



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

A 257.9  
Ag 8 A  
No. 28

~~\_\_\_\_\_~~

**LIBRARY**  
**RECEIVED**  
**MAY 24 1963**  
U. S. DEPARTMENT OF AGRICULTURE  
BELTSVILLE, Md.

# **AGRICULTURE**

and

# **ECONOMIC G R O W T H**



Agricultural Economic Report No. 28  
Economic Research Service  
U.S. Department of Agriculture

## PREFACE

Since the end of World War II, national policies throughout the world have placed great emphasis on economic growth and development. Economists have made numerous studies to identify and analyze the factors that influence economic growth. One thing brought out by these studies is the critical importance of a highly productive agriculture. This particular study gives special attention to the contributions that American agriculture has made to the growth of the U. S. economy, and indicates the various roles that it will continue to play, not only in domestic economic growth, but in total economic growth throughout the world.

The report was prepared by a study group established in the summer of 1961 by Willard W. Cochrane, Director of Agricultural Economics. The members of the committee when the report was completed in the fall of 1962 were James P. Cavin, chairman; Frank T. Bachmura, Arthur L. Domike, Arthur B. Mackie, Robert H. Masucci, Wayne D. Rasmussen, and Norman Townshend-Zellner. William E. Hendrix served as a member until March 1962, when he was succeeded by Mr. Bachmura. Frederick V. Waugh attended many of the committee sessions and provided valuable suggestions. Sherman Johnson aided the committee in the preparation of the last chapter.

## CONTENTS

	<u>Page</u>
Summary .....	ii
I. Introduction .....	1
II. Theories of Economic Growth .....	2
III. The Role of Agriculture in Economic Growth .....	5
IV. Agriculture's Early Contributions .....	10
V. Agriculture's Later Contributions .....	14
VI. Agriculture's Future Contributions .....	26
Literature Cited .....	33

March 1963

## SUMMARY

The problem of growth is the central economic problem of our time. It is obviously critical for the large number of relatively underdeveloped countries that have recently achieved independence. It is hardly less critical for advanced industrial countries. This is especially true for the United States. Faster economic growth is not only necessary to provide a higher level of living for our rapidly increasing population, but equally necessary to enable us to carry the heavy economic burdens which the leadership of the free world imposes. These burdens include primary responsibility for maintaining the military security of the free world and a large share in the global battle against poverty, ignorance, and disease.

To formulate policies that will foster economic growth, it is necessary to understand the factors involved. During the postwar period, economists have given increasing attention to the problem of identifying these factors and specifying the cause-and-effect relationships among them. One aspect of this renewed interest in the theory of economic growth has been the re-discovery of the importance of agriculture and a more precise evaluation of its role.

The United States provides an outstanding example of what an efficient agriculture can do for the economic growth of a country. An examination of our economic history reveals seven contributions of major importance: The release of workers to industry; lowering of food costs relative to income; an expanding market for industrial goods; large earnings from exports of farm products; sustained output during economic depressions; the meeting of wartime demands for food and fiber; and assistance to the economic development of other countries.

American agriculture has made a massive contribution in the past to the economic development of the United States. But what is to be its future role? Though its most dramatic contributions have been made, it will continue to play a significant role in domestic economic growth. It will continue to supply an abundance of food at prices that are low in relation to the prices of other goods and services; it will continue to be an important source of manpower for nonagricultural enterprises; and it will release land for other uses in the economy.

However, the dynamic contributions of American agriculture in the years to come will almost certainly be to world economic growth, both in the industrialized and in the less developed countries. Contributions to the growth of the latter will be of special importance.

The United States is the greatest storehouse of agricultural knowledge in the world. Exporting this knowledge to help raise farm production in the new, emerging economies is now and will continue to be a contribution of utmost importance to world economic growth.

Perhaps the most direct and dramatic opportunity for American agriculture to assist world economic growth is through programs that will supply food to underdeveloped countries. These programs aid economic growth in many ways--they help curb inflation, provide disaster relief, increase health and productivity of the labor force, and enable recipient countries to devote more of their resources to capital investment. Finally, stimulation of economic growth helps to build future markets for United States products which, in turn, will help us to achieve a high sustained rate of economic growth in this country.

# AGRICULTURE AND ECONOMIC GROWTH

## A Report by a Study Group of the Economic Research Service

### I. INTRODUCTION

Discussions of economic policy--whether by legislators, administrators, businessmen, or economists--tend to focus on some central problem of critical importance to the Nation as a whole. Currently, the focus is on economic growth. This is not a new problem. It has concerned economists and statesmen at least as far back as the 17th century when theories of economic growth can be discerned in the writings of the Mercantilists. Sometimes it has gone by a different name, such as economic progress, economic development, or the wealth of nations.

The problem of economic growth received a great deal of attention in the industrialized countries during the 1930's when unemployment was widespread, and many persons doubted that these countries possessed the capacity for growth sufficient to bring about continuous full employment of the labor force. There has been a revival of interest throughout the last decade. What is new in the present situation is the almost universal preoccupation with economic growth, which extends to both developed and underdeveloped nations with increased attention to the international ramifications.

Consideration of the growth problem gives rise to a number of questions: (1) What is meant by economic growth? (2) Why is it getting so much attention? (3) What are the factors which stimulate the growth of an economy? (4) What policies will promote economic growth? Answers to the first two questions are briefly outlined in this section. The study as a whole attempts to provide some partial and preliminary answers to the last two questions, particularly with respect to the role of agriculture in economic growth.

#### What is Economic Growth?

The growth of an economy is a complex process. Central to the idea of growth is a rising level of national output accompanied by a rising level of living per person over a long time. But we also want (1) a steady rate of growth--one that is not interrupted by wide swings in production or employment, and (2) substantially full use of the productive resources of the economy within a given technology, both in terms of output per unit of input and in terms of the wants and needs of the people.

Thus, the aims of economic growth involve complex interrelationships among various segments or aspects of an economy. For example, during the early stages of a nation's growth, productivity in agriculture needs to increase fast enough to release large amounts of manpower to industry. The capital accumulation necessary for increased productivity must be attained, but not at the expense of a volume of consumer goods sufficient to provide economic incentive to the labor force. There also must be an acceptable balance between private consumer goods (such as food, clothing, and shelter) and public services (roads, hospitals, and education).

This last condition is important even in a dictatorship where economic authority is centralized. But it is even more important in a democracy where the public can easily and quickly defeat an economic program that proves to be unsatisfactory in terms of the levels of living attainable by the great mass of people. Basic consumer demands cannot be ignored very long without inviting economic and political repercussions.

### The New Concern with Growth

The problem of growth is the central economic problem of our time. Several factors account for this emphasis. One is the great upsurge in population since World War II. For densely populated countries, such as India and Egypt, economic growth not only requires a rising level of output, but one that is high enough to provide a rising level of living for greatly increased numbers of people. However, the relation of population to economic growth is not the same in all economies. In advanced industrial countries, such as the United States and West Germany, the postwar population increase has been a dynamic factor contributing to growth rather than a barrier to it.

Another important factor has been the achievement of independence by a large number of relatively underdeveloped countries. They have a new national pride, and the attainment of increased output and rising levels of living has become the focus of their respective economic policies.

Certain factors have special importance in the United States. The upsurge in population, accompanied by higher levels of living, has generated new demands for roads, water, urban development, hospitals, recreation, and, above all, education. If these demands are to be met without impinging on the supply of privately produced consumer goods, such as food, clothing, housing, and automobiles, a rising level of economic growth is an absolute necessity. There are also the additional needs of national defense requiring the production of vast quantities of complicated and expensive items of armament, such as nuclear submarines, antimissile missiles, and impregnable missile sites. Finally, there is direct competition with the Soviet Union with respect to the rate of economic growth. This competition in growth rates has an influence on the rest of the world comparable to relative achievements in nuclear fission, satellites, and trips to the moon.

## II. THEORIES OF ECONOMIC GROWTH

It is necessary to understand the processes of economic growth in order to formulate policies that will promote it. Economists have tried to identify the principal factors contributing to growth and to specify the cause-and-effect relationships among these factors--in other words, to develop theories of economic growth. These efforts have a long and voluminous history which will not be recounted here. However, it seems appropriate to mention a few of the outstanding theoretical contributions of the past, and to say something about the present state of theory. 1/

---

1/ Some analysts draw a distinction between economic development and economic growth. Economic development refers to the process by which an economy passes from a less advanced stage to a more advanced one, while economic growth refers to a rising level of national output within a given stage. However, these two processes are so closely intertwined that the more general term, economic growth, is used in this report to include both of them.

The elements of a theory of economic growth are first clearly discerned among the Mercantilists, whose writings reached a peak in the 17th century; and among the Physiocrats, a group of French philosophers who flourished in the second half of the 18th century. Both groups gave attention to the sources of economic growth (8). 2/ The Mercantilists regarded the non-agricultural sector as the strategic one, while the Physiocrats assigned this role to agriculture. According to the latter group, agriculture was the only part of the economy that produced a "surplus." This surplus in turn provided the fundamental growth-generating factor for the economy as a whole.

Adam Smith did not have a theory of growth apart from the body of economic principles which he formulated, though he clearly recognized the importance of agriculture in economic growth or what he called the "progress of opulence." Specifically, he said, "When by the improvement and cultivation of land the labour of one family can provide food for two, the labour of half the society becomes sufficient to provide food for the whole. The other half, therefore, or at least the greater part of them, can be employed in providing other things, or in satisfying the other wants and fancies of mankind." (7)

Among the English classical economists, David Ricardo gave the most attention to economic growth. According to his theory, the total income of a country passes through the hands of the capitalists. The bulk of this income is advanced to laborers in the form of wages; the remainder is profit which accrues to the capitalists. As long as profits are above zero, the capitalists are willing to forego present consumption and save a portion of their income, which is reinvested in the production of more capital goods. This increases the demand for workers, causing a rise in the rate of money wages. This rise eventually stimulates expansion of the population (as described by Malthus), which requires more food. More food can be obtained only by more intensive cultivation, or use of poorer land. Both raise the cost of food. To cover higher food costs, capitalists must pay higher wages. This reduces the rate of profit and discourages further saving and investment.

This sequence of new investment, rise in money wages, increase in population, advancing food costs, and falling profits continues until a stationary state is reached. At this point, wages are close to the subsistence level, population is stable, profits fall to zero, and capital accumulation ceases. The only real gainers are the landlords who own the better land and obtain increased rents as food costs rise. This analysis provides a discouraging outlook for the great mass of people and is one of the reasons that economics was called the "dismal science." Three of the factors stressed by Ricardo--capital accumulation, population increase, and the productivity of agriculture--are still in the picture with respect to economic growth.

Karl Marx also holds a prominent place in the history of growth theory. He borrowed heavily from Ricardo, but the end results were quite different. According to Marx the capitalist economy produces more than enough income to pay the workers a subsistence wage and maintain the existing stock of capital. The excess, called "surplus value," is appropriated by the capitalists. If they used this surplus value to purchase consumption goods, the aggregate purchasing power of the economy would be maintained, but instead it is diverted to the creation of more capital. This brings a further increase in the output of consumer goods, and a widening of the gap between the purchasing power of the workers and the flow of consumption goods onto the market. The result is a continued oversupply of goods, sharply falling prices,

---

2/ Underscored numbers in parentheses refer to items in the Literature Cited, p. 33

and a series of business depressions. These depressions increase in severity, and ultimately bring about the collapse of capitalism and the emergence of socialism. In the latter state, surplus value would be eliminated and the conditions of continuous economic growth presumably established.

Next come the neoclassical economists, who dominated economic thought from the latter part of the 19th century down to about the time of the great depression of the 1930's. The neoclassical group had many distinguished representatives, with Alfred Marshall, founder of the Cambridge school of neoclassical economics, occupying a preeminent place. The neoclassical group did not develop an explicit theory of economic growth. Their position implied that the maintenance of a competitive system characterized by flexibility of prices, wages, and interest rates (along with free international trade) would more or less automatically provide sustained economic growth consistent with technological changes. New technologies could be absorbed into the system without damaging effects. The neoclassicists were also reasonably optimistic about the ability of the working population to convert the resultant gains in productivity into a higher level of living as contrasted with the Malthusian view of a population continually pressing upon the food supply.

Lord Keynes, the famous student of Alfred Marshall, eventually became the most influential critic of neoclassical economics insofar as the latter failed to deal realistically with the problem of maintaining full employment and the aggregate money demand for goods and services. Although Keynes' immediate concern was with the short-run interrelations among national income, consumption, savings, and investment, his work suggested the possibility of a gradual slowing down in economic growth. With rising wealth, Keynes envisioned a continued increase in savings, accompanied by narrowing investment opportunities. Since the maintenance of a high level of investment was the key to full employment, a decline in private investment opportunities would result in stagnation unless public investments were launched to take up the slack. Interest in the stagnation theory disappeared during the post-war boom, but the appearance of substantial and continued unemployment in the United States has brought about some revival of interest, and a number of the contemporary theories of economic growth take as their starting point the Keynesian analysis of savings, investment, income, and consumption.

Although the ideas of Smith, Ricardo, Malthus, Marx, Keynes, and the neoclassical economists are important in the evolution of theories of economic growth, they did not reveal the full significance of agriculture in the process.

The current interest in policies to foster economic growth has resulted in an enormous amount of contemporary theorizing and investigation. First, there have been attempts to develop general theoretical models, both for advanced industrial societies and for underdeveloped ones. These general theories usually stress the importance of a continued increase in capital accumulation in order for an economy to achieve its growth potential in terms of income. Second, theories have been formulated with respect to the influence of specific factors on economic growth. Thus, there are theories concerning the respective roles of population, agriculture, and technical innovations. Third, there have been historical studies which show that as economies develop they tend to pass through certain stages that have fairly well-defined characteristics.



Fourth, there are studies that attempt to isolate the noneconomic aspects of growth and to relate them to the economic factors. Finally, in a series of case studies attempts have been made to identify specific problems actually encountered in efforts to stimulate the economic growth of particular countries or areas.

There has not emerged from all this activity any single analytic framework or set of principles that provide a comprehensive and definitive theory of economic growth. However, our understanding of the processes of economic growth and the relative importance of different factors to this process has been notably advanced.

One aspect of this renewed interest in economic growth has been the rediscovery of the importance of agriculture and a more precise evaluation of its role. This not only aids our understanding of the problems involved in assisting underdeveloped countries to achieve economic growth, but also our understanding of the contributions of agriculture to the economic growth of this country. In the next chapter, the nature of agriculture's contribution is examined in some detail.

### III. THE ROLE OF AGRICULTURE IN ECONOMIC GROWTH

The importance of agriculture in economic growth and development was rediscovered only recently. Though the credit belongs to no single individual, an article in 1954 by the English economist, W. Arthur Lewis, provided a starting point for intensive analysis. Lewis wrote that "it is not profitable to produce a growing volume of manufactures unless agricultural production is growing simultaneously. This is also why industrial and agrarian revolutions always go together, and why economies in which agriculture is stagnant do not show industrial development." (4)

A number of outstanding economists have since given special attention to the relation between agriculture and economic development, and have formulated mathematical models that greatly clarify the nature of the agricultural contribution.<sup>3/</sup> These efforts point to the necessity of a balance between agricultural and industrial growth, and correct the widely held notion that the economic expansion of underdeveloped countries must come through a "big push" on the industrial side alone.

W. W. Rostow's Stages of Economic Growth, published in 1960, also deserves mention (5). Rostow has emphasized the critical importance of agriculture at certain stages, and has made a number of lasting contributions to the vocabulary of economic growth. Specifically, he identified five stages of historical growth. These are (1) the traditional society; (2) the pre-takeoff stage; (3) the takeoff stage; (4) the drive to maturity; and (5) the age of high mass consumption. The concepts embodied in the second and third stages have been particularly useful in understanding the role of agriculture.

---

<sup>3/</sup> See, for example Nicholls, W. H. "The Importance of an Agricultural Surplus in Underdeveloped Countries." Presented as the J. S. McLean Memorial Lecture at Ontario Agricultural College, January 1962. This paper also contains references to related contributions by Georgescu-Roegen, Jorgenson, Ranis, Fei, and others.

In the pre-takeoff stage, the insights of modern science are beginning to be translated into increased agricultural and industrial output. The idea of economic progress is beginning to take hold, and a favorable economic environment is emerging in terms of transportation, communication, markets, and capital accumulation. Historically, this stage is represented by western Europe in the late 17th and early 18th centuries. At present, it is represented by many of the emerging countries in Africa, Asia, and the Middle East. During this stage, agriculture makes a massive contribution; in fact, it sets the limits within which economic growth takes place. According to Rostow, "agriculture must supply expanded food, expanded markets, and an expanded supply of loanable funds to the modern sector."

In the takeoff stage, "the forces making for economic progress, which yielded limited bursts and enclaves of modern activity, expand and come to dominate the society. Growth becomes its normal condition.... New techniques spread in agriculture as well as industry, as agriculture is commercialized, and increasing numbers of farmers are prepared to accept the new methods and the deep changes they bring to ways of life." This is Great Britain from 1783 to 1802; the United States from 1843 to 1860; and Japan from 1878 to 1900. Such countries as India, and possibly China, may be entering this stage.

What are the specific contributions of agriculture to economic growth and development? These will be discussed under seven broad categories. They are not mutually exclusive, but emphasize the fact that agriculture's contribution has many dimensions and that its nature changes as an economy moves through various stages of growth. The first five categories have been recognized, either explicitly or implicitly, in most studies of agriculture and economic growth(2,3). The other two apply more especially to the United States in recent times.

### Increased Food Supplies

A marked increase in food supplies helps to set in motion the whole process of economic development. A rapid advance in agricultural productivity means increased food supplies at relatively lower prices. Because wage earners need less of their income to buy food, the effective money demand for other goods increases. This makes it profitable for entrepreneurs to expand output of nonagricultural goods and to make additional investment in their production. At the same time, the increase in farm productivity releases workers to industry, which can afford to hire them because of the expanding demand for its products. Furthermore, since declining food costs mean higher real income for the workers, pressure to raise money wages is held in check, and the profitability of industrial enterprises is maintained or increased.

This sequence is particularly important for countries approaching a takeoff phase, which typically have a rapidly increasing population and a rising demand for food. Unless domestic food supplies keep pace, rising food prices will place a damper on economic growth. They mean lower real wages which may breed political discontent. In turn come demands for higher wages which, if granted, reduce the profits and the investment incentives of the emerging industrial enterprises. Finally, insufficient food supplies for a rising population may necessitate larger food imports which use up foreign exchange that could otherwise be used to purchase the capital goods required for the industrial side of economic development.

Although abundant supplies of food are critical in the early stages of economic development, they also contribute to the growth of advanced countries. Among other things, they provide a continuous anti-inflationary force, and advance productivity and the level of living by improved nutrition.

## Transfer of Manpower to Industry

Industrial development requires a substantial and steady expansion of the labor force engaged in manufacturing and other nonagricultural pursuits. For many countries, the principal source of this labor force is its farm population, although for some, immigration can be important.

The correlation between a decline in the proportion of a nation's resources devoted to agriculture and the achievement of economic growth is illustrated by figures 1 and 2. These show, for 50 countries in 1956: (1) The relation between the percentage of the labor force engaged in agriculture and per capita incomes; and (2) the relation between the percentage of total GNP derived from agriculture and per capita incomes. Included among the countries with low ratios in both cases are those having high mass consumption, such as the United States, Canada, Sweden, and Switzerland. Among those with high ratios are Thailand, India, Turkey, and Bulgaria, which have not yet reached or are just in an early phase of the takeoff period.

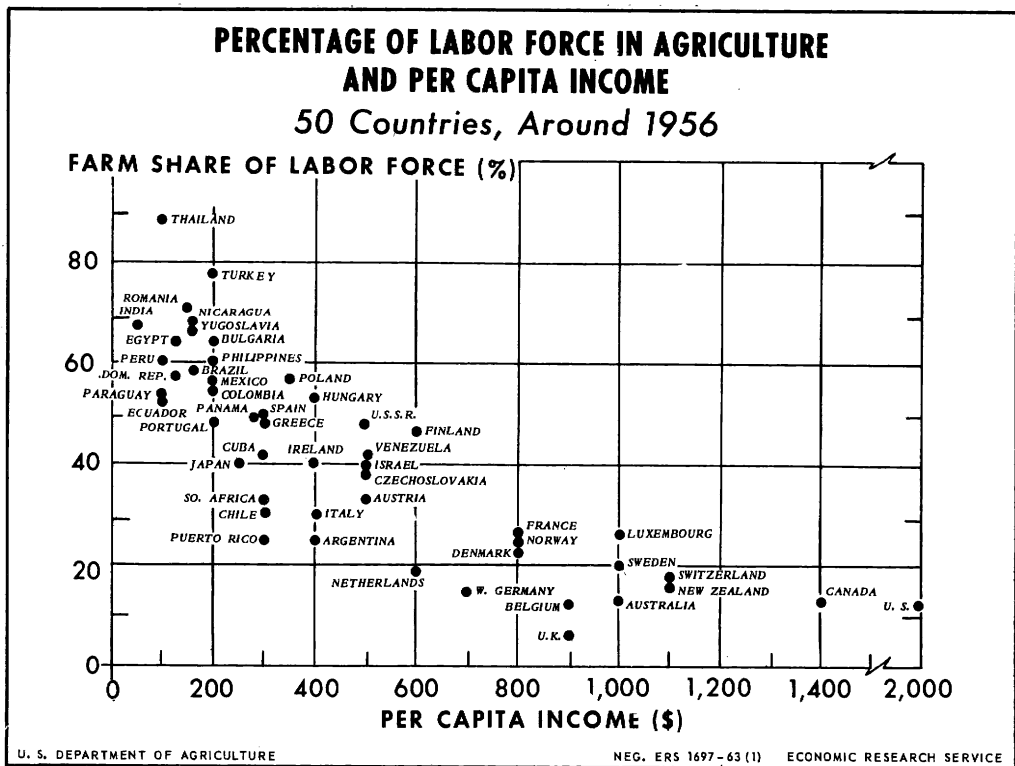


Figure 1

This association between economic growth and contraction of the agricultural segment has been termed the law of the declining importance of agriculture.<sup>4/</sup> A misreading of its significance has led a number of economists to think that the dynamics of economic growth lie entirely in the industrial sector, and that agriculture can be ignored.

<sup>4/</sup> Specifically, by Nicholls, "The Importance of an Agricultural Surplus in Underdeveloped Countries," p. 9.

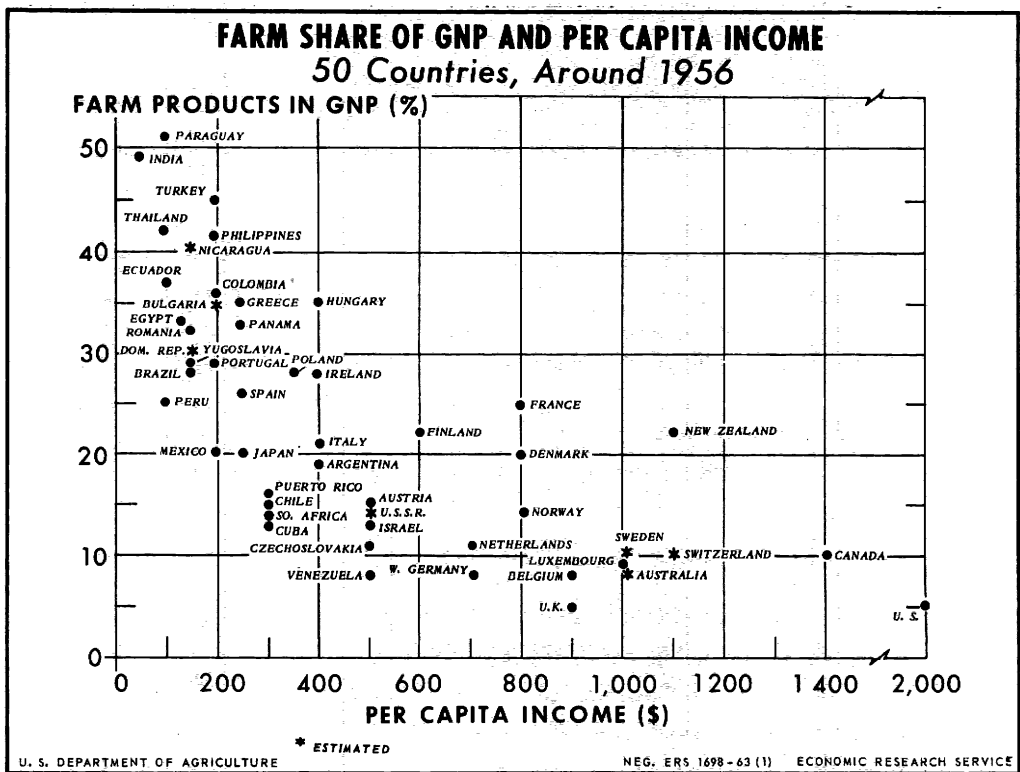


Figure 2

### Increased Capital Accumulation

Even when agriculture is in a position to transfer manpower to the industrial sector, economic growth cannot be rapid until industrial capital is available in the form of machinery, plants, transportation, and raw materials. Here again, the agricultural contribution is likely to be of considerable importance, particularly in the earlier stages of a nation's economic growth, when agriculture provides and receives the largest part of national income.

There are several ways in which the agricultural contribution to industrial capital formation can be made. First, increased farm output can lead to increased farm income. Part of this income can be retained as savings; some can be invested in industrial capital. Second, some of the benefits of increased agricultural productivity would accrue to the urban population through the low prices of food and fiber. Thus they would have a larger real income that would provide the basis for greater consumption, savings, and capital accumulation in the nonfarm sector. Third, agriculture might be required to make a forced contribution to capital accumulation by Government action. This was done in Japan in the latter part of the 19th century, when a heavy land tax was inaugurated; and much of the industrial capital of the Soviet Union has been created by diversion of agricultural resources to the Government through confiscation. Some of the agricultural difficulties in the Soviet Union and also in mainland China may be the result of an overdiversion of farm resources to the nonfarm sector.

Foreign capital may supplement the contributions from domestic savings, as it did in the United States during a good part of the 19th century. Today many of the developing countries in Asia, Africa, and Latin America depend on foreign capital.

### Increased Purchases from Abroad

A readily identifiable contribution of agriculture to economic growth is the expansion of exports of farm products. Proceeds from the exports can be used to purchase both capital goods and consumption goods, or to pay off loans made by foreign investors. These exports contribute to capital formation, but even more importantly to international specialization, which in turn has the effect of raising a nation's productive efficiency--the underlying factor in economic growth. However, large exports of farm products are not necessarily a guarantee of economic development. The economic progress of some countries has been slow despite very large agricultural exports. The reasons for this are usually complex, and they vary from country to country.

### Increased Demand for Industrial Products

Increases in the efficiency of agricultural production that result in higher per capita farm income enable farmers to increase their purchases of production items and consumer goods from the industrial sector. This is an aspect of what Kuznets calls the "marketization" of an economy; the term refers to the development whereby a given sector of an economy shifts from a condition of self-sufficiency to one in which it becomes a seller to and buyer from other sectors. This process has been an important feature of agriculture's contribution to economic growth in the United States. The shortage of labor stimulated the American farmer to purchase labor-saving machinery, fertilizer, and other items that increased productive efficiency. In turn, the increased productivity provided the farmer with even larger quantities of marketable products that could be exchanged for goods produced in the industrial sector.

This sort of interaction has been particularly important in the United States from about the time of the Civil War. It may not always emerge so easily in underdeveloped countries. Agriculture may need to invest its surplus in the industrial capital of these countries before the industrial sector can produce final products for resale to the agricultural sector. To be specific, agriculture may need to provide the capital for the construction of fertilizer plants before it can become a market for fertilizer as such.

### Meeting Emergencies in War and Peace

American agriculture has not only provided the increasing supplies of low-cost foods essential to economic growth, but has developed a surplus capacity which, although it creates production adjustment problems, has been an asset of immense value in other respects. During World Wars I and II, and in the reconstruction periods following them, American agriculture made spectacular contributions to economic growth at home and abroad. Our ability to produce great amounts of food and fiber for ourselves and our allies during wartime, with relatively small amounts of manpower and capital, helped to minimize the distortions introduced into the economy by wartime requirements and thereby ease the transition to a peacetime economic structure. Our ability to supply foreign nations, both allies and former enemies, with large quantities of food greatly facilitated the rebuilding of their economies and the resumption of economic growth. In addition, this capacity has enabled us to help countries which have suffered catastrophes such as droughts and floods.

## Assisting Economic Development Abroad

Although American agriculture will continue to stimulate domestic economic growth, opportunities for making use of our capacity to produce food and fiber, and of our knowledge of how to produce them, appear most promising in the area of world economic development. We will need to identify the areas in the world where our agriculture products and our technical know-how can make a genuine contribution to economic growth, and to redirect our farm resources to the production of those products for which developing countries have the greatest need.

In the next two chapters, the farmer's contribution to economic growth in the United States will be examined in more detail: First, in the period prior to 1900; and second, in the years since the turn of the century.

### IV. AGRICULTURE'S EARLY CONTRIBUTIONS

#### COLONIAL AMERICA

The pattern of economic growth in colonial America is of particular interest now that many nations are moving from colonial status to independence. Because the United States was a group of colonies for a longer period than it has been an independent Nation, Americans have some understanding of the feelings, attitudes, and aspirations of the new nations.

Colonial America contained few elements of Rostow's "traditional society," except in Spanish Florida, the first area of permanent European settlement, and in the American Indian villages. The European settlers were rebels against the traditional society, and were generally prepared to move into the pre-takeoff stage of growth. As the economy evolved, agriculture in the colonies supported both the development of nonfarm industries and further expansion of farming.

Largely because of the relative abundance of land, a pattern of individual ownership was established, even in the slave-worked plantations of the South. In the Southern colonies, overseas markets for surplus tobacco, rice, and indigo provided much of the capital accumulation necessary for the further development of agriculture and the establishment of nonfarm industries. Shipbuilding, fishing, trading, and small manufacturing establishments, particularly in the New England area, led to the accumulation of capital and established another base for the takeoff. The industrial and agricultural revolutions in England provided the technological knowledge necessary for a major change and expansion. All of these activities were made possible by an agricultural output sufficient to supply both the needs of the colonies and a surplus for trade.

#### THE NINETEENTH CENTURY

Within the 19th century, the total economy of the United States moved from the takeoff stage to "maturity." While it is difficult to assign a definite date, it seems clear that maturity came with the end of the century. The economic and technological development of agriculture was closely related to the general growth.

#### Pattern of Development

Geographical differences among areas of the country resulted in the comparative advantage of some commodities over others. Because of this, cotton displaced tobacco early in the century as the most important export commodity. Development became dependent upon

the relative success of cotton as an export commodity and the dispersion of income derived from cotton exports. The emergence of cotton as an export commodity brought about specialization and division of labor, expansion of the domestic market, and increased levels of national income. Cotton's importance brought about a flow of productive factors to the South.

Income from cotton exports flowed from the South to the Northwest in exchange for food-stuffs, and to the Northeast for manufactured goods, transportation fees, and mercantile services. Not only did cotton export income initiate expansion of income and markets, it also accelerated the western migration of labor and capital.

The new Government took a long step toward opening Western land to settlement and making it available to farmers by the Ordinances of 1785 and 1787. Subsequent modifications, culminating in the Homestead Act of 1862, made it easier for farmers to acquire land. The availability of land coupled with Northeastern industrialization led to the development of East-West income flows after 1830. These flows were facilitated by new road, canal, and railroad construction.

Agriculture during the first five decades of the 19th century increased its total output at a rate sufficient to supply both the food and fiber requirements of a growing population and the pressing demands of foreign countries for cotton and tobacco. Estimates indicate that real farm gross product increased more than fourfold, from \$333 million in 1800 to \$1,442 million in 1850 (in 1910-14 dollars) (table 1). Total population grew at about the same rate, increasing from 5.3 million in 1800 to 23.2 million in 1850. Output per worker (in 1910-14 dollars) was about the same in 1850 as in 1800.

Table 1.--Farm gross product, 1800-1900

Item	(In millions of 1910-14 dollars)										
	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900
Sales and home consumption:											
Livestock	194	260	345	462	651	826	1,088	1,436	2,006	2,612	3,100
Crops	113	155	210	302	452	553	897	1,000	1,778	1,992	2,803
Total	307	415	555	764	1,103	1,379	1,985	2,436	3,784	4,604	5,903
New change in livestock inventories	13	16	22	34	33	42	60	74	68	70	109
Gross rental value of farm dwellings	23	32	42	56	76	100	141	184	277	316	397
Total gross output, excluding improvements and home manufactures	343	463	619	854	1,212	1,521	2,186	2,694	4,129	4,990	6,409
Intermediate products consumed	10	15	24	35	56	79	127	215	359	463	669
Farm gross product, excluding improvements and home manufactures	333	448	595	819	1,156	1,442	2,059	2,479	3,770	4,527	5,740
Value of:											
Improvements made on farms	21	26	33	44	47	69	76	106	128	106	94
Home manufactures	8	11	14	16	19	25	21	12	8	5	5
Farm gross product, including improvements and home manufactures	362	485	642	879	1,222	1,536	2,156	2,597	3,906	4,638	5,837

From 1800 to 1850, many implements and machines were developed that brought about the agricultural revolution of the Civil War period. However, few of these were manufactured and sold commercially until the war.

In 1800, the only animal-drawn farm implement in general use was the plow, usually made of wood with a share and colter of wrought iron. After 1819, Jethro Wood's iron plow with interchangeable parts was widely adopted. The 1830's saw the adoption of the steel plow for the breaking of the heavier prairie soils. Practicable harrows and seed drills were patented in the 1840's. Corn planters came into wide use in the following decade. While the corn cultivator had been developed somewhat earlier, it was not used widely until after 1850. Mechanical reapers were patented by Obed Hussey in 1833 and Cyrus H. McCormick in 1834; McCormick sold 1 machine in 1840, 50 in 1844, and 1,000 in 1851. A practical threshing machine, patented in 1837, came into use late in the 1840's.

The effects of this new technology were not felt until the 1850's and later. No substantial rise in demand for grain products had occurred, and farmers generally felt no strong incentive to buy machines that would increase output. There was also some resistance to the adoption of new ideas.

The first U. S. agricultural revolution occurred in the 20 years from 1850 to 1870, when real farm gross output rose from \$1.4 billion to \$2.5 billion (table 1). Real farm gross product per worker in agriculture rose from \$294 in 1850 to \$362 in 1870.

The rate of real investment in implements and farm machinery increased markedly in 1845-55, from an average of \$11 million in 1850 (in 1910-14 dollars) to \$23 million during the next 10 years, and \$54 million in 1865-75 (table 2). Most of the machines purchased were improved models of earlier machines.

Table 2.--Gross investment in agriculture, decade average rates, 1800-1900

Item	(In millions of 1910-14 dollars)										
	:1800:	:1810:	:1820:	:1830:	:1840:	:1850:	:1860:	:1870:	:1880:	:1890:	:1900
Improvements to land and buildings	: 34	44	56	76	89	124	157	207	293	255	295
Implements and machinery	: 2	3	4	5	7	11	23	54	105	155	202
Harness and saddlery	: 2	4	5	6	10	14	20	25	35	48	60
Livestock inventory changes	: 13	17	22	35	32	41	60	65	116	42	74
Total	: 51	68	87	122	138	190	260	351	549	500	631

Expenditures for fertilizer and lime reached significant proportions for the first time in 1850, amounting to \$2 million (in 1910-14 dollars). During the next 20 years, expenditures rose fourfold to an estimated \$9 million in 1870 (table 3). During the years from 1860 to 1870, nearly all of the fertilizer used was of the mixed commercial type, imports of guano having dropped substantially because of high prices and the cutting of the supply line to the South, a heavy user, during the Civil War.



Table 3.-- Intermediate products consumed on farms, 1800-1900

(In millions of 1910-14 dollars)

Item	:1800:	:1810:	:1820:	:1830:	:1840:	:1850:	:1860:	:1870:	:1880:	:1890:	:1900
Repairs to farm structures	5	8	11	16	24	34	54	83	124	142	178
Repairs to implements and machinery	1	1	2	2	3	4	7	5	14	18	30
Fertilizer and lime						2	5	9	22	48	90
Cotton ginning	1/	1/	1/	1/	1	1	1	13	21	28	33
Horseshoeing	1/	1/	2/	3/	4	4	6	8	12	17	20
Miscellaneous	1/	1	1	1	2	2	4	5	8	9	12
Total, excluding rent	7	11	16	22	34	47	77	123	201	262	363
Rent paid to nonfarm landlords	3	4	8	13	22	32	50	92	158	201	306
Total, including rent	10	15	24	35	56	79	127	215	359	463	669

1/ Less than \$500,000.

In 1862, four laws were passed that were to have considerable influence on agricultural production. The Homestead Act encouraged Western settlement; the Morrill Land-Grant College Act encouraged agricultural education; the act establishing the Department of Agriculture recognized the importance of assisting farmers to adopt better methods; and the act chartering the Union Pacific Railroad assisted in opening Western land.

Thus, the 1850's and 1860's witnessed the propitious joining of forces which brought profound changes in American agriculture. The technology was available at a time when social, economic, and political forces, particularly the industrialization of the East, the settling of the West, and demands resulting from the Civil War, provided growing markets.

During the last 30 years of the 19th century, the long-term expansion continued, with real farm gross product increasing 130 percent, from \$2,479 million in 1870 to \$5,740 million in 1900. Output per farm worker rose 45 percent, from \$362 to \$526. This reflected (1) the restoration of commercial agriculture in the South; (2) the continuation of the westward movement and the opening of new land to agriculture; (3) improvements in transportation; (4) increasing population and further industrialization of the Nation; (5) the expansion of European markets; and (6) continually improving practices and greater use of machinery.

The gains in total production and, even more notably, the gains per worker in agriculture reflected continuing effects of the agricultural revolution. The passage of the Hatch Act in 1881, providing for the establishment of an agricultural experiment station in each State, brought system and direction to the research work of the agricultural colleges. Research in the colleges, experiment stations, and the Department of Agriculture provided the bases for the adoption by farmers of continually improving practices. The period of rapid change was followed by a period of consolidation in which growth continued at the rate established during the early phases.

Agriculture from 1850 to 1870 played a decisive part in the takeoff of America's drive to maturity. The coming together of various lines of technology, the emphasis on agricultural reform, and, most important, the profitability of agriculture, resulted in an agricultural revolution. The profitability of farming resulted primarily from the greatly increased overseas demands for American farm products, and from the demand for agricultural products to support the armies engaged in the Civil War.

The Nation's farms produced enough food and fiber to satisfy the needs of our growing population and to constitute most of our exports. In 1865, agricultural exports made up 82.6 percent of our total exports. This percentage declined slowly, but did not fall below 50 percent until 1911. Both value and volume increased from year to year, but not as rapidly as other exports.

The extent to which further growth in both the farm and nonfarm sectors resulted from the agricultural revolution is hard to measure. That agriculture had some influence, however, is clear. For example, the value of intermediate products consumed by agriculture increased from an estimated \$79 million in 1850 to \$215 million in 1870 (table 3). Gross investment increased from \$190 million to \$351 million, with the investment in implements increasing from \$11 million to \$54 million (table 2).

Farmers also made investments in such nonagricultural industries as cooperative processing plants and implement factories. In some areas, farmers invested large amounts in railroad companies.

Businessmen invested heavily in farm lands and mortgages beginning with the Civil War period. Recent studies of farm mortgage companies indicate that large sums were paid as interest to Eastern investors by Illinois and Iowa farmers.

Year after year, since colonial times, people have moved from farms to cities. Farm youth has been an important source of labor for urban areas. The movement has been measured to some extent, and it is obvious that this has been a major contribution of the rural areas to the Nation's industrial development.

## V. AGRICULTURE'S LATER CONTRIBUTIONS

The cause-and-effect relationships involved in agriculture's contribution to the economic growth of the United States in the 20th century are highly complex. Some of the principal ones are briefly described below.

### The Shift from Agriculture to Industry

The hallmark of modern economic development is the capacity of a nation to meet its food and fiber needs while at the same time releasing its human and physical resources for the production of other goods and services. The more rapidly agriculture declines in relative importance within an expanding economy, the greater is its contribution to the growth process. By this test, American agriculture has been highly successful, not only during the takeoff stage which began around the middle of the 19th century, but also in the drive to maturity from the turn of the century to 1920, and on into the period of high mass consumption that has extended over the last 40 years.

Three overall indicators attest to the successful performance of its role in the Nation's economic growth during the first six decades of the 1900's. These are (1) the percentage of the gross national product accounted for by agricultural products; (2) the percentage of national wealth required to meet the Nation's food and fiber needs; and (3) the percentage of the total labor force employed in agriculture.

In 1900 the agricultural component accounted for 23.2 percent of the gross national product. In 1960 it accounted for only 4.9 percent (fig. 3). In table 4 the growth in the agricultural component of GNP is shown as a percentage of growth in total GNP for specified periods. Total GNP grew by \$27.6 billion from 1870 to 1900, with agriculture accounting for nearly 18 percent of the increase. However, out of the \$222 billion increase from 1900 to 1960 (in terms of 1929 prices), only 1.8 percent was contributed by the agricultural sector.

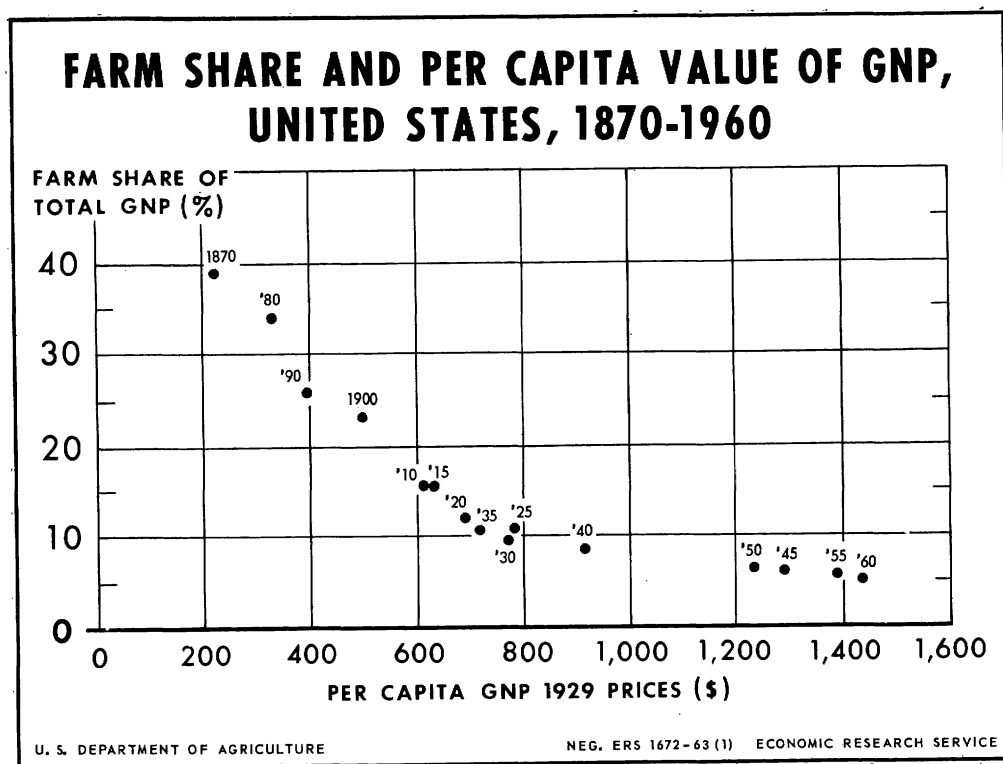


Figure 3

The percentage of national productive wealth represented by agricultural assets gives a similar picture. The Nation's total wealth in 1900 is estimated to have been \$163 billion in 1929 prices. Of this, about \$45 billion, or nearly 27 percent, consisted of farmlands and buildings and of crop and livestock inventories. In 1956, the total wealth of the United States (also in 1929 prices) was estimated at \$515 billion. About \$64 billion, or only 12 percent, was accounted for by agricultural assets, not including farm machinery (9).

Even more significant has been the decline in the farm population and the percentage of the Nation's labor force employed in agriculture. The rural farm population declined from 35 percent of the total in 1910 to 11.5 percent in 1960. The percentage of the labor force employed in agriculture, a sure index of economic growth, dropped from 37.5 percent in 1900 to 8.6 percent in 1960 (figs. 4 and 5).

Table 4.--Growth in gross national product and in its agricultural component (1929 prices) by decades, 1870 to 1960

Time period	Gross national product	Agricultural component	Agricultural component as a percentage of gross national product
	<u>Billion dollars</u>	<u>Billion dollars</u>	<u>Percent</u>
1870 to 1880	7.3	2.0	27.4
1880 to 1890	9.4	1.1	11.7
1890 to 1900	10.9	1.8	16.5
1900 to 1910	17.9	-.1	-.6
1910 to 1920	18.3	.2	1.1
1920 to 1930	21.8	.2	.9
1930 to 1940	25.9	1.5	5.8
1940 to 1950	66.1	1.1	1.7
1950 to 1960	72.1	1.1	1.5
<b>Total:</b>			
1880 to 1960	238.8	7.1	3.0
1900 to 1960	222.1	4.0	1.8

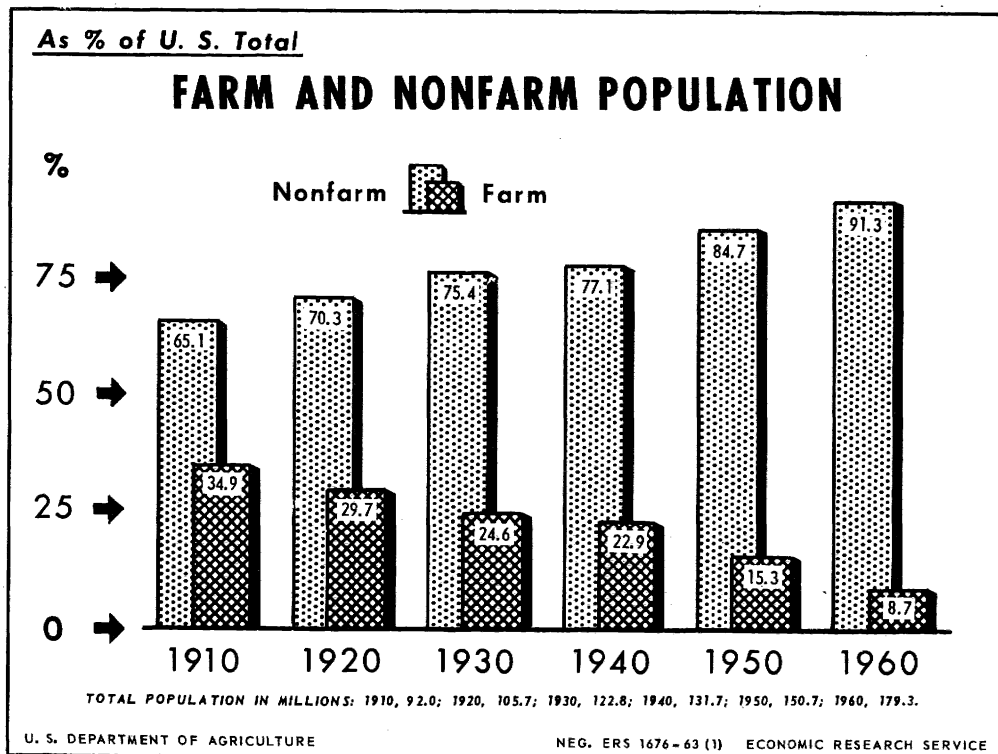


Figure 4

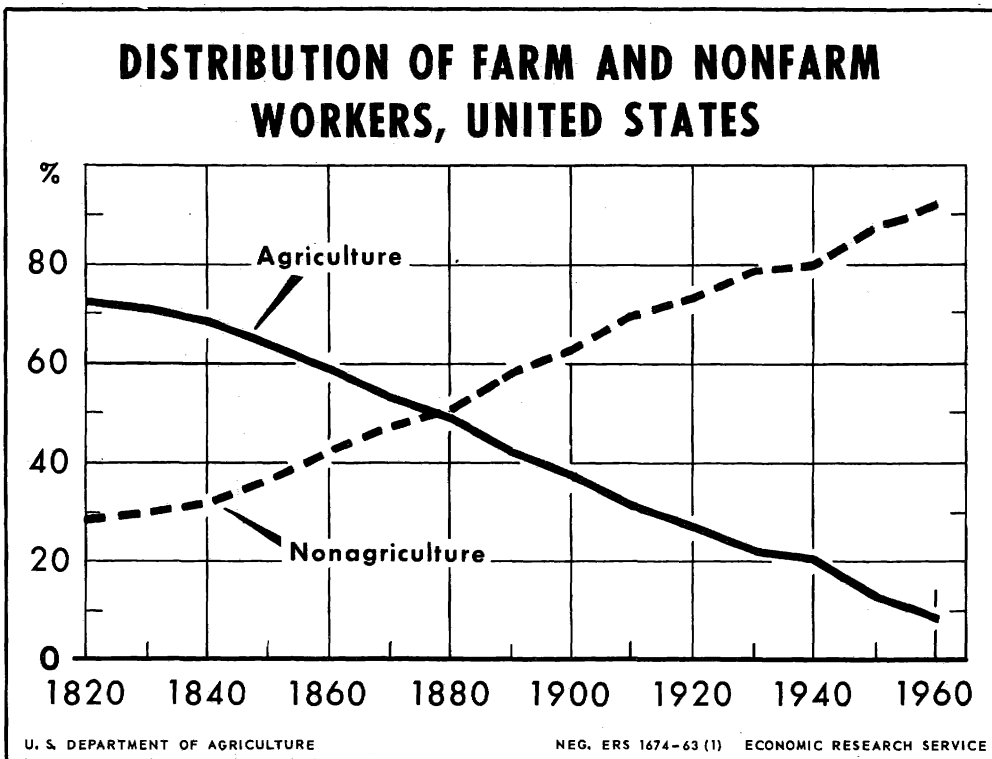


Figure 5

#### The Increase of Agricultural Output

Underlying the release of more and more of the Nation's human and physical resources to the nonagricultural sector has been the long-time upward trend in total U. S. agricultural output.

This increase has not always been uniform, nor has it always been due to the same causes. From about 1870 to 1900, output increased about 3 percent a year. Only about one-third of the increase is attributable to greater labor efficiency. The rest was due to larger inputs of other factors, principally new land. From 1900 to about 1925, the rate of increase dropped to about 1 percent per year, with the gain being due to larger capital inputs. Trends during the next decade were not clear because of the effects of drought and the great depression. From the mid-1930's, however, the rise in total output has again been rapid. From 1935 to 1960, the annual rate of increase averaged about 2-1/2 percent. This was due primarily to greater efficiency based on technological change (10, 6). The rapidity of this rise in efficiency is shown in figure 6, using the standard USDA measure of output per man-hour in farming. The 1961 level is 165 percent higher than it was in 1935.

In recent years, moreover, productivity per man-hour in agriculture has increased more rapidly than in the nonfarm sector. Agriculture still lagged behind industry from 1929 to 1937, increasing only 6.8 percent while industrial productivity rose 16.4 percent. From 1937 to 1948, however, net agricultural output per man-hour increased 51 percent compared with 28 percent in the nonfarm economy. And from 1948 to 1957, the agricultural gain was 64.7 percent compared with 28.6 percent for industry (table 5).

Another indicator of the magnitude of recent gains in farm productivity is the number of persons whose supplies of food and fiber are provided by each farm worker (fig. 7). This has risen from about 7 persons in 1900 to over 26 persons in 1960. In other words, one farm worker supplies the needs of almost 3 times as many Americans as was the case in 1900.

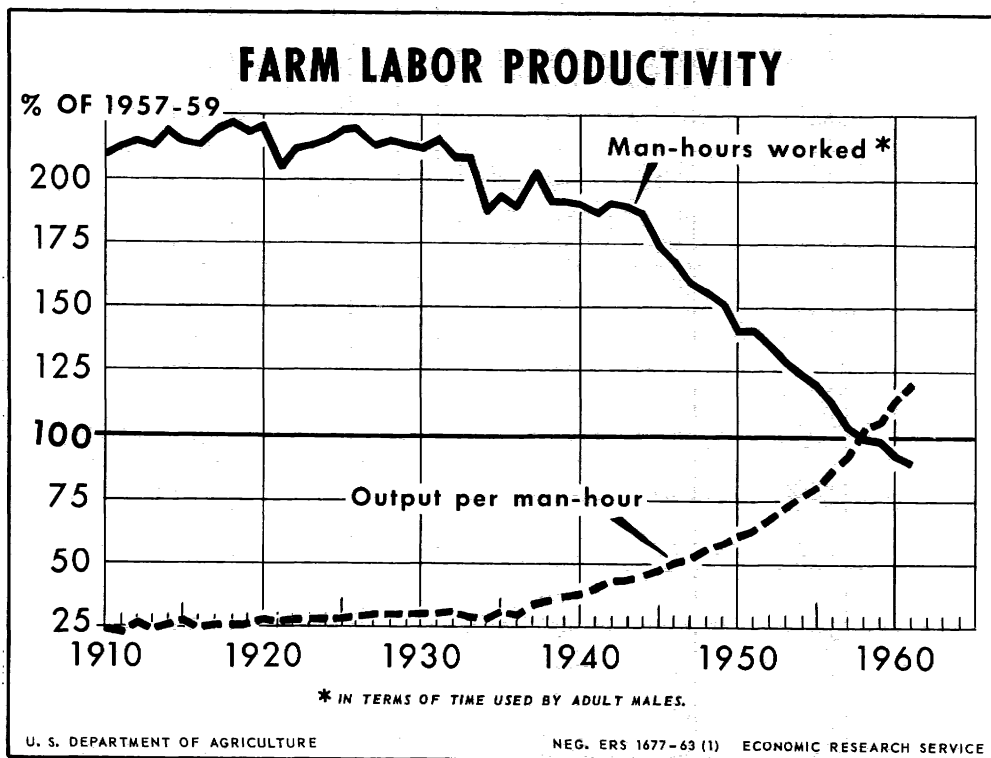


Figure 6

Table 5.--Percentage increase in productivity per man-hour, farm and nonfarm sectors, United States, specified periods, 1899 to 1957 1/

Period	Farm 1/	Nonfarm 2/
	Percent	Percent
1899 to 1909	0.2	22.5
1909 to 1919	.3	23.2
1919 to 1929	13.1	25.5
1929 to 1937	6.8	16.4
1937 to 1948	51.0	28.4
1948 to 1957	64.7	28.6

1/ Computed from indexes of net output per man-hour, Kendrick, J. W. Productivity Trends in the United States. Nat. Bur. Econ. Res. No. 71, Gen. Ser., Princeton Univ. Press, 1961, pp. 362-364 (farm) and pp. 338-340 (nonfarm).

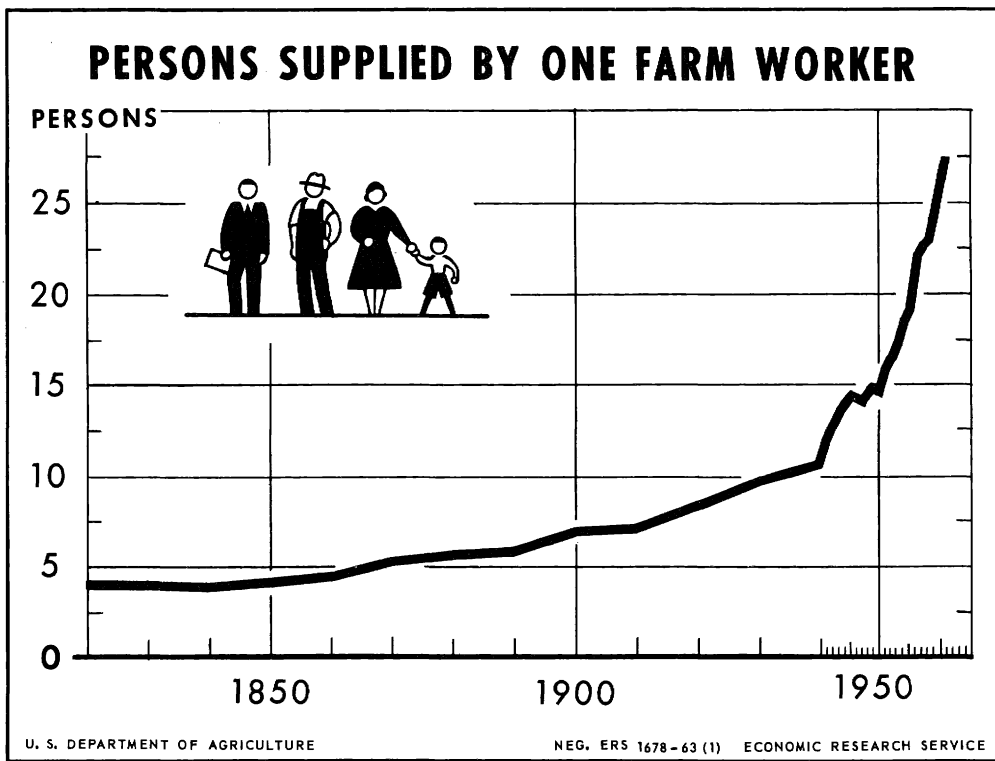


Figure 7

Much of the rapid rise in agricultural productivity during the past quarter century has been due to technological innovations. Farmers have adopted innovations even though these have tended to increase supplies more rapidly than demand has expanded, and to impose serious problems of adjustment upon American agriculture.

Here also may be noted the contribution of scientific research to improved technology in agriculture. This has come from two main sources: the Federal and State governments and agriculture's private industrial suppliers. Federal agricultural research has been a long-term, sustained effort. In 1940, for example, research expenditures of the USDA totaled \$29 million. By 1960, they totaled \$131 million. Expenditures for research and development by many private industries having a connection with agriculture are also at a high level. Excluding Federal funds, manufacturers of processed foods and concentrated products spent \$97 million in 1960; paper and allied products, \$65 million; stone, clay, and glass, \$78 million; and primary metal industries, \$146 million. Industries functioning as major suppliers to agriculture made even larger expenditures for scientific research and development. Out of the \$4.4 billion spent by private industries in 1960, the industrial chemicals and machinery industries alone accounted for approximately \$1 billion, or nearly 24 percent of the total. <sup>5/</sup>

<sup>5/</sup> Data from Statistical Abstract of the United States, 1962, U.S. Dept. Commerce, tables 736 and 738, pp. 543, 544. The USDA expenditures are not completely comparable with those of private industry as some of them represent contracts with private industries or grants to them.

## THE SPECIFIC CONTRIBUTIONS

In what specific ways has this increased efficiency of American agriculture contributed to U. S. economic growth since 1900? Seven different ways can be identified: (1) Release of workers to industry; (2) lowering of food costs relative to income; (3) increased purchases of industrial goods; (4) continued export earnings; (5) sustained output during economic depression; (6) the response to wartime needs; and (7) assistance to world economic development.

### Release of Workers to Industry

With a smaller number of farmers and farm workers producing the food and fiber needed by a rapidly growing population, more and more farm people have left agriculture to become part of the industrial labor force. Migration from the farms appears to have been much greater since 1920 than before, although figures on migration from 1900 to 1919 are not available. In the earlier period, most of the additional labor force needed to man the Nation's rapidly growing urban industry was supplied by immigrants, mainly from Europe (fig. 8). They entered the United States at an average rate of 820,000 per year in the first decade of the 1900's, and 1,030,000 per year from 1910 to 1914. Beginning in 1915 the rate dropped sharply, and nonfarm workers than began to come from the Nation's own natural population increases and from agriculture.

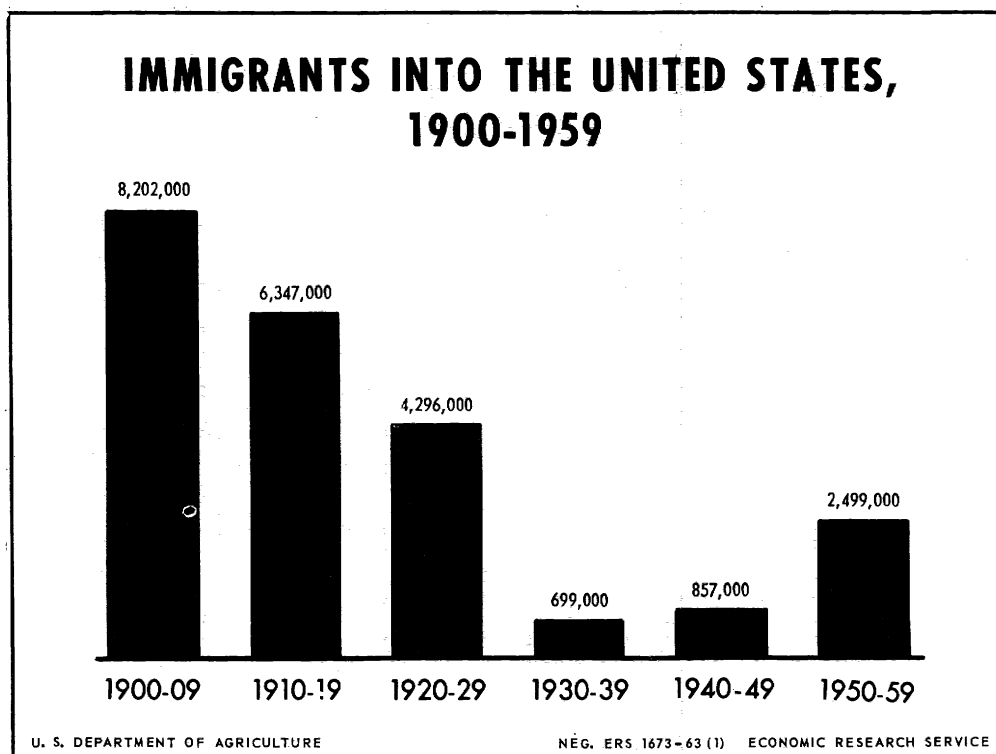


Figure 8



Over 5 million persons moved out of agriculture in the 1920's. There was a drop during the depression, but the outflow has since accelerated, with nearly 10 million persons leaving the farms during the 1950's. Migration patterns by States are shown in figure 9. The movement by decades is as follows:

<u>Decade</u>	<u>Persons</u>
1920-29 .....	5,810,000
1930-39 .....	3,715,000
1940-49 .....	8,784,000
1950-59 .....	9,761,000
Total .....	28,079,000

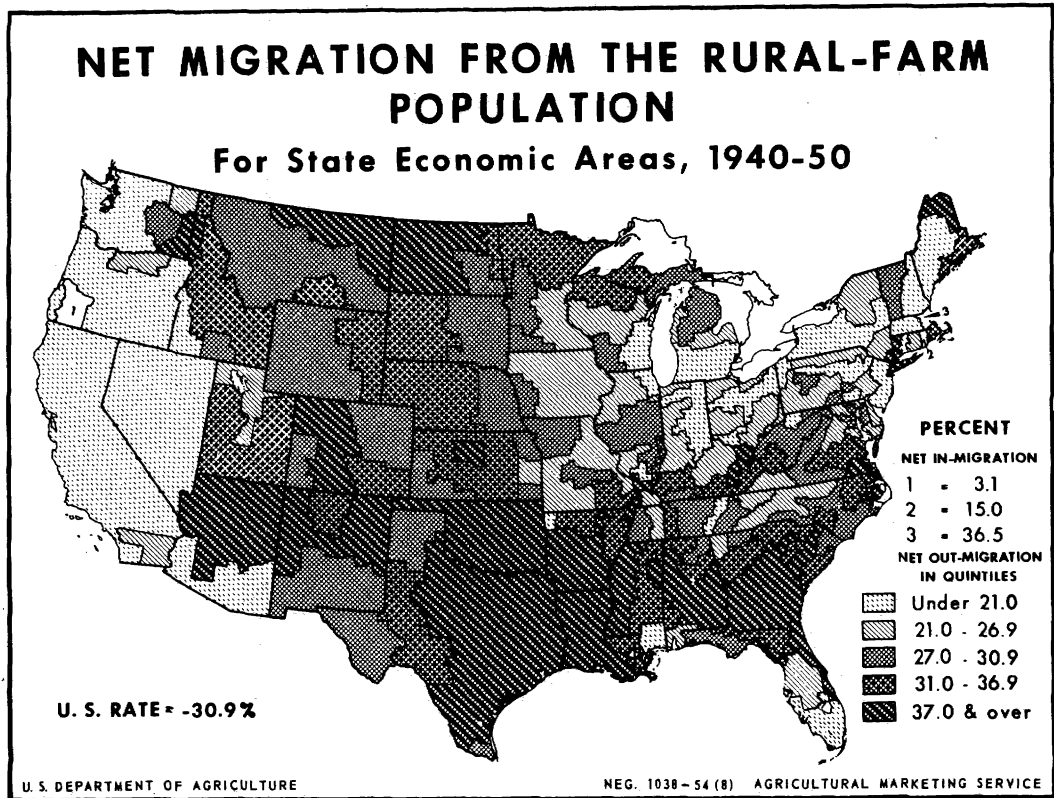


Figure 9

### Lowering of Food Expenditures Relative to Income

With the rapid growth in per capita income, accompanied by increased agricultural efficiency, the people of the United States have been able to buy an increasing variety of foods with a smaller percentage of their income. By 1909 about 28 percent of the disposable income in the United States as a whole was spent for food, and by 1960 it had dropped to 20 percent (table 6). In 1962 it was only 19 percent. Though the percentage of income spent on food is smaller, it pays for increasing amounts of services and larger numbers of meals eaten away from home.

Table 6.--Amount and percentage of disposable personal income spent for food, selected years, 1909-62

Year	Disposable income	Food and all beverages		Food and nonalcoholic beverages	
		Amount	Percent of total income	Amount	Percent of total income
	Billion dollars	Billion dollars	Percent	Billion dollars	Percent
1909 <sup>1/</sup>	26.4	9.2	34.7	7.4	27.9
1914 <sup>2/</sup>	33.3	11.0	32.9	9.0	26.9
1919	63.3	20.6	32.5	18.6	29.3
1925	73.0	19.6	26.9	17.9	24.5
1929	83.1	21.7	26.1	19.7	23.7
1932	48.7	11.4	23.4	11.4	23.4
1939	70.4	19.2	27.2	15.7	22.4
1945	150.4	41.6	27.7	34.1	22.7
1948	189.3	56.1	29.6	48.2	25.4
1950	207.7	55.2	26.6	47.4	22.8
1955	274.4	67.9	24.8	59.2	21.6
1960	349.4	79.5	22.8	69.7	19.9
1962	382.3	84.7	22.2	74.0	19.4

<sup>1/</sup> Average 1907-11. <sup>2/</sup> Average 1912-16.

Historical Statistics of the United States, Colonial Times to 1957 and Survey of Current Business, U. S. Dept. Commerce.

Even in such advanced countries as the United Kingdom and Japan, the percentages of personal income spent for food in 1958 were about 25 percent and 36 percent respectively. In India, the percentage was approximately 57 percent.

#### Purchases of Industrial Goods

In the early stages of U.S. economic growth, agriculture was the major customer for the goods and services produced in the nonagricultural sectors. But with the declining importance of farming in the total economy, the proportion of industrial products used by farmers has declined. In absolute terms, however, agriculture has been an important component of aggregate domestic demand throughout the 20th century. In recent years it has constituted much of the demand for products of the complex of industries which includes petroleum, fertilizer, motor vehicles, and machinery. These industries are based on new technologies; they use large amounts of capital, and they are growing rapidly.

Outlays for certain production and capital items used in agriculture in 1910 and 1960 are shown in table 7. Currently, agriculture spends \$1.57 billion for petroleum fuel and oil; \$4.33 billion for motor vehicles, machinery and equipment, and repair and operation costs (excluding fuel and oil); and \$1.46 billion for fertilizer and lime. By contrast, in 1910 agriculture spent only \$11 million, \$336 million, and \$152 million, respectively, for these items. Purchases

of these items increased from 14 percent of agriculture's total production expense (except depreciation) and gross capital expenditures in 1910 to 28 percent in 1960.

As shown in table 8, farmers' total production assets in the 20 years from 1940 to 1960 increased from \$83 billion (1947-49 prices) to \$109 billion, a rise of 30 percent. Particularly striking has been the increase in machinery and motor vehicles, which rose from slightly over \$4 billion to more than \$10 billion, an increase of 151 percent. Production assets per farm advanced 82 percent between 1940 and 1960, while assets per farm worker doubled during the same period.

### The Contribution to Exports

Agricultural exports accounted for over three-fourths of the U.S. total from 1865 to 1890 (table 9 and fig. 10). They have declined in the 20th century, as economic growth has been increasingly generated by the expanding nonagricultural sector. Nevertheless, agricultural exports since 1900 have not been negligible. Not until 1910 did their value fall below 50 percent of the total, and in recent years it has averaged 20 percent or more.

Table 7.--U. S. agriculture's production expenses and gross capital expenditures, selected items, 1910 and 1960

(In millions of dollars)			
Item	Year		
	1910	:	1960
Total production expenses <u>1/</u>	3,115	:	22,039
Selected current farm operating expenses:			
Fertilizer and lime	152	:	1,462
Repairs and operation of farm capital items:			
Buildings	199	:	578
Motor vehicles and machinery			
Petroleum, fuel, and oil	11	:	1,545
Other motor vehicle operating expenses	4	:	1,298
Repairs on other machinery	37	:	440
Total	52	:	3,283
Miscellaneous <u>2/</u>	558	:	2,839
Gross capital expenditures:			
Buildings	236	:	1,497
Motor vehicles	36	:	1,315
Other machinery and equipment	259	:	1,269
Total	531	:	4,081

1/ Excluding Government payments to nonfarm landlords, depreciation, and other consumption of farm capital. Does not include gross capital expenditures. 2/ Includes short-term interest, pesticides, ginning, electricity and telephones (business share), livestock marketing charges, containers, milk hauling (1946 to date), irrigation, grazing, binding materials, tolls for sirup, horses and mules, harness and saddlery, blacksmithing and hardware, veterinary services and medicines, net insurance premiums (crop, fire, wind and hail) and miscellaneous dairy, nursery, greenhouse, apiary, and other supplies.

Data from the Farm Income Situation, July 1961. U. S. Dept. Agr.

Table 8.--Value of production assets used in agriculture, and percentage change in value, 1940, 1950, and 1960 1/

Kind of asset	1940	1950	1960	Percentage change	
				1940-60	1950-60
	<u>Bil. dol.</u>	<u>Bil. dol.</u>	<u>Bil. dol.</u>	<u>Pct.</u>	<u>Pct.</u>
Total production assets	83.3	95.9	108.6	30	13
Farm real estate	58.2	63.4	71.1	22	12
Livestock	12.9	13.1	15.4	19	18
Machinery and motor vehicles	4.1	8.6	10.3	151	20
Other <u>2/</u>	8.1	10.8	11.8	46	9
	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Pct.</u>	<u>Pct.</u>
Per farm <u>3/</u>	13,118	16,979	23,921	82	41
Per farm worker	7,347	9,625	14,707	100	53

1/ In 1947-49 prices.

2/ Includes crop inventories held for livestock feed and the portion of demand deposits owned by farmers estimated as being held to meet farm production costs.

3/ Based on number of farms as reported by the Department of Agriculture, according to 1954 Census definition.

### Sustained Output and Flexible Prices in Depression

Agriculture has maintained employment and output in periods of major economic depression. Total farm employment in the deep depression year of 1933 was 12.6 million, only slightly below the 1929 level of 12.8 million. Meanwhile, nonagricultural employment shrank from 37.2 million to 28.8 million, a drop of over 22 percent.

Between 1929 and 1933 the farm sector of the U. S. gross national product decreased only fractionally, while the nonfarm sector fell by 36 percent.

Because of a drastic drop in farm prices, food consumption in the country as a whole remained high despite seriously depressed incomes. Prices of farm commodities at the wholesale level dropped 51 percent compared with a decline of 22 percent for nonfarm commodities.

At the consumer level, disposable personal income per capita (in constant dollars) dropped nearly 30 percent from 1929 to 1933. But retail food prices declined 37 percent, and the index of per capita food consumption dropped less than 3.5 percent.

### Response to Wartime Needs

American farmers, by achieving large increases in the production of food and fiber during wartime with relatively small amounts of manpower and capital, have helped to minimize the wartime strains on the economy and to relieve worldwide food shortages during the postwar periods. The performance of American agriculture during World War II was spectacular. By 1945, total farm output was 28 percent higher than in the prewar period 1935-39. This was

# TOTAL EXPORTS AND AGRICULTURAL EXPORTS; UNITED STATES

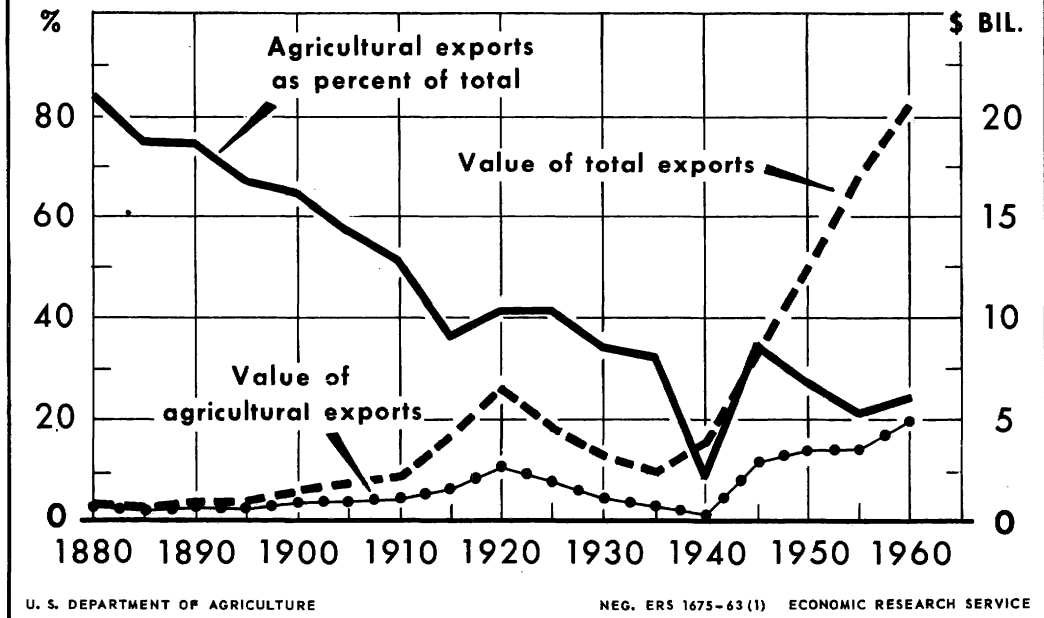


Figure 10

Table 9.--Total exports and agricultural exports, United States, 1865-1961 <sup>1/</sup>

Year <u>2/</u>	Total exports	Agricultural exports		Year <u>2/</u>	Total exports	Agricultural exports	
		Value	Percent of total exports			Value	Percent of total exports
	Mil. dol.	Mil. dol.	Pct.		Mil. dol.	Mil. dol.	Pct.
1865	338	279	83	1920	6,386	2,606	41
1870	428	330	77	1925	4,653	1,892	41
1875	526	411	78	1930	3,032	1,038	34
1880	884	738	84	1935	2,375	766	32
1885	666	501	75	1940	3,959	350	9
1890	872	652	75	1945	8,468	2,857	34
1895	863	574	67	1950	12,598	3,411	27
1900	1,460	949	65	1955	16,896	3,496	21
1905	1,718	975	57	1960 <sup>3/</sup>	20,461	4,946	24
1910	2,014	1,029	51	1961 <sup>3/</sup>	21,388	5,141	24
1915	4,272	1,516	36				

<sup>1/</sup> Merchandise exports, excluding re-exports. <sup>2/</sup> Fiscal year, beginning July 1.  
<sup>3/</sup> Preliminary.

Data from U. S. Dept. Agr., Foreign Agr. Serv. Foreign Agricultural Trade Statistical Handbook, Statis. Bul. 179, Aug. 1956, p. 1. Data for 1955 from Econ. Res. Serv., Foreign Agricultural Trade of the United States, January 1963, p. 2.

accomplished with a relatively small expansion in acreage, and despite scarce supplies of labor, machinery, and various production items, such as insecticides. Even though over one-fifth of our total food output went to military and related war uses, domestic food supplies in 1944 and 1945 provided civilians with 12 to 14 percent more food per capita than during the prewar years. In somewhat different terms, food output by the end of the war was sufficient to feed about 50 million more people than were fed during 1935-39 at the same dietary level prevailing in that period.

### World Economic Development

Since the end of World War II, an increasing proportion of U. S. agricultural exports has been under Government programs designed in part to provide economic assistance to foreign countries. Within the past 7 or 8 years, more and more farm commodities sent out under special programs have been to the less developed areas and for the express purpose of assisting their programs of economic growth. The next chapter contains a preliminary assessment of the role of U. S. agriculture in the great task of accelerating economic growth throughout the world.

## VI. AGRICULTURE'S FUTURE CONTRIBUTIONS

American agriculture has made a massive contribution to the economic development of the United States. What will be its future contributions to domestic and world economic growth?

### Domestic Economic Growth

The most dramatic contributions of agriculture to our economic growth were in the past; that is, in the pre-takeoff and takeoff stages of our development. This does not mean, however, that its contributions have come to an end, or will be minor. They will continue to be large, but they will provide a persistent and firm underpinning to our economic growth and wellbeing rather than a major dynamic impetus.

In an expanding economy, agriculture will maintain its basic functions even though the nature of its contributions will change. Domestic and foreign economic growth will create new problems, as well as new market opportunities. The extent to which agriculture participates in these additional opportunities depends upon its ability to make the necessary adjustments and improvements in production and in use of resources.

Agriculture will continue to supply an abundance of food and a high nutritional level at prices that are low in relation to the prices of other goods and services. Low food prices mean a higher level of real wages, which will help to reduce inflationary pressures and provide the savings needed for the capital accumulation that is essential to economic growth.

Agriculture will also continue to be an important source of manpower for nonagricultural enterprises. Net migration from American farms is continuing to average around a million persons a year. Something fairly close to this rate can be anticipated over the next several years, though it may decline somewhat toward the end of the 1960's.

American agriculture can meet increased demands, both domestic and foreign, for food and fiber with fewer workers and a considerably smaller acreage than is being used at present. Our plentiful land and the continued rise in the efficiency of production enables us to use part of our farmlands for the increasing requirements of the urban population, larger recreational areas for all of the population, and land reserves in the form of woodland, pasture, and range. Thus, the reduction of agricultural labor is being accompanied by a reduction in the use of another basic resource--land.

The whole matter has been well summarized by Ruttan and Callahan (6, pp. 79-80):

“Current population and per capita income projections imply a growth in the demand for farm products of slightly more than 30 percent between 1960 and 1975. If technological change continues at the level maintained during the decade of the 1950's, it seems likely that the 1975 farm output will be produced with approximately 25-30 percent less labor, around 10-15 percent more capital, a 25-30 percent increase in current operating expenses, and a decline in land inputs of 5-10 percent. Furthermore, these output and input changes are expected to occur with no rise in farm prices relative to the general price level.

“It seems clear then that in the case of agriculture, resource scarcity cannot be expected to act as a serious brake on the growth of output during at least the next decade and a half. The momentum of the current technical revolution is such that it is reasonable to expect the production of 1975 farm output requirements with little or no rise in total inputs and with less land than at present.”

### World Economic Growth

American agriculture in the years ahead will almost certainly make dynamic contributions to world economic growth. This is not a new role. During the first half of the 19th century, the combination of Eli Whitney's cotton gin and the cultivation of new lands in the South provided Britain's rapidly expanding textile industry with abundant supplies of cheap cotton. During this period these exports made a key contribution to the industrial takeoff in Great Britain which “centered on the direct and indirect consequences of the rapid expansion of cotton textiles” (5, p. 60). These exports were also vital to domestic economic growth: They financed imports for consumption, as well as capital for economic development. These mutual benefits were achieved through trade in the 19th century due to circumstances peculiar to that era. Even greater opportunities in the mid-20th century are open for American agriculture.

American agriculture can be expected to continue its contributions to the economic growth of the more developed countries, such as those of Western Europe, but it seems likely that the most dramatic contributions will be to the underdeveloped countries, whose population accounts for about 2 billion persons out of a world total of some 3 billion.

### Problems of Underdeveloped Countries

The contribution of American agriculture to underdeveloped areas must be worked out with each country to fit into its own efforts to promote economic growth. Current and future efforts to contribute to world economic growth will, of necessity, involve some trial and error, and we should expect failures as well as successes. The type of program that will be successful in an individual country will be determined by its particular needs and circumstances.

Economic conditions in the underdeveloped world are by no means homogeneous. But despite many differences there are also similarities that necessarily shape the conditions and the opportunities for our contribution. In the first place, the underdeveloped world has from 60 to 80 percent of its population engaged in agriculture, producing from 40 to 50 percent of total national product. Since agricultural production per person is low, income per person is also very low. With little opportunity for savings from incomes at subsistence levels, and with scarcely any educational facilities for the masses, the people lack both the necessary capital and the technical and managerial skills to improve their production and incomes. These conditions create inefficient use of both land and human resources, and limit the contributions of each country's own agricultural sector to national economic growth.

Although all the underdeveloped countries have in common high percentages of people in agriculture, low production per person, and low incomes, there are also many differences among countries--in their agriculture, social and economic structure, population density, natural resources, available arable land, and governmental structure. These differences affect the type of economic aid that will accelerate economic development. For example, some of the African countries are now emerging from tribal organization of their societies, whereas countries such as Pakistan and India have fairly well developed governmental structures with trained civil servants to run them. Most of the Latin American countries have additional land available for settlement, whereas densely populated countries such as Egypt and India will have to depend on increased output per acre for expansion of agricultural production. Differences in the magnitude of population pressures, industrial potentials, export potentials, etc., offer challenging opportunities for direct and indirect contributions by American agriculture to help alleviate growth restrictions.

### Agricultural Aid to Developing Nations

Progress in the agricultural sector alone will not insure economic growth in underdeveloped countries. It must accompany and support industrial development if the takeoff stage is to be achieved. But many countries face a food barrier that is crucial to their economic progress. American agriculture is in a position to help break this barrier, either with technical assistance to help them increase their own food production, or with donations of food in the transition period, or a combination of these two forms of aid adapted to the needs of each country. We should move simultaneously along the two paths of technical assistance and direct food shipments. At the same time, we must expand greatly our research efforts to learn how to combine technical and economic aid to achieve maximum results.

### Technical Assistance

Some technical assistance has been combined with nearly all of our postwar foreign aid programs. But development of technical and management skills is a difficult undertaking. Know-how is not a homogeneous commodity that can be packaged, shipped in bulk, and put to immediate use by recipients.

Improvement of agriculture is likely to require more technical assistance and less capital aid than industrial development. Rural people must learn new technical and management skills if they are to use capital effectively in increasing production per acre and per man. Even such simple changes as better seed and use of chemical fertilizer are likely to be unproductive unless they are combined with instructions on how to use them in an improved system of farming.



Industrial development may require the importation of capital and of skilled technicians to supervise and train native workers. If factories are built by private investors from abroad, the investors usually maintain supervisory responsibility for a considerable period. With agricultural development, on the other hand, improvements must be made largely on land already being cultivated and by the people who are now using primitive methods of production.

Technical assistance in agriculture involves breaking into the closed circle of village culture which has developed to protect villagers against external exploitation. Therefore, those who work with villagers must have the ability to communicate with them not only in their own language but also with reference to ways of overcoming the problems which villagers themselves consider important. Training nationals for leadership in this work is one of the most important contributions. Institutions for the training of leaders can be established in the country receiving assistance, or persons to be trained can be brought to the United States. Experience to date indicates that whenever possible the training should be undertaken within each country and applied to the specific problems which are encountered. Perhaps one of the greatest technical assistance services that the United States can render is to help these countries establish systems of public education, from elementary schools up to universities.

Unfortunately, it is not feasible to make a direct transfer of knowledge developed in the United States to local conditions in foreign countries. Our services were developed for use by a literate citizenry and in an environment where credit is available for investment in new equipment and supplies; where supplies of improved seed, fertilizer, and other materials are not only readily available but sold to farmers by private salesmen; and also where the increased output can be handled by existing marketing agencies.

Another important contrast between the United States and the more densely populated countries is the relative scarcity of labor in the United States which has greatly accelerated mechanization. In some densely populated countries, the marginal product of labor is zero. Consequently, one of the key problems is effective use of abundant labor where capital and technical and management skills are scarce. Since all historical evidence points to very slow reduction of the labor force in rural areas, even with accelerated economic development, rapid mechanization and release of labor on farms are not the answer in densely populated countries. However, combinations of labor-intensive improved techniques can be developed that will result in much higher production per acre.

Some of our past failures can be traced to the lack of recognition of the contrast between rural environments in the United States and in the less developed countries. Effective technical assistance will involve help in building tenure, credit, and marketing institutions, as well as sponsorship of research applicable to local areas. Fortunately, many dedicated people have joined forces with agricultural workers in countries receiving aid, and have achieved significant results. A few items in the AID program can serve as examples. We have helped farmers in Libya to raise their output through the introduction of high-yielding varieties of cereal grains, fruits, and vegetables, and through improved methods of cultivation. Local research stations have been established to find what seeds and animals are best suited to different soils and climates.

Starting 10 years ago in Lebanon, U. S. technicians instituted a program in poultry husbandry, including introduction of improved breeds of chickens and methods of disease control. Lebanon now has a \$10 million commercial poultry industry with 30 enterprises in operation.

At about the same time, a large agricultural education program was launched in Ethiopia with direction provided by Oklahoma State University. The program has helped to establish a college of agricultural and mechanical arts, an agricultural technical school, and an agricultural experiment station. It is expected that by 1970 around 500 agricultural scientists will have graduated from the college, and many more from the technical school.

One of the most serious obstacles to the economic development of Bolivia has been its lack of transportation facilities. In 1955, the United States and Bolivia undertook a joint program to improve the roads of that country. Since then, over 2,000 miles of farm-to-market or inter-city roads have been improved and maintained, plus more than 400 miles of secondary roads. As a result, there has been a marked reduction in travel time, truck payloads have doubled, and the lowland farming areas of the east have become more closely linked with the industrial and mining centers on Bolivia's central plateau.

The United States also makes important contributions to agricultural progress through its support of and participation in international organizations. These include the International Bank for Reconstruction and Development, the Inter-American Development Bank, and various agencies of the United Nations, such as the Food and Agriculture Organization.

We have already mentioned the training of foreign agriculturists in the United States. In addition to trainees under the AID program, many come under the sponsorship of such organizations as FAO, OEEC, or foreign governments. In recent years, 2,500 to 3,000 persons have arrived annually in the United States, with a 3-year total of about 8,400 for 1959-61. More than half of these came from underdeveloped countries. Training is provided by USDA, other Federal agencies, the Land-Grant Universities, farm groups, and private institutions. The subject-matter fields include virtually all the agricultural disciplines, such as agricultural economics, extension, engineering, agronomy, animal husbandry, forestry, and home economics.

The USDA is currently studying ways by which it can contribute more effectively to international training programs of the Federal Government. One proposal receiving serious consideration is the establishment by the USDA of a permanent center for international agricultural studies. The center would be an instrument for the exchange of information, the association of U. S. and foreign agriculturists, and the conduct of seminars in the physical, life, and behavioral sciences.

#### Competitive Aspects of Technical Assistance

If the less developed countries are able to raise the productive efficiency of their agricultural sectors, will this not make them more self sufficient, thereby narrowing the foreign market for our own agricultural exports? Paradoxically, the reverse will probably be true. The less developed countries have a very high income elasticity for food. A rapid rise of average per capita income would result in an enormous increase in their demand for food, which could not be met by expansion of their domestic agriculture. Assuming the validity of current estimates of population increase and income elasticities for food in the underdeveloped areas, movements of food from the developed countries to the less developed could rise far above current levels (1).

Although most of the less developed countries are striving for self-sufficiency in food production, many of them will not be able to keep up with the explosive demand that will result from a combination of rising income per person and a rapid increase in population. They must develop other resources that will earn enough foreign exchange to shift gradually from food aid to commercial imports of food.

### Direct Food Shipments

American agriculture has its most direct and dramatic opportunity for promoting world economic growth and development through programs that supply surplus food to underdeveloped countries. Shipments of food can aid economic growth in many ways. They help to curb inflation, provide disaster relief, increase health and productivity of the labor force, and raise the level of real income, which is essential to domestic capital accumulation.

When food aid can be combined with new investment and technical assistance, total contributions to growth are increased above the separate contributions because of the complementary effects. In fact, this sort of combination appears to offer the greatest potential for United States assistance to foreign economic development in many areas.

Many alternative uses of food aid have been explored in recent years. For example, in 1961 the proceeds of food sold in Egypt were lent to the Egyptian Government to build electric power facilities, grain storage facilities, and rural roads. India borrowed rupees to develop a river valley, while Spain borrowed pesetas for irrigation, reclamation, and resettlement. Iran received a direct grant of wheat, 80 percent of which was used for workers' wages. The remainder was sold to buy tools and materials for agricultural development projects such as village access roads, irrigation facilities, terrace construction, and weed control.

The precise role of food aid in the economic growth of underdeveloped areas has yet to be determined and evaluated. However, there seems to be little doubt that even a modest rise in the per capita income of the underdeveloped areas taken as a whole cannot be accomplished without massive transfers of food from the developed countries, combined with a high level of domestic food production in the underdeveloped countries. Presumably a substantial portion of these food transfers would need to be in the form of direct aid (1).

### Research

Although there has been a vast amount of research pertaining to economic growth, no systematic and comprehensive effort has been made to provide a firm foundation for a long-term program of U. S. assistance to underdeveloped areas. Such an effort, especially an intensified analysis of the interconnections between agriculture and economic growth, is urgently needed. It should be carried on at home and abroad, employing both American and foreign research facilities.

For a number of years the Department of Agriculture has had a limited research program primarily to evaluate short-run opportunities for expanding markets for U. S. farm products. Recently the Economic Research Service has enlarged its research on market potentials and is studying the influence of past and present P. L. 480 programs on the economic development of recipient countries.

More fundamental investigations are needed. The Economic Research Service, in cooperation with AID, is now formulating a comprehensive research program that will provide a better understanding of potential changes in agricultural supplies and demand in underdeveloped countries.

### World Economic Growth and Our Own

The contributions that the United States may make to world economic growth are not something apart from its own economic progress. Economic growth in the underdeveloped countries and in the industrially advanced ones is interrelated. Rising levels of output and income in the poorer countries, from whatever source, generally increase the demand for the products of the more developed countries. The ensuing trade will influence the pace of economic development in both groups of countries, and the pace of economic growth will in turn affect the rate of trade expansion. It is no accident that the United States, along with other advanced industrial countries, is interested in both the stimulation of world economic development and the expansion of international trade.

World economic development can help us to achieve a high sustained rate of economic growth in the United States. If we are to derive maximum benefit from our own great production capabilities, we need to participate in the fruits of technological development and specialization that will accompany economic growth throughout the world. These will be realized through trade and investment on a worldwide basis, both among countries that are efficient producers in their own right, and those that need assistance to achieve economic self reliance. Not to promote and participate in world economic development is to place an artificial ceiling on the economic growth of the United States and to write off the political futures of many less developed countries.

The economic welfare of the free world depends on sufficient economic growth in all countries to increase production of the goods and services which each country can produce best, and to supplement domestic production with commercial trade in world markets. This is a long-term hope rather than an immediate promise, but within this hope lies the best prospect for world prosperity and stability.

\* \* \*

## LITERATURE CITED

- (1) Cochrane, W. W.  
1962. The World Food Budget: A Forward Look to 2000 and Beyond. U. S. Dept. Agr., World Food Forum Proceedings, May 15, 16, 17. Washington, [D. C.], pp. 86-95.
- (2) Johnson, B. F., and Mellor, J. W.  
1961. The Role of Agriculture in Economic Development. Amer. Econ. Rev. v. 51, No. 4, pp. 565-593.
- (3) Kuznets, Simon.  
1961. Economic Growth and the Contribution of Agriculture. Internal Jour. Agrarian Aff. v. 3, No. 2, pp. 56-75.
- (4) Lewis, W. Arthur.  
1954. Economic Development with Unlimited Supplies of Labour. The Manchester School of Economic and Social Studies. v. 22, No. 2, p. 173.
- (5) Rostow, W. W.  
1960. Stages of Economic Growth. University Press, 179 pp. Cambridge [Eng.].
- (6) Ruttan, V. W., and Callahan, J. C.  
1962. Resource Inputs and Growth: Comparisons Between Agriculture and Forestry. Forest Sci., March. pp.68-82.
- (7) Smith, Adam.  
1937. Wealth of Nations. N. Y. Modern Library. p. 163.
- (8) Spengler, Joseph J.  
1960. Mercantilist and Physiocratic Growth Theory. Theories of Economic Growth. pp. 3-64. Free Press of Glencoe, Ill.
- (9) U. S. Bureau of the Census with cooperation of Social Science Research Council.  
1960. Historical Statistics of the United States, Colonial Times to 1957. p. 152. Washington, [D. C.].
- (10) U. S. Economic Research Service, Farm Economics Division.  
1961. Changes in Farm Production and Efficiency. U. S. Dept. Agr. Stat. Bul. 233, rev. July. 54 pp., illus.