The U.S. Farm Export Boom: How Will It Be Shaped by Global Infrastructure?

By Alan Barkema and Mark Drabenstott

A recent surge in U.S. agricultural exports has triggered a wave of optimism about the industry's prospects in the world food market. At the root of the industry's recent export gains are rapidly growing populations and incomes across Asia and Latin America. Adding fuel to U.S. agriculture's newfound optimism is the recent emergence of China—the world's most populous nation and most rapidly growing economy—as a net importer of food.

The world food market may not live up to current expectations, however, without substantial investment in food processing and distribution infrastructure in developing countries. Much of the developing world has limited capacity to process and distribute food, whether imported or produced domestically. For example, in China and Mexico—two of U.S. agriculture's most promising markets—the existing transportation and distribution systems are inadequate to meet current food system needs. Such infrastructure limitations could become a crucial bottleneck for exports of some U.S. farm commodities. At the same time, however, exports of other kinds of products, including U.S. farm and food technology, could be strengthened by efforts to upgrade the infrastructure supporting the food systems in the developing world.

This article examines how an inadequate food system infrastructure in the developing world may affect U.S. agriculture's prospects in the world food market. The first section assesses the potential size of the world food market. The second section evaluates how limitations in food system infrastructure in developing countries could limit that potential, focusing on China and Mexico as illustrative case studies. The third section considers implications of infrastructure limitations for U.S. farm and food exports. The article concludes that inadequate infrastructure could tilt U.S. exports toward food technology and products and away from traditional bulk commodities.

WHERE IS THE WORLD FOOD MARKET GROWING?

U.S. agriculture is facing its best prospects in the world market since the 1970s. Economic

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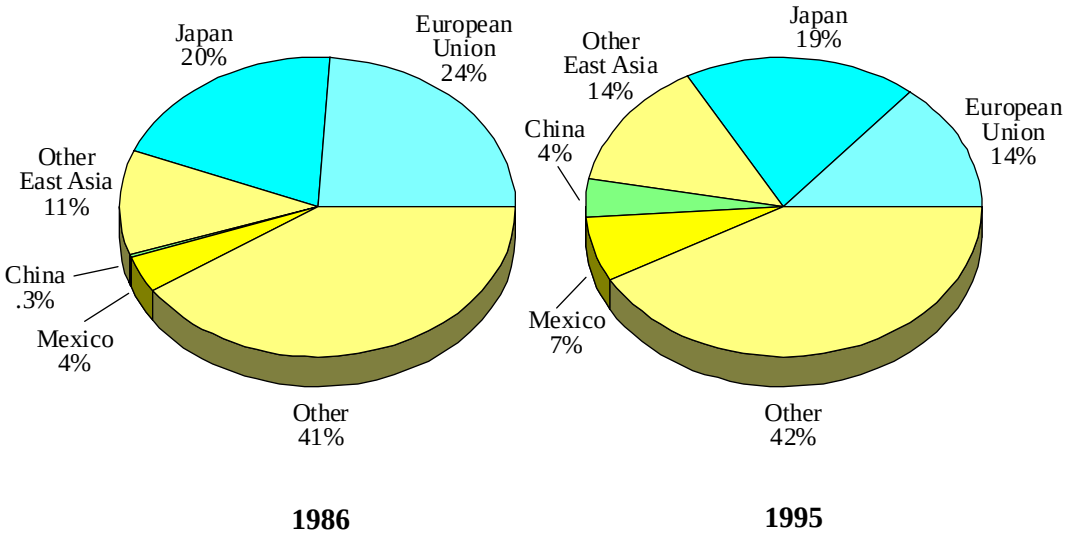
Chart 1

DESTINATION OF U.S. AGRICULTURAL EXPORTS

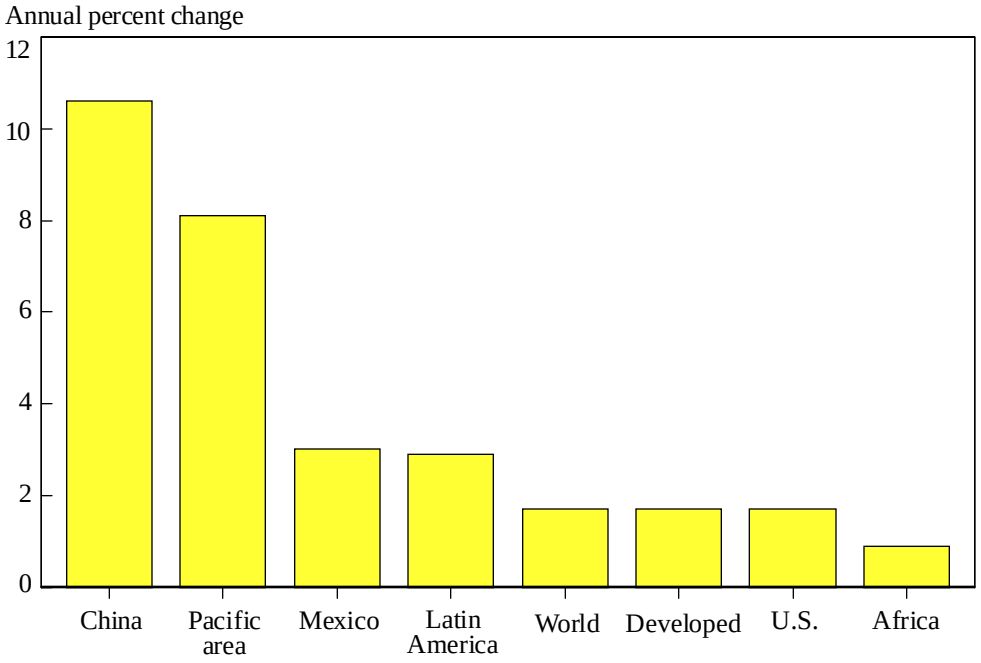


growth continues in traditional developed markets, such as Europe, Japan, and Canada. What makes the period ahead especially promising is the potential for a number of small and large developing countries to increase food purchases substantially. Countries across Asia and Latin America are experiencing rapid growth in both their economies and their populations. Thus, not only is food need growing, but consumers increasingly have the incomes to improve their diets. Based on the forces at work, Asia and Latin America appear to hold particularly bright prospects for U.S. exporters of food and agricultural products.

Before looking ahead, it should be recognized that Asia and Latin America already have made a big impact on U.S. agricultural exports. Five of the top seven markets for the nation's agricultural exports in 1995—Japan, Mexico, Korea, Taiwan, and China—are in Asia and Latin America. While the industrial countries of the European Union are still a big market for U.S. farm products, the European share of U.S. agriculture's exports has declined, shrinking from a fourth a decade ago to about a seventh in 1995 (Chart 1). Meanwhile, Asia has quietly become U.S. agriculture's dominant customer. Together Japan, China, and a cluster of other high-growth nations around Asia's Pacific Rim now account for nearly 40 percent of the industry's foreign sales. China's imports of U.S. farm products have tripled in the last few years. Mexico is the fourth-largest market overall. Sales to Mexico

Chart 2

REAL GDP GROWTH, 1990-94



Source: U.S. Department of Agriculture, Economic Research Service.

lost some steam last year due to the downturn in the Mexican economy, but Mexico and Latin America remain promising markets of long-term potential.

Recent trends in population and income promise to make Asia and Latin America even more attractive markets for U.S. producers in the years ahead. Today, the world's population is about 6 billion. Only a fourth of the world's residents live in the high-income, developed nations, while three-fourths live in the developing countries of Asia, Latin America, and Africa. More important, populations in both Asia and Latin America are expected to grow at a rate faster than the world average of 1.4 percent through the end of the century. Such growth will run far ahead of the slight gains in population in the developed world. While Africa will have the fastest growing population, gains there are not expected to increase demand in the world food market appreciably since many of these people will remain on subsistence diets.

Incomes may be even more important than population in fueling future demand for U.S. agricultural exports. Over the period beginning in 1990 and ending in 1994, countries in East Asia enjoyed an economic boom, with growth in real GDP averaging 8 percent a year (Chart 2). China topped the list of Asian countries with growth of nearly 11 percent a year. Growth was solid but much less rapid in Latin America, averaging 3 percent for all Latin American economies,

including Mexico. By contrast, economic growth in the United States over this time period was only 1.7 percent.

Looking ahead, economic expansion is expected to remain brisk in Asia and Latin America, at least through the end of the decade. Current forecasts indicate real GDP in Asia will grow nearly 8 percent a year through the year 2001, led by growth of nearly 10 percent a year in China. Growth in Latin America is expected to average about 5 percent a year, with growth in Mexico averaging about 4 percent a year. Although considerably less than projections for Asia, Latin America's prospective growth rate still compares favorably with projected growth of less than 3 percent a year in the developed world.

Rising incomes do not necessarily translate into rising food demand, but in Asia and Latin America they almost certainly will. Most consumers in these two regions of the world have a much more basic family budget and diet than is commonplace in the developed world. For example, the average per capita income is about $3,500 in Mexico and about $500 in China. These numbers are probably reasonable proxies of overall standards of living, including dietary standards. A considerable portion of any gains in income will likely go to improving the diet. In Mexico, for instance, food represents about a third of total household spending, while in China it represents about 60 percent.

A final factor that will enhance export opportunities for U.S. producers is the likelihood that Asia and Latin America will be unable to meet their burgeoning food demand from domestic sources. If current patterns continue, neither region appears capable of increasing food production fast enough to keep up with demand, thereby creating market opportunities for U.S. producers.

A good indicator of the food supply and demand balance is per capita consumption and production of grains (Chart 3). Grains are by far the world's most important food, whether consumed directly or as livestock feed. A comparison of production and consumption throughout various regions of the world reveals a substantial mismatch between where food is produced and where it is consumed. For example, the United States and the European Union produce substantial exportable surpluses of grain.[1] In contrast, in much of the developing world—especially Asia and Latin America—per capita production falls well short of consumption. Multiplying these per capita food shortfalls by the large number of consumers in these areas reveals a substantial food deficit to be filled by food imports.

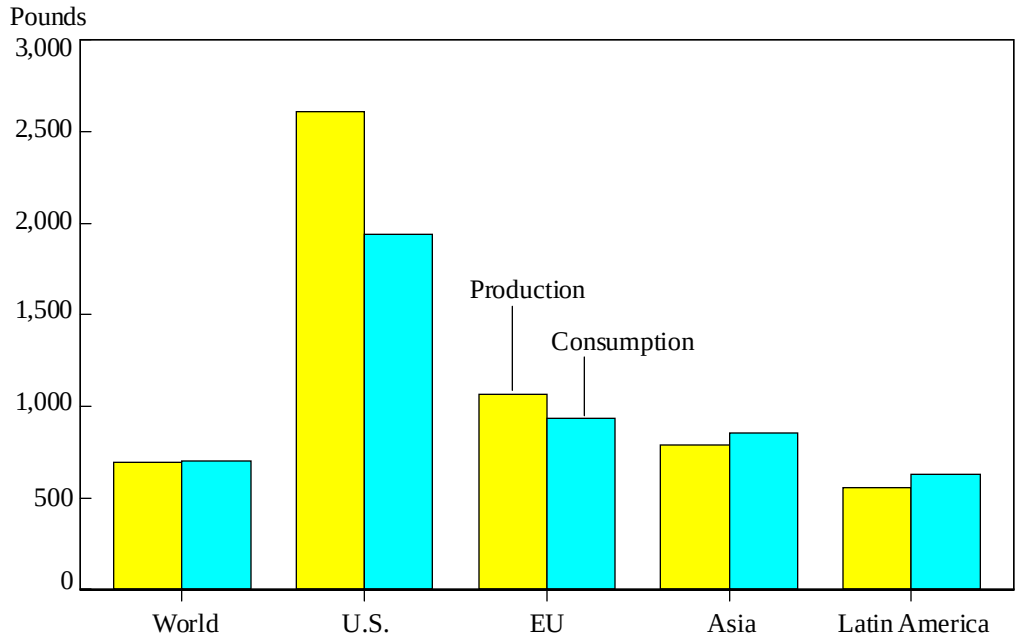
To sum up, growing populations and incomes in the developing world—especially Asia and Latin America—are fueling demand for food products. With economic growth likely to continue in these two regions, and with domestic production insufficient to satisfy demand, U.S. producers can expect growing markets abroad for U.S. food products.

WILL INFRASTRUCTURE CONSTRAIN THE WORLD FOOD MARKET?

Growth in population and incomes will clearly be the fundamentals lifting potential food demand in the developing world. Yet for this potential to be realized, substantial investments in food system infrastructure will be required in many nations (see box). The flow of imported commodities and food products will depend on logistical and distribution systems. The ability to transform farm commodities into food products will depend on the developing world's food processing technology. And the extent to which developing countries supply their own food needs will depend on investments in agricultural resources

Chart 3

PER CAPITA GRAIN PRODUCTION AND CONSUMPTION
Annual average, 1990-95



Source: Food and Agricultural Organization of the UN, and U.S. Bureau of the Census trade data.

and production technology. Thus, while growth in income and population points to an optimistic rate of growth in world food demand, infrastructure investment could significantly temper the outlook.

Infrastructure needs range in size and scope throughout the developing world and thus make a global assessment of investment needs extremely difficult. A better approach may be to assess infrastructure needs in a couple of key countries and then examine how the nature and pace of investment will affect the food market in those countries. China and Mexico offer useful case studies. Both countries will be important markets for U.S. agriculture, yet each faces unique challenges in upgrading the infrastructure that underpins their respective food markets. China's infrastructure needs appear great and diverse—from improving its capacity to produce agricultural products to better distribution systems. Mexico's challenge, on the other hand, is upgrading its transportation infrastructure.

China's infrastructure challenges

How much food—and what type of food—China imports over the next decade and beyond will depend on how much food can be produced domestically and how well both imported and domestic foodstuffs can be distributed. Thus, investments in China's capacity to produce food and improve distribution systems loom large in assessing China's potential as a market for U.S. farmers and food companies.

While the extent to which China can boost food production is currently an object of widespread debate, there is general consensus that gains will come only if China raises the level of its agricultural technology and expands its supply of water for irrigation. Both efforts will require substantial investments that will have to compete with surging capital demands in other parts of the Chinese economy.

Many observers agree that China's investment in agricultural research will be the critical factor in governing its future food supply. As China's economy has grown rapidly in recent years, state funding for agricultural research has suffered. Western economists have recently reported that most Chinese agricultural research institutes—still run wholly by the state—have resorted to producing commercial crops just to pay wages to staff scientists (Crook). Staffing has been all the more difficult due to an exodus of scientists from agricultural research to other sectors of the economy and to declining enrollments in agricultural universities.

The cutback in support for agricultural research by the Chinese government has been dramatic. When the liberalization of agriculture began in 1978, China was spending nearly 14.0 percent of the state budget on agricultural sciences (Chart 4). By 1993, that portion had shrunk to just 8.4 percent. Moreover, not only is agriculture's share of state spending declining, more of its funds are paying for "administration" workers instead of basic research. When agricultural research was a top budget priority in 1978, a third of the funds were spent on research equipment. By 1993 that share had dwindled to a fifth.

The research cutbacks are having two impacts on Chinese agriculture. First, with fewer advances in plant genetics, the rate of increase in Chinese grain yields appears to be slowing. Second, strained research funds have hampered China's ability to respond to threats to its agricultural production from pests and disease. Both cotton and shrimp production have been hurt in recent years by pests and disease, with only a limited response from Chinese research institutes.

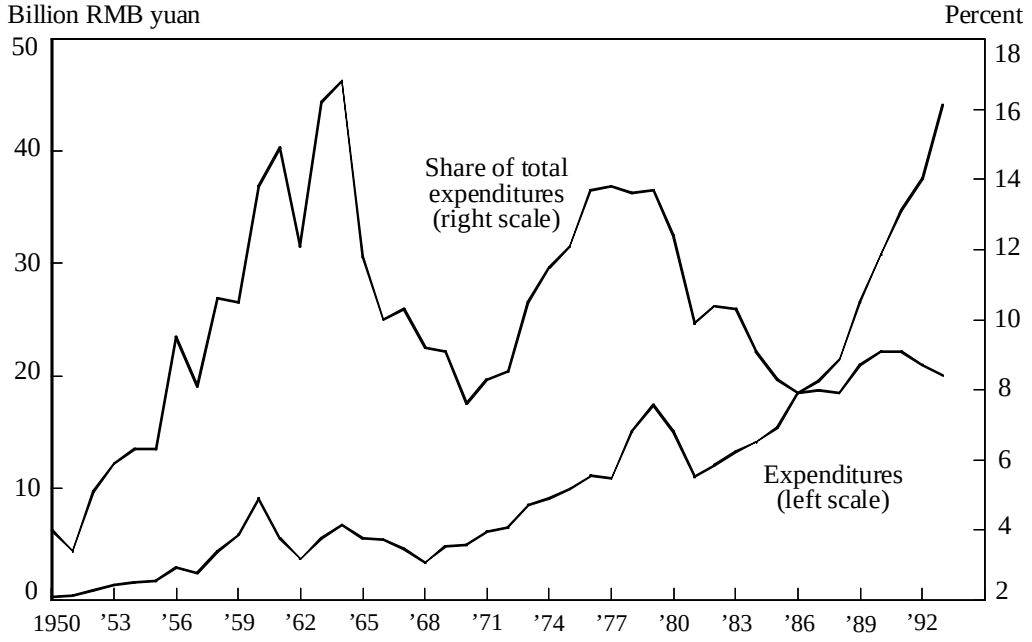
Water is another critical constraint on Chinese agriculture. Much of northern China, including the fertile North China plain, will soon exhaust all of the irrigation water available from the nearest source, the Yellow River. In some areas, the water needs of cities and coalfields are already diverting water from irrigation. If current trends continue, some observers predict that millions of hectares of productive land could go fallow due to a lack of water (Goldberg).

Despite the prospect of mounting food demand, investment in irrigation projects remains meager. The major water project in China today, the Three Gorges Dam, has dominated Chinese spending on water projects, leaving few funds for other pressing needs, such as the proposed South-North Water Transfer project, which would funnel water to the fertile North China plain. Moreover, the Three Gorges Dam will not even significantly increase the flow of water to irrigation—its primary goal is to generate electrical power and control flooding on the Yangtze River. Some small projects are under way in other parts of China with assistance from the World Bank. The additional supply of water created by such projects, however, could be exhausted in a few years.

In sum, a limited supply of water and the prospect of little additional investment in irrigation projects will be a significant brake on China's agricultural production. Although the precise extent of this constraint is not fully understood, a lack of water appears likely to boost Chinese imports of grain and other agricultural commodities.

Chart 4

STATE INVESTMENT IN AGRICULTURAL RESEARCH IN CHINA



Sources: State Statistical Bureau. *China Statistical Yearbook*, various years.

The final investment issue facing China is transportation infrastructure. China's transportation systems are weak, and agriculture must compete for its share of the strained capacity with other burgeoning sectors of the economy. Grain traffic by rail has increased substantially over the past decade, but grain still accounts for just 5 percent of total rail cargo (Nyberg). Overall, rail transportation is so inadequate that a surplus of feed grains in North China cannot be moved to areas in the South clamoring for more grain.

An issue of overriding importance to U.S. and western exporters will be China's capacity to import grain and foodstuffs through its overcrowded ports and then distribute the imports over its outdated railways and highways. Port capacity is a major problem. While seaport cargo capacity doubled from 1986 to 1994, the gains were for mostly small ships. Seaport berths that can accommodate larger vessels typical in world grain trade are estimated to number fewer than a dozen (Nyberg). Moreover, poor dock equipment and facilities make unloading grain extremely slow. Unloading a medium-sized grain ship (35,000 to 40,000 tons) can take 10 to 11 days in China, about half again the time required in Japan. China has only two ports that can accommodate larger grain vessels that represent the low-cost standard today, and these ports have limited dock equipment.

Alleviating this port bottleneck will require major investments. The World Bank has estimated

that a minimum of $2.5 billion will be needed simply to convert some of China's existing cargo berths to handle grain. The estimate jumps higher if new berths are built to accommodate bigger vessels.

Ports will not be the only bottleneck. In most nations, grain leaves ships and is quickly and efficiently transferred to domestic railways—so-called bulk intermodal transport. Such shipments in China are possible only between one port and Beijing. Other systems are under development in the northeast and in the southwest, but capacity remains small relative to the potential demand (Nyberg).

The infrastructure needs in China clearly hold far-reaching implications for U.S. and other western exporters. If China's investment in agricultural research and water supplies continues to flag, the gap between China's food demand and supply is sure to widen. This will spell growing opportunity for U.S. sellers of commodities and processed foods. Yet the yawning gap between demand and supply will also pose a dilemma for Chinese leaders, and it remains unclear how many food imports they will allow.[2] Regardless of how much food China can produce itself, the nation's inadequate port and transportation system poses a serious bottleneck for U.S. and other exporters. At the same time, the bottleneck may present opportunities for western companies to form joint ventures to upgrade China's transportation systems. Some multinational food companies appear to be considering such investments.

Mexico's infrastructure challenge

Mexico appears to have less daunting infrastructure needs than China in the period ahead. In part, this reflects the fact that Mexico's economy and its agriculture are further developed than China's. Mexico's major need over the next several years will be upgrading its transportation infrastructure. Despite its proximity to the United States and the convenience of a long overland border, transporting food and agricultural products *within* Mexico can be costly and time-consuming. Thus, distributional bottlenecks could be a brake on the growth of the Mexican food market. Improvements to truck, rail, and maritime infrastructure will be especially critical to accommodate the trade that seems likely to develop under NAFTA.

Truck traffic accounts for nearly three-fourths of Mexico's food and agricultural shipments, but only because it is a better alternative than rail and maritime transport. Shipments by truck are much more expensive in Mexico than in the United States, in part because the road systems will generally not handle large trucks over a long distance. To move long distances, most shipments are moved through a series of shorter hauls—a much less efficient system. Nearly 2,500 miles of limited access four-lane highways have been built in recent years between major cities in Mexico. These are all toll roads, however, and tolls are extremely expensive—ranging from 35 to 90 cents a mile. As a result, many trucks resort to public roads, leading to further deterioration in already poor highways. Currently, 61 percent of Mexican roads are in poor condition, 29 percent are in fair condition, and only 10 percent are in good condition. Finally, current regulations prohibit U.S. trucks from traveling more than 20 miles beyond the border. That will change by 2003, when transportation rules between the two countries will be eliminated (Economic Research Service). But for now, U.S. goods must be transferred to more costly Mexican carriers once they cross the border.

Looking ahead, there will be a huge need for upgrading Mexico's roadways. A recent World Bank survey of Mexican businesses ranked highways as the leading constraint to economic development in Mexico (World Bank).

Although no estimate of the capital required is available, it will likely run into the tens of billions of dollars. More than $6 billion of private capital has been invested in the new toll roads of the 1990s. The need to upgrade the country's much more extensive network of public roads will swamp that investment. There is clearly a long way to go; in 1993, the $2 billion in private investment in toll roads was three times all public investment in roads.

Railways should be a major conduit for U.S. food and agricultural products flowing into Mexico, but shipping by rail is a costly alternative in Mexico. Rail services are provided exclusively by the national railway (FNM) with outdated equipment. There are no refrigerated rail cars in Mexico, for example, and this forces many food products off rail cars at the border and onto trucks. Inflexible work arrangements and high mandatory crew counts cut efficiency and push up costs. It is estimated that labor productivity in FNM is only one-eleventh the average for the U.S. rail industry (Agricultural Marketing Service). Finally, Mexican tracks are unable to handle the weight of standard U.S. rail cars, requiring smaller cars at higher total cost.

Major investments will be needed to upgrade Mexico's tracks and rail equipment. In addition, greater competition will be needed to increase the overall efficiency of the rail system. Both problems could be solved by recent proposals from the Mexican government to privatize FNM and permit foreign firms to hold minority shares in joint ventures. The Mexican government is also considering a plan that would permit U.S. rail companies to operate their trains on Mexican rails. Regardless of the exact path reform takes, overhauling the Mexican rail system will probably take several years to accomplish.

Finally, maritime shipping is vital to transporting grain to Mexico, but again this mode of transportation is costly and inefficient compared with the United States. Port facilities are poor, especially for accommodating intermodal transshipments common in the grain industry. Ships take a long time to unload, and bureaucratic delays at customs only extend timetables. Moreover, routes from Mexican ports to inland cities are poorly developed.

Improved port facilities will be needed to accommodate increased food and agricultural trade, but more efficient inland distribution is probably more important. The Mexican government has made intermodal transportation a priority and is expanding the capacity to handle and distribute container shipments. Thus, maritime infrastructure may not be a major factor limiting the development of Mexico's food market in the period ahead.

Overall, infrastructure will be a factor influencing U.S. food and agricultural exports to Mexico, but less so than to China. Whereas Chinese infrastructure investments appear likely to affect both the growth and the type of U.S. exports, transportation problems in Mexico seem likely to affect mostly the rate of growth. Moreover, U.S. firms will probably be major participants in upgrading the Mexican transportation system. Nevertheless, considerable investment is needed, and distribution bottlenecks and high transportation costs will curtail U.S. food opportunities for the foreseeable future.

HOW WILL INFRASTRUCTURE LIMITATIONS SHAPE U.S. AGRICULTURE'S OPPORTUNITIES?

The world food market of the future holds both much promise and considerable uncertainty for U.S. agriculture. On one hand, rapidly growing populations and incomes in China, Mexico, and other high-growth countries in the developing world promise to fuel demand for the industry's

myriad products. On the other hand, antiquated food system infrastructure in these otherwise promising new markets may limit the industry's sales. This prospective infrastructure constraint adds yet another dimension to the already nettlesome problem of forecasting and planning for growth in U.S. agriculture's sales to China, Mexico, and other new markets in the developing world. In view of these considerations, what is the most likely outlook for U.S. agricultural exports in the years ahead?

A precise, quantifiable answer is difficult to determine, but it is possible to frame possible outcomes under different scenarios. Given the foregoing discussion, the most important parameters to consider in the analysis are consumer incomes in the importing countries—a key determinant of food demand—and the nature of the likely infrastructure constraint on food imports. Implications for different kinds of U.S. agricultural exports can then be considered under various combinations of consumer incomes and food system infrastructure.

It is useful first to consider the effect of rising consumer incomes on the development of a country's food system, apart from any limitations inadequate infrastructure may place on food imports. Low household incomes in many developing countries constrain the amount of disposable income available for spending on food and other items. Instead, a substantial portion of the average diet in low-income countries is often produced at home, and minimal food purchases are generally raw or unprocessed foods. As a result food systems are poorly developed. In China, for example, per capita incomes average less than $500 per year and per capita production in the food system is only $70 a year (Chart 5).

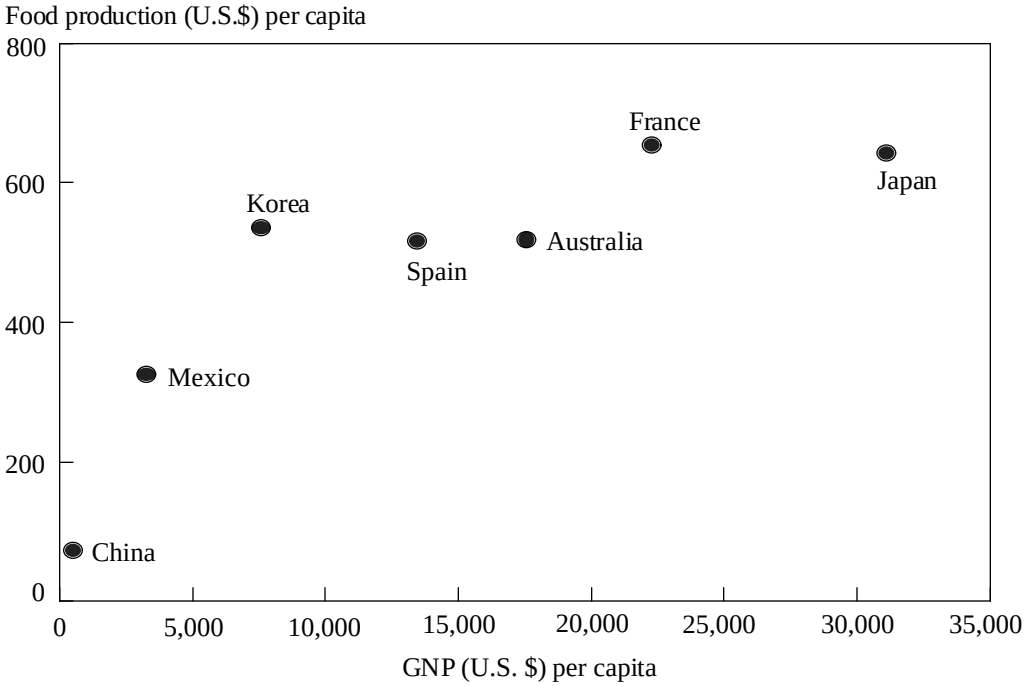
Food systems become more highly developed as spending on more highly processed foods climbs with rising incomes. In Mexico, for example, average per capita income of about $3,600 boosts per capita production in the food system to about $325. With higher incomes, spending first rises for foods in which processing has added relatively little value to raw agricultural commodities, such as processed fats and oils and meat and dairy products. As incomes rise still further, consumers can afford more highly processed food products, including some packaged goods that add more convenience and variety to household diets. Thus, rising incomes tend to tilt food demand from unprocessed food commodities to processed food products. The result is growing demand for imports of food processing technology and processed food products.

Similarly, infrastructure limitations may also shift the mix of agricultural products purchased from the United States and other exporters. Specifically, inadequate infrastructure can limit imports of some kinds of products while creating a stronger market for others, including the technology that could help correct the infrastructure obstacles. The framework sketched in Table 1 offers some insights about which products hold the greatest promise in China, Mexico, and other countries where inadequate infrastructure is an issue.

Two scenarios are considered. In the first scenario, a developing nation—like China or Mexico—establishes a policy of upgrading its domestic food production capacity, with the intent of providing a solid, basic diet for its citizens. Under this scenario, domestic production of raw farm commodities may rise, offsetting and thus weakening somewhat the demand for U.S. farm commodities. The market for exports of U.S. farm technology, however, may be somewhat stronger, as the developing nation searches for ways to gear up its farm output. With scarce funds channeled primarily into improving the farm production infrastructure, food processing and distribution bottlenecks would

Chart 5

DEVELOPMENT OF THE WORLD FOOD SYSTEM



Source: World Bank, *World Development Report 1995*, World Development Indicators.

likely remain. Thus, demand for imported value-added food products might still be relatively strong, especially among that portion of the population that could afford them. With imports of value-added food products up, demand for additional food processing technology may be relatively weak. Overall, this scenario brightens the market outlook for U.S. farm technology companies and U.S. food companies.

In the second scenario, the developing nation chooses to channel its scarce capital into improving its food processing and distribution infrastructure. In this scenario, the nation takes less interest in boosting its domestic production capability and instead relies more heavily on farm commodities from abroad. Thus, farm commodity imports would be stronger than in the first scenario, while farm technology exports would be weaker. Investments in the food processing and distribution infrastructure would be reflected in bigger imports of food processing and distribution technology, including food processing, handling, and transportation equipment. On the other hand, imports of value-added food products would probably be weak since there would be a large supply of farm commodities and new technology for making commodities into food products. This scenario brightens the market outlook for U.S. producers and exporters of grains and other commodities and for U.S. food processing companies who could market

Table 1

HOW FOREIGN INFRASTRUCTURE INVESTMENTS MAY AFFECT EXPORT OPPORTUNITIES FOR U.S. AGRICULTURE

Developing country infrastructure strategy:	*U.S. export opportunity:*			
	Commodities		Foods	
Invest in	Products	Technology	Products	Technology
Production systems	Weak	Strong	Strong	Weak
Distribution systems	Strong	Weak	Weak	Strong

their technology abroad directly or in foreign joint ventures.

Which of these two scenarios best fits the outlook for U.S. agricultural exports to China and Mexico depends on the course of infrastructure investment in the two nations. The first scenario, with an investment focus on farm production systems, could describe the emerging situation in China. For example, some observers believe significant gains in the productivity of Chinese agriculture could be obtained with investments in improved seed and fertilizer technology. Moreover, Chinese leaders have expressed a keen interest in maintaining a high degree of food self-sufficiency (Center for International Affairs). The second scenario, with an investment focus on distribution systems, may be a better fit for Mexico. The food system in Mexico has achieved a higher stage of development than in China (Chart 5). Nevertheless, transportation remains a significant bottleneck that could be broken with additional infrastructure investment, paving the way for exports of U.S. farm commodities and food processing technology.

CONCLUSIONS

Growing populations and incomes in China, Mexico, and other countries of Asia and Latin America are fueling rapid growth in the world food market. Prospects for a growing food market have in turn created a wave of optimism in U.S. agriculture, as the industry gears up for bigger foreign sales. The industry's fundamentally optimistic outlook, however, may be tempered somewhat by bottlenecks created by inadequate farm and food system infrastructure in the developing world.

The outlook varies widely for different segments of U.S. agriculture, depending on how the developing world builds up its food system infrastructure. Concerted efforts to boost farm production in the developing world could bolster sales for U.S. farm technology companies. Resulting gains in foreign farm production, however, would likely soften demand for U.S. farm commodities. Alternatively, new investment in foreign processing and distribution systems could clear away bottlenecks for imports of U.S. grains and other farm commodities. But

new processing capability abroad could trim demand somewhat for exports of U.S. processed foods.

Overall, the market for U.S. farm and food products is likely to grow in the years ahead, although the pace will vary somewhat from product to product. Regardless of the overall direction and speed of the market, however, time will be required to build and develop the infrastructure required to sustain a bigger world food market. Temporary bottlenecks are likely to occur from time to time, triggered by limitations of food system infrastructure. More fundamentally, where developing countries invest in food system infrastructure will have a major impact on which products and technology they import from the United States. Thus, U.S. farmers and agribusinesses gearing their business plans to the world food market of the future should brace themselves for occasional unforeseen shifts in demand for their products.

WILL CAPITAL BE AVAILABLE FOR FOOD INFRASTRUCTURE PROJECTS?

In a global context, entrepreneurs in developing countries can tap two sources of capital to fund their projects. They can borrow abroad or they can rely on funds generated internally and stored in the savings accounts of domestic citizens.

First, consider the prospects for borrowing abroad. The total flow of capital into developing countries slowed sharply in the 1980s, restricted by concern that large loans based on oil revenues might not be repaid after oil prices crashed in the early 1980s. In recent years, markedly improved investment prospects have boosted the flow of capital into the developing world. The total capital inflow soared to an average of $120 billion a year in the 1990s, cresting at $159 billion in 1993. Roughly a third of those funds flowed into Asian countries and about a fourth into Latin America.[3]

Despite the recent surge, the flow of funds into the developing world remains relatively modest compared with overall global capital flows. For example, the total inflow of capital to developing countries at its recent peak in 1993 was still less than 1 percent of the combined GDP of the OECD nations. In contrast, government financial deficits in the OECD nations were about 4 percent of their GDP. Thus, investment in the developing world has made a relatively small dent in global capital supplies.

While global capital supplies appear ample, most investment in the developing world is funded from domestic savings, with some augmentation by international borrowing.[4] In the developing world overall, only 6 percent of total investment was financed with funds borrowed abroad during the past decade and a half. In Asia, where savings rates are the highest in the world, borrowed funds averaged only 2 percent of total investment. In Latin America, where savings rates are lower than in Asia, borrowed funds accounted for about 5 percent of total investment in the 1980s and about 10 percent in the 1990s.

These data suggest that domestic savings rather than funds borrowed abroad will be the major factor determining the pace of overall investment in the developing world in the years ahead. Moreover, prospects for developing country savings appear relatively bright. While a wide range of factors play a role in determining savings rates, the demographic composition of the population is fundamental. In developing countries, the working-age proportion of the population is expected to climb from about a third today to about half by 2015, and the proportion that is either very young or very old is expected to decline. With a bigger share of the population working, savings rates should rise, boosting funds available for financing agricultural infrastructure investments and other projects.

Burgeoning capital needs in many different sectors of developing country economies will compete for available capital supplies. Nevertheless, infrastructure investments in agriculture should generally be able to compete effectively for a healthy slice of capital. In many developing countries, agriculture is a low-capital, labor-intensive enterprise, boosting the rate of return on capital investments in agriculture. In addition, food demand is rising with growth in consumer incomes, further enhancing the return on investments in the farm and food system. Thus, a relatively high rate of return on food infrastructure projects should enhance their chances of funding.

ENDNOTES

[1] Several other countries also regularly produce exportable surpluses of grain, including Canada and Australia.

[2] At a recent conference, Chinese officials expressed reluctance to rely too heavily on food imports. They were also optimistic that gains in Chinese production would meet most of the nation's future food needs (Center for International Affairs).

[3] This discussion draws heavily from Reisen.

[4] While global capital supplies in themselves appear ample, all nations face certain limits on international borrowing. These limits are not clearly defined, but instead rest on the confidence of international investors and lenders. The primary concern of lenders, of course, is that they will ultimately be repaid. Thus, the greater the income generating potential of a borrowing nation is, the greater will be the confidence of its lenders, and the greater will be the debt load that nation can bear. But as total external debt rises relative to national income or GDP, international borrowing capacity is gradually exhausted.

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