country, is an important supplier of beef in the United Kingdom. This disease has segmented the world beef market along lines dictated by policies governing the processing or product quality required of imports from infected regions (Forysthe et al., 1991).

The current debate on the role of environmental regulations in the North American Free Trade Agreement (NAFTA) also reflects this dilemma. Some argue that trade policy should be used to ensure environmental protection on a global basis. Others argue that differing worker safety requirements confer an unwarranted competitive advantage on the lax country, to the detriment of their workforces. On the other hand, environmental regulations are the concerns of sovereign governments that must reflect the priorities of their citizens, and these priorities depend upon stage of economic development. As a poorer country, Mexico may be more concerned with economic growth and less with environmental protection than the more affluent United States is. It has been shown that greater environmental protection is sought in higher-income countries.

Economic theory states that policies should be adopted that directly address the problem giving rise to them. Trade policies often are second best inasmuch as domestic policies directly addressing the issue would be more efficient and would not introduce additional economic distortions. For example, tariffs implicitly subsidize a protected sector while simultaneously taxing consumers. A direct subsidy is pre-

ferred because it avoids the distortions of the consumer tax accompanying a tariff.

Policy aimed directly at environmental problems is more likely to correct them than trade policy is. The concern that environmentalists have shown over trade policy reform, however, probably reflects the difficulty of implementing direct environmental measures, especially in foreign countries.

Economists also are concerned that environmental issues could be used to justify agricultural policies whose environmental rationales are not well-founded scientifically. In the recent GATT round, environmental concerns have been raised as legitimate reasons for continuing protectionist agricultural policies even though such policies may not be the best way of protecting the environment. In short, the concern is that environmental issues are simply a guise for protectionism.

Nontariff barriers also can affect the form in which imports are competitive and hence the directions in which trade evolves. For example, a quota may limit the quantity rather than the value of imports, driving trading partners to export higher and higher unit value products. When the United States limited automobile imports from Japan, the Japanese responded by shipping more luxury vehicles and fewer economy cars.

Before the European Union banned imports of beef treated with growth hormones, a similar phenomenon had been occurring slowly in EU beef import markets, in which most beef imports came under a restrictive quota and had become very high-quality cuts intended for the restaurant trade. The EU protection afforded such high premiums to quality that U.S. exporters still saw an opportunity to profit although much of the premiums accruing to the cuts had to be paid as border taxes.

An important component of policy is those regulations that govern the marketing institutions and arrangements arising for specific products. For example, a country's legal system establishes labeling requirements—including language restrictions, information requirements, and wording restrictions, all of which can impede imports. In France, wine marketing is controlled by the *appellation contrôlée* system, under which wine names indicate the region of origin rather than the type of grape. California exporters cannot market a *champagne* in France because the drink does not come from that region. Instead, imports must use some other name, which may denote lower quality to French consumers.

In this regard, the 1992 EU market unification initiative may offer benefits to third-country export-

ers to the European Union. Under this initiative, uniform labeling requirements and product standards were to be established throughout Europe. To the extent that this goal is achieved, exporters may create a product for the wider European market instead of being required to tailor products and labels to individual countries. The extent to which a *European product* can be produced is limited, however, because preferences across countries differ.

Another interesting aspect of policy reform is that it often involves changes in border measures and domestic regulations. The elimination of these restrictive domestic measures may permit certain segments of previously protected domestic industries to flourish so that when protection is removed the sector actually may expand rather than contract. Kalaitzandonakes and Bredahl (1993) showed this to be the case for both Japanese and New Zealand meat producers. Evidently, domestic regulation was more onerous for domestic than for foreign firms, and its elimination more than compensated for lack of protection from foreign competition.

Much of the debate on policy to affect competitiveness wrongly focuses on the use of export subsidies to enhance competitiveness. But theory and experience suggest that subsidies often have negative consequences. The intent of subsidies is both to capture market share from competing exporters and to increase the size of import markets by making products cheaper to consumers from importing countries. For many agricultural commodities, however, consumers may not be very price responsive, or imports may be made by a government agency more concerned with meeting food needs and achieving domestic price stability than with the cost of these imports. Moreover, subsidies to capture market share may be matched by competitors so that each exporter must incur a cost and yet in the end no market share is gained, or market shares (destinations for exports) simply are rearranged.

The international wheat market involves this dilemma for U.S. wheat export policy. Whereas U.S. wheat interests see the Export Enhancement Program (EEP) as highly successful in combating the European Union in international markets, the United States and the European Union could benefit from stopping the trade war and decreasing costly export subsidies. In periods of weak demand, most U.S. wheat exports have been subsidized by one or another subsidy program including P.L. 480 (Food Aid), the Commodity Credit Corporation, credit subsidies, or the EEP. Yet U.S. market share was highest during the late 1970s, when import demand was expanding

rapidly and the nation had the production capacity to meet it. Subsidies were not required during that period.

The infant industry literature from economic development illustrates another of the problems with subsidies. That literature initially proposed a justification for protecting new industries, which was based on the argument that although an initial period of protection is necessary, in time industries would grow and become competitive in world markets. But experience shows that, once begun, subsidies are nearly impossible to eliminate and that protected domestic industries often remain inefficient due to that protection. Moreover, with a protected domestic market, products meeting the higher quality standards needed for international trade may not be produced. Low-quality products are all that are available to domestic consumers due to the border measures in place. Research has shown that outward looking strategies are more successful than inward looking, protectionist trade policy regimes.

Another problem stemming from such regimes is the observed rent seeking behavior of firms. That is, protectionist policies confer on those receiving protection certain benefits in the form of rents rather than benefits in the form of returns to real investments. Firms may expend resources wastefully to capture those rents instead of devoting resources to product development or cost control. Lobbying the government for subsidies may become more profitable than making real investments. Many protectionist agricultural policies throughout the world have been identified as conferring benefits on special interest groups, with costs to society as a whole exceeding the targeted benefits due to the policies. Such protection may be sought in the form of subsidies but also can arise if technical regulations limit entry by foreign competitors.

## Product Differentiation

The food industry provides a classic illustration of Porter's ideas (1990) regarding the ways in which a firm can compete. It can do so based on a product distinctly different from all others because of characteristics such as quality, safety, packaging, reputation, and convenience; or it can do so based on price.

If the firm chooses the first strategy, it needs to use advertising and promotion to develop a consumer following. If the firm chooses the second strategy, it needs to compete with many processors with unbranded (private label) products in a market characterized by cut-throat competition, e.g., in which one-

tenth of one cent per unit could make the difference between a sale and a no-sale.

Piercy (1982) identifies another factor that differentiates one firm's output from another: service. Before output reaches the public, the processor must sell it to a wholesaler or to a retailer; in other words, a product must be sold to the ultimate distributor before the firm gets a chance to sell it to the end user. For this reason, the firm must supply products consistently and rapidly, provide technical advice, and change labeling and packaging, etc. when necessary, just to enter products into the distribution system.

Product identification and differentiation are especially important in international trade, for potential importers can choose from among many domestic and foreign food products. If customers are discriminating, the supplying firm must meet the needs of the importer, or a competitor will. It therefore is necessary for an exporter to establish a close relationship with the importer or distributor; otherwise, trade will suffer.

Product differentiation can affect policy unpredictably. Bredahl et al. (1992) found that, until recently, administration of the Japanese variable-levy system for pork disadvantaged those exporters unable to provide a range of products meeting Japanese market requirements. The reason was that a combination of high- and low-priced products was needed to minimize the variable levy. The United States therefore lost market share to Taiwan and Denmark after the mid-1970s. The researchers also found that liberalization of the Japanese pork market since 1986, which decreased the need to minimize the variable levy, significantly increased the market share of Taiwan at the expense of Denmark, which could no longer export pork loins in combination with bellies and hams. The impact of trade liberalization thus involved a good deal more than the response of producers and consumers to a price change.

The liberalization of the Japanese beef market also illustrates the importance of factors other than price in evaluating competitiveness. Despite numerous studies that have used models from simple elasticity models to complex consumer demand systems, few agricultural economists if any correctly predicted the outcome of liberalization of the Japanese beef market. The decisive factors in that outcome were (1) new entrants into the market and (2) emergence of new marketing channels and contractual relationships. The United States has captured the lion's share of the expanded market because a large domestic market allows U.S. processors to ship only that part of the beef carcass desired in the Japanese market and to

supply it on a timely basis. This advantage could not be exploited by Australia or New Zealand.

Product differentiation is more than simply advertising and promotion; research and development are as important. Products can be changed to incorporate characteristics desirable to consumers, or novel ingredients can be developed for use in the recipe. An example is the use of sweeteners in the soft drink industry. For many years, sugar was the only natural sweetener used in producing soft drinks. Artificial sweeteners such as saccharine were used, but the market was rather limited. High U.S. sugar prices generated research which led to a technical change allowing use of high fructose corn syrup (HFCS) as a sweetener. Now HFCS accounts for most of the natural sweetener used in soft drinks.

## Foreign Direct Investment

One perception is that multinational food firms invest in foreign countries because of lower wages there. But most U.S. investment in foreign food processing is in the European Union, which accounted for 60% of affiliate sales in 1991. Canada was another important processing location for U.S. multinational firms, accounting for 11% of U.S. foreign affiliate sales. Most foreign investment by the U.S. food industry is horizontal in nature, i.e., its purpose is to reach consumers in that foreign market. And given that this investment flows into developed countries—where wages are at least as high as in the United States, it seems logical that labor costs are not a major consideration in investment decisions.

Rather, such investments allow the U.S. company to jump over tariffs and other trade restrictions because foreign affiliates of U.S. food companies receive national treatment, i.e., are treated like domestic companies in terms of regulation and taxation. In most instances, U.S. foreign investment in the food industry is a strategy for entering the market and not one for decreasing food processing costs. United States foreign affiliates export a very small percentage of their output. In 1991, 76% of sales by foreign affiliates were for local consumption and most of the exporting done by U.S. foreign affiliates was intra-EU trade and hence duty-free.

Conversely, foreign food firms have found the United States an excellent place to invest. In 1991, foreign companies owned 229 affiliates in the United States and employed 241,700 people. These affiliates in the United States had 1991 sales of \$47.6 billion and assets of \$48.2 billion. Many affiliates had been acquired rather recently, so their asset value

was inflated relative to their sales. Obviously, international investment flows are two-way propositions for the United States. Investment inflows create jobs whereas investment outflows create competitive advantages for U.S. multinationals.

Larger food firms tend to invest overseas while smaller food firms tend to export. Reed and Marchant (1992) found that the ratio of foreign affiliate sales to U.S. exports for these U.S. food manufacturers was almost 3 in 1988. Thus, they were three times more likely to reach a foreign market through sales by a foreign affiliate than through exports from the United States. But the ratio was 10.6 for the 64 largest food processing firms, and 14.7 for the 20 largest food processing firms. The largest food processors are 15 times more likely to reach a foreign market through their foreign operations than by exports from the United States.

The largest U.S. food multinationals export on average only 3.5% of their output, yet foreign sales account for almost 28% of their total sales (Handy and Henderson, 1994). Reed and Ning (1995) found that these sales by foreign subsidiaries of U.S. multinationals tend to be competitive with U.S. processed food exports although both exports and affiliate sales have been increasing lately. Clearly, the role of multinational corporations must be considered carefully in discussions of manufactured food exports.

These U.S. multinationals are significant exporters, and their *intrafirm trade*, i.e., trade between their subsidiaries, accounts for 50% of all exports by foreign affiliates, or 10% of the total food output from their foreign facilities. Most of the exports from foreign affiliates of U.S. companies go to other foreign countries instead of to the United States. This intrafirm trade in food products is still much smaller than that in other manufacturing industries such as electronic equipment, automobile parts, and textiles, in which trade among affiliates is large because enterprises requiring low-skill labor typically are done in less developed countries.

Without a doubt, the role of U.S. multinational food companies is basic to the understanding of U.S. food product exports. Yet future growth of current U.S. multinationals may be dwarfed both by U.S. exports, which have been stimulated by new trade agreements in GATT and NAFTA, and by movement of current exporters into multinational status. Furthermore, many multinational food companies are finding it increasingly difficult to compete with smaller manufacturers who are producing own-label products for food retailers throughout the world. In response, these multinationals are shedding employees and

other costs.

Despite the importance of multinational food firms, U.S. exports of processed food products are increasing rapidly and constitute the fastest growing segment of U.S. agricultural exports. United States exports of processed foods increased from \$16.4 billion in 1988 to \$22.6 billion in 1992—a 38% increase in only 4 yr. And U.S. exports of processed fruits and vegetables, beverages, bakery products, and miscellaneous foods all increased at an even greater rate. The world's consumers are growing more concerned with product quality, so they are willing to pay for specialized food products from the United States.

As trade barriers for agricultural products fall, opportunities for exports/imports of differentiated food products will increase. An excellent example of increased trade in agriculture is the Canada-United States Free Trade Agreement. United States exports to Canada of animals and animal products increased by 110% (to \$892 million in 1992) over the first 3 yr of the agreement, while U.S. imports of animals and animal products from Canada increased by 50% (to \$1,853 million in 1992). Lowered trade barriers because of NAFTA and GATT will strengthen this trend toward increased U.S. exports and imports of similar products.

In summary, popular perceptions of U.S. multinational food firms have some truth to them: these companies invest a great deal of resources in foreign manufacturing plants whose output competes directly with U.S. processed food exports. Multinational food firms are not moving overseas, however, to take advantage of low-cost labor, because their affiliates are located in Canada, Germany, the United Kingdom, and other high-wage countries.

The most important entities with respect to processed food trade are the small-to medium-sized processors who are increasingly finding overseas markets for their products.

The U.S. food processing industry continues to globalize through investment and trade. This phenomenon cannot be classified as good or bad, nor is there anything that the United States can do to stop it. Obviously, every change creates winners and losers, but certainly the move toward increased global integration has generated many new opportunities for U.S. food firms. The U.S. government must make sure that it follows policies that do not diminish overseas opportunities for U.S. food processors.

## The Four Economies of Agriculture

The seminal article by Breimyer (1962) introduced the notion of the *three economies of agriculture*—namely, the production of primary products, the conversion of feedstuffs into animal products, and the marketing of food products. Four economies of agriculture that could serve as the basis for evaluating the usefulness of trade theory and for identifying the factors affecting location of production and pattern of trade will be defined in this report. The taxonomy will be defined in terms of the characteristics of economic activities, e.g., level of processing, and not in terms of the characteristics of products. Specifically, the taxonomy is based on potential substitution among traded and nontraded inputs, the linkage of production to end-use characteristics of final consumption goods, the relative importance of product versus process technology, and the resulting value added to economic activity. These four economies of agriculture are as follows:

1. production of an undifferentiated primary commodity with no linkage between production and end-use characteristics in final consumption;
2. production of differentiated primary products for which a linkage may exist between (a) production and processing and (b) end-use characteristics in final consumption;
3. conversion of primary products and commodities into semiprocessed products for further processing; and
4. conversion of primary and semiprocessed products into processed, consumer-ready products.

Selected issues identified during the discussion of

competitiveness in international food markets are presented within this context in Table 3.1. The importance of each issue is ranked for the four economies.

The columns include the substantive competitiveness issues for each type of economic activity. For example, natural resource advantage, cost-reducing technology, infrastructure, and trade/domestic policies were the issues judged most important to competitiveness in global commodity markets. Quality-enhancing technology, human capital, firm strategy, industry structure, and nonprice factors were judged less important. For semiprocessed products, cost-reducing technology and government policies were judged less important. Salient issues for that sector and for the consumption-ready product sector included firm strategy, industry structure, and product quality. These issues could be paramount if the end-use characteristic needed to be present from the farm level to the final product. Although policies might affect trade of consumer-ready products, few agricultural economists seem to be conducting research on the critical technical barriers that matter most.

Evaluating the separate elements of Table 3.1 without regard for the interactions across them is inappropriate. Commodities, which are closely linked to natural resources, can become differentiated products, e.g., identity-preserved cereals; and, in such an instance, the second column identifies the major competitiveness issues. Firm strategy and industry structure cannot evolve independently from type of economic activity. Cost and comparative advantage matter but are not the only factors influencing success in international markets. As one moves up the four economies of agriculture to products with higher value-added content, cost and comparative advantage become less important.

Table 3.1. The four economies of agriculture and the importance of determinants of competitiveness (Abbott and Bredahl, 1994)

Determinants of competitiveness (Value added)	Production, assembly, transformation (processing), and final distribution of			
	Undifferentiated primary commodities (Little value added)	Differentiated primary products (Some value added)	Semiprocessed products (Great value added)	Consumption-ready products (Greatest value added)
Natural resource advantage, factor endowments	Generally critical, but the mobility of technology likely is diminishing its importance		Little importance, but varies with mobility of primary inputs	Little importance, but varies with mobility of primary and semi-process products
Cost reducing technology	Mandatory, but technology is increasingly mobile	Some importance, but product differentiation requires that characteristics be reflected in production practices; technology generally mobile		
Human capital and managerial expertise	Some importance, skills in application of production technology important; many people involved		Great importance; skills are critical, especially in organization and coordination of activities, with fewer people involved	
Quality enhancing technology	Some importance; transportation for example	Some importance; quality and product form are closely related	End-use characteristics are most important	
Product characteristics and nonprice factors	Grades and standards provide information	Product differentiation possible through quality differences	Degree of product differentiation and other activities determine the amount of value added	
Firm strategy	Minimum cost is only feasible strategy	Cost and differentiation are possible strategies	Cost leadership and product differentiation, or a combination may be pursued	
Industry structure, input supply, marketing and distribution channels	Markets provide vertical coordination	Depends on economies of scale in economic activities other than production. Markets or hierarchies link primary product production. Often accomplished by single firms. Importance of end-use characteristics at farm level varies and influences vertical coordination of markets.		
Infrastructure	Important to cost competitiveness		Important to cost competitiveness, product differentiation, and innovation.	
Regulations, environment, and trade policies	Great, but declining; may determine trade patterns	Varies greatly; policies greatly influence competitiveness and trade patterns. But often policy impacts are indirect. Technical barriers matter most.		

## 4 Increasing Agricultural Competitiveness

### Role of Land Grant Colleges and Universities

This document's implications for the Land Grant university system are important, indeed, if the United States is to develop a competitive food industry. Universities cannot facilitate the transition to a new world-economy if they focus on research for homogeneous products: the markets for such products are limited compared with those for more processed foods. Processed foods are highly differentiated and often produced by large agribusinesses striving to capture individual competitive advantages from research and development. Great potential private-sector benefits are available to individual firms from research on differentiated product issues, and the focus of Land Grant research must change if the system is to assist such firms in their struggle for competitiveness.

Bullock (1994) analyzed the amount of research conducted relative to the importance of that research within the four economies of agriculture. He argued that agricultural experiment stations have focused research attention on a small part of the matrix of relevant research activities, specifically on developing cost reduction technologies, improving factor quality and infrastructure, and analyzing regulatory and trade policies. These activities have broad benefits for agriculture but are most important for undifferentiated, primary commodities. Product differentiation, quality enhancement technology, managerial expertise, industrial institutions, and many other considerations essential to the manufacturers of consumer-ready products are paid little attention by agricultural experiment stations. It is crucial, however, for the Land Grant university system to link its research priorities with economic payoffs to the entire agricultural system.

To get a clear idea of the payoff to society, those setting priorities must consider (1) activities to add value, (2) international diffusion of technology, and (3) private versus public benefits from research. They must pay close attention to the end use of products and to the means of tailoring product characteristics to these uses. Quality enhancing technological devel-

opment and design of technical regulations optimal from a scientific viewpoint must become research areas of high priority. Given the consolidation of food industries in the United States and worldwide, analysis of industrial structures and firm strategies will become increasingly important. These topics have received little attention in the past, yet they are crying out for attention and will continue doing so.

The major problem with these new research areas is that they generate private benefits for individual firms, and consequently the Land Grant university system has shied away from research of this type. Although research on cost-reducing technologies that can be extended to thousands of farmers does not generate concern about Land Grant universities' use of public resources to generate concentrated private benefits, such research could be exhibiting diminishing returns over time relative to the returns on research concerning the consumer oriented products already mentioned. If returns do diminish, the Land Grant university system must change its research agenda as well as its stance toward research benefits if it is to reap substantial economic payoffs.

As the food industry continues to consolidate and to privatize throughout the world and becomes ever less farm-resource intensive, the Land Grant university system will be forced either to deal with additional questions concerning private versus public benefits from research or simply to withdraw from the growing market for research topics with firm-level consequences. Put differently, agricultural experiment stations will have a choice between downsizing and increasing collaboration on and possibly subsidization of research with the private sector. These days, major agribusinesses are not looking for farm-level technologies to decrease their ingredient cost by a fraction of a cent per pound; rather, they are looking for new technologies with which to deliver products at a time and a place and in a form that will improve their competitiveness in the world economy. Of course, these businesses will accept lower ingredient costs, but they would much prefer technical advances in other more challenging and firm-specific areas.

## The Role of Government

Whereas policy has a substantial role in creating the competitive environment that firms operate in, the extent to which policy can stimulate competitiveness is limited. It now is evident from both a theoretical and a practical perspective that subsidies seldom are successful in conferring competitive advantage on a sector or a firm. The examples already discussed were intended to show how export subsidies can be ineffective means of capturing market share or of expanding market demand and yet are self-perpetuating and costly. Trade theory shows that even when firms or governments have market power, subsidies can work to the disadvantage of exporters and seldom are likely to improve overall national welfare. The success of subsidies depends crucially on how firms interact with and judge the competitive responses of rivals. These factors may be unknown to the government and can change as policies are altered.

The benefits to special interests of a subsidy policy generally are overwhelmed by the implicit costs borne by other parts of society. For example, in the United States and in Europe, export subsidies on agricultural commodities may benefit farmers and exporters, but the costs in terms of higher food prices paid by consumers and processors and greater burdens placed on taxpayers usually exceed producer benefits. Benefits often also are distributed unequally among producers and may not reach targeted beneficiaries, e.g., small family-farms.

What the government can do is seek to foster a competitive, well-functioning market. Regulations necessary to protect the health, safety, and welfare of the population need to be imposed whereas regulations intended solely to protect domestic firms from foreign competition must be avoided. In such an environment, healthy firms can thrive and sickly firms,

which if protected by regulations or border measures might be more a drain on than a benefit to society, may fail. Difficult decisions are required regarding which regulations are appropriate based on scientific evidence and which economic sectors can be saved at a reasonable cost.

Government also must play a role in creating industrial infrastructure, which often is embodied in public goods for which benefits are dispersed widely and is difficult for firms to capture directly. Free riders may take advantage of infrastructure created by other firms and thereby discourage all firms from making needed investments. For example, firms may hesitate to incur the costs of training workers if they are likely to be hired away by competing firms.

The government also may fund or conduct basic research to help an industry stay at the leading edge when the benefits of such research are difficult for firms to internalize in products. Under such conditions, it is beneficial for the government to create infrastructure if firms fail to. This is, in fact, the classic *raison d'être* for government. Again, hard choices need to be made regarding which among many opportunities to pursue.

The macroeconomic environment is crucial to the evolution and the fortunes of agriculture and agribusiness sectors. The performances of these sectors have followed macroeconomic cycles closely. Stable and predictable macroeconomic policies are called for to permit long-range planning by businesspeople, farmers, and agricultural policymakers. Radically changing macroeconomic conditions can alter competitive advantage dramatically, as exchange-rate swings in the 1980s demonstrated. The outcome of the Agricultural and Food Act of 1981, in which loan rates were set out of line relative to subsequent inflation rates, also highlights the importance of stable and predictable macroeconomic policy to agricultural policy formation.

# Appendix A: Acronyms and Symbols

<b>EEP</b>	Export Enhancement Program	<b>GNP</b>	Gross National Product
<b>EU</b>	Economic Union	<b>HFCS</b>	high fructose corn syrup
<b>FY</b>	fiscal year	<b>NAFTA</b>	North American Free Trade Agreement
<b>GATT</b>	General Agreement on Tariffs and Trade	<b>yr</b>	year

## Appendix B: Glossary

**Appellation contrôlée system.** French system under which wine names indicate the region of origin rather than the type of grape.

**Commodity trade.** Trade including relatively homogenous raw, unprocessed products such as wheat, corn, and soybeans.

**Consumption-ready.** Manufactured.

**Export unit value.** The value divided by the quantity of exports.

**Foreign affiliates.** Subsidiary businesses in which a firm has long-term interest.

**Foreign direct investment.** An investment made in another country to obtain a lasting, or ownership, interest in its economy.

**Higher differentiated status.** At which only certain firms or countries can use it.

**High-value trade.** Trade including relatively heterogeneous high-value unprocessed products such as fresh fruits and vegetables, semiprocessed products such as fresh and frozen meat, and highly processed products such as manufactured food.

**Horizontal foreign direct investment.** Investment in a stage of processing as occurs in the home country.

**Horizontal foreign investment.** Investment whereby subsidiaries performing the same tasks overseas as they perform in the United States.

**Internalize.** Realize profits from.

**Intra-EU trade.** Trade among the member countries of the European Union is excluded, and only trade with third countries is included.

**Intrafirm trade.** Trade between subsidiaries.

**Labor productivity.** Gross Domestic Product (GDP) per worker.

**Manufactured food.** An agricultural product that has undergone processing.

**Merchandise trade deficit.** The difference between the value of imports and exports.

**Mix of products.** A combination of commodities and high-value products.

**Nondifferentiated status.** At which all countries can use it and output prices fall.

**Nontariff barriers.** Quotas and technical regulations.

**Tariff barriers.** Tax imports of a product.

**Three economies of agriculture.** The production of primary products, the conversion of feedstuffs into animal products, and the marketing of food products.

**Value-added.** The value that an activity adds to the resources consumed in the production of a given output.

**Vertical foreign direct investment.** Investment in a stage of production different from that in the home country.

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