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The Links Between Development and World Trade

Thomas L. Vollrath

Economic development in the various nations shape the patterns of world trade. A nation's exports and imports affect demand and supply, including available resources, with "resources" here understood to include such factors as educational level and technical skills, as well as such physical assets as land, water, and climate. When two nations' competitive advantages (and disadvantages) complement each other, a natural trading partnership can ensue. But, between nations of similar endowments a true competition exists. Trade is less likely to occur between the two countries, and producers in both nations are likely to vie for the same trade in the global marketplace.

Differences in national economic structures are the source of commodity exchanges and resource allocations. Changes in these structures will bring about changes in international trade patterns. Alterations in a country's technological base and growth in its domestic income will generate shifts in the way resources are used, and will alter the composition and direction of trade in the international market. This report shows how competitive advantages can complement or compete with one another. In addition, it gives formulas which measure such advantages.

Economic complementarity still largely marks the trading patterns between the United States and 12 nations of Asia Near East and North Africa. Additional capital investment channeled into unskilled labor-intensive manufacturing in these countries—perhaps in part through U.S. development assistance programs—enhances this complementarity.

This study divides national economies into eight sectors, one of which is agriculture. The other sectors are high-tech goods, finished capital goods, basic intermediates, intermediate manufacturing, agriculturally linked industries, mining, and fish and forestry.[1] These eight sectors, whose industry classifications table 1 describes, will be understood to comprise total merchandise trade.

The trading patterns considered are those of the United States and of 12 other nations in the area referred to here as Asia Near East and North Africa: Bangladesh, Egypt, Indonesia, India, Jordan, Morocco, Nepal, the Philippines, Pakistan, Sri Lanka, Thailand, and Tunisia. The data given are based on worldwide trade records of the United States and these nations between 1962 and 1985.

[1]Data were obtained from the United States Trade Net System at the National Institutes of Health.

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Findings:

1. Levels of economic development among nations determine the patterns of the global marketplace.
   - Competitive advantages or disadvantages in trade arise from differences in national resources (resources in the wider sense).
   - Changes in a nation's economic structures will bring about changes in international trade patterns.
2. Economic complementarity largely characterizes the trading patterns between the United States and the 12 nations of Asia Near East and North Africa considered here.

Differing Developmental Levels Bring Complementary Trade Patterns

Competitive advantages in world trade follow nations' developmental levels. A high-level-development country and a low-level one tend to form a complementary trading partnership.

Countries have become increasingly linked to the global economy during the past 25 years. There has been a dramatic shift in trade patterns and in the location of production of goods offered for international purchase. At the same time, a well-integrated international capital market has emerged.[2] These factors ensure that both domestic and foreign funds will flow toward profitable investments, wherever they may be. Decisionmakers must be able to identify those areas in which their country has a competitive advantage in the world market, if they wish to design rational economic policies and to appropriate monies from funding sources.

The United States and the Asia Near East and North Africa countries are competitive in different economic areas because of their dissimilar supply and demand structures. Trade specialization will reflect these differences because each country has a unique endowment of resources. (Here, again, "resources" applies to such factors as skills and educational levels, as well as material assets.)

This study divides these resources into eight economic sectors, which help describe the level of development of a country and thus its activity in the world marketplace. Table 1, describing these sectors, is arranged in a *ladder of development*, showing the changing requirements of production processes necessary for an output from that sector. The increasing need for skilled labor as the ladder goes upward is illustrated.

Low on the ladder of development are the agriculturally linked industries which use substantial unskilled labor relative to other inputs. Above come intermediate manufactures and basic intermediates. These two sectors depend upon moderately skilled labor. The top two rungs—finished capital and high-tech industries—require highly skilled and very highly skilled labor, respectively. Post-World War II Japan has climbed this ladder. During the past two decades, the newly industrializing countries have been rapidly scaling it as well.

A high-level-development country and a low-level one tend to form a complementary trading partnership. The competitive advantages of the United States and of the nations in Asia Near East and North Africa are complementary because the United States and these nations are at different levels of economic development.

Patterns of consumption and production differ in high-level development and low-level development nations. The demand for food is a striking example of this. In low-income countries, a relatively small increase in income will permit a relatively large increase in food demand. But in high-income countries, an increase in income has less of an effect on food demand because the consumer's need for food has already been largely satisfied. Also, low-income countries specialize in industries that intensively use unskilled labor, since unskilled labor is comparatively plentiful for them. But, high-income countries concentrate production in areas that intensively use very highly skilled labor, a resource that they possess in relative abundance.

An overall competitive trade structure occurs—that is, the nations are in actual competition—when two countries have the same competitive advantages (and therefore the same competitive disadvantages). Also, the reverse is true: the trade structure becomes complementary when the two have *dis*similar competitive advantages and competitive disadvantages.

[2]Schuh (*1*) notes that international capital flows currently swamp international trade flows. He estimates 1984 capital exchange flow at $42 trillion, and flow of real commodities at only $2 trillion. Italicized numbers in parentheses refer to items listed in the References section.

Table 1—A sketch of eight economic sectors: input-output descriptions

Sector	Typical industries	Factor intensity requirement
High tech	Medical products, optical and medical instruments, telecommunication equipment, organic and inorganic chemicals, etc.	Very highly skilled labor
Finished capital	Automobiles, trucks, buses, boats, ships, aircraft, agricultural machinery, war firearms, etc.	Highly skilled labor and capital
Basic intermediates	Iron and steel, electrical energy, processed petroleum and coal, paper, fertilizer, rubber, plastic, etc.	Moderately skilled labor and capital
Intermediate manufacturing	Office supplies; maps; musical instruments; hunting and sporting equipment; watches and clocks; plumbing, heating, and lighting equipment; etc.	Moderately skilled labor
Agriculturally linked industries	Textiles, yarn, fabrics, clothing, leather, footwear, furniture, etc.	Unskilled labor
Mining	Crude fertilizer, natural gas, unprocessed petroleum and coal, metalliferous ores, etc.	Natural resources
Fish and forestry	Wood, lumber, and cork; pulp and waste paper; fish and fish preparations; etc.	Natural resources
Agriculture	Food and live animals; beverages and tobacco; animals and vegetable oils; etc.	Land, labor, and capital

Method for Determining Competitive Trade Advantage

The "revealed competitiveness" concept expresses what the trade record reveals about a nation's total capacity to compete against others in the world market.

A summary indicator of complicated world trade patterns can be worked out using the concept of revealed competitiveness.

A nation's revealed competitiveness in a particular economic sector is a measure of how well the country competes in that sector compared with how well the country competes across all sectors and with other nations. The measure, based on trade records, incorporates all factors influencing competition, not only demand, but land, labor, and capital, as well as governmental policy. Revealed competitiveness summarizes how well a country's particular economic sector (say, agriculture) competes with other economic sectors at home and abroad. It necessarily includes both the nation's exports and its imports. The revealed competitiveness number can then be compared with another country's number as a way to summarize a very complicated series of effects and countereffects in the global marketplace.[3]

The revealed competitiveness statistic *(RC)* can be expressed logarithmically for convenience of interpretation as follows:

$$RC_{an}^{ir} = Ln\{[XS_a^i/XS_a^r)/(XS_n^i/XS_n^r)/ [MD_a^i/MD_a^r)/MD_n^i/MD_n^r]\},$$

where *XS* refers to exports, *MD* to imports, subscript *a* to any particular sector, subscript *n* to a commodity composite aggregate, consisting of all other sectors, and superscripts *i* and *r* to the home country and to the rest of the world, respectively.

A positive value for revealed competitiveness indicates that the country or region in question possesses a relative competitive advantage for the particular commodity being investigated. Conversely, a negative value indicates a relative competitive disadvantage.

[3]For a detailed breakdown of the revealed competitiveness statistic into its component parts, see (*3*).

A merit of this revealed competitiveness indicator is that it is a useful measure of competitiveness when goods from the same production sector are both imported and exported. This is often the case in the real world, especially when the production sectors have been rather broadly defined, as is the case with table 1. For example, the United States is a large exporter of grains. But it also imports agricultural products from the tropics. A calculation of the revealed competitiveness for U.S. agriculture would reveal both its exports and its imports in the agricultural sector.

When economic sectors are defined by intensity levels of inputs required for their production (inputs still including skills and education as well as other "resources"), then the revealed competitiveness measure can generally identify the direction that a country's investment and trade should take, to exploit its differences in relative factor assets. This concept is especially useful when applied to the differences between developing countries and the more developed nations.

Another advantage of the revealed competitiveness indicator is that it indicates the effects of relative supply and demand. It does this, since the nation being considered and the rest of the world have their exports and imports consolidated in one single number. The idea is analogous to economists' theoretical concept of comparative advantage. (In fact, the terms "competitive advantage" and "competitive disadvantage" have been used interchangeably with "revealed competitiveness" in this study.)

However, revealed competitiveness is not equivalent to comparative advantage. Market imperfections affect the former, but leave the latter unchanged. Such imperfections are induced by policy and by faulty transmission of information.

Thus, while revealed competitiveness may approximate comparative advantage, this indicator needs to be purged of the impacts of distortions before it can be considered an unadulterated measure of comparative advantage.

Methods for Determining Complementarity and Competitiveness in World Trade

Complementarity—which occurs when a nation with a competitive advantage trades with one with the corresponding disadvantage—is strikingly evident in the trade patterns between the United States and the nations of Asia Near East and North Africa.

When the United States is considered in relation to the Asia Near East and North Africa region, the trade complementarity between our country and these nations is striking. Overall complementarity occurs when the United States has competitive advantages in sectors where Asia Near East and North Africa has competitive disadvantages, and vice versa.

Asia Near East and North Africa displays a competitive disadvantage in finished capital and high tech, two sectors in which the United States possesses a competitive advantage. Conversely, these other nations show a competitive advantage in three sectors for which the United States reveals a competitive disadvantage: agriculturally linked industries, mining, and fish and forestry. Only in the sector identified in table 1 as basic intermediates (iron and steel, petroleum, etc.) is competition between the United States and Asia Near East and North Africa likely to occur; for, here, both have a competitive disadvantage that is diminishing with time.

A summary statement of the extent to which the United States *(u)* and any country in Asia Near East and North Africa *(v)* have overall trade structures that are competitive or complementary can be determined. This is done by relating their competitive advantage vectors, RC^u and RC^v. This relationship is identified by first measuring the covariance, defined as the trade-weighted sum of the product of each country's competitive advantage deviations from their mean, zero:

$$cov(RC^u, RC^v) \equiv \Sigma_a [(T_{\ddot{a}}/T^{\cdot})*(RC^u - 0)*(RC^v - 0)],$$

where $T_{\ddot{a}}$ and $T^{\cdot}$ refer to total world trade of commodity a and of all commodities, respectively.

The degree of overall economic competitiveness or complementarity between the United States and country v is affected by the matching of competitive advantage structures, and it is also influenced by the concentration or diversification of the sectors. For instance, a country, like Morocco or Tunisia, whose structure of revealed competitiveness shows a concentration on a few production sectors, tends to have a higher complementarity in its trade with the United States than a country, such as India, with a similar but more diversified trade structure.

Such concentration (or diversification) is measured in terms of standard deviations of revealed competitiveness indexes from their mean, zero:

$$\sigma(RC^u) \equiv \sqrt{\Sigma_a (T_{\ddot{a}}/T^{\cdot})*(RC_a^u - 0)}$$

$$\sigma(RC^v) \equiv \sqrt{\Sigma_a (T_{\ddot{a}}/T^{\cdot})*(RC_a^v - 0)}.$$

The simple correlation coefficient provides a synthesis of overall competitiveness/complementarity:

$$r_{uv} \equiv cov(RC^u, RC^v)/\sigma RC^u * \sigma RC^v.$$

This statistic summarizes how two countries' trade makeup interlock in terms of:

- the tendency for their competitive advantage vectors to move together; and
- the degree of specialization in their competitive advantage structures.

If the United States and country v have an overall competitive trade structure, r_{uv} takes a value approaching 1. However, if they have an overall complementary trade structure, the correlation coefficient approaches a value of -1.

Competitive Advantages and Disadvantages of the United States in Eight Economic Sectors

The competitive advantages of the United States are concentrated in those economic sectors that require high levels of development.

A country's trade structure can be defined in terms of its pattern of revealed competitiveness across a range of economic production sectors. The vector RC^i over all sectors (RC_1^i, RC_2^i,...RC_n^i) shows the competitive advantage structure for any country *i*. Large positive *RC* values denote strong competitive advantages. Large negative values identify convincing competitive disadvantages.

Time series estimates of revealed competitiveness for the United States in eight economic sectors are shown in figure 1. Competitiveness patterns typifying Asia Near East and North Africa are shown in figure 2.

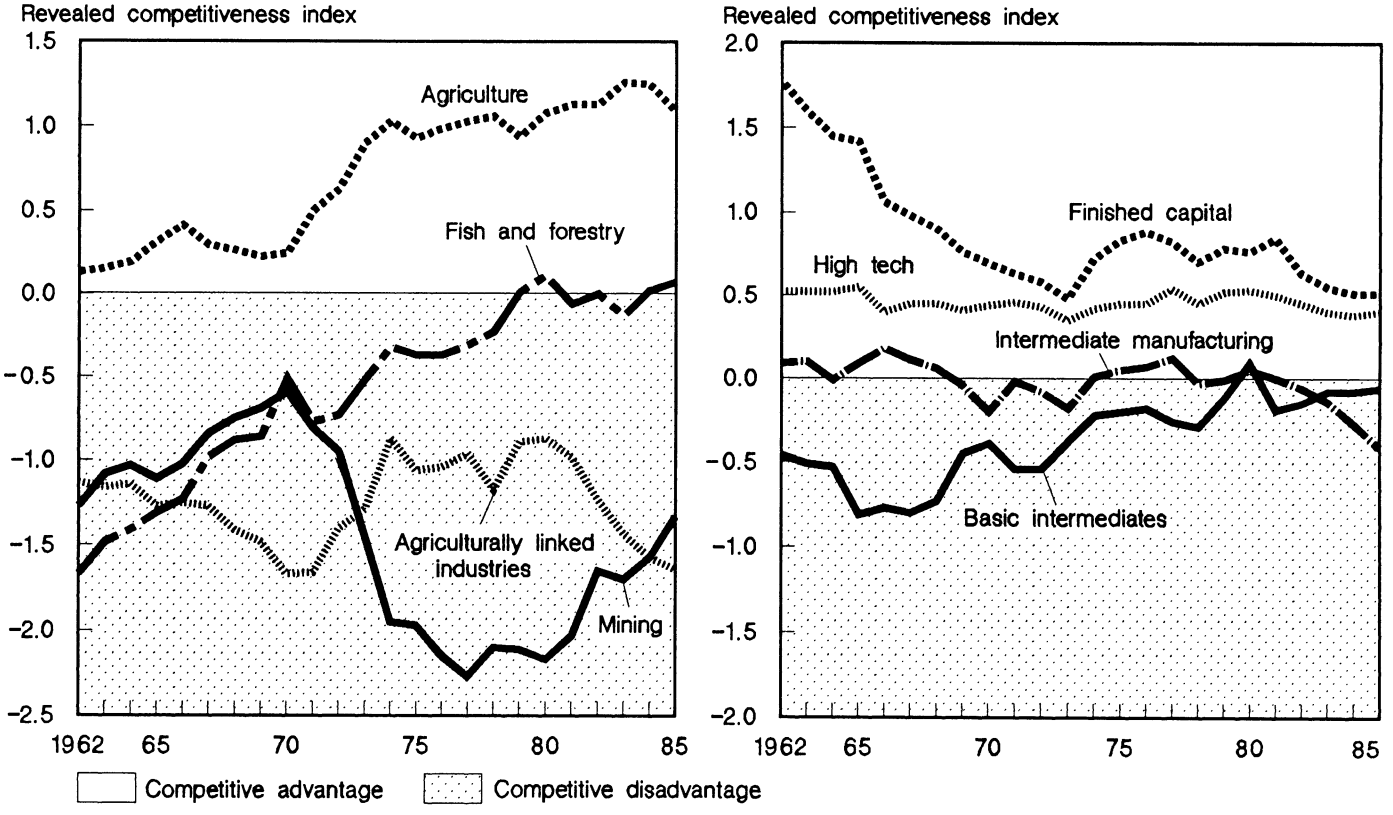
The United States displays a competitive advantage in the following three sectors: agriculture, finished capital, and high tech. The relative abundance of the U.S. land resource base, its capital endowment, and its highly trained labor force explain why the United States would be expected to have a comparative advantage in these sectors.

Agriculture is the only one of these three sectors in which the United States is increasing its relative competitive edge in the long run. This may be attributable, in part, to domestic support for U.S. agriculture.[4]

However, the United States is losing its competitive advantage in the finished capital sector. But its competitive advantage in the high-tech sector has remained stable. The United States is competitively neutral with

[4]However, Vollrath (*3*) found an inverse relationship between revealed competitive advantage and protection in both the U.S. and world agriculture.

Figure 1
Economic trade competitiveness of the United States



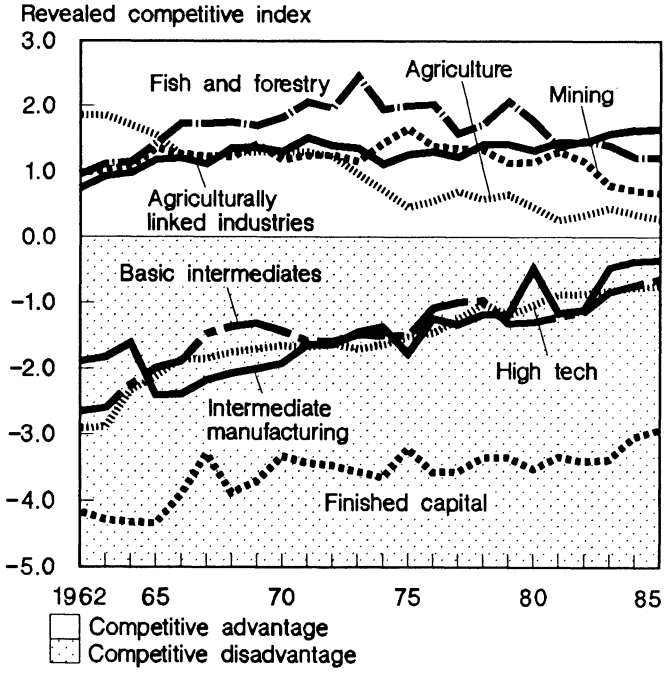
respect to intermediate manufactures, which are defined—table 1—as using much moderately skilled labor.

But the U.S record reveals a competitive *dis*advantage in agriculturally linked industries, as well as in mining, fish and forestry, and basic intermediates. The first three of these sectors need intensive use of natural resources and unskilled labor, and basic intermediates require much moderately skilled labor and capital.

For mining and agriculturally linked industries, the competitive disadvantage for the United States is especially marked. Also, by the 1980's, this country had become competitively neutral with respect to basic intermediates and to fish and forestry, because of rising relative supply for the former and the declining relative demand for the latter.

Figure 2

Economic trade competitiveness of Asia Near East and North Africa



Agriculture: Competitive Advantages and Disadvantages of the United States and the Nations of Asia Near East and North Africa

The United States is increasing its competitive advantage in agriculture in relation to the nations of Asia Near East and North Africa.

Both the United States and the Asia Near East and North Africa region display competitive advantages in agriculture during the period analyzed in this study. This is reflected in figure 3.

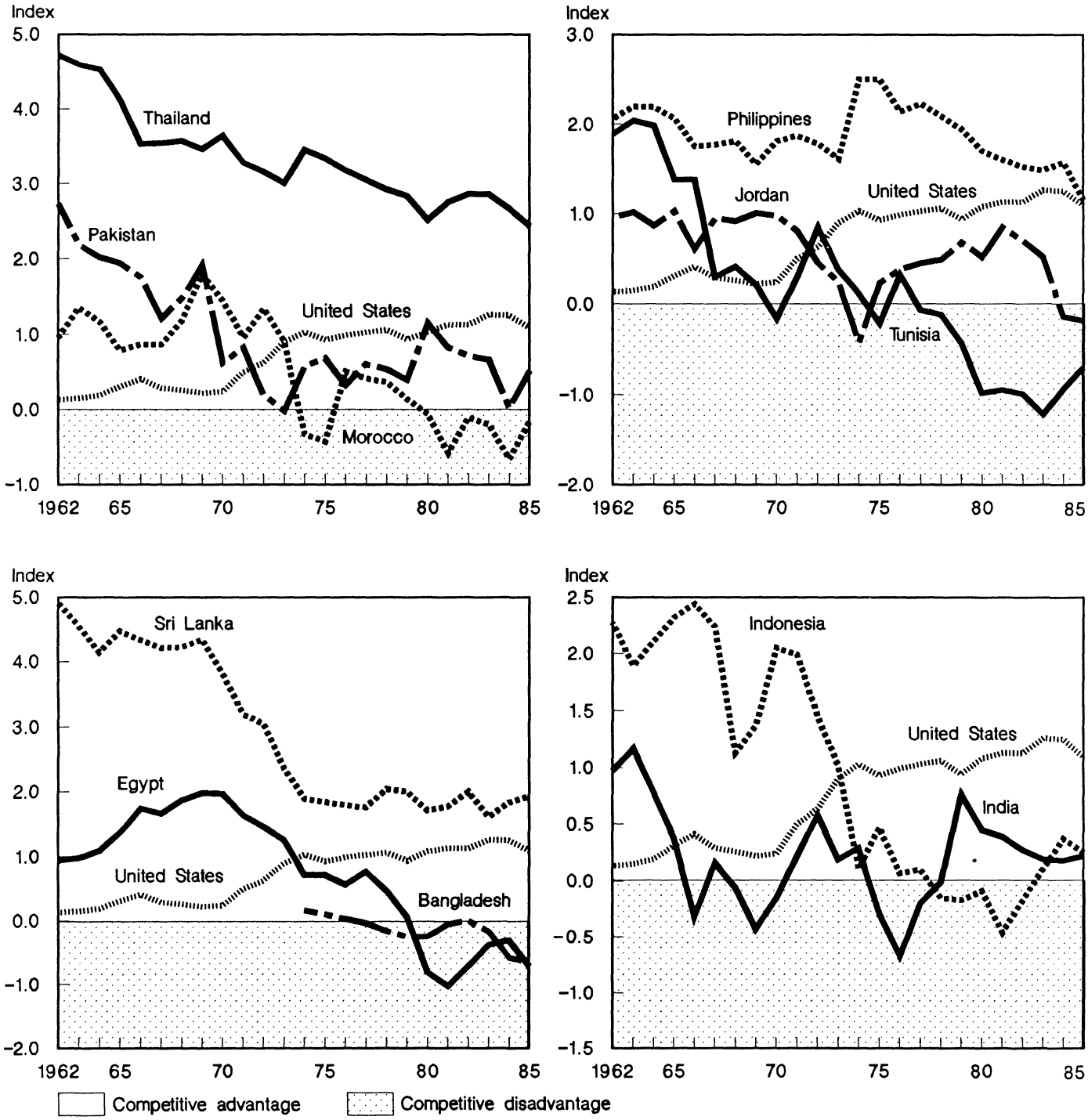
However, the evidence shows that the United States is increasing its relative competitiveness in agriculture. At the same time, the Asia Near East and North Africa region is losing its absolute competitiveness edge in this sector, compared with nonagriculture. Individual analyses of the different countries confirm the declining revealed agricultural competitiveness in Asia Near East and North Africa. All 12 countries in this region exhibit declining competitiveness trends in agriculture, with the exception of India, a country that has sharply shifted its trade policies in a pursuit of agricultural self-sufficiency.[5]

Despite the general loss of agricultural competitive advantage which can be traced in the Asia Near East and North Africa region as a whole, considerable national variations exist. Figure 3 depicts the different revealed agricultural competitiveness configurations of these 12 nations.

Between 1962 and 1965, Thailand, Sri Lanka, and the Philippines consistently displayed stronger competitive advantages in agriculture than the United States. By contrast, Bangladesh, Morocco, Tunisia, and Indonesia not only possessed lower agricultural competitive advantages than the United States—a trend which started in the early to mid-1970's—but actually exhibited agricultural competitive disadvantages during the 1980's.

[5]It is likely that revealed competitiveness measures for Indian agriculture do not approximate Indian comparative advantage because of substantial government interventions.

Figure 3
Agricultural competitiveness



Patterns of Complementarity and Competitiveness Between the United States and Asia Near East and North Africa

In general, trade complementarity exists between the United States and the 12 nations of Asia Near East and North Africa, although 4 are becoming increasingly competitive.

Figure 4 depicts the results of simple correlation analyses of similarities and dissimilarities of competitive advantage profiles between the United States and the Asia Near East and North Africa region, and between countries that lie within this region. The generated coefficients typifying the United States and the Asia Near East and North Africa region fell within the -0.4 to -0.6 range throughout the 24-year period of this analysis. This indicates overall complementarity in trade structures.

The study found considerable variation within the Asia Near East and North Africa area when examining individual nations' competitive advantage patterns in agriculture. The 12 nations' individual competitive advantage patterns for the other seven sectors also differed from the regional average. It is, therefore, not surprising that there were differences in overall bilateral competitiveness/complementarity characterizing the United States and the individual countries within the Asia Near East and North Africa region.

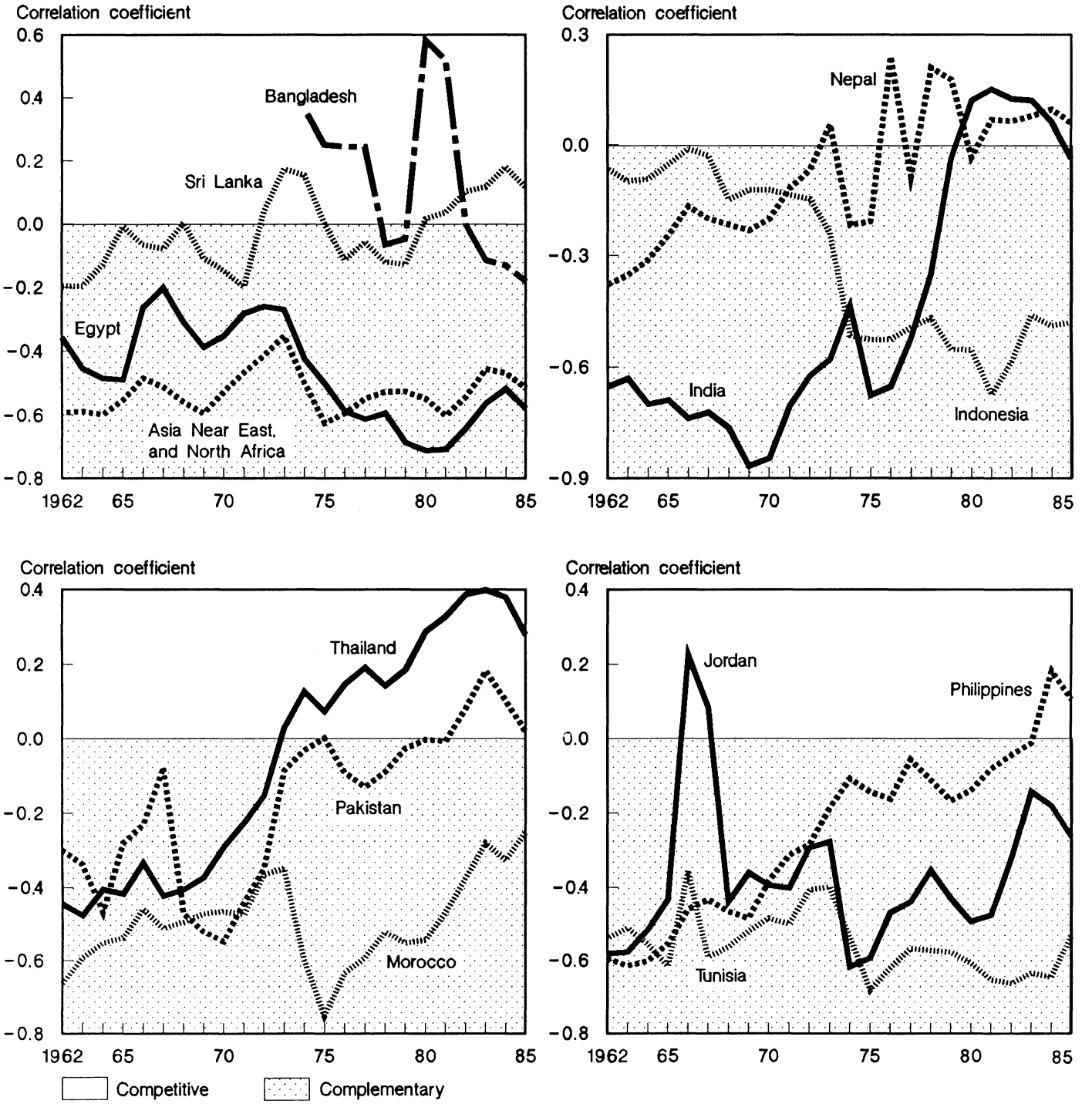
However, the nature of overall economic complementarity between the United States and the Asia Near East and North Africa region is generally confirmed by individual analysis of each Asia Near East and North Africa country. Increasing overall complementarity characterizes emerging trading relations between the United States and Indonesia, Egypt, Tunisia, and Bangladesh.

The individual country correlation analyses also show (contrary to the analysis for the region in general) that there are now increasing competitive pressures being exerted by several of the Asia Near East and North Africa nations on the domestic U.S. economy. Eight countries in this region are associated with longrun rising correlation coefficients.

Of the 12 Asia Near East and North Africa countries considered here, Thailand, the Philippines, Pakistan, and Sri Lanka have the competitive advantage trade structures that most resemble those of the U.S. pattern. During the 1980's, these four countries became increasingly competitive with the United States, illustrated by positive and rising *RC* correlation values.

Figure 4

Economic trade complementarity between the United States and Asia Near East and North Africa



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In this report...

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For more information...

Contact Thomas L. Vollrath (202-786-1680), Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, Room 734, 1301 New York Avenue, NW., Washington DC 20005-4788.

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