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ABSTRACT

AGRICULTURAL POLICIES, PROGRAMS AND RESOURCE FLOWS, UNITED STATES, 1917-1962

by

Francis S. B. L. van Gigch

The purpose of this study was to explore the hypothesis that modern agriculture has an inherent propensity to overcommit resources and hence to overproduce. Overproduction occurs when the product, priced at market prices, is not worth enough to meet simultaneously the acquisition cost of all factors involved. It has often been argued that agricultural overproduction is the result of exogeneous shocks such as wars, recessions and technological advances and would be self-liquidating if price support programs did not exist. This dissertation, instead, took the view that the observed propensity to overproduce is inherent to the sector. This inherence results from: (1) the existence of imperfect knowledge which leads to allocative errors on the part of producers and (2) a divergence between factor's acquisition and salvage price. Thus, it has argued that although imperfect knowledge about exogeneous shocks is a necessary condition for the development of excess capacity in agriculture, it cannot be made solely responsible for it. Theoretically, the existence of a divergence between factor's acquisition and salvage prices is an essential condition

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to explain agriculture's inherent propensity to develop excess capacity.

The asymmetric output response during different phases of the cycle and the perpetuation of low rewards to all factors coupled with capital losses are important phenomena that traditional theory fails to explain adequately. These limitations have encouraged economists to advance some modifications. Refinements such as those suggested by T. W. Schultz, D. Gale Johnson, and Willard W. Cochrane while improving on existing theory fall short of explaining the simultaneous occurrence of the above mentioned phenomena. Glenn L. Johnson's fixed asset theory is an attempt to achieve the latter objective.

Johnson's fixed asset theory emphasizes: (1) divergence between factors' acquisition and salvage price and (2) imperfect knowledge. In a changing environment, an economic unit subjected to these conditions may display a bias towards overproduction. While acknowledging the usefulness of earlier modifications this study has relied principally upon fixed asset theory to explain the behaviour of United States agriculture.

This study has examined agricultural history from 1917 to 1962. Its principal yet not sole sources of information were six sectoral contributions to a master project sponsored by Resources for the Future, Inc., of which this study is also a part.

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For analytical convenience the period 1917-1962 was divided in six sub-periods: 1917-29, 1930-33, 1934-41, 1942-47, 1948-54 and 1955-62. This division permitted observing the behaviour of United States agriculture during different phases of the cycle, during peace and war and under different policy set-ups. For each of the periods evidence was gathered and examined in regard to agricultural prices; flows of labor, real estate resource and other forms of capital; output's supply and disappearance; and income and wealth.

Agriculture was observed under a variety of circumstances and yet on no occasion could clear signs of adjustment be detected. Overcommitment of farm resources was observed in the presence and absence of price supports, and during different phases of the business cycle. Only during World War II did the most obvious signs of excess capacity fail to appear although there are some indications that excess capacity may have been latent even during the War years tending to confirm the hypothesis that a modern agricultural sector has an inherent propensity to overcommit resources.

During the period under study, the behavior of agriculture is in reasonably close accord with fixed asset theory. This theory shows that unforeseen errors of management may result in asset fixity. Asset fixity in turn may cause less than expected returns and capital losses. The

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AGRICULTURAL POLICIES, PROGRAMS AND RESOURCE FLOWS, UNITED STATES, 1917-1962

By

Francis S. B. L. van Gigch

A THESIS

Submitted to
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in partial fulfillment of the requirements
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Department of Agricultural Economics

1968

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I owe a debt of gratitude to many persons for the opportunity of having completed my advanced graduate studies. I wish to single out, however, the names of those to whom I feel particularly obliged. Dr. Glenn L. Johnson, who served as my major professor during my doctoral program, was always a dedicated, patient and kind teacher. Dr. Lester V. Manderscheid, Dr. David H. Boyne and Dr. Lawrence L. Witt, members of my guidance committee, offered constructive comments at different stages of the preparation of my thesis. Dr. Larry L. Boger, Chairman of the Department of Agricultural Economics, Michigan State University and Resources for the Future, Inc., Washington, D. C. provided the financial assistance that made my graduate studies at East Lansing possible. Mrs. Anne Ryan and Mrs. Barbara Larson were most helpful in typing and editing earlier drafts of this thesis. My wife Jane, however, was the necessary condition for undertaking and completing my doctoral program.

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CHAPTER I

INTRODUCTION

The Purpose of the Study

Except for very short periods of time U. S. agriculture has consistently overproduced since the end of the First World War. It has overproduced in the sense that the product, priced at market prices, was not worth enough to meet simultaneously the acquisition cost of all factors involved, even when prices were supported. The cost of agricultural overproduction, that is the amount over and above the value of the output at prevailing prices, was at times borne exclusively by producers in the form of low rewards to the factors of production and subsequent capital losses. At times, however, society at large shared the cost of agricultural overproduction supporting the storage of unwanted surplusses and/or subsidizing foreign disappearance from public funds.

Agriculture has been for the last 35 years a problem sector and barring dramatic changes in either international relations or domestic farm policy is likely to remain so in the near future. It has often been argued that agricultural overproduction originated from exogenous shocks such as wars and depression and would have worked itself out had it not been for the presence of price support

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programs. This dissertation takes a different view. It has undertaken to explore the hypothesis that an agricultural economy such as that of the United States has an inherent propensity to overcommit resources and that consequently the consistently observed excess production should not be blamed only on exogenous shocks. This tendency appears to be the result of the interaction of a series of properties which, as a group, are characteristic of but not necessarily unique to agriculture. Once these properties are duly recognized, the bias towards overcommitment can be rationalized by some additional refinements to the theory of production economics.

Nature of the Study and Sources

Joseph A. Schumpeter[1] considers four "techniques" of economic analysis: (1) economic history, (2) statistics, (3) theory and (4) economic sociology. This present thesis is fundamentally a study of the portion of the agricultural history of the United States that covers the period between 1917 and 1962. It is not a purely factual approach to that period of history since it purports to utilize historical evidence to examine the hypothesis already stated that an agricultural economy such as that of the United States has

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[1]Joseph A. Schumpeter, History of Economic Analysis, Edited from manuscript by Elizabeth Boody Schumpeter, (New York: Oxford University Press, 1954), Chapter II, pp. 12-24.

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an inherent propensity to overcommit resources independently of exogenous shocks such as war, business cycles and government programs.

This research belongs to a family of studies completed during the last five years as contributions to a master project sponsored by Resources for the Future Inc. The purpose of the master project was the description of the ". . .national impact of selected U. S. agricultural programs 1917 to date, on output and resource utilization in U. S. agriculture."[2]

Six authors have made direct contributions to the overall project: Bob T. Jones[3] and Chennareddy Venkareddy[4] on labor, Milburn L. Lerohl[5] on product price expectations,

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[2]From the project proposal presented to the sponsoring organization by the director of the project, Professor Glenn L. Johnson.

[3]Bob T. Jones, "Farm-Nonfarm Labor Flows, 1917-62 with Emphasis on Recent Manpower and Credit Programs," (unpublished Ph.D. Thesis, Michigan State University, 1964).

[4]Chennareddy Venkareddy, "Present Value of Expected Future Income Streams and Their Relevance to Mobility of Farm Workers to the NonFarm Sector in the United States, 1917-62," (unpublished Ph.D. Thesis, Michigan State University, 1964).

[5]Milburn L. Lerohl, "Expected Prices of U. S. Agricultural Commodities, 1917-62," (unpublished Ph.D. Thesis, Michigan State University, 1965).

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George E. Rossmiller[6] and Arne Larsen[7] on farm real estate and C. Leroy Quance[8] on farm capital. These contributions plus an analysis of selected agricultural programs of post World War II by Glenn Johnson[9] are the principal sources of information utilized in this study.

Jones[10] contributed to the overall project with a description and analysis of the flow of labor resources between the farm and the nonfarm sectors of the United States' economy between 1917 and 1962. Further Jones evaluated the impact of selected farm policies upon labor use and labor flows.

Lerohl's effort was aimed at estimating series of expected prices for several horizons for each of thirteen agricultural commodities and to make a preliminary evaluation of these.[11] As a part of his work in arriving at

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[6]George E. Rossmiller, "Farm Real Estate Value Patterns in the United States, 1930-1962," (unpublished Ph.D. Thesis, Michigan State University, 1965).

[7]Arne Larsen, "Changes in Land Value in the United States, 1925-62," (unpublished Ph.D. Thesis, Michigan State University, 1966).

[8]C. Leroy Quance, "Farm Capital: Use, MVPs and Capital Gains or Losses, United States, 1917-1964," (unpublished Ph.D. Thesis, 1967).

[9]Glenn L. Johnson, "An Evaluation of U. S. Agricultural Programs, 1956 to 1960," Report for the Committee on Economic Development, (East Lansing, Mimeo, 1961).

[10]Jones.

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estimates of expected prices Lerohl went into a detailed year by year examination of the state of the market of thirteen commodities he studied.[12]

Rossmiller summarizes the purpose of his contributions in the following words: "The primary objective of this study was the delineation of the factors in the farm real estate market which have affected the price of farm real estate since 1930."[13] In his study Rossmiller estimated income streams to real estate in 19 type-of-farm areas.

The object of Chennareddy's contribution may be described as follows: To estimate the present values of expected future income streams for workers in the farm sector and in four different occupations, to formulate a model for estimating the mobility of farm operators, and to estimate the number of farm workers in the future.[14]

The purpose of Larsen's research[15] was to investigate the effect of variables such as conservation practices, land and labor saving technologies, and population density on land values. Larsen's study covers the period 1925-62.

---

[12]Lerohl, Appendix B, (Commodity notes for expected prices), pp. 186-252.

[13]Rossmiller, p. 8.

[14]Chennareddy, p. 12.

[15]Larsen, p. 1.

The main objective of Quance's thesis was to estimate costs and earnings of capital inputs in United States agriculture between 1917 and 1962. His estimates show that farmers tend to overcommit capital input in their operation even in the absence of price supports.[16]

Johnson's, "An Evaluation of U. S. Agricultural Policies and Programs, 1956 to 1960",[17] completes the list of basic sources for the present study. In his background document Johnson uses selected indicators to describe the flow of resources into the production of a series of farm commodities each related in varying degrees to price support mechanisms and other government programs. The contrast between case studies allows that author to pass judgment on the programs studied in the light of the objectives they were meant to achieve.

Although the above mentioned contributions to the master project provided this study with its principal source of documentation, they did not exhaust the information that was judged essential for its completion. Furthermore some of the contributions, notably Larsen's, Rossmiller's and Johnson's did not cover the whole 1917-62 period. Consequently other sources of information had to be tapped.

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[16] Quance, p. 15.

[17] Johnson.

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Information beyond that provided by the direct contributors to the project was sought in the works of agricultural historians, documents of the United States Department of Agriculture and other government offices and in newspapers and other periodicals. These sources are spelled out in detail as footnotes throughout this thesis and its bibliography. Two byproducts of the overall project, a chronology of relevant events surrounding U. S. agriculture during 1917-62 and a chronology of outstanding federal legislation[18] of the same period, also were found to be valuable sources of information.

Why 1917-62?

Two considerations were paramount in selecting this particular period for the study of agricultural policies and resource flows in the United States. In the first place, 1917-62 is a long, statistically well-documented period of history which offers a unique opportunity to observe the impact of a wide variety of economic and institutional changes on the allocation of agricultural resources. In the second place, at different times during the period similar disturbances affected agriculture alternatively in the presence and absence of agricultural programs. The

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[18]"Federal Legislation Affecting Flows and Product Price Expectations in U. S. Agriculture, 1917-62", A background paper prepared for the project, no date.

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possibility of observing well-recorded reactions of agriculture to similar stimulus under different policy set-ups was considered promising for the evaluation of policy results.

Historical Highlights, 1917-1962

During the first years of the period, the United States enjoyed the double stimulus of the general prosperity of the turn of the century and the favorable effects of World War I on the demand of the United States products. Except for the limitations imposed by the war, trade was flexible and carried out more or less according to the classical rules of the game. As World War I progressed, the requirements and demands of the Allies for U. S. products grew and as a result the United States extended large credits which later were to cause unsuspected trouble. During the first decades of the century, the United States turned from a debtor to a creditor nation, a new position to which it had to learn to adjust.

The spectacular population growth in the United States was brought to a halt by new restrictions on immigration. Agricultural population, in particular, continued the decline initiated around 1910. Meanwhile, the productive capacity of the United States grew more than population and thus per capita income climbed steadily.

The land was becoming fully occupied. As an engine of agricultural growth, the opening of new land was practically exhausted. There was a growing concern for

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technology, extension and education. During World War I, the main concern was to prevent lags in agricultural production relative to needs. Farmers were encouraged to produce more. The production of wheat and pork reached all time highs. The price of land boomed. Labor was drawn into the army and wages rose. Involved in the general price inflation and with an optimistic outlook, farmers got into debt in a less than perfect capital market.

In the immediate post-war period, the economy remained in high gear. Industrial capacity kept expanding and this developed into keen competition for resources. Prices kept moving upward.

However, the end of the war had brought about major changes in international relations: (1) European countries went back to normal production and decreased their demands upon U. S. capacity, (2) competition from other countries (Argentina, Australia, New Zealand, etc.) in world agricultural markets became keener, (3) financial troubles plagued U. S. war debtors. The U. S., not fully aware of its new position in world affairs, was not too keen on free trade and kept tariffs high. These circumstances were partially responsible for the collapse of foreign demand for U. S. farm products. Thus, as one of the two columns sustaining U. S. agricultural demand fell, agricultural prices began to skid in 1920 from their all time high.

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With no similar experience to refer to, the collapse of farm prices was unexpected. Farmers were caught with (1) capacity developed to cope with unusual war demands, (2) low prices, (3) high indebtedness, (4) overexpanded credit, (5) a non-farm boom bidding the prices of resources upward, and (6) progressively tighter monetary policy. The value of land and other assets dropped, imposing on farmers large capital losses. The high (but declining) level of off-farm employment was a fortunate relieving factor which allowed some transfer of labor away from agriculture.

The philosophy of the time allowed only for general and limited government involvement in economic affairs. It was within the power of the government to achieve some changes in the "structure" of the market but it had very limited powers to handle price and output variables. The crisis was dealt with by enacting general programs directed at improving marketing channels and the operation of the market. There was no attempt toward liberalizing international trade and thus recovery was made difficult for agriculture. Unfortunately for the U. S. farmers, this attitude would continue during the twenties and early thirties; they had not seen anything yet.

By the end of the 1920's some indicators showed that the boom was losing momentum: some unemployment developed and construction and manufacturing slowed down. In late 1929 a world-wide depression developed and a wave

of pessimism spread through the financial world. Both investment and employment dropped. Domestic spending, the second column which supported farm demand fell. Bank and insurance companies held short term mortgages and a liquidity crisis made refinancing difficult. A considerable number of U. S. farmers lost their farms. Farm prices reached all time lows but at least farmers were not unemployed. The tremendous unemployment in the cities even led to a short reversal of the movement of people to the cities.

Attitudes with regard to the role of government however were not yet changed: (1) tariffs were raised still higher, (2) some additional efforts in the field of marketing were made, (3) some cautious attempts to support prices were made but were abandoned as soon as carry-overs developed. During a whole decade, from the early twenties to early thirties, agriculture went from a position of depressed sector in the midst of a growing economy to that of a member of a depressed economy. Meager consolation!

At the time of the inauguration of President Roosevelt, the economy was truly bogged down; business activity was low and farm prices were down. The public was beginning to realize that this was not a temporary phenomena. The landmark of the epoch is the change in attitude with regard to the role of government in economic affairs. Several programs were vigorously launched during

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the early days of the new administration, among which stand out the Agricultural Adjustment Act (AAA) and the Federal Emergency Relief Act (FERA). The objective of AAA was to achieve higher incomes via higher prices while FERA was to help farmers in refinancing debts. Price support programs led to carry-overs which began to accumulate from about 1937. Some measures to liberalize international trade were attempted with little success. Bilateral trade agreements and commodity agreements were completed before 1936 but had no chance to be tested before World War II. It would take some time yet to develop a truly new attitude in matters of foreign trade policy.

By 1936 incomes had picked up from depression lows. In the non-farm sector, employment and industrial activity recovered to a substantial extent.

By 1939 World War II began in Europe. Great Britain became a renewed source of demand for U. S. foods. Due to idle capacity no strong pressure developed on farm food prices at first. Farm prices were no higher than in 1937 and still lower than in 1929. However, the government sensed the proximity of U. S. involvement in the war and began to plan accordingly. The Lend-Lease Act of May 31, 1941, can be regarded as an early indication of World War raising demand for American farm products.

In December, 1941, the United States was attacked at Pearl Harbor and United States involvement in the war

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effort was complete. The U. S. Department of Agriculture was reorganized to meet war needs. Mechanisms were created as a means of determining priorities and setting up production goals for the guidance of farmers. Agricultural production was encouraged, i.e., early in the war the price support for hogs was raised.

Agricultural demand expanded on account of: (1) U. S. commitment in the war, (2) U. S. commitments to allies, (3) increases in the spending power of low income sectors due to elimination of pockets of unemployment within the United States and (4) restricted range of choice in domestic spending. Thus, inflationary pressures developed, particularly on food prices. The government was forced to control prices of agricultural products (and ration) but offered in exchange a sort of "forward prices" for the immediate post war in order to prevent a farm price crisis similar to that of post World War I. The formidable capacity of U. S. agriculture to expand output became evident as output was not only sustained but increased despite fantastic reductions in the use of human resources. The evidence of such flexible capacity suggested the possibility that an overproduction crisis, similar to that experienced during the post World War I period, could repeat itself at the end of World War II. This explains why stocks were not always carefully managed and as a result were quasi-exhausted at the end of the war. Exceptional harvests of food grain

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in 1945 to 1947 permitted the U. S. to face up to external food commitments.[19]

The hostilities were suspended in mid-1945. After the war rationing was lifted the combination of accumulated purchasing power plus still limited range of choice developed into a food price inflation. By virtue of the "forward prices" guarantee of the war, farm prices were sustained at high levels until 1947. Later AAA acts of 1948 and 1949 continued the policy of high price supports. Agricultural surplusses began to develop again.

The Korean conflict broke out in June 1950 and lasted until 1954. The Korean War was a renewed source of demand which prevented carry-overs from reaching embarrassing proportions. Simultaneously, the war generated high farm prices which encouraged producers to increase capacity.

In terms of international trade, the post World War II trend was toward freer trade indicating that the lessons of the past had not been in vain. Trade agreement acts were reviewed in 1945, 1948, 1949, and 1951. Between the end of World War II and the end of the Korean War,

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[19]The weather index of U. S. aggregates crop production indicates that weather was rather poor for agriculture as a whole during those years. However, the food grain weather index in particular was good. See, James L. Stallings, "Weather Indexes," Journal of Farm Economics, Vol. 42, (Feb. 1960), pp. 180-186.

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additional changes occurred in the international sphere. Largely under the sponsorship of American aid, the European countries recovered fully and rapidly from the war and reached levels of prosperity unknown to them before. Common markets developed to strive, particularly in agricultural matters, for self-sufficiency. Thus, the increase in European income proved to be of little help in utilizing U. S. excess capacity to produce foods and fibers. However, a new dimension in international relations developed. In 1959, the Congress passed legislation permitting the use of U. S. farm surplusses to help poor countries initiating economic development.

In the late 1950's the U. S. entered in one of the longest periods of economic expansion in the twentieth century. The problems of over-capacity and low income persisted and were aggravated by the price support policies of the post Korean War period.

The Selection of Sub-Periods

The review of economic development in the United States between 1917 and 1962 reveals two distinct doctrines toward the role of government in economic affairs. Before 1933, to get involved with price and quantity variables was not considered proper for the government. After that year such action became more legitimate. In each of these two periods agriculture was stimulated and then let down on different occasions. It will be argued later in this

study that readjustments after "let downs" seldom occur without hardships to producers generating political pressures for government assistance. Agriculture received stimulus in the form of increased demand with U. S. involvement in World War I, World War II and the Korean War. There were serious let downs after World War I when foreign demand collapsed; in 1929 when domestic spending gave out; and after World War II and the Korean War. Thus, for analytical convenience, this study will be broken down in the following periods:

A. 1917-1929: This subperiod is characterized by ills similar to those in periods to follow but characterized by more direct symptoms. During this subperiod, farmers were highly stimulated by World War I to invest in agriculture but continued to overinvest after 1921 despite the development of adverse terms of exchange and the absence of government controls. The burden of adjustment fell on prices, incomes and wealth.

B. 1930-1933: The ills of the previous period were aggravated by financial collapse. The crisis was no longer confined to agriculture.

C. 1934-1941: The New Deal represented a change in attitude toward the role of government in economic affairs. The economy at large

was stimulated by government. Agriculture began to be influenced by price supports and stock accumulations. The disease of overcommitment continued but the symptoms became increasingly those of accumulating government stocks. Further, more public influence on flows of resources into, out of, and within agriculture was attempted. The first stimulus of World War II demand was cushioned until 1942 by existing stocks and the idle capacity created by previous overcommitment of resources.

D. 1942-1946: In the war period new demand allowed the fuller use of previously overcommitted resources. To an extent, war price stimuli were limited by price ceilings and limited availability of factors of production. On the other hand, some price supports were elevated to expand production. Farm labor was drawn into the armed forces and, in some case, held in agriculture with draft deferments.

E. 1947-1954: Price supports which had been exceeded during the war became effective after cessation of hostilities and were stretched into the peace by successive acts. The Marshall Plan took care of expansions in

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productive capacity during the first years of post World War II but stocks began to accumulate in 1948 and 1949. G. I. vocational agricultural programs encouraged young people to remain in farming. The outbreak of the Korean War provided a new source of demand which disappeared in 1954.

F. 1955-1962: From 1955 on stocks of supported commodities accumulated in spite of the launching of disposal programs such as P. L. 480 and the entrance into an unusually long period of overall prosperity. The disease of overcommitted resources manifested itself in symptoms of government stocks of surplusses of farm products, subsidies, price supports, and high land values.

Organization of the Study

Chapter II will be devoted to the discussion of a group of characteristics of agriculture which justify refinements of the existing tools of analysis in agricultural production economics. After a short enunciation of previous modifications to the neo-classical analytical apparatus, Chapter III presents the refinements used in this study to help understand the manner in which a modern agriculture like that of the United States operates. Chapter IV through IX are devoted to an examination of the

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historical record of U. S. agriculture from 1917 to 1962 in light of these refinements. Chapter X summarizes the thesis' findings and presents conclusions.

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CHAPTER II

CHARACTERISTICS OF AGRICULTURE AND THE ECONOMY IN WHICH IT OPERATES

Introduction

Chapter I indicated that the principal purpose of this thesis is to investigate the peculiar behavior that agriculture exhibits, the recognition of which is important for policy making. It was suggested that this seemingly peculiar behavior could be better understood by means of refinements to the current theory of agricultural production economics. Though these refinements are needed for both agricultural and non-agricultural economic analysis; they are particularly important because of the peculiar nature of agriculture.

The peculiarity of agriculture, as has been correctly emphasized by Dale E. Hathaway,[1] does not reside in the fact that agriculture is the sole possessor of one particular characteristic but rather because it possesses several characteristics simultaneously.

No attempt will be made here to list all characteristics generally attributed to agriculture. Instead this

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[1]Dale E. Hathaway, Problems of Progress in the Agricultural Economy, (Chicago: Scott, Foresman and Company, 1964), p. 25.

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chapter will consider mainly those structural characteristics of agriculture which require the assumptions behind the theory to be presented in Chapter III. The term "structural" is stressed to distinguish these characteristics from those that could be called "induced" characteristics. The former types determine the response of agriculture to economic stimuli. The latter are the result of the response. The rest of the chapter will be devoted to a brief review of those structural characteristics which are regarded as important in the context of the theory to be developed in Chapter III. Induced characteristics such as relative levels of income, changes in wealth, rate of growth, etc. will be the substance of Chapter IV through Chapter IX.

Competitive Structure of Production

The concept of competition, as accepted in economic literature, is an expression of the smallness of economic units. The actions of any one unit are of little or no consequence to other units. An alternative expression of this property is that the economic unit is primarily a price taker, both in factor and product markets. Most people will agree that there would be no noticeable effect upon prices if any one farm in the United States were to double its output or double its demand for the inputs it uses. Thus, as far as "price taking," agriculture qualifies as an essentially competitive industry.

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There is sufficient evidence to indicate that both price and income elasticity of demand for the aggregate farm output are low in the United States. The principal implications of inelastic demand are: (1) increases in output result in a more than proportional fall in prices, (2) the growth in demand for farm products is slow even in the presence of substantial overall economic growth, and (3) inelastic demands for both price and income are responsible for wide price fluctuations emanating from shifts in either supply or income. T. W. Schultz[2] and D. G. Johnson[3] have emphasized that the existence of wide and unpredictable fluctuations multiply the possibilities of making errors in management.

Subjection to Various Sources of Uncertainty

Farmers, like other entrepreneurs in a changing environment, are subjected to many sources of uncertainty. Some sources, such as input requirements, output yields, price uncertainty and uncertainty in regard to human relations, affect most industries to a similar degree. Other sources of uncertainty seem to be so closely associated with farming that they deserve separate mention. Among these may be

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[2]T. W. Schultz, Agriculture in an Unstable Economy, (New York: McGraw-Hill, 1946).

[3]D. Gale Johnson, Forward Prices for Agriculture, (Chicago: University of Chicago Press, 1947).

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cited: the uncertain institutional set-up both of agriculture itself and of the economy in which it evolves; "biological" uncertainty; and "technological" uncertainty.

Society attaches particular values to farmers and the product they sell. Even in wealthy societies such as the United States, food is regarded as some sort of special good. Thus, for instance, whenever the price of food increases: (1) it may be regarded by some as a symptom of scarcity generating pressures for a policy of expansion of farm production, or (2) it may be regarded by some others as a threat for real incomes conducive to demands for price controls.

On the other hand, farmers are sometimes regarded as possessors of fundamental virtues whose existence must be preserved. Hence political pressure develops in order to create those inducements which will perpetuate rural life. This conglomeration of sometimes contradictory and often ill-defined normative beliefs prevents the enunciation of clear goals. Unclear goals may lead to inadequate choice of policy instruments and these to perverse expectations.

The institutional uncertainty which has the potential of perverting expectations goes beyond the political pressures generated from within the sector itself. Agriculture is constantly subjected to unpredictable institutional changes originated elsewhere in society. The economic milieu of American agriculture was affected during the last

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Farming is a biological process in which an important factor is the weather over which the producer has little or no control. Dependence on weather prevents farmers from predicting with reasonable accuracy the output during any one period of production. Hence farmers are more prone to erroneous assessment of resource productivities than other entrepreneurs engaged in more "mechanical" type of processes.

The relative smallness of the agricultural firm has implications for the entrepreneur that go beyond mere price taking. Contrary to the situation that may prevail in many other non-farm industries, farmers have no control over the timing of the production and revelation of technological change. This is an additional element that places farmers in a particularly vulnerable position at the time of formulating expectations about the future productivity of resources.

Seasonality and Length of the Productive Process

Typically there exists a substantial lag in agriculture between the time when resources are engaged and the time when the product is ready for sale. Further, resources are not committed continuously along the productive process but rather as discreet chunks often a considerable

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time before the product is forthcoming. Finally, farm output does not flow in a continuous fashion (there exist exceptions such as dairying, egg production, etc.) but rather in one or few installments during the year. The length and discreetness of the production process implies that readjustments, once actions have been taken, are difficult to bring about. Consequently, the avoidance of faulty actions becomes all the more crucial.

Spacial Set-up of Agricultural Production

Because of the nature of agricultural production, each unit of production is spread over a considerable portion of terrain relative to non-farm industries. In addition, the industry itself is widely dispersed. Distance within the farm and among farm subjects movements of both products and inputs to substantial transport cost. The existence of transfer costs prevents farmers from receiving for the salvage of an input the same price it would cost them to acquire an additional unit of a similar input. Some of the economic consequences of unequal acquisition and salvage cost are explored in Chapter III.

Use of Specialized Factors of Production

Production in agriculture is achieved by the use of various specialized factors of production. A low non-farm opportunity cost of a resource, that is a low salvage value relative to a wide range of resource productivity,

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is a sign of factor specialization. Most farm land, an important input in agriculture, has near zero opportunity cost to the sector. Furthermore, technological progress is currently "specializing" a substantial portion of the non-land resources in agriculture: (1) innovation in agriculture itself limits the alternative uses of some agricultural inputs, and (2) innovations outside of agriculture reduces the demand of unskilled labor and hence "specializes" farm labor in agriculture. An important consequence of specialization is that it tends to delay the intersectoral flow of resources.

Other Structural Characteristics of Agriculture

The list of characteristics of agriculture has been limited to those bearing upon the conceptual framework to be developed in the next chapter. Other characteristics often mentioned in the literature are, (1) loss of distinction between consumption and production decisions, (2) production within the firm itself of replacement of human resources, etc. These do not play a leading role in the theory of Chapter III, although they are important in applying it.

Summary

The structural characteristics of agriculture discussed in this chapter fall in two broad categories:

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A. Those complicating the formation of accurate expectations, hence multiplying the probabilities of making errors.
   1) Competitiveness, coupled with biological as well as technological uncertainty which affects the formation expectations about the productivity of resources.
   2) Inelasticity of demand which affects the formation of expectations about prices.
   3) Unstable policies affecting the formation of all kinds of expectations.

B. Those complicating the adjustment once errors have been committed:
   1) Discontinuity and length of the productive process.
   2) High transfer costs resulting in wide divergence between inputs' acquisition and salvage price primarily resulting from:
      a) location factors which subject products and factors to high transport cost and
      b) specialization which makes the flow of resources difficult.

Clearly, a theory which relies upon perfect knowledge and perfect mobility cannot make allowances for the

above mentioned characteristics. Since the position taken in this study is that these characteristics are important, some modifications to currently accepted concepts are justified.

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CHAPTER III

THE CONCEPTUAL FRAMEWORK

Introduction

It was argued in Chapter II that agriculture possesses some characteristics which limit the usefulness of traditional tools of economic analysis. In the present chapter these characteristics are taken into account in the development of a conceptual framework which promises to have more explanatory power than the unmodified neo-classical theory of production economics. But first some attention should be given to earlier modifications.

Some Early Modifications to Traditional Concepts of Agricultural Production Economics

Agricultural economists have been preoccupied for a long time with the fact that the unmodified neo-classical apparatus of production economics leaves unexplained many behavioral facets of a modern agricultural economy. The asymmetric output response during different phases of the cycle and the perpetuation of low rewards to all factors of farm production coupled with capital losses are important phenomena that traditional theory of production economics fails to explain adequately.

The limitations of the unmodified neo-classical theory of production economics encouraged various prominent

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agricultural economists to suggest some modifications to that theory. The refinements of neo-classical theory of agricultural production economics that have attracted considerable attention since the Second World War are: (1) T. W. Schultz's modification of the classical secular analysis, (2) D. Gale Johnson's risk and uncertainty modification and (3) hypotheses concerning technological change. These contributions to theory will be briefly reviewed in the following paragraphs. This review should be regarded as an introduction to the conceptual apparatus that constitutes the core of this chapter. A more detailed inventory and evaluation of early modifications of traditional tools of analysis may be found elsewhere.[1]

According to T. W. Schultz[2] there exist forces within a modern agriculture which tend to sustain a positive rate of output growth. Prominent among these forces are the secular increases in the stock of resources, human resources in particular, and technological progress especially of the labor-saving, output increasing type. Output

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[1]See Glenn L. Johnson, "The State of Agricultural Supply Analysis," Journal of Farm Economics, XLII, No. 2, (May, 1960), p. 435.

----------, "Supply Function - Some Facts and Notions," Agricultural Adjustment Problems in a Growing Economy, E. O. Heady et. al., (eds.), (Ames: Iowa State College Press, 1958), p. 74.

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[2]T. W. Schultz, Agriculture in an Unstable Economy, (New York: McGraw-Hill Book Company, 1945).

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growth tends to take place faster than the growth in demand because in wealthy countries the process takes place in ranges of low income elasticity of demand. Due to the relatively low price elasticity of demand for aggregate farm output, the fast growth of supply causes a decrease in relative farm prices. Falling output prices and the secular expansion in the stock of labor depresses the reward to labor below its off-farm opportunity cost causing this resource to be profitably drawn out of agriculture. The drain in labor input and increases in labor saving technology encourage substitution by capital inputs. Capital inflow is only possible if returns to capital remain above competitive levels. T. W. Schultz's models therefore predict a long run situation of expanding output, falling terms of trade for agriculture, rewards to labor below acquisition costs but returns to capital which more than cover acquisition costs. Most of these conclusions have been substantiated by actual events. Contrary to these conclusions, however, the rule in contemporary agriculture appears to be the perpetuation of rewards to farm capital below rather than above acquisition costs.

D. Gale Johnson has argued[3] that uncertainty would prompt farmers to discount expected prices and consequently to produce less output than if prices were known

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[3]D. Gale Johnson, Forward Prices for Agriculture, (Chicago: The University of Chicago Press, 1947).

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with certainty. Less output than otherwise would result in returns to some, and probably to all factors of production above the level that would exist had expected prices not been discounted. Hence the removal of uncertainty - through forward prices as advocated by D. Gale Johnson - would increase the willingness of farmers to expand production and would tend to shift the rewards to factors of production towards equilibrium levels. The ever increasing productivity of U. S. farming under price supports - a form of forward prices - tends to lend plausibility to this hypothesis. D. Gale Johnson's modification however does not help to explain the prevalence of low earnings of factors of production engaged in farming relative to acquisition costs nor capital losses.

There is a school of thought that hypothesizes that the asymmetric output response of U. S. agriculture to the phases of the cycle can be attributed to rapid adoption of technological innovations. According to this argument producers are caught in a "treadmill", using the word coined by Willard W. Cochrane[4] one of its more fervent advocates. The "treadmill" would function as follows: (1) technological change, which is viewed mostly as exogenously determined, results generally in output expanding

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[4]Willard W. Cochrane, Farm Prices - Myth and Reality, (Minneapolis: The University of Minnesota Press, 1958).

cost-reducing innovations that some alert producers find profitable to adopt, (2) progressive adoption results in the expansion of output which given the relatively low elasticity of demand for farm products in turn causes farm prices to deteriorate, (3) caught in a profit squeeze, most farmers are "forced" to adopt the new technology as they can no longer compete with the old one, (4) widespread adoption only worsens the profit squeeze, (5) since the new technology is of a lower cost than the old one, there is no incentive for any one individual farmer to reduce output by means of shifting back to the old method of production, (6) instead, producers seek the adoption of still newer techniques that continuously flow from exogenous sources. The logic of this argument has made it a favorite in many intellectual circles. Further, the fact that the average technology in U. S. commercial farming is among the world's most advanced made the hypothesis appear almost self-evident.

The "treadmill hypothesis" emphasizes that the irreversibility of U. S. supply response and its bias towards overproduction can be principally attributed to forces prompting farmers to adopt constantly new technology. This argument implies the existence of an agriculture utilizing substantially up-to-date production techniques. This implication can only be accepted in a very restricted sense. Experience tends to show that only a sub-sector of contemporary U. S. agriculture utilizes the most recent

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technology available while a significant number of farmers stick to obsolete methods of production. Glenn L. Johnson points out that ". . .the very high proportion of obsolete production plants in American agriculture. . .makes it obvious that overproduction in American agriculture occurs in an industry characterized primarily by obsolete production plants rather than by plants which have adopted unduly advanced technology, . . ."[5] The perpetuation of obsolete technology is an empirical fact of theoretical and practical significance that the "treadmill hypothesis" ignores completely.

Once due consideration is given to the fact that technological change enters production embodied in human and non-human inputs - a fact that the treadmill hypothesis does not emphasize sufficiently - the forces that prompt farmers to desire the adoption of new technology are easy to recognize. These forces are the same that govern

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[5]Glenn L. Johnson, "An Evaluation. . .", p. 54. This author also makes reference to a number of studies by sociologists and economists that point out that: (1) seldom do farmers utilize the most up-to-date technology; (2) that considerable lags exist, often estimated up to fifteen years, between the moment when a new farm technique is revealed and the time when its use becomes common and that (3) in an agriculture like that of the United States the perpetuation of obsolete technology is often the rule rather than the exception.

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substitution among factors.[6] Embodiment alone, however, is not sufficient in explaining the less obvious forces that block rational farmers from adopting modern technology even though they may be fully aware of the superior productivity of the new technique. It will be argued in the following sections of this chapter that the latter forces may be explained theoretically once proper assumptions are made (1) with respect to the entrepreneurs state of knowledge and (2) with respect to input's prices.

The successive modifications that have affected the traditional neo-classical model of production economics have improved the power of theory in explaining actual developments in United States agriculture. Each of these improvements fails however to explain the asymmetric behavior of agriculture in responding to expansion and contraction forces and low rewards to all factors of production coupled with perpetuation of obsolete technologies. These shortcomings prompted Glenn L. Johnson to make additional refinements to available concepts of production economics. The rest of this chapter is devoted to these refinements.

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[6]The substitution of an input embodying new technology for one that does not will be decided after contrasting against each other the input's ratio of MVP to the respective input's price. A key factor in the theory to be presented in this chapter is the recognition that input's acquisition costs generally differ from the same input's salvage price.

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Prices in Traditional Analysis

Neo-classical analysis often assumes implicitly that producers are able to dispose of their inputs at the same price they would have to pay for additional units of identical inputs. Moreover the neo-classical analysis often fails to explore adequately the implication of frustrated expectations or else such possibility is dismissed as unimportant.

With respect to the first assumption, it can be said, as a rule, that the acquisition price of a factor is larger than its salvage price. This difference is mostly due to transfer costs. As Glenn L. Johnson has argued,[7]

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[7]The theoretical development that follows is inspired by Glenn L. Johnson's fixed asset theory. The first formulation of the theory may be found in Glenn L. Johnson and Lowell S. Hardin, Economics of Forage Evaluation, North Central Regional Publication No. 48, Station Bulletin 623, (Lafayette, Indiana: Agricultural Experiment Station, Purdue University, April, 1955). Since that formulation Johnson and his students have made successive refinements to the point that at the present the literature on that subject has become abundant. What follows are a few selected references that may lead the readers interested in other pertinent literature: Clark Edwards, "Resource Fixity, Credit Availability and Agricultural Organization," (unpublished Ph.D. Thesis, Michigan State University, 1958); Clark Edwards, "Resource Fixity and Farm Organization," Journal of Farm Economics, XLI (Nov. 1958) 747; Glenn L. Johnson, "The State of Agricultural Supply Analysis," Journal of Farm Economics, XLII (May 1960), 435; Glenn L. Johnson, "Supply Function - Some Facts and Notions," in Agricultural Adjustment Problems in a Growing Economy, Earl O. Heady et. al. (eds.) (Ames: The Iowa State College Press, 1958), pp. 74-93. See also comments by Willard W. Cochrane in the same collection of essays; Lester V. Manderscheid, "Incorporating Durable Goods in Consumption Theory,"

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the divergence between acquisition price and salvage price is important and has the interesting implications which will be explored in the following section.

As long as acquisition costs equal salvage values production adjustments are perfectly reversible and the possibility of frustrated expectations need not be crucial. However, as soon as changes in the organization of production are not perfectly reversible, unfulfilled expectations may result in undesired allocation of resources and "non-Pareto better" redistribution of wealth.

The implications of divergence between acquisition and salvage prices and between expected and actual product prices shall each be considered in turn. The difference between expected and actual product prices has been selected for analytical convenience as a means of exploring the theoretical consequences of frustrated expectations in general. The results of the Interstate Managerial Survey[8]

(unpublished paper prepared for presentation at meetings of the Econometric Society, New York, Dec. 28, 1965); Dale E. Hathaway, Government and Agriculture, (New York: MacMillan Co., 1963), Chapter IV; Glenn L. Johnson et. al. (eds.), A Study of Managerial Processes of Midwestern Farmers, (Ames: The Iowa State University Press, 1964); Theodor Heidhues, "A Recursive Programming Model of Farm Growth in Modern Germany," Journal of Farm Economics, XLVIII (August 1966) 668; Richard H. Day, Recursive Programming and Production Response, (Amsterdam: North Holland Publishing Company, 1963).

[8]Earl J. Partenheimer and Robert D. Bell, "Managerial Behaviour of Farmers in Formulating Expectations of Future Events," A Study of Managerial Processes of Midwestern Farmers, Glenn L. Johnson et. al. (eds.), (The Iowa State University Press: Ames, 1961), p. 36.

confirm the hypothesis that farmers formulate expectations about matters other than just product price expectation. Other such important matters are: (1) input price expectations conceivably with respect to both acquisition and salvage prices, (2) production responses, (3) changes in technology, (4) human behavior and (5) institutional arrangements. The frustration of any one of the above mentioned expectations will lead to erroneous commitment of resources. The consequences of these errors are similar regardless of the source of frustrated expectation and thus the analysis of unfulfilled product price expectations may be easily generalized to other forms of expectations.

Implications of the Divergence Between Factor's Acquisition and Salvage Price

The criteria for the achievement of maximum profits under conditions of certainty and perfect knowledge is combining factors of production so that the marginal value product of each factor equals its marginal factor cost. No other combination of inputs promises to yield larger net profits to the entrepreneur. As new prices become effective, the entrepreneur is warranted maximum profit if he recombines his inputs in order to satisfy the criteria.

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regarded as a service from some storable[9] asset X_k which delivers a unique rate of service per unit of time and has a fixed durability of, say, n periods of time. Hence if the entrepreneur wishes to use one more unit of x_k per unit of time he will have to acquire one more unit of the storable X_k. Alternatively, if the entrepreneur desires to use one less unit of service x_k per unit of time he will rid himself of one unit of the storable.[10] According to the criteria set above, maximum profit is obtained when:

$MPPx_k y \cdot Py = Px_k$ where

$MPPx_k y$ denotes the marginal physical product of input x_k in producing output Y,

Py is the price of output Y,

Px_k is the price of input x_k.

Assume that the high profit point has been achieved but that as soon as this is so, Py falls to P'y so that

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[9]Inputs may be classified in many ways. A possible classification is to divide inputs into storables and non-storables. The use of the service from a storable input may be postponed at will. The service of a non-storable input, instead, must be used as it becomes available or otherwise lost. Labor service for the laborer falls into the later category. Durability is a condition for storability.

[10]The storable asset in question could be thought of as a light bulb which burns permanently unless it is unscrewed from its socket. Hence while in the socket it delivers a unit of x_k per day (i.e., 24 hours of light, per day). If at time t+1 instead of 1 unit of x_k per day 2 units are needed, then it will be necessary to add another light bulb because despite the fact that it may deliver more than 24 hours over its lifetime it cannot deliver more than 24 hours per day.

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$MPPx_k y \cdot P'y < Px_k$. Under the conditions of a continuous production function showing diminishing returns, the entrepreneur will wish to use less of x_k, thereby increasing $MPPx_k y$ until $MPPx_k y \cdot P'y = Px_k$.

Consider now that transfer costs are important so as to make the acquisition price of the factor to the producer ($P^a_{x_k}$) larger than its salvage price ($P^s_{x_k}$). Consider further that the entrepreneur somehow achieved $MPPx_k y \cdot Py = P^a_{x_k}$, the high profit point and that next, the price of y falls unexpectedly so as to cause $MPPx_k y \cdot P'y < P^a_{x_k}$.

The high profit point can only be reached by using less of x_k. However, the services of X_k cannot be disposed at $P^a_{x_k}$ but only at $P^s_{x_k}$; $P^s_{x_k} < P^a_{x_k}$. Now if in addition, $MPPx_k y \cdot P'y \geq P^s_{x_k}$, it will not be profitable for the producer to rid himself of X_k. The value of the product he would have to forego is larger than the receipts that would arise from selling X_k. In fact, X_k has become fixed with the following consequences:

1. More y is produced than if some units of X_k had been withdrawn from production.
2. The owner of X_k presumably receives less income from the use of X_k than before as he produces as many units of y as before but which are now valued at a lower price. The owner of X_k is less wealthy: he has suffered capital losses.

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The argument presented above leads by extension to the following definition: Whenever the present value of the stream (conceivably one) of MVPs of an input is smaller than the acquisition price of that input and larger than its salvage price, it is not profitable either to add or withdraw units of that input from production: that input has become economically fixed.[11] The only factors which may become fixed in terms of the above concept of fixity are storable factors.[12] In the case of storables which can be used more than once, the proper concept of MVP is, of course, the discounted stream of future MVPs over the life of the asset.

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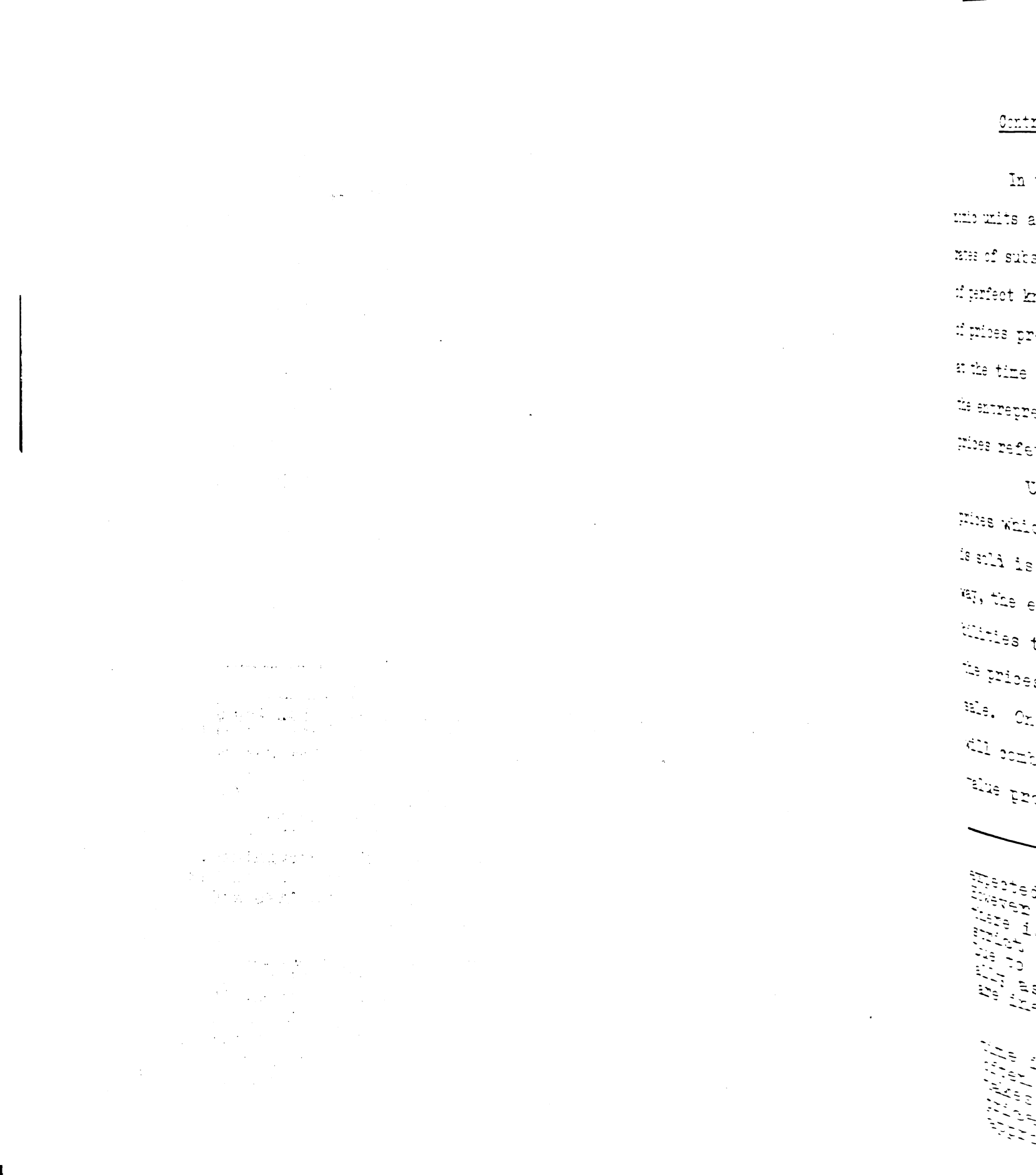
[11]Only recently the problem of the variability of the rate of service flow from a fixed storable has begun to receive due attention. For a recent discussion of this topic see Pan A. Yotopoulos, "From Stock to Flow Capital Inputs for Agricultural Production Functions: A Micro-analytic Approach," Journal of Farm Economics, XLIX, (May 1967), 476 and a discussion by Richard H. Day in the same issue. In this chapter, however, the problem will be assumed away although its importance is fully recognized. Here it will be assumed that productive assets are used at capacity; that they have a predetermined useful life and that they have a residual value of zero.

[12]By definition non-storable factors cannot become fixed. Asset fixity, however, affects indirectly non-storable factors by changing their marginal productivity. For instance, the presence of excess quantities of a fixed input will tend to increase the marginal productivity of its good non-storable complements and lower that of its good non-storable substitutes relative to what they would have been otherwise.



Contrasting the Roles of Expected Prices Versus Actual Prices

In the study of production and consumption, economic units are viewed as constantly comparing marginal rates of substitution to price ratios. Under conditions of perfect knowledge there exists a unique constellation of prices prevailing at both the time of the decision and at the time of production (or sale), and which is known to the entrepreneur without a shadow of doubt. The set of prices referred above is both expected and effective.

Under conditions of uncertainty, however, the prices which will become effective at the time the product is sold is not known. Since factors must be combined anyway, the entrepreneur is forced to select among many possibilities that which he believes most perfectly reflects the prices that will effectively prevail at the time of sale. Once this choice has been made, the entrepreneur will combine inputs so as to equate expected marginal value products[13] to their respective factor prices.[14]

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[13] Implied in the discussion is the fact that the expected marginal value product E(MVP) is $E(MVP) = E(Py) \cdot MPPx_1y$. However, particularly in other than very short run planning, there is no certainty about future factors' MPP. In the strict sense it should be said, $E(MVP) = E(Py) \cdot E(MPPx_1y)$. Due to the lack of estimate of factors E(MPP)'s it is generally assumed that expectations with respect to factors MPP are inelastic.

[14] In a strict sense the proper concept at planning time is expected factor prices. However, considering that often a large portion of the total commitment of inputs takes place at planning time, the use of effective factor prices does not do too much violence to reality as a first approximation.

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As soon as the assumption of certainty is relaxed, expected rather than actual prices become the guideline for decision making. However, a theory that assigns a leading role to expectations but leaves them unspecified is indeterminate. In the words of Patinkin, "once the Pandora box of expectations. . .is opened upon the world of economic analysis, anything can happen."[15] Hence the legitimate incorporation of expectations in the theory requires that some statement be made with respect to how expectations are formulated. Fortunately, a substantial amount of fruitful work has been done recently in that direction.

The Formation of Farmer's Expectations

Although the role of price expectation has long been recognized in the literature[16] most of the effort to give it empirical content is rather recent. In the mid-50's Darcovich and Heady[17] tested the validity of fourteen

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[15]Don Patinkin, Money, Interest and Prices, (Evanston, Illinois: Row, Peterson and Co., 1957) p. 180.

[16]Two examples that have become classics in the treatment of expectations are: Frank H. Knight, Risk Uncertainty and Profit, (New York: Kelley and Millman, Inc., 1957); and D. Gale Johnson, Forward Prices for Agriculture, (Chicago: University of Chicago Press, 1949).

[17]William Darcovich and Earl O. Heady, Application of Expectation Models to Livestock and Crop Prices and Products, (Iowa Agriculture Experiment Station Research Bulletin 438: 1956).

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relatively simple expectation models. Twelve of the models are different rules of selecting past prices as expression of expected price; one relates expected prices to the future market while the remaining forecasts by means of the government's outlook information. The authors computed selected statistics and concluded that the outlook model performed the best in the case of livestock products and rather well with crops.

During the years 1954 and 1955 the Interstate Managerial Survey (IMS) was carried out under the sponsorship of the Risk and Uncertainty Subcommittee of the North Central Farm Management Research Committee. One among the several objectives of the IMS was "To describe and establish expectation models used in the decision process."[18] The IMS's results in this regard were reported by Partenheimer[19] and by Partenheimer and Bell.[20] An important finding was that farmers display a surprisingly high degree of economic sophistication in formulating expectations. Models such as those advanced by Darcovich and Heady appear to be oversimplifications of the process by means of which farmers form

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[18]Interstate Managerial Project Committee, Summary Data from the Interstate Managerial Survey, (Lexington: Kentucky Agricultural Experiment Station, Bulletin 669, June 1959).

[19]Earl J. Partenheimer, "Some Expectation Models Used by Selected Groups of Midwestern Farmers," (unpublished Ph.D. Thesis, Michigan State University, 1959).

[20]Earl J. Partenheimer and Robert D. Bell, p. 36.

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their expectations. The evidence provided by IMS indicates that in addition to most of the elements contained in the decision models postulated by earlier researchers (past prices, outlook information, etc.) farmers pay attention to condition of supply; of supply and demand and to the actions of the government.

The findings of IMS guided Lerohl to generate series of expected prices[21] for agricultural commodities which have fared rather well in empirical tests. Lerohl started by generating what he calls "mechanical" estimates of expected prices which he determined as a function of actual prices in previous years. These estimates are arrived at by regressing expected price on past prices allowing the data to determine the weight to be given to each of the previous years.[22] After achieving these "mechanical" estimates he adjusted them in order to insure consistency with outlook information revealed by historical investigation to have been available to producers at the time. The result was an attempt to estimate the prices anticipated by "reasonably well-informed" producers. Lerohl subjected his series of expected prices to several tests. First he compared his figures with series of expected

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[21]Lerohl.

[22]The mathematical technique used by Lerohl is a "general distributed lag." For details see Lerohl, Chapt. 3 & 4.

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prices developed by USDA outlook workers for Glenn L. Johnson,[23] and found that they were consistent. This Lerohl took as a strong indication that "different investigators are capable of arriving at similar conclusions regarding the direction of shifts of expected prices relative to the previous year's actual prices."[24] Second his long run expected prices were contrasted with changes in farm real estate value. Expected prices appeared to explain changes in farm real estate value better than either actual prices or mechanically derived expected prices. Finally, Lerohl's expected prices performed satisfactorily when incorporated into an econometric model.[25]

Asset Fixity and the Organization of Agricultural Production

Consider the production of a homogeneous output y by means of only two variable inputs x_1 and x_2, all other inputs being fixed in the sense that $P\overset{a}{x}_i \geqslant MVPx \geqslant P\overset{s}{x}_i$, for all possible reorganizations. The production function is of the type: $y = f(x_1, x_2/x_3,\ldots,x_n)$. It is continuous and shows diminishing marginal physical product. At times it will be postulated that (1) the acquisition price $P\overset{a}{x}_i$

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[23]Glenn L. Johnson, An Evaluation. . .

[24]Lerohl, p. 85.

[25]Michel Petit, "Econometric Analysis of the Feed-Grain Livestock Economy," (unpublished Ph.D. Thesis, Michigan State University, 1964).

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of each input is higher than its salvage price $P\overset{s}{x}_i$; for i = 1,2, and that (2) expected product price E(Py) may differ from effective product price Py.[26]

In Figure 3.1 lines I, II, III, and IV are expected iso-marginal value product functions E(IMVP) each one representing the locus of those combinations of x_1 and x_2 for which the marginal value product of one of the inputs is equal to some constant. In the particular instance of Figure 3.1 the constants are appropriate input prices i.e., curve II is the locus of the combination of x_1 and x_2 where the $E(MVPx_2y) = P\overset{a}{x}_2$. As indicated in Figure 3.1 there exist four E(IMVP) lines:

II and III where: $E(MVPx_iy) = P\overset{a}{x}_i$ and

I and IV where: $E(MVPx_iy) = P\overset{s}{x}_i$ for i=1,2.

It will be assumed for a moment that the production function is stable and perfectly known to the entrepreneur; this means that the only source of divergence between E(MVP) and MVP is through the frustration of output price expectations.

Assuming atomistic competition under the conditions specified thus far, the entrepreneur will find it profitable to use x_1' of x_1 and x_2' of x_2 so as to achieve:

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[26]For simplicity the analysis will assume that the commitment of all inputs is done at once and thus there is no need to distinguish at planning time between expected input prices and their effective counterparts.

Figure 3

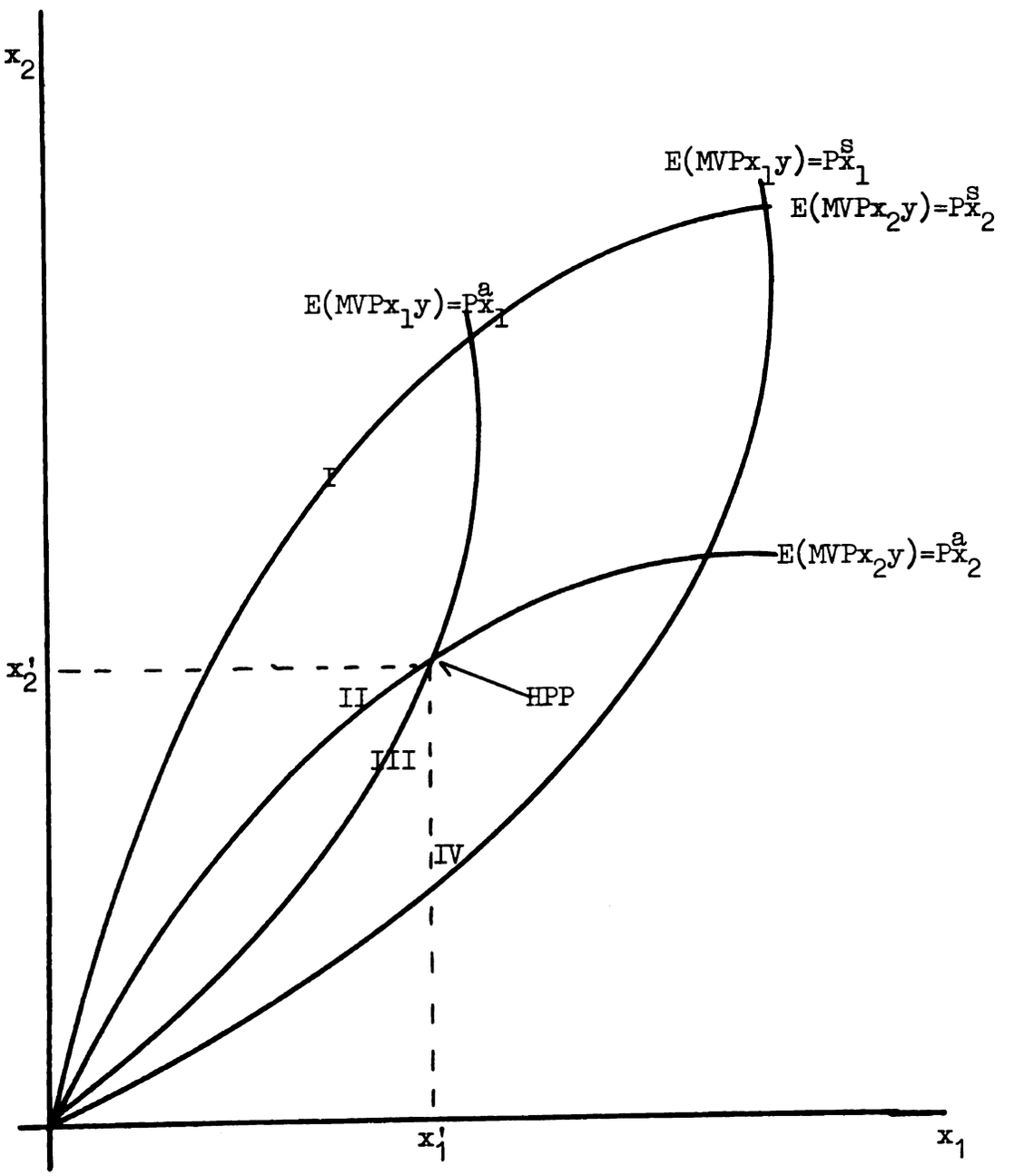

Figure 3.1: Expected iso-marginal value product functions in a factor/factor diagram in a case where input's acquisition prices are larger than their respective salvage values.

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$$\text{I.}\quad \frac{E(Py)\cdot MPPx_1y}{P\overset{a}{x}_1} = \frac{E(Py)\cdot MPPx_2y}{P\overset{a}{x}_2} = 1 \text{ or}$$

$$\text{II.}\quad \frac{E(MVPx_1y)}{P\overset{a}{x}_1} = \frac{E(MVPx_2y)}{P\overset{a}{x}_2} = 1$$

If under all circumstance $P\overset{s}{x}_i = P\overset{a}{x}_i$, for all x's, the four (IMVP) curves would collapse into two and their only function would be to indicate, as in the usual neo-classical analysis, the high profit combination of inputs at their point of intersection (Figure 3.2). Further, in equations I and II above, the superscripts attached to input prices would be superfluous.

The next step will consist in contrasting the result brought about by frustrated expectations under the following two alternative situations: a) $P\overset{a}{x}_i = P\overset{s}{x}_i$ and b) $P\overset{a}{x}_i > P\overset{s}{x}_i$. Assume that, after committing x_1' and x_2' to the production of y, it turns out that

III. $E(Py) \neq Py$ and in particular (for the sake of argument) that

IV. $E(Py) < Py$

Concentrating first upon the case where $P\overset{a}{x}_i = P\overset{s}{x}_i$ holds - the case most recurrently treated in the literature - it may be found that, ex post, x_1' and x_2' did not turn out to be the most profitable combination of inputs. The dotted line of Figure 3.3 are iso-marginal value product lines,[27] superimposed on the set of E(IMVP) of Figure 3.2.

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[27]Iso-marginal value product (IMVP) is a different concept than expected iso-marginal value product. The former is an ex post concept while the latter is ex ante.

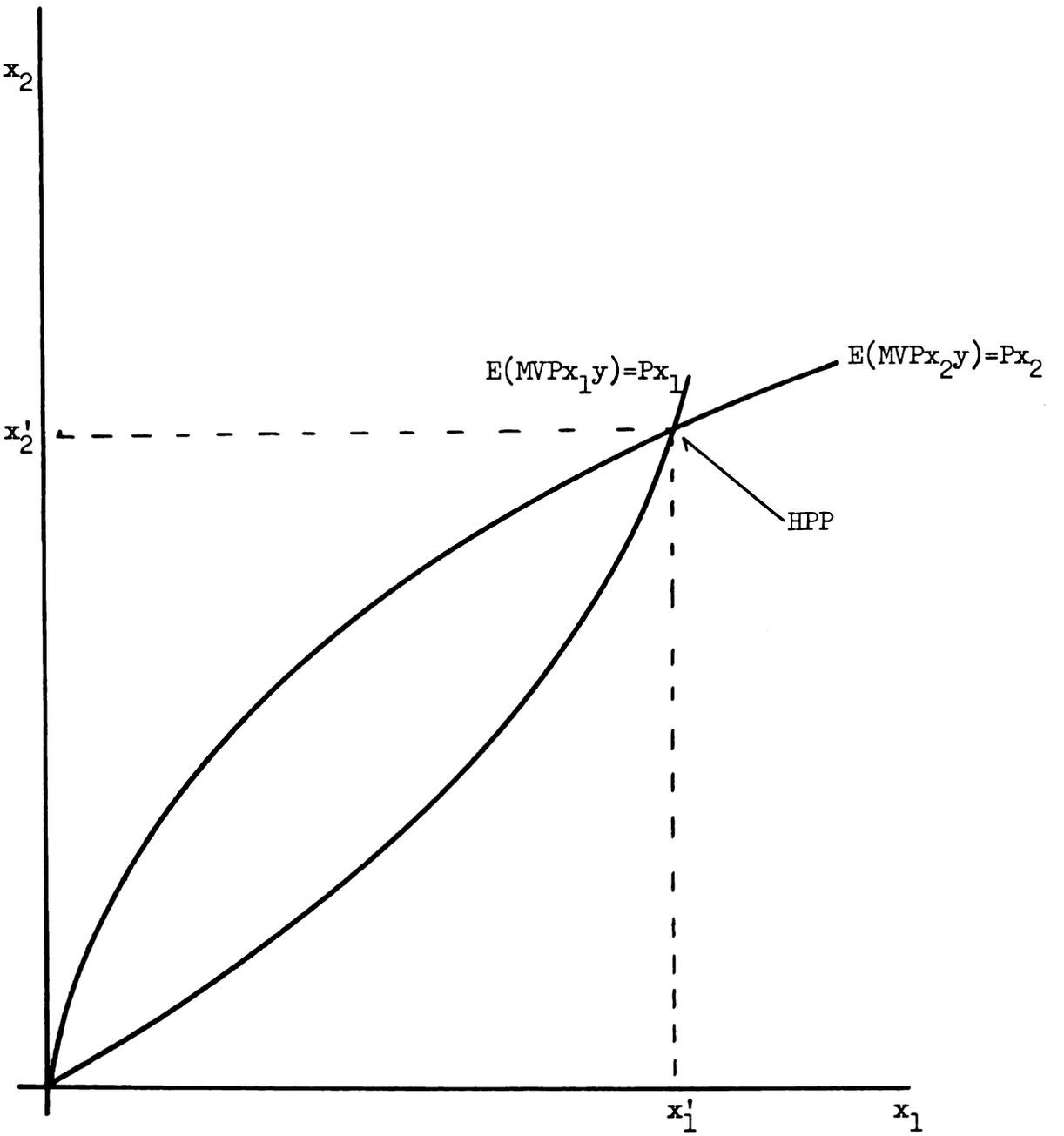

Figure 3.2: Expected iso-marginal value product functions in a factor/factor diagram in a case where input's acquisition prices are equal to their respective salvage values.

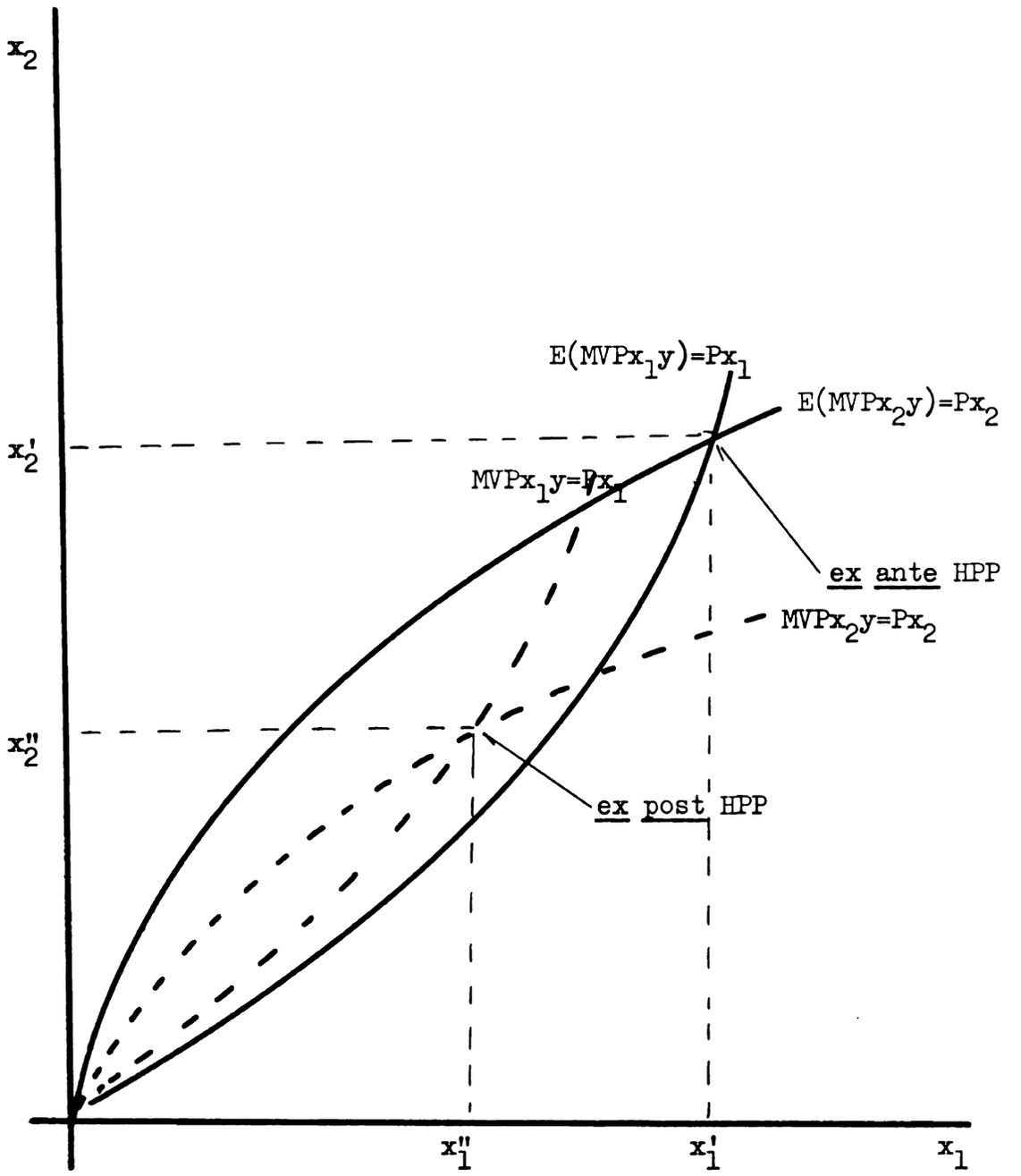

Figure 3.3: Factoral adjustment to changing price expectation in a factor/factor diagram in a case where input's acquisition prices are equal to their respective salvage values.

The intersection of the two IMVP lines indicates an ex post high profit point which clearly does not correspond to the combination x'_1, x'_2. Too much of both inputs has been used relative to the ex post optimum combination. The combination x'_1, x'_2 represents a situation of overcommitment of resources and hence one of over-production.

The first effect of the lack of correspondence between expected product and actual prices is that, to the extent that expected prices depend upon actual prices, expectations will be revised. The form of dependence does not matter for the moment. It can temporarily be assumed that producers expect for the period t + 1 the price effectively prevailing at time t. If so the dotted lines in Figure 3.3 become the new E(MVP) and $x_1", x_2"$ the new optimum expected combination of inputs. The entrepreneur will adjust production by ridding himself, at no loss, of $(x_1' - x_1")$ of x_1 and $(x_2' - x_2")$ of x_2. Nothing can prevent him from reaching what he regards as his optimum position.

Contrast now the preceding case with that illustrated in Figure 3.4 in which $P^a_{x_i} \neq P^s_{x_i}$. The combination of factors x_2', x_1' is the combination that was felt optimum for period t given the price expectations held for that period. It resulted from the situation illustrated in Figure 3.1. As in the case where $P^a_{x_i} = P^s_{x_i}$, it was found that after committing x_2', x_1' the price actually received was lower than the price expected at planning time. As in

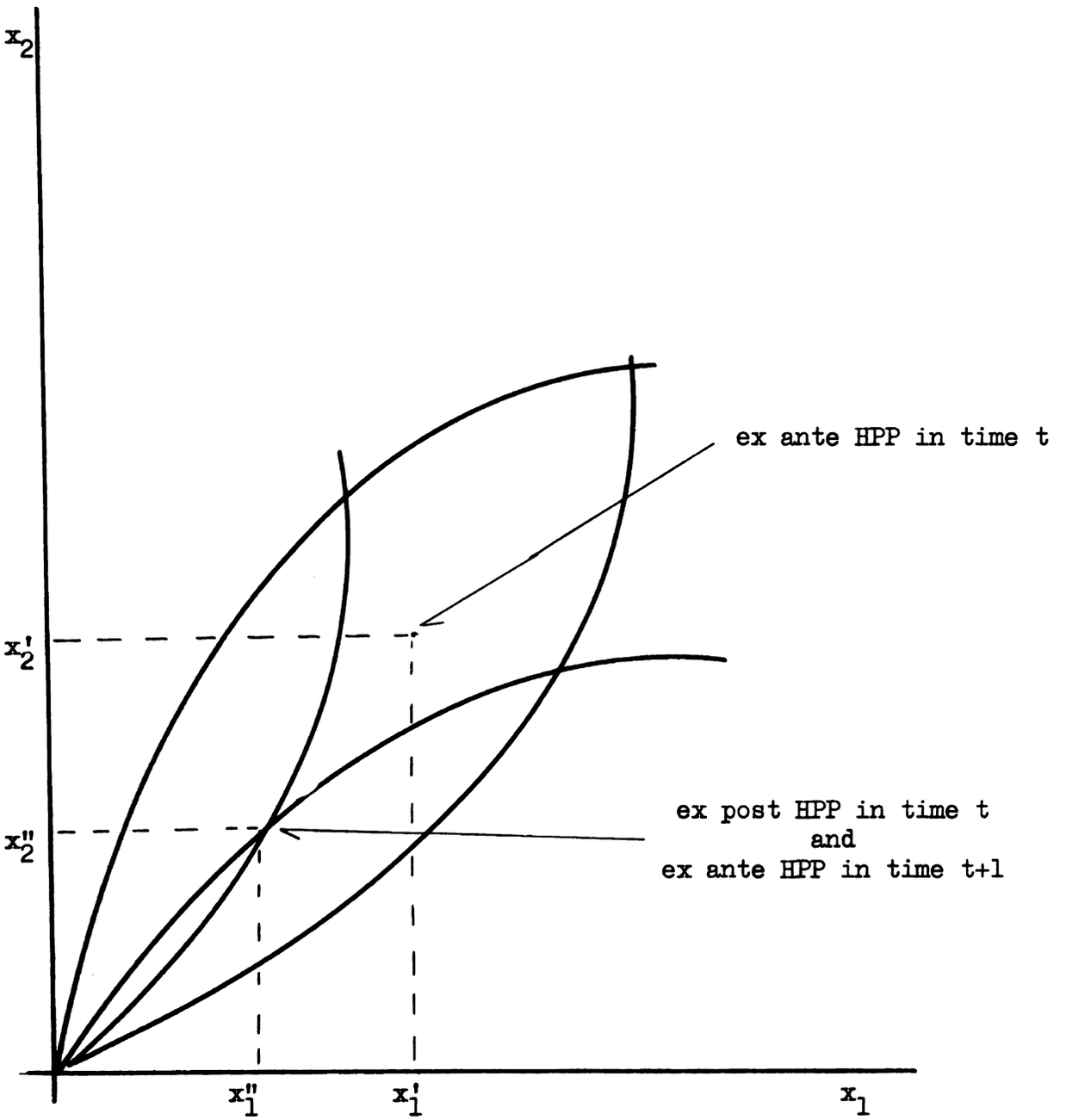

Figure 3.4: Desired factoral adjustment to changing price expectation in a factor/factor diagram in a case where input's acquisition prices are larger than their respective salvage values.

the previous case, the first effect of frustrated expectations is to stimulate a revision of expectations for period t + 1. For the sake of simplicity assume that the producer expects for t + 1 the same prices which in fact prevailed in time t. Hence in Figure 3.4 the IMVP functions corresponding to time t become E(IMVP) for the time t + 1 and the ex post MPP of time t becomes ex ante or expected MPP for time t + 1. In view of these circumstances the producer will wish to achieve for time t + 1 the position $x_1"$,$x_2"$ (Figure 3.4) for which he has to rid himself of $(x_1' - x_1")$ of x_1 and $(x_2' - x_2")$ of x_2. Is the combination regarded as optimum for t + 1 attainable? Clearly not. As the situation stands, both the $E(MVPx_1y)$ and $E(MVPx_2y)$ are respectively higher than their salvage value and lower than their acquisition value. In this particular case it is not profitable for the entrepreneur to make any factor adjustment. This position is optimum to the extent that no other has the potential of rewarding the producer with higher net returns and yet some resources are earning less than was expected from them. As a result the owners of these resources are incurring in capital losses implying "non-Pareto better" reallocations of wealth.

In the case just postulated it so occurred that both inputs became fixed simultaneously; this need not be always the case. In the two variable input situations only one input or even neither of them may become fixed as a result of frustrated product price expectation. The

conditions under which adjustments are possible at all, the degree of possible adjustment and the inherent tendency to overcommitment are explored in the next section.

Possibility of Correcting Errors of Factor Commitment When $P\overset{a}{x}_i \neq P\overset{s}{x}_i$

Figure 3.5 is Figure 3.1 magnified plus some additions. First the iso-product curve VV, passing through the high profit point HPP is explicitly indicated. This line is important in dividing all combinations of inputs x_1 and x_2 in three categories: (1) those yielding optimum output; (2) those yielding more than optimum output and (3) those yielding less than optimum output. The curve VV itself is the locus of the combinations of x_1 and x_2 yielding optimum output. Only one point along VV, however, indicates optimum allocation of factors. This latter point is HPP. Additional modifications to Figure 3.1 are four pairs of dotted lines parallel to the axis, which radiate from each of the corners of the diamond shaped area. The purpose of these lines is to delineate in the figure areas of interest.

Figure 3.5 contains nine regions which in addition to the high profit point itself are analytically interesting. The rest of this section will examine some of the consequences upon the volume of output and wealth of committing factors other than in the optimum

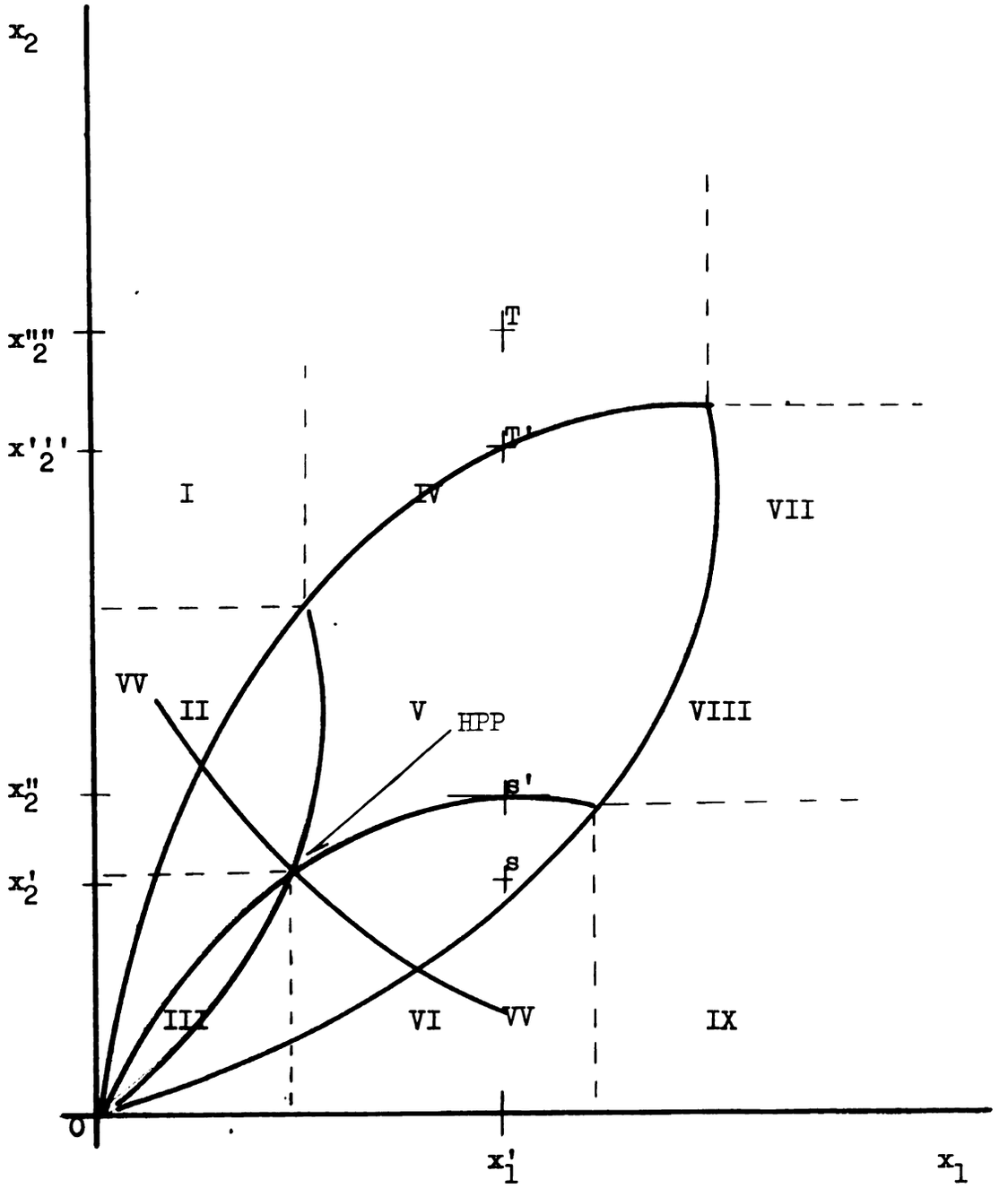

Figure 3.5: Regions of interest to fixed asset theory in a factor/factor diagram.

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combination.[28] Except that combination of factors which result in HPP, all other combinations are wrong. The consequence of wrong commitment varies depending upon the region where the combination falls. Three examples will be developed in the text. The consequences of other erroneous overcommitments of resources are summarized in Table 3.1.

It will be recalled from previous discussion that it was not profitable to change the amount used of an input when the following conditions held: $P^a_{x_i} \geqslant E(MVPx_i \cdot y) \geqslant P^s_{x_i}$. In particular, if for some reason the initial combination of inputs is such that if falls within area 5, (Figure 3.5) it will be unprofitable to vary the amount used of either of the inputs. The implications of this situation are the following:

1. Except for the point of optimum production itself, any combination of inputs falling within area 5 results in more than optimum output.

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[28]It should be emphasized that the purpose of this section is restricted to showing that under the assumptions of fixed asset theory agriculture displays an inherent propensity to develop excess capacity. Only few of the properties of fixed asset theory are sufficient to explain how in the aggregate agricultural firms will tend to exhibit such propensity. Hence many properties of fixed asset theory will be ignored because they are not essential to make the desired point. The theory has been explored in greater depth elsewhere as for instance in Clark Edwards, "Resource Fixity. . ."

Table 5.1: Effects on the Volume of Output and Wealth of Correcting Non-optimum Combinations of Factors in the Presence of a Divergence Between a Resource's Acquisition Cost and Salvage Price

Table 3.1: Effects on the Volume of Output and Wealth of Correcting Non-optimum Combinations of Factors in the Presence of a Divergence Between a Resource's Acquisition Cost and Salvage Price

Region	Initial Volume of Output Relative to Optimum	Relation of Resource MVP to Resource Price before Adjustment		Resource Adjustment	
		X_1	X_2	X_1	X_2
I	indeterminate[1]	$P_{x_1}^a \gtrless MVP_{x_1}y > P_{x_1}^s$	$MVP_{x_2}y < P_{x_2}^s$	expand	contract
II	indeterminate[1]	$P_{x_1}^a < MVP_{x_1}y$	$P_{x_2}^a > MVP_{x_2}y \gtrless P_{x_2}^s$	expand	none
III	less	$P_{x_1}^a \gtrless MVP_{x_1}y \gtrless P_{x_1}^s$	$P_{x_2}^a \gtrless MVP_{x_2}y \gtrless P_{x_2}^s$	expand	expand
IV	more	$P_{x_1}^a > MVP_{x_1}y \gtrless P_{x_1}^s$	$MVP_{x_2}y < P_{x_2}^s$	none	contract
V	more	$P_{x_1}^a > MVP_{x_1}y > P_{x_1}^s$	$P_{x_2}^a > MVP_{x_2}y > P_{x_2}^s$	none	none
VI	indeterminate[1]	$P_{x_1}^a > MVP_{x_1}y \gtrless P_{x_1}^s$	$P_{x_2}^a < MVP_{x_2}y$	none	expand
VII	indeterminate[1]	$MVP_{x_1}y < P_{x_1}^s$	$MVP_{x_2}y < P_{x_2}^s$	contract	contract
VIII	more	$MVP_{x_1}y < P_{x_1}^s$	$P_{x_2}^a > MVP_{x_2}y \gtrless P_{x_2}^s$	contract	none
IX	more	$MVP_{x_1}y < P_{x_1}^s$	$P_{x_2}^a \gtrless MVP_{x_2}y > P_{x_2}^s$	contract	expand

Region	Relation of Resource MVP to Resource Price after Adjustment		Final Volume of Output Relative to Optimum	Changes in Asset Position
	X_1	X_2		
I	$P_{x_1}^a = MVP_{x_1}y$	$P_{x_2}^a > MVP_{x_2}y = P_{x_2}^s$	more	losses
II	$P_{x_1}^a = MVP_{x_1}y$	$P_{x_2}^a \gtrless MVP_{x_2}y \gtrless P_{x_2}^s$	more	losses
III	$P_{x_1}^a = MVP_{x_1}y$	$P_{x_2}^a = MVP_{x_2}y$	optimum	gains
IV	$P_{x_1}^a \gtrless MVP_{x_1}y \gtrless P_{x_1}^s$	$P_{x_2}^a > MVP_{x_2}y = P_{x_2}^s$	more	losses
V	$P_{x_1}^a \gtrless MVP_{x_1}y \gtrless P_{x_1}^s$	$P_{x_2}^a \gtrless MVP_{x_2}y \gtrless P_{x_2}^s$	more	losses
VI	$P_{x_1}^a \gtrless MVP_{x_1}y \gtrless P_{x_1}^s$	$P_{x_2}^a = MVP_{x_2}y$	more	losses
VII	$MVP_{x_1}y = P_{x_1}^s$	$MVP_{x_2}y = P_{x_2}^s$	more	losses
VIII	$P_{x_1}^a > MVP_{x_1}y = P_{x_1}^s$	$P_{x_2}^a \gtrless MVP_{x_2}y \gtrless P_{x_2}^s$	more	losses
IX	$P_{x_1}^a > MVP_{x_1}y = P_{x_1}^s$	$P_{x_2}^a = MVP_{x_2}y$	more	losses

[1] Left of the isoquant VV of optimum output (Figure 3.5) it will be a situation of overproduction and of underproduction in the rest of the region.

2. As long as no drastic changes in expectation occur such an error of overproduction cannot be corrected until the exhaustion of the sources of either x_1, x_2, or both.
3. Since the product that results from the use of x_1 and x_2 is priced at a lower price than expected, the earnings of both x_1 and x_2 are less than expected as well.
4. As it is assumed that x_1 and x_2 are flows of service originated by some storable source, a smaller stream of earnings than expected will accrue to the owner of the sources and as a consequence their respective values will have to be adjusted downward from its acquisition costs. The difference between the discounted value of the expected stream of earnings and the discounted value of the stream of effective earnings indicates the extent of capital losses.

The next example to consider is one in which adjustment from a position of excess production entails further commitment of resources. Consider the case of an entrepreneur found in the initial position of point S in

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Figure 3.5.[29] Point S represents the combination of x_1' of x_1 and x_2' and x_2. Given the standard case of convex iso-product curves, S is a combination of inputs resulting in more output than the expected optimum and therefore the producer will wish to consider appropriate readjustments. Combination S entails x_1' of x_1 for which $P^a_{x_1} > E(MVPx_1y) > P^s_{x_1}$ hence x_1 is fixed at x_1'. Any adjustment, consequently, will be limited to changing the amount of x_2 holding x_1 constant at x_1'. Considering that the avenues to the expected optimum are for the time being closed, the producer will at least attempt to minimize losses relative to that optimum. Combination S is clearly not a least cost combination (expected least cost combination). Such combination, as is evident by the position of the expected iso-marginal value product curves, can be approached from S, given x_1 fixed, only by expanding the use of x_2. A rational producer will move to position S', which entails the use of x_1' of x_1 and x_2'' of x_2, $x_2'' > x_2'$. At point S', x_2 also becomes fixed and no more adjustment is possible.[30] The

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[29] Area VI, where combination S is located, and area II are symmetric with respect to the line of least cost combination. In general, a resource combination falling in area VI enjoys similar properties to its homologous combination situated in area II. Hence the example corresponding to area VI may be extended to cases of area II and viceversa.

[30] Expanding the use of x_2 implies by definition that $MVPx_2y > P^a_{x_2}$. As the more x_2 is used the $MPPx_2y$ will become smaller and smaller, until $P^a_{x_2} \geq MVPx_2y \geq P^s_{x_2}$, since $P^a_{x_2} > P^s_{x_2}$. At that point x_2 is economically fixed.

implications of this particular case follows:

1. S was a combination of overproduction relative to the expected optimum; however, rational adjustment consists in expanding production still more.
2. Maximum expected profits are unattainable.
3. Capital losses are imposed upon the owner of x_1.
4. If many producers are forced into the same sort of adjustment, the price of y may be driven down. If Py decreases sufficiently, and expectations are revised in the right direction, the $E(MVPx_i y)$ of both x_1 and x_2 may become smaller than $P\overset{s}{x}_i$ such as to permit further adjustments toward both least cost combination and a receding HPP. However, a considerable time lag may be required.

The final example to consider is one in which partial yet not perfect adjustment is possible. At point T in Figure 3.5, production is brought about by input combination x_1' of x_1 and x_2'''' of x_2.[31] This combination,

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[31]Area IV and VIII are symmetric with respect to the line of least cost combination. The properties of any resource combination falling in area IV may be extended to the homologous combination falling in area VIII and vice-versa.

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the figure shows, is one of excess production relative to isoquant VV which represents the optimum volume of production. The entrepreneur will consequently feel encouraged to make some adjustments in his resource mix. Any adjustment from T, however, can only be achieved by varying the amount of x_2 holding x_1 constant at x_1' because at T the following condition holds: $P_{x_1}^{a} > E(MVP_{x_1}y) > P_{x_1}^{s}$. With this restriction in view, the entrepreneur will attempt to minimize losses by means of contracting the use of x_2. Input x_2 will be contracted from x_2'''' to x_2''' but no more since at this level x_2 is also fixed and no further adjustment is any longer profitable. Final position T', resulting from input combination x_1', x_2''', represents a decrease in production relative to initial position T, yet it is still a situation of overcommitment of resources. As in the preceding example maximum profits are unattainable and capital losses are imposed upon the owner of the source of x_1. In the present case, in addition, the owner of x_2 also incurs capital losses since the productivity of x_2 is not sufficient to cover the acquisition cost of x_2.

Faulty expectations and faulty product price expectations in particular, result in combinations of inputs which lead to other than optimum levels of production. Table 3.1 shows that mistakes of underproduction lead, under some circumstances, to adjustments reaching the expected optimum combination of factors but that on other

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occasions, the adjustment is conducive to more than expected optimum output. The table indicates that mistakes of over-production are never fully correctable. In some instances the adjustment from over-production implies further output expansion and in others only a part of over-production can be neutralized. In all three instances however, the likely result is production in excess of expected optimum.

As a rule no specific bias should be expected in relation to the direction in which, on the average, entrepreneurs will miss actual prices. It could be reasonably argued that on the average errors in price expectation relative to effective prices are random, i.e., for each particular planning horizon, the expected difference between E(Py) and Py is zero. It has been argued, in summary, that: (1) errors of over-production are at best only partially correctable, (2) errors of under-production never lead to final positions of under-production and often lead to over-production and (3) errors in expectations are random. Hence, it can be concluded that under the conditions that have been postulated errors in product price expectations result in more than optimum production even though, on the average, errors in product price expectation may cancel out each other.

A Note on Fixed Asset Theory and Technological Innovations

Technological change enters production embodied in both human and non-human inputs. To the extent that this embodiment occurs, the inherent propensity to overcommit resources may be said to be also a propensity to overcommit technological innovations. This latter propensity results in a seemingly paradoxical situation, namely: (1) perpetuation of obsolete technology coupled with (2) actual overcommitment of new technology. Actual overcommitment should be understood relative to the optimum dictated by the conditions prevailing at decision time which include - as a result of past management errors - a certain stock of fixed input that bear some obsolete technology. Were it not for this backlog of past management errors, more rather than less of the new technology might be profitably used.

An example may help to dispel the "technological puzzle" created by fixed asset theory. Assume that in some sub-sector of an agricultural economy producers have been using before time t a storable input X that implied until such time some stagnant level of technology. According to fixed asset theory, on the average this sub-sector will be found at time t overcommitted in terms of input X. Assume that at time t technological change makes input X obsolete, overcommitment of X means that some producers will not find it profitable to rid themselves of X thus forfeiting at least

temporarily the advantage of the new technique. Relative to the new state of the arts, the agricultural plant of holders of X is obsolete. Simultaneously, however, part of the producers forming the sub-sector will find it profitable to adopt the new technique substituting input X' - that embodies the new technology[32] - for input X. They will carry on substitution because either the services of X have been exhausted or X has ceased to be fixed. As it was shown in the preceding section fixed asset theory shows that on the average producers will engage too much of X' (embodying the new technology) relative to actual optimum. Hence at time t, while the holders of X render the overall plant partially obsolete, other producers will commit more of X' than is warranted by a constellation of existing conditions that include some amount of fixed X. It is conceivable, however, that the amount of the up-to-date resource is only excessive because there existed at time t a backlog of obsolete resources fixed by errors made in the past. Otherwise more of the most modern resource might have been profitably employed.

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[32] X and X' could stand for two different models of tractor. The new model X', thanks to the application of a scientific discovery, may perform identical tasks as X, the old one, but at a somewhat lower cost.

Asset Fixity and Aggregate Supply

At any level, aggregate supply results from the summation of the supplies of the individual units forming the particular aggregate. When individual supply functions are completely reversible the aggregate supply function will be completely reversible as well. Such is the nature of the "conventional" aggregate supply function for agricultural products. This form of supply function is widely known and needs no further elaboration here. This section, instead, will concentrate upon the nature of supply response of an industry composed of imperfectly informed firms using durables for which $P\overset{a}{x}_i > P\overset{s}{x}_i$.

Functions I and II in Figure 3.6 represent the supply functions of two firms producing some output y by means of n inputs. All of the inputs except x_1 and x_2 are assumed fixed in the sense that $P\overset{a}{x}_i \geqslant MVPx_i y \geqslant P\overset{s}{x}_i$, for all possible reorganizations. In addition, these firms are subjected to the following conditions: (1) the acquisition cost of x_1 and x_2 are higher than their respective salvage prices and (2) the firms operate under conditions of imperfect knowledge and as a consequence make errors.

Functions I and II in Figure 3.6 were generated letting price P_y of product y rise to a maximum P_y^m and then letting it alternatively fall and rise again. Consider first function I. Branch AB corresponds to a period of output price increase that cause $P\overset{a}{x}_i < MVPx_i y$ for both inputs.

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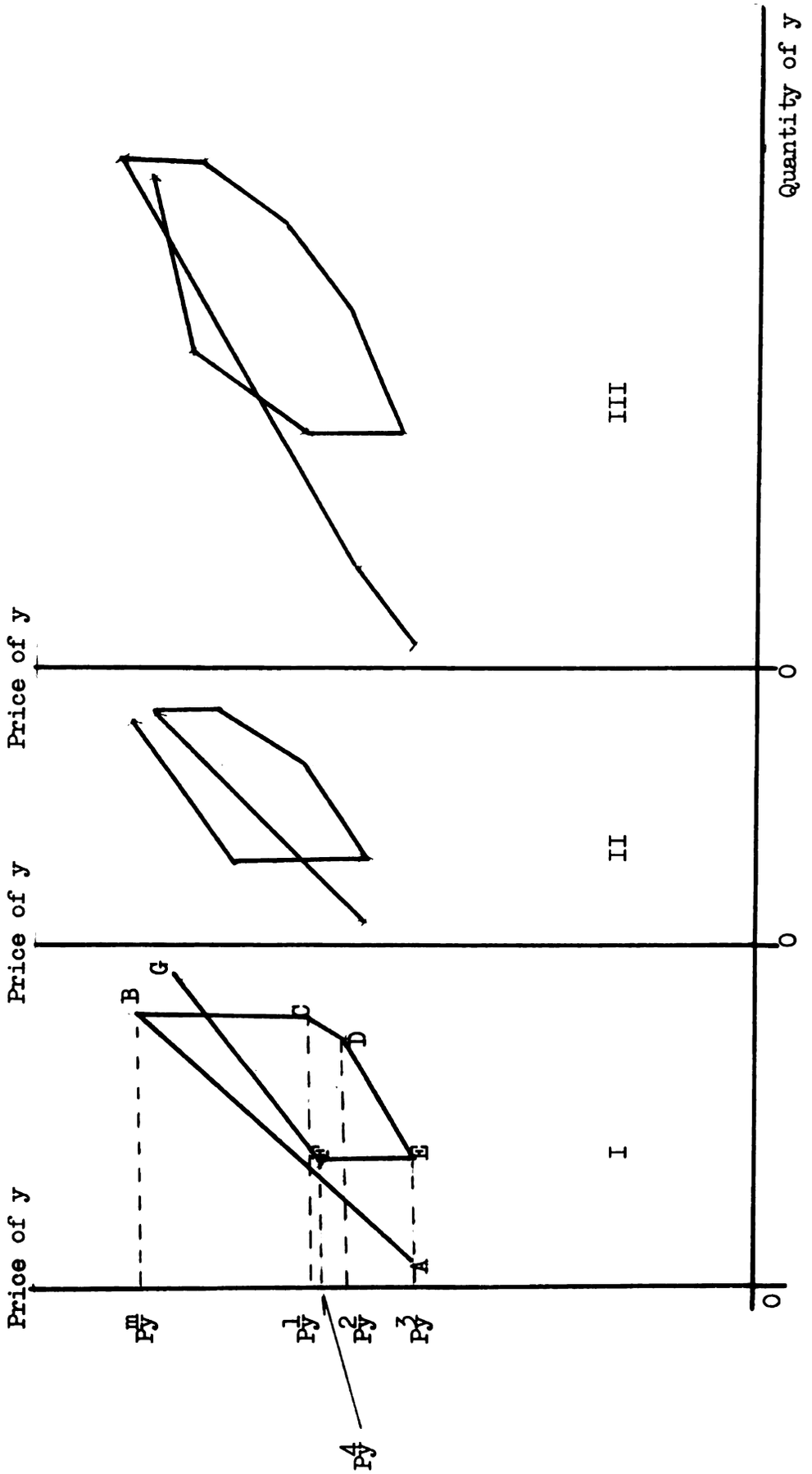

Figure 3.6: Aggregate of two irreversible supply functions.

This branch, taken by itself cannot be distinguished from a "conventional" supply function because the postulated price expansion was sustained long enough to fulfill or more than fulfill all price expectations. Branch BC represents the firm's response to an unanticipated fall in price from P_y^m to p_y^1 that caused both x_1 and x_2 to earn marginal value products lower than their respective acquisition prices yet still larger than salvage prices thereby fixing both inputs. Branch CD is the firm's output response to a further decrease in output price below P_y^1. Along CD there is a negative output response which never-the-less is not as elastic as the response indicated by the following branch DE, signifying that only one of the two factors was variable. The unanticipated decrease in product price from P^1y to P^2y caused the MVP of one of the factors to fall below salvage price yet it was not quite sufficient to prevent the MVP of the other factor from remaining above salvage price. The increase in elasticity of branch DE relative to branch CD indicates that finally the price of product y has fallen sufficiently to mobilize the second input as well. The portion EF shows the firm's response to an unexpected price increase from the low point P^3y to P^4y. The response is zero because x_1 and x_2 are fixed. The product price has risen only enough to cause MVPs to become larger than salvage prices but not larger than acquisition prices. At prices above P^4y both inputs x_1 and x_2 are

variable again causing output to respond as indicated by branch FG. The product price has risen sufficiently to cause earnings to both factors to be above acquisition costs.[33]

Function II is an individual firm's supply response which was generated through a similar process to that of function I just described. Function III, instead, is an aggregate supply response. It resulted from the horizontal aggregation of functions I and II. For each price situation considered, function III is the sum of the outputs indicated by functions I and II. Function III shows that the aggregation of irreversible supply functions resulted in an aggregate supply function that is irreversible as well. This general form applies to any multi-firm industry composed of firms displaying irreversible supply functions that result from a divergence between factor's acquisition and salvage price under uncertainty, regardless of the number of firms that form the industry.

Summary

The shortcoming of the unmodified neo-classical analysis to explain features of American agriculture such as: (1) irreversibility of supply responses, (2) failure to cover simultaneously acquisition costs of all factors

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[33]Branch FG need not coincide with branch AB since the condition $Px_1^a < MVPx_i y > Px_2^s$ may be achieved with an infinite number of ratios Px_1/Px_2.

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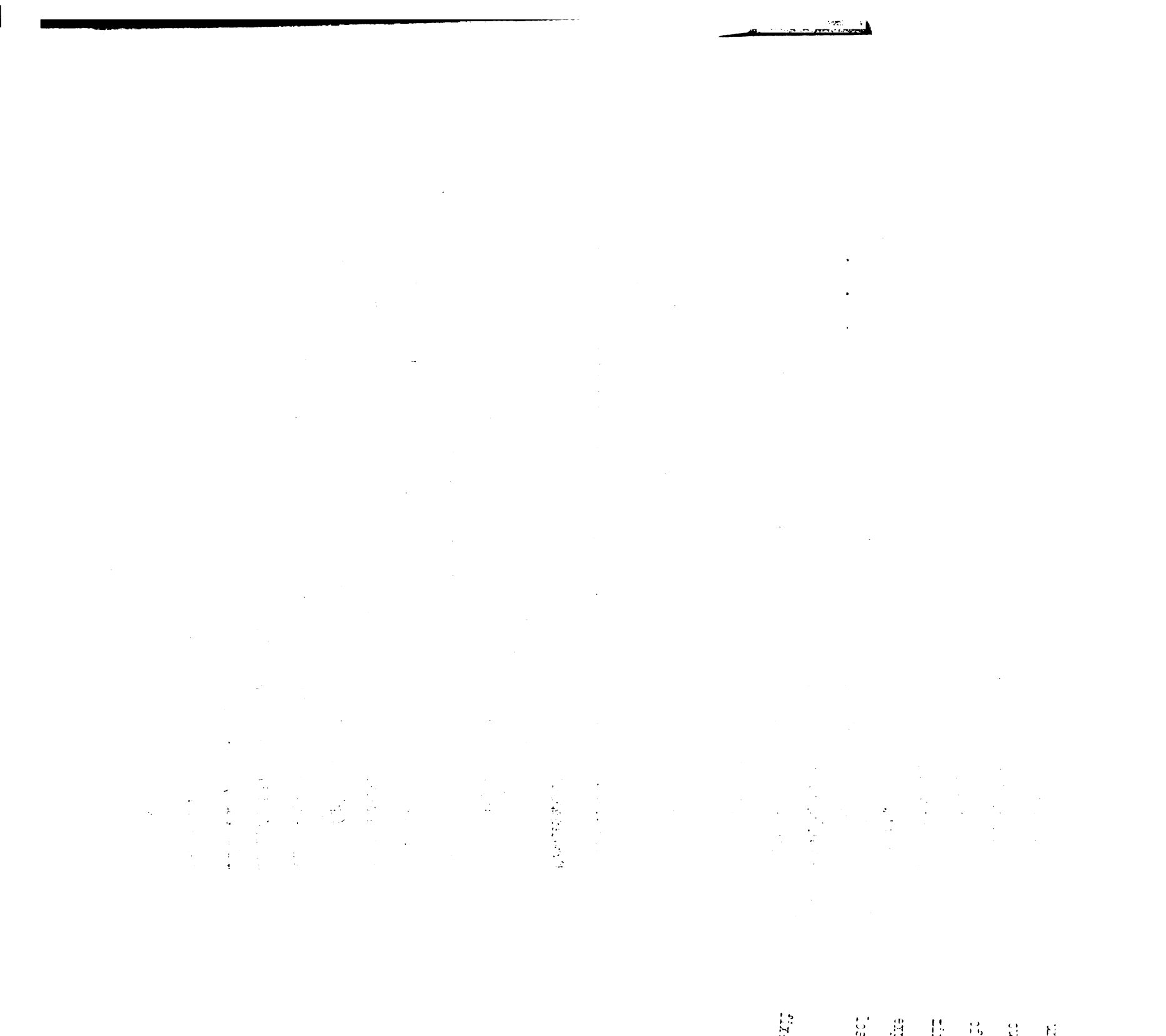
committed and (3) prevalence of obsolete technologies, prompted economists to advance some modifications. T. W. Schultz, for instance called attention to the process of technological change in the light of differentials between the elasticities of demand for farm products and non-farm products. Schultz's analysis predicts a sustained process of capital labor substitution, during which farm labor earnings would fall below earnings in alternative occupations while farm capital earnings would remain above returns in other uses. Although most features of Schultz's modification passed the empirical test, experience has shown that his conclusion about farm capital earnings is inadequate. D. G. Johnson turned his attention to producers behaviour in the face of uncertainty correctly showing that the perfection of knowledge would lead to long run static equilibrium. Uncertainty D. G. Johnson contended, due principally to producers indulgence in different forms of discounting, would tend to result in less than optimum production for static conditions. Historical experience, however, singles out over-production rather than under-production as the problem of agriculture in an uncertain environment. Cochrane, finally, represents a school of thought that hypothesizes that agriculture's bias towards over-production and assymetric output response to the different phases of the cycle can be attributed to adoption of technological innovations. The existence of a large number of American farmers consistently utilizing obsolete

technologies and the existence of a considerable time lag between the revelation and adoption of new technology tends to cast strong doubts upon the argument that technological innovation is the principal factor which causes agriculture's supply functions to be irreversibly upward biased.

Modifications such as those of Schultz, D. G. Johnson, and Cochrane while improving on the original apparatus still fall short of explaining agriculture's asymmetric behaviour during the different phases of the cycle and low rewards to all factors coupled with the perpetuation of obsolete technology. Fixed asset theory explains theoretically these characteristics of American agriculture and consequently was adopted as the conceptual framework of this thesis.

Fixed asset theory assumes: (1) that producers have imperfect knowledge and hence have to organize production on the basis of expectations that are subject to errors. Several studies on the formulation of farmers' expectations are available lending empirical content to this assumption, and (2) that there is a divergence between the acquisition and salvage costs of agricultural inputs. Under the unmodified neo-classical apparatus errors of over-production may be corrected by liquidating redundant resources at no loss and hence frustrated expectations are of little consequence. The gap between acquisition and salvage cost of assets recognized by fixed asset theory may make it



unprofitable to reduce the quantity of inputs used when output price falls below expected price. The production of a constant volume of output by means of a fixed input mix in the presence of falling prices results in less than expected earnings to factors, falling incomes and capital losses.

Once errors of over-production have been committed fixed asset theory shows that:

1. Among the producers who erroneously under-committed resources:
   a. some will find it profitable to expand production to the high profit point
   b. some, instead, will be motivated to minimize losses by expanding production in excess of the original level of optimum production.
2. Among the producers who erroneously over-committed resources
   a. some will not find it profitable to make any adjustment in the factor mix
   b. some others will be able to make partial corrections at more than the original optimum level of production
   c. some others, finally, will further expand production in order to minimize losses.

Two important conclusions for aggregate behaviour may be derived from the study of individual firms faced with divergence between acquisition and salvage costs in an uncertain environment. First, assuming that errors of over-production and under-production are made at random (that is that the expected value of the difference between actual production and expected optimum production is zero) collective adjustment of individual firms will lead on the average to aggregate production in excess of optimum. Second, it may be expected that the aggregation of individual irreversible supply responses will produce an aggregate function which is irreversible as well.

Finally, to the extent that technological innovations enter production embodied in both human and non-human inputs, the inherent propensity to overcommit resources may be extended to signify a propensity to overcommit technological innovations. This latter propensity results in an apparent paradoxical situation namely: (1) perpetuation of obsolete technology and simultaneously (2) actual overcommitment of new technology. However, were it not for the backlog of obsolete technology that tends to exist due to past management errors, more rather than less new technology might be profitably used at any point in time.

CHAPTER IV

1917-29 BETWEEN WAR AND DEPRESSION

The immediate years prior to the First World War mark the end of an epoch for American agriculture. By and large, the "extensive" dimension of farming had become fully exploited. In the future, growing requirements from agriculture would have to be satisfied along the "intensive" dimension, the tremendous potentials of which would not become fully evident until many years later. In particular, the years 1910-14, were years to be later regarded by many people as "normal", serving as a bench mark for farm income policies.

Agricultural Prices

The First World War was a source of exceptional demand which forced prices received by farmers far above the 1910-1914 average. This high level of farm prices lasted until about 1921. In 1917 the ratio of prices received to prices paid by farmers (parity ratio) reached its highest levels in pre-depression times. Since both these price series are computed relative to the same base period,[1] a ratio larger than 100 indicates that prices

[1]Price indices, unless otherwise indicated are computed as 1947-49 = 100.

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received have increased more (decreased less) than prices paid. After reaching the mentioned high, prices received fell relative to prices paid for three consecutive years forcing the parity ratio down from 112 in 1917 to 74 in 1921. During the rest of the period prices received recovered somewhat relative to prices paid but the parity ratio did not recover the level of the base years. See Table 4.1.

Long run expected prices, that is average price for the current and subsequent nine years - found by Lerohl to be a satisfactory expression of producers expectations[2] - followed a similar pattern as price effectively received during the year in which expectations were formulated. This comparison, however, does not yield sufficient information. Long run price expectation should also be compared with the prices prevailing along the planning horizon for

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[2]Lerohl estimated expected prices for selected commodities and an index of prices expected by farmers for a composite of farm produced commodities. The estimates are short (the current marketing season), intermediate (the average of the current plus four following years) and long run (the average of the current plus nine following years). Lerohl subjected his estimates to a series of tests and found that his long run price expectations are more closely associated with appropriate economic variables than alternative estimates. It should be pointed out that what Lerohl sought was an adequate expression of farmers' past expectations, which of course cannot be observed. Thus, to the extent that he achieved his purpose, his estimates should be called a "proxy" of farmers' price expectations rather than expectations proper. See Lerohl, Chapter V.

Table 4.1: Selected Indices of Agricultural Prices (1947–49=100),[1] United States, 1917–29

Table 4.1: Selected Indices of Agricultural Prices (1947-49=100),[1] United States, 1917-29

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices		
				Ten Years Average Expected Prices[3]	Ten Years Average Price Received[4]	Ratio of Expected to Received
1917	66	59	112	67	--	
1918	76	69	110	78	--	
1919	80	79	101	81	--	
1920	78	86	91	86	--	---
1921	46	62	74	76	--	---
1922	48	60	80	65	61	107
1923	52	64	81	65	60	108
1924	53	64	83	64	58	110
1925	58	66	88	66	55	120
1926	54	64	84	69	52	133
1927	52	64	81	67	51	131
1928	55	65	85	66	48	138
1929	55	64	86	66	46	143
1917-29	59	67	89	70	54[5]	124

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100.

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 year planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Table 4.11 Continued

Table 4.1: Continued

Sources: U. S. Department of Agriculture, Major Statistical Series of the U.S.D.A., Volume 1, Agricultural Handbook 118, (Washington: U. S. Government Printing Office, 1957), pp. 30 and 64; U. S. Department of Agriculture, Agricultural Prices, January, 1963, p. 56; Milburn L. Lerohl, "Expected Prices for U. S. Agricultural Commodities, 1917-1962", (unpublished Ph.D. dissertation, Michigan State University, 1965), pp. 102-4 and U. S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, (Washington: Government Printing Office), pp. 125-6.

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which expectation was formulated.[3] The ratio of long run expected prices to corresponding prices received, computed in Table 4.1 achieves this object. A ratio larger than 100 indicates that long run expected prices were above the prices that were achieved during the appropriate horizon. Alternatively, a ratio smaller than 100 indicates more than fulfilled expectations. Likewise, a growing ratio shows that long run expected prices were growing relative to the long run average of prices actually received. A falling rate, instead, shows the opposite. Table 4.1 shows that during the period 1917-29: (1) producers planned in view of receiving higher prices than those which in fact prevailed, (2) expected prices continuously grew relative to average price received. In absolute terms, however, expected prices declined after 1925.

Farm Labor

In 1917, farm population stood at 32.4 million. It decreased during the 1917-29 interval by 1.8 million. By 1929, farm population had shrunk by about 5.7 per cent. The outflow of population did not occur at a steady pace. A large decrease occurred between 1917-19 principally under the pressure of the war. With the return of soldiers an

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[3]For instance, comparing the price expectation formulated for years t to t + 9 with the average price received during years t through t + 9, both centered in the middle of the period.

increase took place from then until 1921/22 followed by a steady decrease thereafter. (Table 4.2)

Table 4.2, indicates that the farm labor force stood at 13.6 million in 1917 and decreased 5.9 per cent between 1917 and 1929 to 12.8 million. In relative terms this decrease was slightly larger than that for the farm population and occurred at a steadier pace. About 23.8 million hours of man-work were used in agriculture in 1917 of which 2.5 per cent could be spared by 1929. Not a large saving under present day standards.

An additional way of looking at the flow of labor is through the method of "cohort analysis".[4] "A cohort of farm operators is defined as the group of farm operators born during a specified time period."[5] Cohort analysis studies the changes in cohort size over time. The main limitation of this analytical technique is that it concentrates solely upon farm operators. It can be argued, however, that this type of analysis can be extended to the whole labor force if the number of farm operators is correlated to other types of farm labor. "Farm operator labor comprises more than one-half the total labor input. Also

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[4]Dan Kanel, "Age Components of Increase in Number of Farmers, North Central States, 1890-1954," Journal of Farm Economics, XLIII (May, 1961) 247-263; Marion Clawson, "Aging Farmers and Agricultural Policy," Journal of Farm Economics, XLV (1963) 13-20.

[5]Jones.

Table 4.21 Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years, 1917-1959

	Farm Labor Force		Farm Labor Requirements	
		Change	Number	Change

Table 4.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years, 1917-1929

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(Mill. hours)	(Mill. hours)	(Per cent)
1917		32,430			13,568			23,751		
	1917-19	--	-1,230	-3.8	--	-325	-2.4	--	-122	- .5
	1919-25	--	- 10	"	--	-207	-1.5	--	171	.7
	1925-29	--	- 610	-2.0	--	-273	-2.1	--	-642	-2.7
1929		30,580			12,763			23,158		
	1917-29	--	-1,850	-5.7	--	-805	-5.9	--	-593	-2.5

(-) Does not apply.

(..) Negligible.

Sources: Vera J. Banks, Calvin L. Beale and Gladys K. Bowles, Farm Population Estimates for 1910-62, U. S. Department of Agriculture ERS-130, October, 1963, p. 23; U. S. Department of Agriculture, Farm Employment, Statistical Bulletin N. 334, (no date), p. 7 and U. S. Department of Agriculture, Changes in Farm Production and Efficiency, 1963, Statistical Bulletin N.233, (U. S. Government Printing Office: 1964), p. 34.

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changes in family labor use are believed to follow changes in farm operator labor fairly closely. Thus, cohort analysis permits analysis of a substantial segment of the labor input.[6]

An adjusted rate of change in the number of farm operators in a cohort is defined as the difference between the number of operators in an age group at the beginning of the decade who are expected to survive to the end of the decade and the effective number of farm operators surviving at the end of the decade. Adjusted rates of change in the number of farm operators are presented in Table 4.3 as percentages of the number of operators in the specific age group at the beginning of the decade. Table 4.3 indicates high rates of entry for younger age brackets,[7] during 1910-20. As Jones points out, the ". . .data do not permit us to determine when during the decade entry rates increased, but there is reason to believe that they occurred during latter parts of the decade. Draft deferments were available for agricultural workers."[8]

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[6]Jones, p. 173.

[7]The following comments should be helpful in interpreting Table 4.3. The number of farm operators who were 25 years of age or under during the decade 1910-20 increased by 261.4 per cent with respect to their number at the beginning of the decade. This cohort (which would be between 25 to 34 years of age the following decade) increased by 12.5 per cent during 1920-30.

[8]Jones, p. 189.

Table

Age at Beginning of Decade
Under 25
25-34
35-44
45-54
55-64

Source:
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Table 4.3: Net Per Cent Change in Number of Farm Operators Adjusted for Survival Rates, United States, Selected Periods, 1910-1959

Age at Beginning of Decade	1910-20	1920-30	1930-40	1940-50	1945-55	1950-59
	per cent					
Under 25	261.4	189.8	169.1	260.9	320.6	145.4
25-34	22.2	12.5	22.3	30.8	30.0	1.5
35-44	3.5	.4	7.6	2.5	-9.4	-15.1
45-54	-11.9	-9.5	-3.4	-13.4	-24.3	-22.7
55-64	-8.1	-1.5	8.2	-9.1	-12.0	-16.1

Source: Bob F. Jones, "Farm-Non-Farm Labor Flows, 1917-62, with Emphasis on Recent Manpower and Credit Programs", (unpublished Ph.D. Thesis, Michigan State University, 1964).

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The rates of entry for the three younger groups were lower in the decade 1920-30 than in the immediately preceding decade. This comes as no surprise considering that agriculture was in a state of depression while the rest of the economy enjoyed relative prosperity. The rates of withdrawal for older groups, however, were higher during the 1910-20 decade than for the 1920-30. In summary, while there was a net increase in farm operators of about 1.4 per cent during the period 1910-20, there was a net decrease of about 2.5 per cent during 1920-30. The decrease in the rate of entry of the twenties relative to the teens was larger than the decrease in the rate of withdrawal.

The particularly high prices received for farm products during the war years reflected favorably on factor earnings. During the years of the war, the average annual farm income per worker[9] grew faster than the annual wage per employed factory worker. The absolute level of farm income per worker, of course, remained below the wage per employed factory worker. Table 4.4 contains information in regard to residual returns to labor (all labor and family labor) in U. S. agriculture for selected years between 1910 and 1930 which can be compared with the hourly earnings

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[9]Realized net income of farm operators plus total farm wage. See U.S., Department of Agriculture, Farm Income Situation, July, 1963, p. 41.

Table 4.41 Residual Returns to Labor (All Labor and Family Labor) in United States Agriculture, 1910–1962

Net Income	Farm-Mortgage Interest	Man Hour of Family Labor Available Used For Hand For Hour of Work	Man Hour of Labor Returns per	Average Hourly Earnings of

Table 4.4: Residual Returns to Labor (All Labor and Family Labor) in United States Agriculture, 1910-1962

Year	Net Income Originating in Agriculture	Capital Invested in Agriculture	Farm-Mortgage Interest Rate (All Lenders)	Interest on Capital Invested in Agriculture	Labor Income	Wage Bill	Family's Labor Income	Man Hour of Labor Used For Farm Work	Man Hour of Family Labor Used For Farm Work	Returns per Hour of Work: All Labor	Returns per Hour of Work: Family Labor	Average Hourly Earnings of Factory Workers
	(---000,000 dollars---)		(per cent)	(--------000,000 dollars--------)				(-000,000 hours-)		(---dollars/hour----)		
1910	5,436	43,293	6.0	2,598	2,838	755	2,083	22,547	16,924	.13	.12	.20
1920	10,663	83,846	6.1	5,115	5,548	1,790	3,758	23,995	17,936	.23	.21	.55
1925	9,083	60,711	6.3	3.825	5,258	1,267	3,991	23,800	17,736	.22	.23	.55
1930	6,327	60,493	6.0	3,630	2,697	1,177	1,520	22,921	17,069	.12	.09	.55
1935	6,223	40,392	5.5	2,222	4,001	775	3,226	21,052	16,294	.19	.20	.54
1940	5,529	43,902	4.6	2,019	3,510	1,029	2,481	20,472	15,477	.17	.16	.66
1941	8,126	46,000	4.5	2,070	6,056	1,249	4,807	20,046	15,063	.30	.32	.73
1942	11,996	52,400	4.4	2,306	9,690	1,631	8,059	20,583	15,576	.47	.52	.85
1943	14,408	61,200	4.4	2,693	11,715	2,027	9,688	20,297	15,558	.58	.62	.96
1944	14,404	69,400	4.4	3,054	11,350	2,202	9,148	20,163	15,761	.56	.58	1.01
1945	15,154	76,100	4.5	3,424	11,730	2,299	9,431	18,838	14,846	.62	.64	1.02
1946	18,448	82,400	4.6	3,790	14,658	2,532	12,126	18,080	14,236	.81	.85	1.08
1947	19,563	92,800	4.5	4,176	15,387	2,783	12,604	17,196	13,441	.89	.94	1.22
1948	21,999	103,400	4.5	4,653	17,346	2,990	14,356	16,833	13,037	1.03	1.10	1.33
1949	16,751	109,700	4.5	4,936	11,815	2,806	9,009	16,202	12,540	.73	.72	1.38
1950	17,698	108,000	4.5	4,860	12,838	2,811	10,027	15,137	11,585	.85	.87	1.44

Table 4.4: Continued

Year	Net Income Originating in Agriculture	Capital Invested in Agriculture	Farm-Mortgage Interest Rate (All Lenders)	Interest on Capital Invested in Agriculture	Labor Income	Wage Bill	Family's Labor Income	Man Hour of Labor Used For Farm Work	Man Hour of Family Labor Used For Farm Work	Returns per Hour of Work: All Labor	Returns per Hour of Work: Family Labor	Average Hourly Earnings of Factory Workers
	(---000,000 dollars---)		(per cent)	(--------000,000 dollars--------)				(-000,000 hours-)		(---dollars/hour----)		
1951	20,281	125,700	4.6	5,782	14,499	2,921	11,578	15,209	11,646	.95	.99	1.56
1952	19,372	140,100	4.6	6,445	12,927	2,857	10,070	14,442	11,058	.89	.91	1.65
1953	17,170	137,700	4.7	6,472	10,698	2,736	7,962	13,870	10,601	.77	.75	1.74
1954	16,372	134,300	4.7	6,312	10,060	2,596	7,464	13,249	10,062	.76	.74	1.78
1955	15,309	137,600	4.8	6,605	8,704	2,615	6,089	12,795	9,689	.68	.63	1.86
1956	15,082	141,100	4.8	6,773	8,309	2,641	5,668	12,062	9,063	.69	.63	1.95
1957	14,554	149,900	4.7	7,045	7,509	2,734	4,775	11,162	8,313	.67	.57	2.05
1958	16,935	157,600	4.8	7,565	9,370	2,842	5,528	10,712	7,882	.87	.83	2.11
1959	15,237	173,500	4.9	8,501	6,736	2,882	3,854	10,519	7,722	.64	.50	2.19
1960	15,820	175,600	5.0	8,780	7,040	2,864	4,176	9,974	6,683	.71	.62	2.26
1961	16,139	176,900	5.1	9,022	7,117	2,918	4,199	9,588	6,520	.74	.64	2.32
1962	16,191	185,000	5.2	9,620	6,571	2,902	3,669	9,060	6,161	.73	.60	2.39

Sources: U. S., Department of Agriculture, Farm Income Situation, July, 1961, (Washington: U. S. Government Printing Office, 1961); U. S., Department of Agriculture, Farm Income Situation, July, 1963, (Washington: U. S. Government Printing Office, 1963); U. S., Department of Agriculture, "Land Values and Farm Finance," Major Statistical Series of the USDA, Vol. 6, Agricultural Handbook No. 118, (Washington: U. S. Government Printing Office, 1957); U. S., Department of Agriculture, Farm Employment, Statistical Bulletin 334, (Washington: U. S. Government Printing Office, n.d.); U. S., Department of Agriculture, The Balance Sheet of Agriculture, Bulletin 290, (Washington: U. S. Government Printing Office, 1965); U. S., Bureau of Labor Statistics, Employment and Earnings, Annual Supplement Issues, (Washington: U. S. Government Printing Office, 1961-1963); Alvin S. Tostlebe, The Growth of Physical Capital in Agriculture, 1870-1950, (New York: National Bureau of Economic Research, Inc., Occasional paper 44, 1954).

of factory workers.[10] The table shows that the residual returns per hour to all labor and to family labor are consistently below the average wage for factory workers. Furthermore, the gap existing between the rewards to labor service in and out of farming increased between the years 1910 and 1930.

Although actual earnings of labor are important as an index of welfare, the mobility of labor is determined by the relative level of expected earnings in farming to expected earnings in alternative occupations. Chennareddy[11] derived estimates of present values of expected streams of life-time earnings for 25 and 45 years old men in agriculture and alternative employments. Following Chennareddy the discussion will center on the comparisons of (1) the present values of expected earnings in manufacturing with those in farming for 25 years old workers and (2) of expected earnings in laundry and farming for the 45 years old workers. These ratios have been found to explain satisfactorily the behaviors of "younger" and "older" men faced with the decision of either entering or departing the farm sector.

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[10]There are numerous qualifications to comparison as those reported here, i.e., place of residence does not necessarily correspond to occupation, the proportion of persons in working age is different between farm and city and many persons qualified as workers in official estimates only contribute a few hours to the farm labor force.

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Chennareddy's estimates of expected labor earnings in and off farm for different age groups are plotted in Figure 4.1. The figure suggests: (1) expected earnings for "younger" and "older" operators moved synchronically, (2) expected earnings in laundry were more variable than expected earnings in manufacturing. In the remaining sections of this thesis, the following symbols will be used in analyzing data on expected labor earnings:

WL: expected earnings in laundrying (the opportunity cost of old farmers).

WM: expected earnings in manufacturing (the opportunity cost of young farmers).

WF: expected earnings in farming.

RM: ratio of expected earnings in manufacturing to expected earnings in farming.

RL: ratio of expected earnings in laundrying to expected earnings in farming.

Q25: number of farmers in the 25 year old bracket.

Q45: number of farmers in the 45 year old bracket.

The wider variability of earnings in laundrying permits using in Chennareddy's model[12] the assumption of

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[12]In addition to generating information on expected labor earnings, Chennareddy constructed a model that permits testing the consistency of his estimates with actual farm labor flows in different age brackets. The model assumes alternatively variable wages in manufacturing and fixed wages in laundry or the opposite. When wages in laundry vary more than wages in manufacturing the model should be used under the assumption of fixed wages in manufacturing. See Chennareddy, Chapter VI, pp. 98f.

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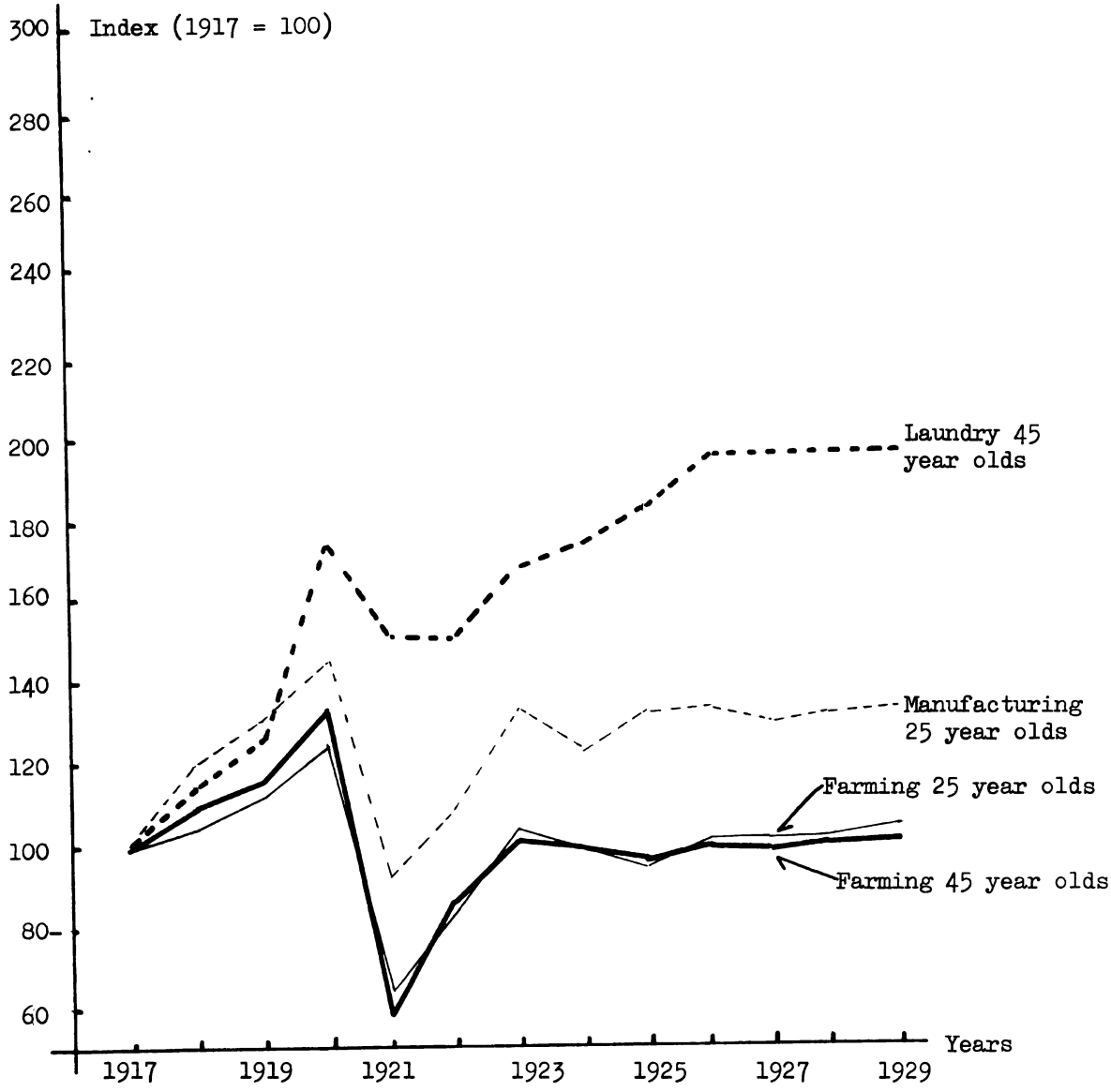

Figure 4.1: Indices of the present value of expected income streams for 25 and 45 years old workers in selected occupations United States, 1917-29.

Source: Chennareddy Venkareddy, "Present Values of Expected Future Income Streams and their Relevance to Mobility of Farm Workers to the Nonfarm Sector in the United States, 1917-62", Appendix D, Table 2.

constant earnings in manufacturing. Under this assumption the model would predict: (1) as wages in laundry WL increased relative to farm wages WF, the ratio RL, which is regarded as guiding employment decisions of "older" farmers also increased persuading many "older" farmers to leave agriculture, (2) the exit of older farmers caused WF to increase above what it would have been otherwise resulting in a decrease in the ratio RM of expected earnings in manufacturing to those in farming. The increase in RM encouraged the entry of young men into farming (3) Chennareddy has shown that under the conditions postulated in his model the change in Q45 would be larger than in Q25 and thus the total number of farm operators (Q45 + Q25) could be expected to decrease.[13] The results of cohort analysis are in general accord with the predictions of this model.

Capital

For the purpose of this study, the term capital will represent a very heterogeneous group of goods including land, which deliver non-labor services. The difference between capital, as defined here, and labor is that both the service of capital and the source may change ownership while in the case of labor, beginning with the abolition of slavery, only the services can be hired away. Different

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[13]Chennareddy provides a rigourous proof of this result. See Chennareddy, pp. 104-111 and Appendix I.

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capital goods enjoy particular properties that distinguish them from each other. At times, this suggests the advisability of studying this group at a lower level of aggregation. A first division may be drawn according to durability; those capital goods delivering a flow of service along more than one planning horizon will be called durables and will be distinguished from expendables. The services of expendables may be completely exhausted during one planning horizon. Within the category of durables one group, real estate, differs from other durables by its lack of geographical mobility. By and large the user, like in the case of Mohammed and the mountain, must go to the service rather than the other way around. Real estate itself is made up of land and "things attached to land." At times it may be convenient to distinguish between farm produced and nonfarm produced as well as between specialized and nonspecialized resources which may be either durables or expendables.[14]

Farm durables

Real estate

Real estate is not a homogeneous asset. Cropland, rangeland and improved pastures measured in acres, are not resources that deliver the same kind of service. Further,

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[14]For an elaboration on this classification see Glenn L. Johnson, "Supply Function - Some Facts and Notions", Agricultural Adjustment Problems in a Growing Economy. Earl O. Heady et. al. (ed.) (Ames, Iowa: The Iowa State College Press, 1958) and Quance, p. 89.

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the degree of man-made development (clearing, draining, irrigating, etc.) varies from one place to the other. It is thus advisable to express real estate, resource in terms of one particular type of land - a common denominator so to speak - letting prices indicate the equivalence between the different types of land. In this study the common denominator for land will be pasture acre equivalents.[15] Table 4.5 shows units of pasture acre equivalents by regions and for the whole United States for selected years of the period 1917-29. The table shows that the amount of farm land for the U. S. as a whole changed little during the period. However, a closer inspection shows that substantial interregional switches in land use did occur. In the northeastern region there was a substantial decrease in the number of pasture acre equivalents between 1917 and 1929; in fact, by 1929 the count was nearly one fourth below that of 1910/14. This decrease can be explained largely by technical developments which permitted the exploitation of westward regions relative to which the northeast was at a comparative disadvantage. Increases in the number of pasture acre equivalents were substantial in

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[15]The series of pasture acre equivalents used in this study was developed by Larsen. Larsen considers the following types of land; pasture land not irrigated, cropland irrigated, pasture irrigated, cropland not irrigated and other land. For each state, each type of land is weighed by the ratio of its price to the prices of pasture land. See Larsen, especially Appendix A, p. 161.

United States, 1917–1929

Table 4.5: Units of Pasture Acre Equivalents and Percentage Change by Region and United States, 1917-1929

Region	Pasture Acre Equivalents							1917-1929
	1917	1919	1921	1923	1925	1927	1929	(per cent)
	(----------(000,000)----------)							
United States	1,701	1,724	1,697	1,669	1,669	1,696	1,722	1.2
Northeast	136	134	129	123	118	114	110	-19.2
Corn Belt	497	498	487	476	471	472	473	- 4.9
Lake States	140	143	140	139	136	137	138	- 1.7
Appalachian	168	168	162	157	154	154	155	- 7.8
Southeast	81	82	79	76	75	75	75	- 7.5
Delta States	66	67	65	63	63	65	67	1.7
Southern Plains	177	180	180	179	184	194	203	14.9
Northern Plains	186	191	190	189	192	200	207	10.9
Mountains	75	79	82	85	89	94	98	30.9
Pacific	174	182	183	184	187	191	196	12.4

Source: Arne Larsen, "Changes in Land Value in the United States, 1925-1962" (unpublished Ph.D. Thesis, Michigan State University, 1966). Appendix A, pp. 161ff. Data corresponding to the 1910-1925 interval was computed from unpublished material supplied by David Boyne.

the Mountain Regions, Northern and Southern Plains and Pacific. The increase in land in the Northern Plains may be accounted to a large extent by the plowing of grazing lands for grain production: "It is evident that 'the plow that broke the Plains' broke much of it in the decade following World War I."[16] Much of the land broken for grains in the Northern Plains was located in the semi-arid portion of the region and was to be abandoned later. The switch to more intensive use of land in the Southern Plains may be explained to a large extent by the rise of land in the production of cotton stimulated by the high prices which resulted as a consequence of boll weevil in competing regions. Cotton had its greatest expansion in the mid-1920's when over 45 million acres were planted. Texas alone, between 1919-20 and 1925-26, put into cotton some 5 to 6 million additional acres and became the holder of about one third of the total acreage.[17] Also, relatively large acreages were planted with citrus fruits. The development of agricultural land in the Pacific region seemed a response to two causes: (a) the general development of the region which increased the demand for agricultural products which

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[16]Sherman E. Johnson, Changes in American Farming, U.S., Dept. of Agriculture (Washington, D.C.: U. S. Government Printing Office, 1949) p. 18.

[17]Harold Barger and Hans H. Landsberg, American Agriculture, 1899-1939, A Study of Output, Employment and Productivity, (New York: Bureau of Economic Research, Inc., 1942) pp. 76-77.

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could not be shipped advantageously from distant regions and (b) national increases in demand for the products of the region as a result of changing patterns of consumption brought about by growing national income. Both the Southern Plains and the Pacific regions experienced expansions of irrigated land.

Other durables

The growth in the value of the stock of capital may be due to either or both of the following causes: (1) growth in the physical volume of durables committed to agriculture and (2) increases in the price at which the above mentioned stock is valued. Often, but by no means always, it may be desirable to isolate the first element by pricing the stock of durables in money of constant purchasing power.

The census of 1920 showed the highest volume of farm durables on record expressed in dollars of constant value prior to the Second World War. The last years prior to 1920 mark the peak of a steady increase in net investment in American agriculture which began at the end of the Civil War. At the time of the 1920 census, Alvin S. Tostlebe[18] estimated that the value of the physical capital (stock

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[18]Alvin S. Tostlebe, The Growth of Physical Capital in Agriculture 1870-1950, (New York: National Bureau of Economic Research, Inc., Occasional Paper 44, 1954).

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of durables, including land, in the terminology of this paper) in constant dollars (1910-14 average) amounted to 49.8 million. Table 4.6 indicates the changes in physical volume of the different components of the stock of durables in agriculture. Between the censuses of 1910 and 1920 the total stock increased by about 10 per cent. There was a net addition to all and each of the components of the group although the most spectacular gain occurred in implements and machinery.[19]

A net decrease in the volume of agricultural durables took place during the interval 1920-25, the first since the Civil War. When regional changes in farm investment are examined, however, this net desinvestment appears of little significance. By the 1930 census, after the upswing of 1925-30, levels of capitalization of 1920 were approached except in workstock which remained in a downward trend. The volume of implements and machinery (particularly motor vehicles) ended up substantially above 1920 figures.

Land and buildings were the most important component of the stock of farm durables. While land input

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[19]Inspection of USDA series, the U.S., Department of Agriculture, The Farm Income Situation, July 1961, shows that the fastest growth in capital expenditures within this category occurred in motor vehicles. During the last years of the decade net investment in motor vehicles was larger than the net investment in other equipment.

Table 4.6: Value of Physical Assets in United States' Agriculture in Constant Prices (1910-1914 Average), and Percentage Composition, Census Years, 1910-1940

Asset Category	1910	1920	1925	1930	1935	1940
	(----------000,000 dollars----------)					
Total	45,367	49,842	48,013	49,160	47,178	48,572
	(----------per cent----------)					
Land and Buildings	80.7	79.1	80.3	80.6	83.9	81.3
Implements and Machinery	2.8	4.1	3.1	4.5	3.1	4.0
Livestock	11.6	11.8	11.1	10.1	9.9	9.6
Horses and Mules	5.9	5.7	5.2	4.4	4.0	3.4
Others	5.7	6.1	5.9	5.7	5.9	6.2
Crop Inventory	4.9	5.0	4.9	4.8	3.1	5.1
Total	100.	100.	100.	100.	100.	100.

Source: Alvin S. Tostlebe, The Growth of Physical Capital in Agriculture, 1870-1950, (New York: National Bureau of Economic Research, Inc., Occasional paper 44, 1954).

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measured in pasture acre equivalents remained practically unchanged during the period there was a substantial investment in farm buildings. Between the war years, 1917 and 1920, farmers invested in buildings at a rate of 95 million dollars per year and later for 1920 to 1929 at a rate of 256 million dollars per year.[20] Quance has estimated expected and actual marginal productivity for selected farm assets from 1917 to 1964.[21] According to Quance the ex ante capital value of a dollar invested in farm buildings was $1.20 between 1917 and 1920 and $1.80 between 1921 and 1929.[22] Thus the observed addition to the stock of farm buildings was proceeding in response to high expected value productivity.

Between the censuses of 1910 and 1930, the share of implements and machinery expanded at the expense of livestock inventory, in particular workstock. During the war years the number of mules and horses on farms decreased at

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[20]Quance, pp. 138-141.

[21]Quance assumed a production function linear in the logarithm. In order to avoid problems of multicolinearity, Quance chose to estimate equilibrium factor shares that he uses as elasticities in the production function. He then applied standard procedures to compute marginal value products (MVP) which he transformed in present values by discounting them over the life of each asset. Multiplying MVPs by the ratio of price received by farmers to expected price, Quance transforms MVP in expected MVP and hence can compute expected present values. Quance, Chapter IV, pp. 75 and f.

[22]Quance, Table 6.10, p. 140.

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a rate of half a million heads per year.[23] The rate of decrease accelerated between 1920 and 1929. Quance estimated that throughout 1917-29 the ex ante capital value of mules and horses was above acquisition cost,[24] indicating relatively high expectation in the value productivity of this asset category. However, farmers decreased rather than expanded their stock of draftstock on farms. This contradiction may be due to the fact that the estimating technique was not sensitive enough to distinguish the productivity of horses and mules from that of substitute sources of farm power. It is likely that the expected productivity of power on farms was increasing but that simultaneously a superior substitute source of power (tractors) was becoming available. Hence farmers were expanding power on farms but substituting mechanical power for animal power. At any rate Quance's estimate of ex post capital values of horses and mules was lower than the respective ex ante value implying that producers were being subjected to capital losses. Hence farmers could have profitably speeded up the rate at which they were disposing of horses and mules.

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[23]Quance, pp. 97-101.

[24]Quance, Table 5.1, p. 98.

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The quantity of livestock on farms other than draftstock, measured in dollars of constant value, decreased between the censuses of 1920 and 1930. Quance reports that the number of beef cows on farms decreased at a rate of 410,000 head per year between 1921 and 1929.[25] The same author indicates that the number of milk cows on farms increased during the period but at a slower pace.[26] Quance estimated that between 1921 and 1929, the ex ante capital value of a milk cow was higher than acquisition cost and thus farmers were justified in increasing the number of milk cows on farms. Similar ex ante estimates of capital value for beef cows were found to be above acquisition cost and yet, contrary to what could have been expected the herd of beef cows contracted between 1921 and 1929. Quance argues in this regard that his capital values are upward biased due to the use of a discount rate which reflected time preference for a safer type of assets than livestock; to an overestimation of the residual value of old cows and to problems of aggregation.[27] In addition, the beginning of the period under consideration coincided with a peak in the cattle numbers cycle.

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[25]Quance, Table 5.3, p. 103.

[26]Quance, Table 5.6, p. 110.

[27]Quance, p. 102.

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The inventory of farm machinery and equipment, expressed in dollars of constant purchasing power, increased during the period 1917-29. The net addition to the stock of selected pieces of equipment and machinery investigated by Quance was positive through 1917-29 and accelerated during the post war. Between 1920-29 farmers added to their stock of machinery a yearly average of 60,000 tractors; 6,000 grain combines; 4,000 corn pickers and 78,000 motor trucks. In nearly all the types of farm machinery investigated by Quance the ex ante capital value was above acquisition cost indicating that investment in farm equipment was the response to high expected productivity.[26] Only in few instances, according to Quance's estimates - all in cases of specialized equipment - did capital losses ensue.[27] Hence, in general, farmers could have profitably expanded still more the use of machinery and equipment.

The information presented by Tostlebe also permits the examination of changes in the volume of agricultural durables on a regional basis.[28] This information indicates that during 1910-20 there was a net positive addition to the stock of durables in all but one region, the northeast. This region underwent a period of adjustment as a consequence of the emergence of keen competition brought about by technological progress. The 1920-25 period, which witnessed

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[26]Quance, Chapter VI, pp. 117-145.

[27]Quance.

[28]Tostlebe.

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a serious fall in farm prices was also a period of net disinvestment, although the net disinvestment was relatively mild. The smallness of the contraction in durables becomes more evident when regional figures are examined. Almost half of the decrease in the value of farm durables at constant prices occurred in three regions: Southeast, Delta States, and Appalachia, in spite of the fact that together they held, in 1920, less than 15 per cent of the total stock in U. S. agriculture. A plausible cause for this disproportionate change is the emergence during the early twenties of exceptional problems in cotton production, the most important crop of the South. During the years 1921-22 and 1923, cotton yields were unprecedently low as a consequence of a series of severe attacks of boll weevil. "The greatest damage occurred in 1921 and was estimated at more than 30 per cent of the United States Cotton Crop."[29] The productivity of "Cotton lands" in these regions likely fell to the point that, in spite of relatively high prevailing cotton prices, land was withdrawn from cotton production causing simultaneously the salvaging of those assets which were its complements in the production of that crop. Once exception is taken of the cotton region, it becomes clear that disinvestment was not large during the early twenties.

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[29]John A. Hopkins, Changing Technology and Employment in Agriculture, (Washington: U. S. Government Printing Office, 1941) p. 38.

Appendix

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Expendable capital

Quance's work on farm capital also provides estimates of the productivity of selected expendable farm inputs.[30] Information is available for both farm and non-farm produced expendables.

The use of fertilizers expanded between 1917 and 1929 from .8 million tons per year to nearly 1.5 million tons per year although the rate of increase was slower after 1920.[31] Increasing use of fertilizer was prompted by an expected productivity promising to cover acquisition cost.[32] By and large, according to Quance's estimates, the ex post productivity of fertilizers remained near acquisition cost indicating that farmers faced no serious adjustment problems in this input category. As in the case of fertilizers, the use of gasoline expanded following high expectations and in this case too there was no evidence of adjustment problems. Quance studied a series of farm-produced expendables in the production of beef, milk, pork and poultry.[33] During the period 1917-29 the use of expendables decreased

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[30] Quance.

[31] Quance, Appendix Table B.8, p. 229.

[32] Quance.

[33] The farm expendable assets studied by Quance were steers, heifers, corn and hay in beef production; heifers, corn and hay in milk production; sow, feeder pigs and corn in hog production and chickens and corn in poultry production.

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in beef production and pork production and increased moderately in milk and poultry production. The decrease in the use of farm-produced inputs in beef and pork production was a consequence of the decrease in the demand for these products that followed the First World War. Quance's estimates indicate that the contraction in the use of these inputs was prompted by a decrease in expected productivity relative to acquisition costs. Similar estimates in regard to ex post productivity suggest that farmers could have profitably contracted the use of farm-produced expendables at a still faster rate.[34] Milk and poultry products had received comparatively less stimulus during the war and thus faced a smaller adjustment problem relative to beef and pork. Milk and poultry production could be expanded in response to a steadily increasing demand generated by population growth and rising off-farm incomes. Quance's estimates of ex ante and ex post capital value of inputs used in milk production indicate that farmers were justified in expanding, the use of farm-produced inputs in milk production.[35] Corresponding estimates in regard to poultry production appear inconclusive.

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[34]Quance, Appendix Tables B.12-15, pp. 233-236, B.20-22, pp. 241-243.

[35]Quance, Appendix Tables B.17-B.19, pp. 239-241.

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Farm Output

Between 1917-1929 the index of farm output grew by about 13 index points (1917-19 = 100).[36] The source of most of this increase was the expansion of such industries as poultry (including egg production) and dairying. During this period, lines of production of traditional importance like food-grains, and meat animals barely held their own. Vegetables and fruits showed good gains. By and large, the change in the structure of the output mix was the reflection of switches in the domestic pattern of consumption brought about by the growth in non-farm incomes.

Among food-grains, wheat production was stimulated by high foreign demand generated by World War I. During the years preceding the war, about 46 million acres of wheat were harvested yearly while between the years of 1918 and 1929, seldom less than 55 million. The sources of expansion were the plowing of marginal lands and replacement of other crops.[37] The average yield per harvested acre was slightly lower during the twenties than during the preceding decade indicating that any progress in productivity of land for wheat production had been offset by low yields in newly incorporated lands.

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[36]U.S., Department of Agriculture, Changes in Farm Production and Efficiency, A Summary Report 1962, Statistical Bulletin N. 233, (Washington, D.C.: Government Printing Office, Revised September 1962).

[37]Sherman E. Johnson, p. 8.

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At first sight, the twenty per cent growth in cotton production between 1917-29 looks rather substantial.[38] However, during the first years of this period cotton production was decimated by plant disease. The growth in cotton production was, in fact, far more modest. The average production during 1925-29 was only 6 per cent superior to that of 1919-25. The decrease in U. S. cotton production caused by the boll weevil occurred simultaneously with the decline in cotton exports due to the war. Both factors terminated at about the same time: "The year 1921 . . .appears to have marked the turning point in weevil control and the resumption of exports on a pre-war scale. . ."[39] The scarcity of cotton relative to world demand in the immediate post-war years resulted in exceptionally high cotton prices which encouraged cotton production not only in the United States but in competing countries as well.

Due to the quasi-exhaustion of hog stocks in Europe during the war, an unusually high demand for U. S. pork (particularly lard) had developed at the end of the war. American farmers were encouraged to increase production with the promise, "to maintain prices of hogs at a fixed ratio to corn at Chicago."[40] As it is common in farm

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[38]U.S.D.A., Changes in Farm Production and Efficiency, A Summary Report 1962, Table 1, p. 11.

[39]Harold Barger and Hans H. Landsberg, p. 79.

[40]Sherman F. Johnson, p. 8.

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production there was a lag in response and thus the highest figures in hog numbers were reached in 1923-24 (about 68 millions) at a time when European production was recuperating strongly.[41] By 1929 the number of hogs on U. S. farms was about 60 million head. It is worth stressing that during the period under consideration technological developments, particularly in the line of feed technology, selection of more efficient feed consuming stock, and cholera control permitted achieving larger production of pork per unit of feed fed.

Beef production remained essentially unchanged between 1917 and 1929. Between 1912, a low point in the cattle cycle and 1918, the cattle herd grew from 56 to 78 million head.[42] From 1918 until 1929 the stock of cattle steadily decreased to 59 million. The high prices effective during World War I encouraged more intensive feeding of beef cattle. During 1910-14 an average of 967 feed units of all feed was fed per 100 pounds of beef produced. This figure reached 1.302 feed units per year on the average

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[41] According to T. W. Schultz (Vanishing Farm Markets and Current World Trade, World Peace Foundation, World Affairs Pamphlets No. 11, 1935, pp. 17-18) the leading hog producing countries of Europe slaughtered less than 1.5 million heads in 1919 when the annual average along 1910-13 was about 20 million. By 1926, however, pre-war levels were regained and soon after, surpassed.

[42] Sherman Johnson, p. 8.

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between 1917-22 falling back to levels slightly above the value of 1910-14 in the late twenties.[43]

The observer accustomed to present day American agriculture is surprised to find that, in contrast with similar experience of the 40's, the high demand generated by the First World War spent itself mostly in high prices with only modest increases in output. Sherman Johnson stresses the contrast in the following words:

> Despite the emphasis on wheat and meat in World War I, and the substitution of these products for other products in the farm economy, wheatless and meatless days were proclaimed. Adequacy of basic food supplies remained a critical war problem.
>
> Weather was not so favorable during the years of World War I as in World War II. The wheat crop of 1916 was reduced by adverse weather and black stem-rust damage. In 1917 the crop was even smaller than in 1916 because of severe winter killing of winter wheat and of drought in some spring-wheat areas. Carry-over reserves were badly depleted by exports to Allied Nations. The wheat crops of 1918 and 1919 were nearly a third larger than in 1917, but these gains in wheat production became available chiefly after the end of the war.[44]

Income and Wealth

According to Hicks, the concept of income includes the ". . .amount they (income recipients) can consume

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[43]U.S.D.A., Changes in Farm Production and Efficiency: A Summary Report, 1962.

[44]Sherman Johnson, p. 8.

without impoverishing themselves.[45] This concept implies that in addition to the rewards that factor owners receive for the use of their factor's services, income should include changes in the value of wealth. Income is said to be of conventional types if it does not include changes in wealth due to price changes. The value of the change in wealth due to price changes is referred to as the nonconventional portion of income.[46] Both conventional and nonconventional portions of income may be expressed in real terms by means of an appropriate deflation.

Net nominal income[47] originating in agriculture attained the highest values of the period in 1917-19 with an absolute maximum in 1919 (Table 4.7). By 1921, however, it had fallen to 50 per cent of that peak. After 1921 and for the rest of the period money income recovered somewhat without reaching the levels of the beginning of the period. In real terms, net income originating in agriculture did not fluctuate as much as the nominal counterpart indicating

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[45]John R. Hicks, Value and Capital (Oxford: Clarendon Press, 1945) p. 172.

[46]See David H. Boyne, Change in the Real Wealth Position of Farm Operators, Technical Bulletin 294, (Michigan State University, Agricultural Experiment Station, 1964).

[47]Net income is defined here as the sum of Realized Net Income (excluding government payment) Total Farm Wage, Interest on Farm Mortgage, Net Rent (excluding government payments) and Net Change in crop and livestock inventories. For the meaning of these concepts see U.S.D.A. Major Statistical Series of the U. S. Department of Agriculture, Agri. Handbook 118.

Table 4.7: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1917-29

Table 4.7: Net income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1917-29

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(000,000 Dollars)							
1917	10,635	19,336	7,670	13,945	0	0	18,305	33,282
1918	11,525	18,008	5,756	8,994	0	0	17,281	27,002
1919	12,037	16,266	10,921	14,758	0	0	22,958	31,024
1920	10,663	12,399	-10,513	-12,224	0	0	150	174
1921	5,497	7,233	-10,377	-13,654	0	0	- 4,880	- 6,421
1922	6,518	9,053	- 287	- 399	0	0	6,231	8,654
1923	7,428	10,175	- 1,310	- 1,795	0	0	6,118	8,381
1924	7,270	9,959	149	204	0	0	7,419	10,163
1925	9,083	12,111	- 92	- 123	0	0	8,991	11,988
1926	8,290	10,908	- 1,999	- 2,630	0	0	6,291	8,278
1927	8,114	10,965	239	323	0	0	8,353	11,288
1928	8,357	11,448	417	571	0	0	8,774	12,019
1929	8,520	11,671	- 726	- 994	0	0	7,794	10,677
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808

[1] Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: U. S. Department of Agriculture, Farm Income Situation 1962 and 1965; Glenn L. Johnson, An Evaluation of U. S. Agricultural Prices and Programs

that, by and large, this portion of income retained its purchasing power. During years 1920, 1921, and 1922, however, net income originating in agriculture (real terms) fell considerably relative to the rest of the period.

The nonconventional portion of income fluctuated wildly during the period. Tostlebe[48] reported that the value of durables in agriculture in current prices doubled between the censuses of 1910 and 1920. The sheer appreciation of these goods become evident when it is recalled that the real growth in the volume of durables between these censuses was only about 10 per cent. Land resource, in particular, which essentially remained unchanged in quantity was worth twice as much in current prices in 1920 as in 1910. Clearly, land holders and holders of other farm assets felt wealthier at the turn of the twenties. Those who bid up the price of assets in the process of attempting to achieve ownership over a portion of them must have expected returns commensurable with the prices they were sanctioning. The collapse of farm prices in the early twenties was followed by collapse in the value of farm assets. In 1925 the value of farm durables in current dollars had fallen to 60.7 billion, a decline of about 28 per cent from 1920 figures. Naturally, these sharp changes in the value

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[48]Tostlebe, Table 6.

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of assets generated alternatively capital gains and losses. Glenn L. Johnson[49] indicates that the capital gains which accrued to agriculture between 1917-19 were about the same magnitude of the capital losses generated between 1920-1929. Extending the examination back to 1915 it is found that there were net capital gains during the 1915-29 interval. However, from the viewpoint of agriculture, capital gains and losses do not necessarily cancel each other out;[50] the capital losses suffered by some producers do not have a counterpart gain within the agricultural sector.

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[49]Glenn L. Johnson, An Evaluation of. . . Table 3.

[50]Perhaps it would be appropriate at this point of the discussion to pause to examine - from the point of the view of the agricultural sector - the consequences of wild fluctuations in the value of farm assets caused by price changes. The stress is on the fact that capital losses do not necessarily cancel capital gains within the agricultural sector. Assume that there is no net change in the physical volume of assets, that is the changes in value of assets are pure appreciations or depreciations. Assume further three points in time: at point 2 the value of the stock of assets and farm prices double with respect to point 1 and at point 3 they regain the level they had at point 1. Various alternative situations are possible. For farmer A who did not add to or alter the structure of his farm assets, the change in value of farm wealth is of negligible consequence since the gains received between 1 and 2 cancel out the losses suffered between 2 and 3. Mr. B, a farmer who sold his assets as the boom in asset value reached its peak made capital gains, he was lucky but he is no more a farmer and thus from the view point of the agricultural sector his fate is of no major interest. Farmer C's case, however, who bought from Mr. B, is of interest from the viewpoint of agriculture: he incurred in capital losses with no counterpart gains within the sector. Further, if he incurred in debts in order to purchase his assets from Mr. B, he faces unavoidable costs which he has to defray at time 3 with diminished revenues caused by the fall in farm prices. Mr. C may not be able to reward at all other factor of production.

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The changes in asset position of agriculture (Table 4.7) were positive only in six out of the 17 years of the period. However, the absolute change during the whole period was negative: farmers as an aggregate were poorer at the end of the period than at the beginning. In the particular case of 1921, the losses in the value of assets were larger than the conventional portion of income. About 95 per cent of all the positive changes in the value of assets occurred in 1917-19, in the midst of the war boom, but from then on only in three occasions the changes were positive and in all three cases of small magnitude.

Policies

From the vantage point of farm policy the years between 1917-1929 may be broken down into two consecutive "problem periods". The first one extends from United States' direct intervention in World War I until about 1920. This was a period during which the overwhelming concern was to secure a sufficient food supply to wage war. This objective was a source of major concern due to the fact that: (1) part of the labor force was being drawn into the army, (2) most of the labor saving techniques that are presently taken for granted did not exist, (3) the supply of fertilizers was seriously threatened,[51] and (4) there was the

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[51]Charles J. Brand, "Some Fertilizer History Connected with World War I", Agriculture History, XIX, 2, (April, 1945), pp. 104-13.

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possibility of outbreak of both plant and animal disease that could not yet be controlled. Somehow, however, the task was achieved and no sooner had the specter of scarcity vanished than the second problem, that of over-production - followed by low prices, low incomes, bankruptcies, etc. - fell over American agriculture. The later problem which started shortly after the armistice proved to be more resilient than the first one.

Solving the food shortage

The drive for a larger output rested upon moral persuasion and direct government intervention. In the particular instance of World War I, recognized authorities claim that moral persuasion did play a role: "emotional appeals to patriotism were apparently more effective, and much more widely used, in World War I than in World War II."[52] The major measures of direct intervention emerged from the conferences of St. Louis and Berkeley, called for consultation by the Secretary of Agriculture.[53] These measures were: (1) the Food Production Act which appropriated 11 million dollars for research and dissemination

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[52]Murray R. Benedict, Farm Policies of the United States, 1790-1950, (New York: The Twentieth Century Fund, 1953), p. 162.

[53]U.S., Department of Agriculture, Report of the Secretary of Agriculture, Yearbook of U.S. Department of Agriculture 1917, (Washington, D. C.: U. S. Government Printing Office, 1918), pp. 12-13.

of information[54] and (2) the Food and Fuel Control Act creating the Food Administration. An appropriation of 150 million dollars was made to the Food Administration which had the power, among other functions, to guarantee prices in order to stimulate production as well as to control farm implements and fertilizers.

The changes brought about by the Food Production Act were more of emphasis than of substance; they consisted mainly in strengthening programs already operating successfully under the sponsorship of the Department of Agriculture. Nearly 40 per cent of the appropriations made under the Act were for further development of the Cooperative Extension Service.[55] Important portions of these funds were for procurement and distribution of seed to farmers as well as for marketing research and extension. In matters such as extension work it is easier to measure the size of the effort than the result achieved. If, as most authorities on the subject claim, the process of extension is a long term process, the contribution of this program in meeting war needs was probably small. There exist strong presumptions that the "production increasing" effects of this program materialized with a lag at a time when opposite production adjustments were called for.

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[54]USDA, Yearbook of the U. S. Department of Agriculture 1917, pp. 16-17.

[55]USDA, Yearbook of the U.S. Department of Agriculture, 1917, p. 20.

On the other hand, there was considerable novelty in some of the policy instruments placed at the disposal of the Food Administration, particularly in what concerns farm prices. Guaranteed prices were used, apparently, with considerable success in order to encourage the production of wheat and pork. In wheat, the guaranteed prices to the farmer were efficient in converting existing high wheat prices into effective signals to producers. By preventing exchange speculation, it was possible to secure higher prices to the farmer and lower flour prices at retail levels, as compared to the years prior to the inauguration of the program.

There was an important technical difference between the "guarantee" given to wheat producers and that given to hog producers. "There was no power to fix prices by law nor to guarantee a price to the producer backed by money in the United States Treasury as in the case of the wheat guarantee."[56] The mechanics of price guarantee in matters of hogs consisted in obtaining the bonafide agreement from Allied Powers that they would affect their purchases of pork and pork products at prices that would permit packers to pay producers the minimum price. In November 1917 the Food Administration, after securing such agreements, proclaimed minimum prices for live hogs. Substantial

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[56]U.S.D.A., Yearbook of the U. S. Department of Agriculture, 1917, p. 263.

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increases in hog production were already evident in July 1918. However, the full impact of the stimulus was felt when the hostilities were suspended and allies became less eager to secure supplies from the United States. Between November 1918 and February 1919 it took great effort and organization from the part of the Food Administration to prevent the collapse of the hog market. Finally, in February 1919, the attempts to control hog prices were discontinued.

It can be said in general that the serious efforts to solve the food shortage problem during World War I bore some fruits while they were still needed. Major adjustments in agricultural production, however, take time and the major effects of the output-expanding policies acted with a time lag. The most plausible source of this time lag is that stimuli seldom affect managerial decision directly but rather working their way through some expectation function. As a result, "The overall volume of agricultural production was only moderately above that of preceding years and was not to reach its peak until 1920."[57]

Tackling the agricultural depression of the 20's

Signs of agricultural troubles developed soon after the cessation of hostilities: (1) the full impact of

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[57]Benedict, p. 167.

the war measures to increase farm production were felt later than 1918, (2) a backlog of exports from many competing countries was waiting the end of the war to flow into world markets and (3) to America's great dismay, Allied powers did not feel any responsibility in relieving the agricultural glut that had been created in their behalf during the war and promptly turned to the lowest bidders. American farm output far outstripped the demand for it and as a consequence, farm prices and incomes crashed.

The farm war boom and the subsequent farm depression, while unpredictable, were temporary phenomena. Viewed as such, the expectation that adjustment to these disturbances was but a matter of time was not totally unjustified. However, the wild and brief changes in economic condition brought about by the war, hid subtle changes, secular in nature, long since in operation and that would be even less reversible than the economic consequences of the war. Outstanding among these later forces were (1) technological progress making farm production more fixity-prone via the utilization of more specialized factors of production and (2) per capita income growth into the range of lower income elasticities of demand for farm products.[58] The failure on the part of interested parties to recognize

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[58]External developments such as agricultural programs in competing and consumer countries and changes in international relations also played an important role.

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the existence of secular forces operating in addition to the more obvious circumstantial disturbances made the relief of farm ills a difficult and, for a long time, an almost hopeless cause. The remedies tried were designed to cure temporary evils while the conditions were, in fact, chronic.

The agricultural depression of the twenties presented policy makers with two different problems: (1) how to bring relief to those who were hit the hardest by the collapse in farm prices and (2) how to promote the recovery of farm prices.

The most obvious result of the farm price deflation was that it imposed upon some sectors of agriculture capital losses which did not have a capital gain counterpart within agriculture. For many farmers, those who made their commitment to agriculture during the upswing and who were later caught heavily in debt when farm prices fell, it meant financial disaster and bankruptcy. Between 1920 and 1924, 16 per cent of all bankruptcy cases reported to the Department of Justice were farm bankruptcies, whereas in the pre-war years only 5 per cent of all bankruptcy cases involved farmers.[59] It might be argued that bankruptcy, other distress forms of abandoning farming and outmigration from agriculture are "natural" ways of adjustment to changing

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[59]U.S., Department of Agriculture, Report of the Secretary of Agriculture, Yearbooks of the Department of Agriculture, 1924, (Washington, D.C.: U. S. Government Printing Office, 1925.)

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economic conditions. These, however, were not the type of adjustment that those in charge of formulating farm policy considered desirable. Distress abandonment of farming was considered unfair on the grounds that the over-production created by the war, if not solely, to a large extent, had been policy fed.[60] Outmigration, on the other hand, was despised on grounds of agriculture fundamentalism.[61] In any event, the losses were non-Pareto better and in accord with the theory examined in the previous chapter.

The policies considered to deal with farm problems were as usual the offsprings of (1) the beliefs held by those whose opinion is important in formulating farm policy as to the nature of the problems and (2) beliefs held in regard to what are proper powers of the government in economic matters. With regard to the nature of the depression it seems evident that it was viewed as a short cycle which was amenable of self-liquidation in the short run. In view of this belief and the prevailing official creed that government should not handle product price and quantity variables except in time of emergency, it is not

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[60]U.S., Department of Agriculture, Report of the Secretary of Agriculture, Yearbook of the Department of Agriculture 1928, (Washington, D. C.: Government Printing Office, 1929) p. 7.

[61]U.S., Department of Agriculture, Report of the Secretary of Agriculture, Yearbook of the Department of Agriculture, 1923, (Washington, D.C.: U. S. Government Printing Office, 1924), pp. 10-11.

surprising that the policy measures were of the "hang-on" type: (1) adjustments in the credit system to hang onto the debts until price recovered and (2) improvement in marketing channels in order to make the best of the existing price structure. It should be stressed that this particular way of looking at farm problems was shared during the early 20's by the Executive, the Congress[62] and producers.[63]

The Agricultural Credit Act of March 1923, paved the way for the establishment of twelve Federal Intermediate Credit Banks and changed regulations covering the extension of farm credit. This act was intended to deal with the two major problems created by the agricultural depression. Some provisions of the act allowed the refinancing of the debt of distress debtors under the assumption, of course, that farm economic conditions were bound to improve. But, as Benedict ably puts it, the fact that the conditions of repayment did not show any obvious sign of improvement was a strong deterrent for banks to extend new credit even if they were allowed to lend more and for long periods.[64]

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[62]See a summary of the "Joint Commission of Agricultural Inquiry," in Benedict, pp. 200-220.

[63]U.S.D.A., Yearbook of the Department of Agriculture, 1923, pp. 6-7; reports on a survey made among farmers in regard to the causes of the depression.

[64]Benedict, p. 186.

The credit Act expected to contribute to orderly marketing through the system of Intermediate Credit Banks which were empowered to "discount short-term agricultural papers for agricultural lending institutions and make loans to farmer cooperative marketing associations on the security of staple agricultural commodities, livestock or other approved collateral."[65] The spirit of these provisions is that farmers should be allowed to hold their products in storage while prices recovered. The aspect of the program was complemented by stepping up the implementation of the United States Warehouse Act. Between 1921 and 1924 the licensed storage capacity expanded considerably (i.e., for grains from 2 to 36 million bushels). According to Benedict, the Intermediate Credit aspect of the 1923 Credit Act did not help farmers much in solving their problems because of the cumbersomeness of the procedures, resulting possibly from lack of experience, and because there was no way to lend directly to farmers. The main contribution of the system seems to have helped in setting the basis for a more comprehensive farm credit apparatus.

The concept of stabilizing farm prices by means of a storage-credit complex was a major innovation that

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[65]Marie Puhr, 1917-1957 Years of Progress with the Cooperative Land Bank System, Farm Credit Administration, U. S. Department of Agriculture, Circular E-43, (Washington, D.C.: 1957), p. 22.

should be kept in mind for contrasting with later experiments in solving problems of farm prices. The Intermediate Credit Bank feature of the Credit Act of 1923 (henceforth "program of the 20's") can be regarded as the forerunner of the Farm Board (FB) of 1929 and through this of the sequence of Agricultural Adjustment Acts (AAA). Although more will be said about FB and AAAs as this thesis progresses, it is submitted here that changes in two fundamental beliefs influenced the evolution of the price support policy from the program of the 20's to those currently in operation. These basic beliefs concerned: (1) the nature of the forces depressing farm prices, that is whether they were accidental or secular in nature and (2) the knowledge (i.e., the information) available to farmers. The program of the 20's rested on the principles that the crisis was temporary and that farmers were sufficiently informed to properly select the timing of sale. Hence, by means of credit facilities farmers were given the possibility of storing their crop until they saw fit. The creation of FB seems to indicate that the second belief had been abandoned but not the first. The FB had the power to buy farm products and thus farmers were given the chance of shifting to FB the decision as to when these products were to flow into regular market channels. The limited resources made available to FB seem to corroborate the contention that the first belief was still strongly held. The price supporting mechanisms

after 1933 differ from the FB in that they were given the power to acquire farm commodities and store them indefinitely. This indicates that the secular nature of the forces tending to depress farm prices had been finally recognized.

Summary

The exceptional demand for farm products generated by the First World War made acceleration in the growth of farm output desirable. Farm policies such as price guarantees, crash publicity programs, distribution of seeds and draft deferment were geared in that direction. This exceptional demand, however, spent itself more in high prices and appreciation of farm asset values than in large output.

Several factors are responsible for the fact that agriculture did not expand immediately to the stimulus of the First World War as it did during World War II: (1) adoption of the complex of labor-saving-output expanding innovations had not yet taken place and agriculture was still mostly dependent upon nature, labor, and farm-produced capital, (2) the war itself competed with farming for the use of some factors notably manpower, and (3) massive additions to landstock were no longer possible through extension of the frontier.

High agricultural product prices resulted in high net income for agriculture, high rewards to factors of

production and in high price expectations prompting substantial appreciation in the value of farm assets. Between 1917 and 1919, the value of farm assets increased at a rate of more than 8 billion annually, of which 80 per cent corresponded to land appreciation. The appreciation of farm assets between 1917 and 1919 proceeded faster than the rise in the average price level.

The high incomes generated by the war created a promising outlook for farming that invited new commitments of resources. During the late teens the stock of capital in agriculture increased, land input increased and in the immediate postwar a net influx of labor into farming occurred. In order to expand farm capacity, farmers went into debt at inflated prices.

Peace brought the collapse of both war and foreign demand and with it a drastic reduction in farm prices. Between 1919 and 1922 prices received by farmers decreased by more than 40 per cent. The dramatic fall in prices indicates that prevailing land values had been based on unwarranted long-run price expectations. Actual value productivities of farm resources turned out to be far below expected value productivities. Residual returns to farm labor fell relatively to returns for its urban counterparts while earnings for many farm durables did not cover acquisition costs. Consequently, the high value of land and other farm assets created by faulty expectations could not be

supported and their values fell wiping out the capital gains which had been received during previous years. Farmers suffered capital losses in most categories of farm assets. Appreciation and later depreciation of farm assets appear to cancel each other out between 1917 and 1929. It should be emphasized however, that the losses imposed upon farm asset holders after 1919 and few off-setting counter part gains within the farm sector. Many farmers were caught with devaluated assets, high debts incurred in financing the purchases of farm assets at boom prices and low revenues out of which not only debts had to be serviced but factors of production rewarded. During the twenties, bankruptcy and other forms of financial distress reached record levels. The government took a series of permissive and not very effective measures aimed at supplying farm credit in order to facilitate the refinancing of farm debts.

The postwar decrease in demand for U. S. agricultural output suggests that a decrease in the rate of growth of farm output would have been desirable. Never-the-less agricultural output tended to grow faster after 1920 than during the war years. Many of the resources committed to farm production during the war had become fixed in agriculture, including soldiers returning to the farms from whence they came. This fixing of inputs was followed by further loss minimizing output-expanding adjustments which expanded production when, superficially, contraction should have been expected.

Land, mostly because of its spacial immobility has a very low opportunity cost outside of agriculture; that is, its salvage value approaches zero. Thus, there was practically no contraction in the use of land between 1920 and 1929 while land values fell catastrophically.

The use of farm capital did not decline in the immediate post war years except in certain years as a result of fortuitous causes other than low prices.[66] Between 1925 and 1929 net additions were made to the stock of farm durables and conspicuous expansion took place in the use of many expendable forms of capital. The hypothesis that producers were using more inputs in order to minimize losses of economically fixed farm resources is consistent with events. Such adjustments from an initial position of over-production result in further increases in production. Part of this expansion, no doubt, may have been prompted by the adoption of technological innovations. Yet as a cause of "over-production" - defined as failure in achieving earnings commensurate with acquisition costs simultaneously for all factors of production - technological change does not deserve a leading role. Rather, it must join the ranks of other unpredictable, exogenous, forces that may result in errors of farm management. Because acquisition and salvage price diverge, these management

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[66] See page 100 to 101 for details.

errors prevent achieving desired factor substitutions which otherwise would result in rewards to farm factors adequate to cover acquisition costs.

The study of U. S. agriculture between 1917 and 1929 revealed a propensity to over-produce even in the absence of price supports. During this period the symptoms of over-expansion were decreasing farm incomes, low rewards to factors of production and capital losses. The war does not appear to have been the sole expansive force present. Had it been so, farming would have taken its capital losses after the decrease in farm prices of the early twenties, resources would have progressively left agriculture, output would have fallen, and returns would have moved in the direction of acquisition cost. The study, however, does not show an overall decrease in the use of agricultural resources during the immediate post war period; instead, it shows a net increase in the use of land, durables and expendable forms of capital after 1925. Resources invested as a consequence of the war became fixed at rates of return which would not cover acquisition costs; hence heavy capital losses were experienced. In order to minimize these losses, farmers found it profitable to bring still more resources into production despite the fact that farm product prices could not cover acquisition prices for all factors. Clearly, an economic model which assumes salvage prices equal to acquisition costs, under certainty, provides

an inappropriate description of events in this period while the model which assumes acquisition costs to be greater than salvage values in the presence of imperfect knowledge is more consistent with events.

CHAPTER V

1930-1933, THE FIRST YEARS OF THE GREAT DEPRESSION

During the second half of the twenties, agriculture was beginning to adjust to the relative slackening of foreign demand which, to a large extent, had been the cause of the post-World War I depression. This promising outlook, however, did not last long. At the end of 1929 the stock market collapsed marking the beginning of one of the major economic depressions on record. Agriculture moved from the position of a depressed sector in the midst of a relatively prosperous economy to a part of an overall depressed economy. The non-farm economy ceased to be an outlet for redundant agricultural labor.

Agricultural Prices

It was noted in Chapter IV that prices received by farmers stabilized below war levels between 1925 and 1929 but above the 1910-14 average. The parity ratio which according to Table 5.1 attained a period low of 74 in 1921 also stabilized between 1925 and 1929, but below both the 1910-14 and World War I averages.

The most serious decline in farm prices after the turn of the century took place between 1930 and 1933. The average index of prices received by farmers during 1930-34

Table 5.1: Selected Indices of Agricultural Prices (1947-49=100)[1], United States, 1930-33

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices		
				Ten Years Average Expected Prices[3]	Ten Years Average Price Received[4]	Ratio of Expected to Received
1917-29	59	67	89	70	54[5]	124
1930	46	60	77	68	44	150
1931	32	52	62	69	42	164
1932	24	45	53	67	41	163
1933	26	44	59	66	40	165
1930-33	32	50	63	67	42	161

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 years planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Sources: See Table 4.1, pages 76, 77.

was 32 with an all time low of 26 in 1933. Prices received by farmers dropped one half relative to the "War" years. Prices paid by farmers also declined during this period but less rapidly than prices paid. As a consequence, the parity ratio itself fell. The terms of exchange between farm commodities and other commodities reached their worst on record - from the view point of farmers of course - for the twentieth century.

As Table 5.1 shows, long run expected prices remained high and stable during 1930-33. This is not surprising if one considers that, although expectations depend upon recent past experience, adjustments in expectations take time to be worked out. Further, as it will be argued later, the actions of the government implied that the depression was a temporary accident and that everything would soon return to "normal." This attitude may have conceivably retarded readjustments in expectations. Simultaneously, the ten years moving average of prices actually received centered at $t_o + 5$ - which indicates the average price received during the ten year period for which long run expectations were formulated at time t_o - continued the downward trend initiated in the early twenties. Thus, evidently farmers were overoptimistic with respect to output prices and evidence of appropriate readjustments in their expectations was lacking.

Farm Labor

In 1929 the farm population stood at 30.6 million. Contrary to the developments of the period 1917-29, an absolute increase in farm population took place from 1929 through 1933. In fact, the decrease in farm population recorded between 1917-29 was almost completely offset by the population increase of the depression years (see Table 5.2). Farm population in 1933 was nearly the same as in 1917.

According to Table 5.2, there was no change between 1929 and 1933 in the size of the farm labor force. It is difficult however to reconcile the existence of a relatively large increase in farm population with a stationary size of the labor force. One possibility is that estimates[1] could not detect the fact that the amount of labor service required during 1929-32 while remaining at best unchanged[2] was supplied by a larger farm labor force. Relative to previous years, each laborer worked fewer hours per year than before. There exists the presumption that the MVP of labor decreased during the period as a consequence of a decrease in both the MPP of labor and product prices. The decrease in the MPP of labor would logically result from

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[1]For an evaluation of available farm labor force estimates, see Jones, Appendix A, pp. 324 f.

[2]In fact, Table 5.2 shows a decrease in farm labor requirements between 1929-33.

Table 5.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years 1929-1933

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(Mill. hours)	(Mill. hours)	(Per cent)
-	1917-29	-	-1,850	-5.7	-	-805	-5.9	-	-593	-2.5
1929	-	30,580	-	-	12,763	-	-	23,158	-	-
-	1929-30	-	- 51	..	-	-266	-2.1	-	-237	-1.0
-	1930-31	-	316	1.0	-	248	2.0	-	506	2.2
-	1931-32	-	543	1.8	-	71	..	-	-822	-3.5
-	1932-33	-	1,005	3.2	-	- 77	..	-	- 51	..
1933	-	32,393	-	-	12,739	-	-	22,554	-	-
-	1929-33	-	1,813	5.9	-	- 24	..	-	-604	-2.6

(-) Does not apply.

(..) Negligible.

Sources: See Table 4.2, page 80.

the availability of a relatively larger labor force. The residual earnings to family labor computed on typical commercial, family-operated farms were generally negative from 1930 through 1933.[3] The smaller reward to human effort made leisure cheaper in terms of what work would fetch and, hence, more leisure was probably consumed.

The information available on "age specific rates of entry and withdrawal" (Table 4.3), is not very revealing as to whether the changes in number of farmers during the depression were brought about mainly through more young people joining the trade or fewer older farmers leaving it or a combination of both. The information available covers a much larger interval (1930-40) than the interval considered here. In addition, the changes occurring during 1934-40 in farm population, farm labor force, and farm labor requirements were larger than the respective changes occurring in the 1929-33 interval. It will be argued in Chapter VI that this information on "age specifics rates of entry and withdrawal" is in closer agreement with the events of 1934-41 than with those of 1929-33.

Table 4.3 indicates for the decade 1930-40: (1) an exceptionally low rate of entry into farming in

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[3]Wyllie D. Goodsell and Isabel Jenkins, Costs and Returns on Commercial Farms, Long-Term Study, 1930-57, U.S. Department of Agriculture, Statistical Bulletin 297, (Washington; U. S. Government Printing Office, 1961).

younger age brackets and (2) a low rate of withdrawal of older farmers. Generally, a low rate of entry is taken to be an indication that young postulants decide to take their chance in occupations other than farming whereas high rates of entries tend to indicate that farming is favored. There is, however, a third interpretation which seems particularly relevant in explaining the events of the Great Depression. In view of: (1) the small likelihood of finding off-farm jobs[4] and (2) the extreme difficulties in getting started in farming under prevailing financial conditions, young men of farm extraction might have been in the position of being unable either to take industrial employment or to get started as independent farmers. It is more probable, instead, that many farm youths were forced to remain as unpaid family workers. As members of the family they would have received near the average value product of labor in the family operation which was higher than the near zero marginal value product of their labor in alternative endeavors. In short many young persons were forced to postpone making a long run

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[4]Unemployment, measures as "Per cent of Civilian Labor Force" increased from 1929 to 1933 and decreased thereafter except for a brief relapse in 1938-39. In 1933 one fourth of the labor force was unemployed. See: U. S., Department of Commerce, Bureau of Census, Historical Statistics of U. S., (Washington: U. S. Government Printing Office, 1960), p. 73.

career choice.[5] Low rates of withdrawal were, of course, consistent with the then existing economic conditions.

Farm Durables

Real estate

Farming's land base, which had widened by about one per cent during 1917-29, increased by about two per cent during the much shorter interval 1929-33. Further, except for the Mountain and Pacific regions, a net increase in pasture acre equivalents was recorded in every region of the United States. This uniform increase in land input throughout the country is also in contrast to the developments of 1917-29 when inter-regional adjustments in land use were important. In terms of combination of factors of production, the period 1917-29 was characterized by an increase in the proportion of other factors of production relative to land which remained relatively constant. To achieve this, factors other than land moved geographically producing the observed regional changes in land use. In contrast to that period, the changes in the input mix of 1929-33 consisted in changes in the volume of land stock. These are indicated in Table 5.3 by a relatively uniform

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[5]It may be argued that many of those who could not make long run career decisions during the early 30's chose off-farm employment when the economic recovery got underway later in the decade. Thus the low rates of entry recorded for 1930-40 reflect the combined effect of (1) postponement of decisions during the early 30's and (2) effective low entries thereon.

Table 5.3: Units of Pasture Acre Equivalents and Percentage Change by Regions and United States, 1929-1933

Region	Pasture Acre Equivalents					Percentage Change	
	1929	1930	1931	1932	1933	1917-29	1929-33
	(----------(000,000)----------					(----Per cent---)	
United States	1,722	1,731	1,739	1,748	1,757	1.2	2.0
Northeast	110	111	112	112	113	-19.2	2.7
Corn Belt	473	474	475	475	476	- 4.9	.6
Lake States	138	139	141	142	144	- 1.7	4.3
Appalachian	155	155	156	157	158	- 7.8	1.9
Southeast	75	76	77	78	79	- 7.5	3.3
Delta States	67	68	69	69	70	1.7	4.5
Southern Plains	203	206	208	210	213	14.9	4.9
Northern Plains	207	208	209	209	210	10.9	1.4
Mountains	98	98	98	98	98	30.9	0
Pacific	196	196	196	196	196	12.4	0

Source: See Table 4.5, page 92.

expansion in the number of units of pasture acre equivalents throughout all regions.

Rossmiller estimated real estate's marginal physical products (MPP) and marginal value products (MVP) for the period 1930-62. Unfortunately, there are no figures prior to 1930. Considering the three intervals of time available between 1930-1933, Rossmiller found that in 17 out of a total of 19 types of commercial farms investigated, there was a decrease in MPP of real estate in at least two out of three opportunities. Rossmiller singled out "widespread drought" as the main cause of declining land's MPP. Actual marginal value products of real estate generally decreased during the depression in the areas studied by Rossmiller. The widespread fall in product prices reinforced the downward trend in physical productivity. Visualizing the entrepreneur as formulating expectations only with respect to product prices - that is assuming that he expects the same MPP recorded at planning time for the future - it can be argued that:

1. In general, the expected MVP of real estate was well above realized MVP since expected output prices were well above price received during the years 1929-33 and
2. Since expected output prices remained somewhat stable (contrary to what happened to actual prices) there was no downward pressure upon expected MVPs.

Consequently there seems to be indications that the adverse economic conditions of the depression were slow in achieving a drastic revision in expectations. The relatively high expected land productivity explained the observed expansions in land base. The decrease in the value of real estate indicates that it was not achieving expected earnings. As a rule, whenever earnings do not measure up to expectations, forces develop encouraging asset holders to rid themselves of part of their assets. In the aggregate these forces are weak in the case of land because of its low salvage value. Overvaluation and subsequent capital losses can be taken in the case of real estate as strong evidence of overcommitment in real estate resources.

Other durables

After a period of net negative investment following the First World War, the physical volume of durables engaged in agriculture increased through the last part of the twenties. At the time of the 1930 census the volume of the stock of durables in agriculture (measured in dollars of constant value) had almost reached the 1920 level. Compared with 1920, the structure of the stock of durables included an all time high in machinery and equipment inventory and an all time low in the number of horses and mules (see Table 4.6).

The only estimate of the aggregate volume of durables in agriculture after 1930 is for 1935. Despite

the fact that 1930-35 is a larger interval than the one considered here, it provides an indication of the direction of net investment during the depression years. During the 1930-35 interval, net negative investment was recorded in agriculture. Table 4.6 indicates that in 1935 the volume of durables in agriculture was the smallest on record since 1910.

The stock of land and buildings measured in dollars of constant value increased. Independent estimates of the U. S. Department of Agriculture[6] indicate that there was a net disinvestment in buildings from 1930 to 1935. The average ex ante capital value of a dollar invested in buildings decreased from over $3.00 in 1930 to $.01 in 1933[7]. However since in three out of the period's four years the ex ante capital value was above $1.00, producers were justified in investing in more farm buildings. The opposite in fact occurred. Quance argues that this inconsistency originated in unreasonably large estimates of production elasticities from 1930 to 1932 resulting in unreasonably high estimates of ex ante capital values.[8]

The number of horses and mules decreased between 1930 and 1933. Quance estimates that the ex post capital

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[6]U.S.D.A., Farm Income Situation, (Various Issues).

[7]Quance, See Appendix Table B-7.

[8]Quance, p. 140.

value of draft power was on the average below acquisition cost.[9] Hence capital losses ensued. Quance also found that ex ante capital value was larger than acquisition cost which appears at first glance inconsistent with the observed decrease in the number of horses and mules on farms.[10] A plausible explanation of this inconsistency is that the physical productivity Quance attributes to horses and mules is in fact the physical productivity of draft power in general. During the early thirties the versatility of the tractor was just beginning to be developed and hence mechanical and animal draft power were closer substitutes than at the present. The close substitutability between these two inputs may have prevented Quance from making a refined enough distinction between their respective productivities. Even though expected productivity of draft power was high, mechanical power was viewed as a superior source of power to horses and mules and thus while total power on farms was increasing, part of the animal power was being displaced by tractors. Thus would be explained the coexistence of high estimates of the ex ante capital value of horses and mules (capital value of draft power) with a decrease in numbers on farms.

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[9] Quance, Table 5.1, p. 98.

[10] Quance.

Quance estimates that ex ante capital value of beef[11] and milk[12] cows was on the average above acquisition cost between 1930 and 1933. These estimates are consistent with the observed increases in the number of cattle on farms. Although ex post capital values are lower than respective ex ante values they remained above acquisition cost. Hence the resulting capital gains would have justified further investment in beef and milk cows.

The figures available on machinery and equipment are contradictory. While Table 4.6 raises the suspicion that there was a net disinvestment in machinery and equipment between 1930 and 1933, Quance's figures invariably show the opposite. Quance[13] reports that between 1930 and 1933 the stock of machinery increased annually by 50,000 tractors; 11,000 grain combines; 5,500 corn pickers and 6,000 motor trucks. Table 4.6 shows that the index of the physical volume of implements and machinery fell from 176 to 114 between 1930 and 1935 (1910 = 100). The apparent contradiction can be solved. The changes reported between 1930 and 1935 in Table 4.6 are the result of gross investment minus capital consumption while Quance's are of changes in the number of selected pieces of equipment. It is

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[11]Quance, Table 5.3, p. 103.

[12]Quance, Table 5.6, p. 110.

[13]Quance, Chapter VI, pp. 117 f.

conceivable that there was during the depression an addition to the existing stock of machines but that the value added to the existing stock was less than the depreciation and deflationary impacts taking place during the same period. As a result, more machines may have existed at the end of the depression but older and cheaper. Tractors are the only durable reported by Quance whose present value was larger than acquisition cost. This would suggest that producers could have profitably expanded tractor use. The high productivity of tractors may have been the result of the increases in land input, and of the versatility of tractors as a factor of production. In addition, the late twenties and early thirties were times when major technical improvements made the tractor a more productive tool.

When viewed on an interregional basis, the pattern of net negative investment in agriculture of the early thirties - expressed as change in the value of agricultural assets in constant dollars - differs from the corresponding pattern for the twenties. During 1920-25 there was a larger interregional variation in terms of the size of the change in the stock of durables than during 1930-35. During 1920-25, in fact while some regions decreased their stock by as much as one fifth, others were increasing it.[14] During 1930-35, instead, the interregional

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[14]Tostlebe.

range is much narrower. The post-World War I depression was more selective with regard to its impact. It was caused by a decrease in foreign demand taking place in the midst of otherwise prosperous and growing domestic economy. Further it followed a period of exceptional price stimulus as selective as the subsequent "let down." Thus at the onset of the post-World War I depression, capacity in some specific lines of production was excessive while the demand for some other farm products was still expanding due to population and income growth.

The difference in the patterns of investment observed after World War I and during the great depression can be explained by the fact that many farm inputs are not specialized in the production of a particular farm commodity. Rather, they may substitute for each other in the production of different farm products even though they may be highly specialized relative to other sectors of production. The possibility of substitution coupled with differentials in the growth of demand for different farm products during 1920-25 caused the MVP of resources overcommitted in a specific direction to fall faster than their opportunity cost within the sector. As a result there existed after World War I profitable opportunities to transfer inputs among farm enterprises; that is to "salvage" inputs within the farm sector. The great depression, on the other hand, may be interpreted as a fall in aggregate demand affecting

rather evenly most farm lines of production. In this case, the opportunity cost of farm resources in most uses would have tended to fall somewhat synchronically with their marginal value productivity thus precluding profitable transfers of resources within the sector.

Expendable Capital

The use of non-farm produced, expendable forms of capital tended to decrease during the depression. The use of fertilizers had been steadily increasing until the late twenties to an annual average consumption of about 1.45 million tons of major plant nutrients. During the depression the annual consumption decreased to near .9 million tons per year.[15] The consumption of gasoline decreased from an all time high of 2 million gallons per year in 1930 to 1.8 million gallons in 1933 and the use of electricity on farms, which had doubled between 1927 and 1930 remained practically stable between 1930 and 1934.[16]

In general the use of farm-produced expendable capital tended to increase or to remain stable during the depression. There was no clear case of decrease in use of a farm-produced expendable during the depression among the eleven cases studied by Quance.[17]

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[15] Quance, Appendix Table 5.8, p. 229.

[16] Quance, Appendix Tables B.8 and B.9, pp. 229-30.

[17] Quance, pp. 149-160.

Available evidence tends to indicate that during the great depression farmers were able to adjust the use of non-farm produced expendables more than the use of farm-produced expendables. Fixed asset theory provides a plausible explanation to the difference in speed of adjustment between farm and non-farm produced expendables. While there is no reason to doubt that under depression conditions expected earnings of farm and non-farm produced expendables will adjust to actual earnings with similar lag, the acquisition price of farm produced expendable is expected to fall relative to the price of non-farm produced expendables. It follows that there may be instances under depression conditions when forces develop toward expanding the use of farm produced expendables that are not necessarily present in the case of their non-farm produced counterpart. Hence even if the salvage price of the two types of expendables were to fall relative to expected earnings at the same rate, farm produced expendables in farm would grow relative to non-farm produced expendables.

Farm Output

In spite of adverse economic conditions there were no signs of decreasing farm output during 1930-33. On the contrary, according to USDA estimate the average index of farm output for the interval 1930-33 reached 114

(1917-19 = 100).[18] These figures were higher than the average of any other prior four consecutive years. This high output was achieved despite rather mediocre weather conditions. It appears that observed disinvestment in some categories of durables was insufficient to offset increases in land and labor input.

The disagregation of output into commodity groups shows that the changes in output mix followed the same pattern as during the interval 1917-29. Livestock and livestock products, led by dairying and poultry, kept growing faster than crops. Feed grains, hay and forages and food grains were responsible for the less rapid growth of crops. Feed production in general slowed down as less feed was needed for horses and mules (the average number of mules during the period 1930-33 was 31 per cent lower than during 1917-19). In fact, the number of horses and mules decreased at a faster rate than feed production suggesting that more feed was available than before to be transformed into livestock products.[19] The average production of feed grains was particularly low due to the poor 1933 harvest which was

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[18] U.S.D.A., Changes in Farm Production and Efficiency, A Summary Report, 1962.

[19] This is an example of output expansion brought about by specialization - in this case intersector specialization. Agriculture could devote resources to the production of food and fibers which before were devoted to the production of power. Farming is more efficient in producing the former than the latter.

affected by very severe weather conditions.[20] The average production 1930-32 - that is excluding 1933 - remained at the same level as during the five immediately preceding years. The largest expansion within the crop group took place in vegetables and fruits, and nuts.

The changes in output mix observed during the period 1917-29 were the natural adjustments to changing patterns of consumption of an increasingly wealthier economy. Consumption (and production) was moving toward more livestock products, vegetables and fruits with their relatively high income elasticities of demand. This trend was not reversed during 1930-33. Thus during the period 1930-33 production was adjusting as if income was rising when in fact it was falling.

The Utilization of Farm Output

On the average, the United States exported during 1930-33, 21 per cent less agricultural products per year than during the interval 1925-29 and of course still much less than during the war years.[21] If cotton is excluded the fall in volume of exports is much more spectacular: 39 per cent relative to the same base period. The value

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[20] James L. Stalling, "Weather Indexes," Journal of Farm Economics, XLII, 1, (Feb. 1960), 180-186.

[21] U. S., Department of Agriculture, Agricultural Statistics, 1941, (Washington: U. S. Government Printing Office, 1941), pp. 485.

of domestic agricultural exports fell 44 per cent relative to the average 1925-29,[22] indicating that prices decreased more than in proportion to the decline in the volume of exports.

After 1933, when agricultural supply became larger than demand at level of prices that government considered intolerable, official institutions were empowered to accumulate stocks in order to relieve downward pressure on prices. The power of stockpiling may be regarded as an addition to demand. During the years 1930-33 stocks of some agricultural commodities also accumulated in the United States both on- and off-farm. The average total stock of wheat recorded on the first of July during the period 1930-33 was two and one half times larger than the corresponding figures for the period 1925-29, despite rather mediocre crops. The carry-overs of the early thirties were, of course, of a totally different nature than the carry-overs of recent years. While the latter are a purposeful addition to demand the former could be viewed as an indication of a lack of outlets for farm products. Under the economic conditions of the early thirties, the consequences of a fall in demand had to be absorbed almost fully by farm prices.

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[22]U.S.D.A., Agricultural Statistics, 1941, pp. 481-82.

Income and Wealth

Table 5.4 shows that total income was negative during all but one year of the period 1930-33.[23] This means that more often than not farmers were not able to consume without depleting their wealth. Negative total income was the result of large capital losses coupled by exceptionally low net income originating in agriculture.[24]

It was typical of periods prior to 1933 that the burden of adjustment to changing economic conditions was let to fall more heavily on prices than on quantities. During 1930-33, a 4 per cent shrinkage in the physical volume of durables was accompanied by a depreciation of 33.2 per cent in the value of total stock. As a consequence producers suffered large capital losses. The average yearly loss in value of assets was larger during 1930-33 than in previous years. Although it was argued previously that, by and large, capital gains and losses compensated each other, during 1915-29, in 1915-33, capital losses outweighed capital gains by over 23.5 billion dollars.

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[23]The events occurring during 1933 may still be considered as pre-New Deal since few if any of the new legislation had time to make impact during the calendar year of 1933, not even yet on expectations.

[24]Net income originating in agriculture was lower relative to earlier years both in nominal and real terms. Further it is worth noting that 1930-33 was a period of net population inflow to agriculture and thus per capita income must have fallen faster than total income.

Table 5.4: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1930-33

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(----------000,000 Dollars----------)							
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808
1930	6,327	8,911	- 7,444	-10,485	0	0	- 1,117	- 1,573
1931	4,947	7,611	- 9,749	-14,998	0	0	- 4,802	- 7,388
1932	3,282	5,659	- 8,451	-14,571	0	0	- 5,169	- 8,912
1933	3,671	6,675	1,978	3,596	131	238	5,780	10,509
1930-33	4,557	7,214	- 5,916	- 9,114	33	59	- 1,327	- 1,841

[1]Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: See Table 4.7, page 109.

Gross farm incomes (quantity produced times prices) fell during 1929-33 as a direct consequence of a fall in the demand for agricultural commodities relative to their supply. Since the price elasticity of demand for agricultural products is low, the relative decrease in demand resulted in a greater proportionate fall in prices than in quantity taken. Thus, on this account alone gross farm income had to fall.

Evidence available shows that prices paid by farmers did not fall in proportion to prices received. Therefore, net farm income fell more than in proportion to gross farm income. Since net farm income fell while the total amount of resources engaged in agriculture remained fairly stable, the earnings of agricultural resources decreased and their owners devalued them. Thus, capital losses were imposed upon holders of farm wealth.

Policies

Such capital losses, falling farm income and high rates of foreclosure were the principal problems facing agricultural policy during the period 1930-33. The problems of this period were an aggravation of those of 1917-29. Since policy makers held the belief that the crisis was temporary and self-correcting, no dramatic changes occurred in policy formulation. The principal policies that emerged were a series of agricultural credit measures and measures to implement the Agricultural Marketing Act of 1929.

Agricultural Credit was used to refinance farmers' debts and to bring relief to those who had been affected by the exceptionally severe drought of the early 30's. Specifically, the federal government set up in mid-1932 the Reconstruction Finance Corporation;[25] it appropriated 125 million dollars to increase the capital stock of the Federal Land Bank and made several emergency appropriations.

Credit was an appropriate measure to solve the problems caused by a random natural calamity such as a drought. But credit policy alone could not be expected to be more than a palliative in the treatment of the agricultural crisis of the early thirties. Credit was ineffectual for that purpose because it did not touch the relevant variables. Given existing demand, resources were combined in agriculture in such proportion that resource owners were not adequately rewarded. Short of achieving expansion in aggregate demand, the correction of this imbalance necessitated mobilizing resources fixed in agriculture. According to the principles developed in Chapter III the readjustment of agriculture to post-World War I conditions required: (1) helping farmers salvage fixed resources and (2) conveying information reflecting prevailing economic conditions.

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[25]The Reconstruction Finance Corporation was endowed with a capital of 500 million dollars subscribed by the Government. It was authorized to issue bonds and debentures, to loan to financial institutions, to finance farming directly and to finance agricultural exports. See: Benedict, p. 255 f.

The essence of credit policy is to decrease the acquisition price of resources by means of diminishing their financial costs. Thus credit has little power in demobilizing fixed resources except in the limited case when the MVP of a fixed resource is decreased by the increase in the use of one of its close substitutes. Unless debts could be refinanced ad infinitum, the extension of credit in the absence of measures to foster readjustments in production could only postpone the day of reckoning. Further, there exists the presumption that an agricultural policy limited to credit conveyed wrong information. Such policy implied the need of adjustments to short run disturbances when in fact producers needed to be told that the disturbances were of long run nature.

Between 1930 and 1932 the Farm Board strove to support the price of major farm commodities mostly by means of the operation of several "Stabilization Corporations" (i.e., wheat and cotton). The Farm Board was not endowed, financially or otherwise, to support prices for any substantial length of time. The Board's set-up was suited to normalize the flow of products to the market over the short run. During 1931 the Board financed the storage of agricultural products. The second part of 1931 found the Farm Board holding larger amounts of wheat and cotton than its financial capability allowed, and consequently by the end of 1931 the Board had to abandon any hope of price

stabilization. The Board was perhaps successful in sustaining prices above market levels during 1931 but probably lower prices resulted when activities were discontinued and accumulated stock were dumped into the market in 1932.

The short life of the Farm Board is perhaps the best measure of the inadequacy of farm policies of post-World War I and particularly of the great depression. The major assumption underlying the programs of the great depression do not seem to stand the test of history. In terms of sustaining farm incomes, preventing further capital losses and relieving farm debt the programs were ineffectual at least in scope as shown by drifting farm incomes, the size of aggregate capital losses and rates of foreclosure.[26] Given the severity of the depression many of the cures to farm problems were, of course, beyond the realm of farm policy alone.

Summary

Farmers continued to develop excess capacity during 1930-33 despite worsening terms of trade and despite indications of the existence of falling expected farm prices.

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[26]There can be no doubt that on an individual basis credit relief must have meant for many farmers the difference between staying in farming or not. In many cases it permitted farmers to survive until the inauguration of stronger programs. Many lucky farmers must have benefited from the short life of the Farm Board's price support programs but in many cases this was at the expense of those who received lower prices than otherwise when the Board's stocks were liquidated.

Short of any effective government intervention agricultural prices were left to fall freely both as a result of deflation and of excessive agricultural production. As during the previous period farmers bore the brunt of the losses. It has been estimated that between 1930 and 1933 real average net income originating in agriculture was 7.2 billion dollars - nearly 35 per cent below the 1920-29 average - while the average total change in asset position in real terms was minus 9.1 billion dollars. As a result the sum of the conventional and nonconventional income (capital losses) achieved during the interval was negative.

Many years of postwar farm recession aggravated by the general depression indicated the wisdom of slowing down the growth rate for farm output. Never-the-less, the level of production achieved during 1930-33 was higher than any four previous consecutive years despite the presence of rather mediocre weather conditions and one of the worst economic environments on record.

The expansion of agricultural output recorded between 1930 and 1933 was brought about by an increase in the use of most agricultural inputs. The study of agriculture during this period reveals: (1) a net inflow of population and thus of available farm labor, (2) increases in land input measured in terms of pasture acre equivalents, (3) decreases in some categories of durables more or less offset by increases in some others and (4) increases in the use of farm produced expendables.

An absolute increase in farm population took place between 1930 and 1933 which almost completely cancelled the corresponding decreases of 1917-29. The inflow of population strongly suggests the presence of an inflow of labor as well. High industrial unemployment reduced off farm salvage values for labor to near zero. Farming, which produced more laborers than required for replacement developed a growing employable labor force. Negative residual returns to labor indicated a low marginal value productivity for farm labor during the depression.

The rate of growth inland use was faster during the 1930-33 interval than during the preceding period. The value productivity of land generally decreased during the depression. Value productivity expectations for land were not achieved as land values fell dramatically. It has been estimated that the value of farm assets decreased by nearly 25 billion dollars during the four year period with 75 per cent of the loss on land. The increased physical use of land in the light of falling expected returns can be explained as an attempt to minimize losses. Increased use of land would be prompted by the need to raise the marginal productivity of labor which, as it has been argued, was remaining or returning to agriculture at very low returns.

Farmers used an increasing amount of farm-produced durables and expendables during the depression while there are indications that they let some non-farm produced durable

capital goods depreciate without replacement. It has been estimated that during the depression, the marginal value productivity of farm-produced capital inputs did not cover acquisition costs. The forces determining acquisition costs for these assets are not independent of those determining their value productivity. Hence acquisition cost and value productivity tended to fall together and the pressure encouraging the use of farm-produced durable capital inputs persisted despite the depression.

It is far-fetched to argue that the expansion in resource use between 1930-33, was still due to the stimulus of the First World War which by then was about fifteen years removed. The agricultural experience of 1930-33 can reasonably be interpreted as a confirmation of the conclusions that were arrived at from the study of the preceding period. As during the twenties, agriculture showed a propensity to overcommit resources. The brutal fall in prices caused a severe decrease in returns to factors of production which led to a massive devaluation of assets. The preceding chapter found that agriculture entered the depression with excess capacity. A model assuming no divergence between acquisition and salvage costs would have predicted a reduction in the use of farm resources. Further deterioration in the terms of exchange for agriculture failed to achieve a reduction in the use of farm resources. Instead the use of labor, land, and many forms of farm capital expanded.

This expansion can be interpreted as the result of producers' attempts to raise the productivity of farm resources that had become fixed in agriculture either as a result of errors committed prior to the depression or during the depression. 1929-33 were years of very imperfect knowledge and uncertainty. This uncertainty set the stage for entrepreneurial errors, leading to the overcommitment of resources in accordance with the theory of Chapter III. The performance of agriculture during the great depression like its performance in the 1917-29 period strongly suggests that an agricultural economy like that of the United States tends to overcommit resources even in the absence of stimuli such as war and price supports.

CHAPTER VI

1934-1941, THE NEW DEAL

At the time of the inauguration of President Roosevelt, the economy and agriculture, in particular, were depressed. With the exception of the mild upswing of the late twenties, agriculture had known little but depression for over one decade. Existing government policies proved to be incapable of bringing about required adjustments.

The new administration was bold and expedient in trying new concepts and ideas. Of course, these new concepts did not emerge spontaneously in 1933, but were rather the end result of an intellectual evolution through earlier years. The translation of new concepts into practice, however, remains the undisputed merit of the new administration that marked a major turning point in matters of agricultural policy.

Agricultural Prices

During 1934-41, prices received by farmers made a slight recovery from the all time lows of the early 30's. According to Table 6.1, the average index of prices received by farmers during 1934-41 was 39.3 as compared with 32 for 1930-33. Prices paid by farmers did not change much relative to the immediately preceding interval. Consequently

Table 6.1: Selected Indices of Agricultural Prices (1947-49=100),[1] United States, 1934-41

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices: Ten Years Average Expected Prices[3]	Long Run Prices: Ten Years Average Price Received[4]	Long Run Prices: Ratio of Expected to Received
1917-29	59	67	89	70	54[5]	124
1930-33	32	50	63	67	42	161
1934	33	48	69	47	38	124
1935	40	50	80	50	36	139
1936	42	50	84	55	35	159
1937	45	52	87	58	36	161
1938	36	50	72	55	40	138
1939	35	49	71	52	44	118
1940	37	50	74	53	48	110
1941	46	53	87	57	52	110
1934-41	39	50	78	53	41	132

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100.

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 year planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Source: See Table 4.1, pages 76, 77.

farmer's terms of exchange improved. Economic activity and farm business picked up from 1934 through 1937 after which recovery lost momentum.

Table 6.1 permits the comparison between long run expected farm prices and average prices actually received during the period for which the particular expectation was formulated. Roughly two periods may be delineated: before 1937 and after that date. Before 1937 long run expected prices, though well above actual prices, fell rapidly while prices received fell only slightly until 1936, recovering thereafter. Thus by 1938 expected and actual prices had reached about the same level and from 1938 to the end of the period remained close together. Expected and actual long run prices rose together, between 1938 and 1941, from an index of about 40 to 57.

Farm Labor

The period 1934-41 marks the resumption of the downward trend in farm population interrupted by the events of 1929-1933. Between 1934 and 1941, the farm population decreased by 2.3 million persons (Table 6.2), that is, by 7 per cent. The average yearly decrease was larger during this time interval than during 1917-1929.

The change in the farm labor force (according to Table 6.2) was larger than the change in farm population. It decreased by over 16 per cent. Total labor requirements

Table 6.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years 1933-1941

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(mill. hours)	(Mill. hours)	(Per cent)
-	1917-29	-	-1,850	-5.7	-	- 805	- 5.9	-	- 593	- 2.5
-	1929-33	-	1,813	5.9	-	- 24	..	-	- 604	- 2.6
1933	-	32,393	-	-	12,739	-	-	22,554	-	-
-	1933-34	-	- 88	- .2	-	- 112	- .9	-	-2,322	-10.3
-	1934-35	-	- 144	- .4	-	106	.8	-	820	4.0
-	1935-36	-	- 424	-1.3	-	- 402	- 3.1	-	- 612	- 2.9
-	1936-37	-	- 471	-1.5	-	- 353	- 2.9	-	1,657	8.1
-	1937-38	-	- 286	- .9	-	- 356	- 3.0	-	-1,520	- 6.9
-	1938-39	-	- 140	- .4	-	- 284	- 2.4	-	98	.5
-	1939-40	-	- 293	- .9	-	- 359	- 3.2	-	- 203	- 1.0
-	1940-41	-	- 429	-1.4	-	- 310	- 2.8	-	- 426	- 2.1
1941	-	30,118	-	-	10,669	-	-	20,046	-	-
-	1933-41	-	-2,275	-7.0	-	-2,070	-16.2	-	-2,508	-11.1

(-) Does not apply

(..) Negligible

Source: See Table 4.2, page 80.

decreased 11 per cent, that is, less than in proportion to the decline in labor force. As Jones points out, the disproportionate decrease in farm labor force probably represented a drain on underemployed farm labor which had built up between 1930 and 1933.[1] This build up showed during 1929-33 as an increase in farm population followed by no apparent change in labor force and a simultaneous decrease in labor requirements.

Increasing returns to human effort relative to the immediately preceding period, are an indication of increasing productivity of farm labor. The residual return to operator and family labor computed on typical commercial farms are low but with few exceptions positive.[2] This represents substantial progress over 1930-1933 when, as it will be recalled, residual returns to labor were as a rule negative. Increased productivity of farm labor was consistent with: (1) higher prices received by farmers, (2) increased use of cooperating factors, and (3) important technological changes.

The data of Table 4.3 - it will be recalled - were not found very helpful in explaining farm labor flows during the period 1930-33. The data available for cohort analysis covered a wider interval (in that case 1930-40)

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[1]Jones, pp. 193-4.

[2]Goodsell and Jenkins.

than the interval which was under study (1930-33). It is thus possible that the change in number of farm operators in different age brackets presented in Table 4.3 for 1930-40 were more typical of the period 1934-40 than 1930-33. If this is so, the changes in cohort sizes during 1930-40 could be expected to be consistent with Chennareddy's series of expected earnings.

Figure 6.1 shows that the period 1934-40 wages in manufacturing varied more than wages in laundry.[3] Therefore, it is permissible to use in Chennareddy's model the assumption of fixed wages in laundry. Under such assumption the model would predict, the following results for 1934-40:[4] (1) The wages in manufacturing WF would rise faster than wages in laundry so that the ratio, RM of wages in manufacturing to wages in farming would increase. (2) As RM increased, more young farmers would be persuaded to take non-farm jobs in preference to farming and thus the quantity of young farmers Q25 would decrease. (3) As less young people join farming, the total quantity of farmers (Q25 + Q45) would decrease causing farm wages, WF to rise. This

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[3]Wages in manufacturing industries, it will be recalled, were found by Chennareddy to be a good expression for the opportunity cost of labor of young farmers while wages in laundry expressed well the opportunity cost of older farmers' labor.

[4]The key to the symbols used in cohort analysis throughout this thesis was given in Chapter IV, see p. 87.

Figure 6.1: Indices of the present value of expected income streams for 25 and 45 years old workers in selected occupations, United States, 1934-41.

Source: Chennareddy Venkareddy, "Present Values of Expected Future Income Streams and their Relevance to Mobility of Farm Workers to the Nonfarm Sector in the United States, 1917-62", Appendix D, Table 2.

would induce more "older" farmers to remain in farming. For the period 1930-40 cohort analysis shows: (1) exceptionally low rates of entry into farming in younger age groups and (2) exceptionally low rates of withdrawal in older age groups. The developments are in accord with the model.

Farm Durables

Real estate

Farming's land base kept widening during 1933-41. Table 6.3 shows that the use of land input was expanded by 2.7 per cent. This expansion was not uniform throughout the country and in fact there were three regions - Northeast, Appalachia and Southern Plains - where either no increase or a decrease took place. The decrease in land input recorded in the Northeast could be considered as a continuation of the interregional process of adjustment mentioned in Chapter IV, which was disturbed by the depression. The Appalachian region was dependent principally on tobacco[5] and cotton, two crops which were subjected to acreage control from early in this period. The Southeast, which was also heavily dependent upon cotton, increased land use. The contrast with the Appalachian region may be due to the fact that in the Southeast farming was more diversified which

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[5]According to Barger and Landsberg, pp. 68 & f., North Carolina, Kentucky and Tennessee supplied more than 70 per cent of all domestic tobacco, the rest was spread through 28 states.

Table 6.3: Units of Pasture Acre Equivalents and Percentage Change by Regions and the United States 1933-1941

Region	Pasture Acre Equivalents									Percentage Change		
	1933	1934	1935	1936	1937	1938	1939	1940	1941	1917-29	1929-33	1933-41
	(----------(000,000)----------)									(--------Per cent--------)		
United States	1,757	1,765	1,769	1,773	1,778	1,782	1,813	1,795	1,805	1.2	2.0	2.7
Northeast	113	114	112	111	109	108	106	106	107	-19.2	2.7	- 5.3
Corn Belt	476	477	477	477	478	478	478	479	480	- 4.9	.6	.8
Lake States	144	145	146	147	148	149	150	150	150	- 1.7	4.3	4.2
Appalachian	158	159	159	159	159	158	158	157	157	- 7.8	1.9	- .6
Southeast	79	80	81	82	83	83	84	85	85	- 7.5	3.3	7.6
Delta States	70	70	71	72	72	73	73	73	73	1.7	4.5	4.3
Southern Plains	213	215	215	214	213	213	212	213	213	14.9	4.9	0
Northern Plains	210	211	212	212	212	213	213	214	216	10.9	1.4	2.8
Mountain	98	97	100	103	105	108	110	114	118	30.9	0	20.4
Pacific	196	195	196	197	198	199	200	203	207	12.4	0	5.6

Source: See Table 4.5, page 92.

permitted the decline in land devoted to cotton to be offset with expansions in other crops. The rather spectacular increases in land use in the Southern Plains during previous periods had been mostly brought about by expansion of cotton which during 1934-41 was affected by acreage controls.

According to Rossmiller, the marginal physical product (MPP) of land, showed a positive average yearly rate of growth in all the 19 types of farms considered throughout 1933-39. Although in many cases the change in product prices was negative, it was not sufficient to prevent a positive average yearly rate of growth in marginal value product (MVP). The rate of growth in MVPs was probably larger than the rate of growth in expected MVPs.[6] Table 6.1 shows that during the period 1930-41 the average rate of change in long run product prices was lower than the equivalent rate of change in actual product prices.

Other durables

Estimates of the physical volume of durables in agriculture are available only for 1935 and 1940 and were presented in Table 4.6. These estimates, however should suffice to indicate the direction of investment in agriculture

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[6]It is assumed that producers expect actual MPP to continue into the future. Thus, MVP differs from MPP to the extent that expected product prices differ from actual product prices.

during 1934-41. According to the estimates, the volume of agricultural durables increased by about 3 per cent. The stock of land and buildings decreased between 1935 and 1940, and since the amount of land input increased, there must have been a net negative investment in buildings. The net disinvestment in buildings is confirmed by the USDA's annual estimates of gross investment in buildings and of capital consumption.[7] Since the number of farms decreased during the period by about 7 per cent,[8] the sector as a whole was in a position of economizing buildings. Machinery inventory grew relative to 1935 without reaching the levels of 1920 nor of 1930. The stock of horses and mules continued to decrease.

From a regional point of view, three areas failed to achieve net positive investment: the Northeast, Great Plains, and Texas-Oklahoma. In the Northeast except for land and horses-mules, there was net positive investment in durables[9] indicating that the adjustment taking place in Northeastern farming implied substitution of other factors of production for land. In Texas-Oklahoma the volume of durables, except land and buildings, increased between

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[7]See U.S.D.A., The Farm Income Situation, Series.

[8]U.S., Dept. of Agriculture, Number of Farms 1910-1959 - Land in Farms 1950-1959, Statistical Bulletin No. 316, (Washington: U. S. Government Printing Office, 1962).

[9]Tostlebe, Table 8, p. 46.

1935-40.[10] This indicates that the decrease in the volume of all durables was caused by a decrease in the stock of "land-buildings" which was larger than the increase in the volume of other durables. However, since the stock of land did not decrease the bulk of net disinvestment must have occurred in buildings. According to USDA estimates[11] the number of farms in Texas-Oklahoma decreased by about 16 per cent during the period 1934-41 which is more than the national average. The decrease in number of farms permitted economizing in use of buildings.

In the case of the Great Plains the change in the structure of capital is more puzzling. Between 1935 and 1940: (1) land use increased by 28 per cent, (2) the number of farms decreased by 16 per cent, (3) the stock of machinery, of productive livestock, and of buildings decreased. The decrease in buildings can be rationalized as in the case of Texas-Oklahoma. The decrease in machinery inventory may have occurred mostly in the drier sections of the region where land which had been incorporated into farming during the first quarter of the century had to be abandoned. The net increase in land stock may have been

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[10]The value of Physical Farm Assets except Land and Buildings measure in constant prices increased 6.8 per cent and 4.8 per cent respectively in the Great Plains and Texas-Oklahoma. These figures were based on Tostlebe's estimates.

[11]U.S.D.A., Number of Farms 1910-1959 - Land in Farms 1950-1959.

the result of land developments in the humid sections of the region which more than offset the decreases in other regions. Further these developments may have been largely within the farms and did not require substantial additional machinery build up. The decreases in livestock inventory were probably caused by the extreme drought of 1934-36.

Thus, in general, except for buildings and draft-stock, farming increased its stock of durable capital between 1934 and 1941. Net negative investment in farm buildings was proceeding as a result of low expected productivity from this type of asset. During 1933-41, according to Quance's estimates[12] a dollar invested in farm buildings had an average ex ante capital value of .56 dollars. Similar estimates in regard to horses and mules indicate that during the interval 1933-41 farmers reduced drastically the number of draftstock on farms despite an expected productivity sufficient to cover acquisition cost. The contradiction between expectations and the direction of investment in the case of horses and mules was probably due to the formulation of expectations with regard to power in general rather than to farm-produced power. Horses and mules were an inferior source of power relative to the tractor.

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[12]Quance, Table 6.10, 140.

Livestock other than horses and mules increased between 1933 and 1941. Quance's estimates[13] of expected productivity of beef cows indicate that the expansion in the beef herd was prompted by high ex ante capital values relative to acquisition costs. Resulting capital gains in this asset category suggest that farmers could have profitably expanded beef herds still more. Ex ante productivity estimates of milk cows were also above acquisition costs and yet the size of the dairy herd contracted between 1934-41. The ex post capital values reported by Quance[14] suggest that farmers were mistaken in reducing the number of milk cows.

During the period 1933-41 farmers increased sharply the amount of machinery and equipment on farms. Farmers were adding 80,000 tractors per year, 16,000 grain combines, 95,000 corn pickers and 985,000 motor trucks.[15] In all cases the addition was the result of high expected productivity relative to acquisition cost. According to Quance tractors were earning sufficiently to cover acquisition costs and could have been used more. The versatility of these assets coupled with a decrease in the quantity used of farm produced power was the probable cause of their high

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[13]Quance, Table 5.3, p. 103.

[14]Quance, Table 5.6, p. 110.

[15]Quance, Chapter 6, p. 117 f.

productivity. Specialized pieces of equipment such as grain combines and corn pickers produced capital losses instead of gains indicating that farmers had overexpanded in these particular directions.

The measurement of the stock of capital in dollars of constant purchasing power has the limitation of hiding not only changes in the structure of capital but also the fact that capital items bearing the same name differ substantially over time. This last element is of crucial importance when one considers the problem of the "embodiment" of technological change.[16] The quick pace of innovation of post-World War I underrates the implication of net positive farm investment.

Expendable Capital

Quance reports that the quantity of expendable inputs used between 1934 and 1941 increased almost without exception in all cases he investigated.[17] In most cases too, his estimates of expected productivity justify the expansion in the use of expendables. The upward revision of expectations appears to have been achieved faster in the

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[16] An example of "embodied" technological change: Consider a capital good A, embodiment has occurred if, when it becomes time to replace A, no identical good is any longer available but only A', a close substitute, which carries in itself technical innovations from which it cannot be separated.

[17] Quance, Chapter VII, p. 146 f.

case of expendables than in the case of durables. This behavior appears plausible as the elasticity of expectations with respect to current prices is probably higher in the case of expendables than in durables and current prices improved over the period. Further the marginal productivity of expendables conceivably improved as the stock of durables increased.

Ex post estimates of capital gains and losses show that in most cases gains and losses alternated between 1934 and 1941. These wild fluctuations in the capital value of expendables indicate that the whole period may be taken as a period of adjustment following the unusual circumstances of the depression. They indicate, further, that farmers adjust the use of expendables with much more ease than the use of durables.

Farm Technology[18]

Producers have constantly developed and become aware of new means and ways of farming. During the twentieth

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[18]For the purpose of this study a new technique of production has been developed if, within the vector of inputs $(x,.....x_n)$ one particular input say x_k, may change its coordinate from zero to some positive number. The technology is adopted when such change is effectively brought about. As the coordinates of an input change, in this case those of x_k, the MPP of all other inputs, of course, will be affected. For a more detailed statement of this point see Glenn L. Johnson, "A Note on Non-conventional Inputs and Conventional Production Functions," Agriculture in Economic Development, Carl Eicher and Lawrence Witt, (eds.), (New York: McGraw-Hill, 1964).

century and particularly after the great depression, the rate of technological change became unprecedentedly high. A moderately exhaustive treatment of this subject is beyond the purpose of this study. However, the problem of the "embodiment" of technological progress suggests that a brief pause on this subject may contribute to a better understanding of the effects of investment in agriculture.

Clearly, the replacement in 1933 of a primitive model of tractor by a new one (all purpose type with newly developed low pressure tires) would entail a change in farming techniques which need not have been revealed by changes in the farm's balance sheet. A herd of milk cows in the mid-thirties was genetically better endowed; was less subject to disease and more efficiently fed than a similar herd years before yet its book value could be the same. Hence, there exists the presumption that more often than not an addition of one dollar of constant purchasing power to the stock of farm durables in 1933 had different productivity than one dollar years before.

Innovation was carried on simultaneously on many fronts during the first half of the twentieth century: farming tools, animal husbandry, cropping techniques, land use, etc. In terms of machinery, to cite an example, tractors were subjected in less than ten years to the following developments: (1) introduction of the general purpose tractor (1924), (2) development of low pressure tires (1932),

(3) design of a wide line of equipment particularly suited for mechanical draft power (1930-35). As it has been shown tractors substituted for horses and mules at a very fast rate after 1910. The immediate consequences of this development were: (1) release for other uses of land and other farm resources previously engaged in the production of farm power,[19] (2) achievement of greater timeliness in farm operations,[20] (3) better working conditions for farm labor which should be inputed as an addition to real income generated by agriculture.

Turning to the field of animal husbandry, technological change proceeded in many different directions: (1) improvements in breeding (progeny test and artificial insemination) including the development of new breeds, (2) improvements in nutrition (emphasis on the role of minerals and vitamins in animal rations), (3) disease controls (practical elimination of tuberculosis in livestock by 1939 as a corollary of campaigns launched in 1917). These and other developments permitted dramatic increases in production per unit of livestock.

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[19]Glenn L. Johnson estimates that a total of about 75 million acres were shifted from production of feed for horses to other uses. See Glenn L. Johnson, "Agricultures' Technological Revolution," United States Agriculture: Perspective and Prospects, (The American Assembly, Graduate School of Business Columbia University, New York, N.Y., 1955).

[20]See Sherman E. Johnson.

In the field of cropping the outstanding developments were hybridization which, in the case of corn, produced substantial increases in yield per acre. (In 1930 only 40,000 acres of hybrid corn were planted in the U. S. while by 1939 there were 24,000,000).[21] There was the introduction of new crops such as soybeans (in 1907, 50,000 acres of soybeans were grown in the U. S.; almost 4,000,000 during the depression and more than 9,000,000 by 1940).[22] There were also other varietal improvements in most species grown in the United States.

The average yearly change in production per man-hour is an indicator which, although imperfect, summarizes the joint impact of different improvements in farming techniques. The yearly rate of change in production per man hour accelerated sharply during 1934-41 reaching 4.2 per cent per year compared with about 1 per cent before the Great Depression.[23]

Farm Output

The upward trend in agricultural output initiated early in the century was interrupted during the first three

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[21]U.S., Department of Agriculture, Technology on the Farm, A Special Report by the Interbureau Committee and the BAE of the USDA, (Washington, D.C.: 1940), p. 21.

[22]U.S.D.A., Technology on the Farm, p. 24.

[23]U.S.D.A., Changes in Farm Production and Efficiency: A Summary Report, 1962, Table 16, p. 38.

years of the period 1934-41. The average index of farm output for the period 1934-36 was about 101 (1917-19 = 100) which was lower than the average index of 1930-33.[24] This decrease was brought about by a decrease in production of both livestock products and crops.

Considering that until 1937 long run expected farm prices were falling, there exists the temptation of attributing the decrease in production to: (1) reduction in the volume of resources devoted to agriculture and (2) government programs which, as it will be seen later, were aimed at controlling output. There are sufficient indications, however, that the force most responsible for the reduction in farm output was the onslaught of one of the most severe and most general droughts in the history of American farming.[25] There is no major evidence of the occurrence of any substantial reduction in resources committed to farming during the early years of the period. Government programs may have played an important role in keeping cotton and tobacco production in check. The

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[24]U.S.D.A., Changes in Farm Production and Efficiency; A Summary Report, 1962, Table 16, p. 38.

[25]According to Stallings, the weather index of farm output for the period 1934-41 was 7.5 per cent below normal conditions. For the period 1933-36 it was 17 per cent below average. Stallings, Journal of Farm Economics, Vol. 42, p. 184.

reduction in wheat and corn output however, can mostly be attributed to weather.[26]

Except for the Great Plains and Texas-Oklahoma, where adverse weather conditions continued until nearly 1940, the productivity of the rest of the country regained momentum as early as 1937. The average index of output for 1937-41 was 126 (1917-19 = 100). The evidence available seems to indicate that the change in economic outlook was not yet sufficient to free the resources that had been engaged in farming during the years of high price expectations.

The Utilization of Farm Output

After a dip during 1934-36 the volume of agricultural output grew to all time records beginning in 1937. Domestic consumption of farm commodities stood relatively stable from the mid-twenties to the mid-thirties at an index of near 72 (1947-49 = 100), it was exceptionally low in 1935 and steadily increased thereafter reaching 82 in 1941.[27] Per capita consumption decreased during the great depression and although some gains were achieved between 1935-40, the pre-depression levels were barely regained. Total consumption varied less than per capita consumption due to secular population growth.

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[26]Benedict, Farm Policies. . ., p. 315.

[27]U.S., Department of Agriculture, Supplement for 1961 to Consumption of Food in the United States 1909-52, Agriculture Handbook No. 62, (Washington: U. S. Government Printing Office, 1962), p. 8.

The volume of U. S. agricultural exports was on the average lower between 1935-41 than during the depression years. The quantity exported decreased by nearly one-half with respect to the 1925-29 average.[28] The value of agricultural exports fell much less than the physical volume. The value of agricultural exports was only 7 per cent lower during 1934-41 than 1929-33.[29] The decrease in the volume of U. S. agricultural exports was the reflection of various forces such as: (1) world-wide drives for self-sufficiency, (2) slow world-wide recuperation from the depression, and (3) widespread drought forcing the U. S., traditionally a wheat exporter, to import wheat in excess of exports during 1934-36 for the first time since the Civil War.

Price support legislation of the New Deal consisted of loans on stored farm commodities. The major innovation in this context was the nonrecource loans made available for corn as early as 1933 and generalized to other commodities in 1938. From the view point of the farmer, the government power to build stocks became an additional source of demand. Stock changes in terms of net annual utilization of farm

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[28]U.S., Department of Agriculture, Agricultural Statistics, (Washington: U. S. Government Printing Office, 1957), Table 809, p. 703.

[29]U.S.D.A., Agricultural Statistics, 1957, Table 808, p. 702.

commodities were positive in every year between 1937 and 1941. By the end of the period substantial stocks of the three principal U. S. crops (wheat, cotton and corn) had accumulated in the hands of Commodity Credit Corporation (CCC). Between 1934 and 1936 effective production controls and the weather reduced cotton output allowing the liquidation of some embarassing stocks held since 1932. High cotton price supports after 1937, which were not accompanied by strict production control, resulted in stock accumulation. Between 1936 and 1939 nearly 10 million bales of cotton accumulated in the hands of CCC, sufficient to provide for normal consumption and exports for a year without any new crop cotton.[30] Wheat production between 1934 and 1936 was sufficiently affected by adverse weather conditions to require large imports. The good harvest of 1937 was devoted to building normal carry-overs. Thus, between 1934 and 1937 there was no problem of overproduction of wheat and it was not covered by loan operation of CCC. At the end of 1938, however, after a good domestic harvest and keen competition in world markets, CCC was forced into price stabilization operations in wheat. At year end CCC owned 6 million bushels and had in addition 21.5 million bushels under loan.[31]

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[30]Murray R. Benedict and Oscar C. Stine, The Agricultural Commodity Programs Two Decades of Experience, (New York: The Twentieth Century Fund, 1956), p. 19.

[31]Benedict and Stone, p. 113.

During the years which followed, government programs failed to control simultaneously prices and output. At the end of 1941, 419 million bushels were either under loan or were owned by CCC.[32] Corn was the first crop to be placed under a nonrecource loan program in 1933 and a substantial quantity was then pledged to CCC. The very poor harvests of 1934 and 1936 took care of whatever corn surpluses existed as most corn placed as security under CCC was redeemed. It can even be argued that the drought of 1936 caused some shortage of feed grains. However, from 1936 on, as weather conditions normalized, it became impossible to bring under control simultaneously both prices and output and carry-overs accumulated. Even though less acreage was planted, yields rose sufficiently to cause CCC holdings of corn of 403 million bushels at the end of 1941.[33]

Income and Wealth

The period 1934-41 brought about some recovery in farm incomes after many years of depression. Table 6.4 indicates that both conventional and nonconventional forms of income increased, nominally as well as in real terms. In real terms, the yearly net income originating in agriculture was on the average 37 per cent larger during 1934-41 than during the great depression.

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[32]Benedict and Stine, p. 117.

[33]Benedict and Stine, p. 208.

Table 6.4: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1934-41

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(000,000 Dollars)							
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808
1930-33	4,557	7,214	- 5,916	- 9,114	33	59	- 1,327	- 1,841
1934	3,842	6,740	2,449	4,296	446	782	6,737	11,819
1935	6,223	10,547	1,424	2,414	573	971	8,220	13,932
1936	5,645	9,568	1,875	3,178	278	471	7,798	13,217
1937	7,378	12,095	1,201	1,969	336	551	8,915	14,615
1938	5,532	9,220	- 1,626	- 2,710	446	743	4,352	7,253
1939	5,323	9,022	- 704	- 1,193	763	1293	5,382	9,122
1940	5,529	9,215	1,091	1,818	723	1205	7,343	12,238
1941	8,126	12,898	5,470	8,683	544	863	14,140	22,444
1934-41	5,950	9,913	1,397	2,307	514	860	7,861	13,080

[1] Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: See Table 4.7, page 109.

With the exception of 1938 and 1939, agriculture made capital gains. The net change in the current value of assets in agriculture between 1934-41 amounted to 8.8 billion dollars or a yearly gain of 1.3 billion dollars. Johnson reports that the highest rate of appreciation took place in productive livestock.[34] The change in value of this asset category was about 85 per cent while the change in physical volume was only 8 per cent. The value of "land and buildings" also increased despite the decreases in the physical stock of this form of capital which, as was indicated previously, was brought about solely by a decrease in buildings.

While the physical volume of land and buildings decreased by .2 per cent the value of that stock in current prices increased by 2.4 per cent. Small changes in the value of land and buildings led to substantial changes in farm wealth due to the fact that this form of wealth represents typically more than 80 per cent of all farm wealth.

Increases in land value in general can be attributed, in addition to improvements in business expectations, to the inauguration of government programs to be discussed in more detail later. Larsen concluded from his study on the sources of changes in land values that ". . .the analysis of sources of increased land value suggests that a large

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[34]Glenn L. Johnson, "An Evaluation. . ."

part of the increase which occurred was caused by conservation expenditures or factors strongly correlated with the conglomerate of expenditures defined as being related to conservation."[35]

In the Great Plains and Texas-Oklahoma, the total value of land and buildings decreased between 1935 and 1940. One plausible explanation for these exceptional cases is that the particular severity of 1930's drought caused many producers to expect low MPP of land; sufficiently low to cause a downward readjustment in expected MVPs even when rising expectations existed for product prices.

The change in the value of productive livestock was caused by increases in the profitability of livestock production brought about by improvements in domestic demand coupled with slow adjustments in supply.[36] The factor most responsible for the increase in demand for livestock products was the recovery in incomes. Another important factor was population growth, particularly non-farm population growth.

The New Deal brought a new element into the structure of farm income: government payments. Government

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[35]Larsen, p. 150.

[36]The average prices received by farmers for beef and hogs during 1935-40 were respectively 50 per cent and 84 per cent higher than the average 1930-34 while the index of prices received by farmers showed only a 23 per cent increase on the average. Lerohl's series of long run expected prices, indicate that expected prices for livestock products were higher than for farm products in general.

payments grew from slightly over 100 million dollars in 1933 to over 700 million at the end of the period or near 10 per cent of net income. The privilege of receiving government payments could be viewed as a form of wealth the value of which is the appropriate capitalization of the stream of payments.

Policies

Although farm policies during the New Deal attempted to attain a variety of objectives, this section will limit itself to the principal instruments meant to combat farm depression. A complete coverage of the New Deal farm policies is beyond the purpose of this study. Two broad lines of policy will be touched in turn: income policies and relief policies.

Income policies

The income policies of the New Deal were based on the principle that in the short run farm prices could be raised by diverting products from the market. Given an inelastic demand for farm commodities this diversion would have a price effect larger than the quantity effect. It was, however, recognized that long run solutions required changing basic conditions of supply. The administration chose to control supply principally by means of controlling land input.

The cornerstones of farm income policy were: (1) the Agricultural Adjustment Act (AAA) of August 1933 and (2) the incorporation (1933) of the Commodity Credit Corporation (CCC). The literature is rich dealing with the details of these programs.[37]

The AAA provided the means to control the flow of products into the market. These means were acreage allotments, marketing quotas and the promotion of marketing agreements. Payment could be made to cooperating producers. These payments would be defrayed from processing taxes. In some instances noncompliance could be taxed. The AAA principally was expected to bring supply in line with demand at "adequate" farm prices.[38]

The CCC was originally regarded as the principal instrument to support farm prices in the short run. The CCC was to support prices by accepting farm commodities as collateral for loans. This collateral would be priced at

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[37]A small sample of references: Murray R. Benedict, Can We Solve the Farm Problem, An Analysis of Federal Aid to Agriculture, (New York: The Twentieth Century Fund, 1955), especially Chapter 7. Murray R. Benedict and Oscar C. Stine, The Agricultural Commodity Programs Two Decades of Experience, (New York: The Twentieth Century Fund, 1956). Also, U. S. Department of Agriculture, Farm Production, Trends, Prospects and Programs, Information Bulletin No. 239, (Washington: U. S. Government Printing Office, 1961).

[38]Provisions were also made to liquidate stock accumulated by the programs of the early 30's. In 1933 the Federal Surplus Relief Corporation was established which would seek to remove surplusses through non-conventional channels.

some percentage of the 1910-14 parity. Non-recourse loans were first extended to corn, then generalized to other commodities. As it turned out, the CCC became the long run instrument of farm income policy because other farm programs failed to achieve sufficient supply adjustment. Fortunately the CCC had the necessary flexibility to achieve this purpose.

The original AAA was to concentrate in major, called "basic", commodities: wheat, cotton, corn, hogs, rice, milk and tobacco. Fundamental production adjustments were most needed in cotton, wheat, tobacco and corn.[39] Political pressure soon extended the list of the basic commodities to 15.

On January 6, 1936, the United States Supreme Court ruled the AAA of 1933 was unconstitutional. The original provisions were quickly superseded by the Soil Conservation and Domestic Allotment Act permitting, by and large, the pursuit of an unmodified line of farm policies. The major change was that financing of the programs would have to come from Treasury funds and thus would depend upon yearly appropriations. The government could make direct payments to farmers shifting from "soil depleting" to "soil conserving" crops. By properly defining "soil depleting" crops, the administration had the power to control the acreage of specified crops. If acreage allotments were

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[39]Benedict, Farm Policies . . ., p. 240.

proclaimed only those complying were eligible for conservation benefits and for non-recourse loans. The new act authorized the government to share the cost of soil conserving practices.

Successive acts (notably the AAA of 1938) made price support more severely contingent upon compliance with acreage allotments and marketing quotas. At the time of the inauguration of the program, the Secretary of Agriculture had broad power to set the level of price supports. Originally price supports could be adjusted to market conditions. This flexibility was gradually diminished by successive acts of Congress. Finally, the CCC was compelled to pay prices near full parity regardless of the state of supply.

Recapitulating, the administration counted upon the following measures as means to improve farm incomes:

1. Direct payment to producers
    a. for compliance with acreage allotments and for carrying conservation practices.
    b. outright parity payments.
2. Reduction of supply relative to a given demand through
    a. achieving acreage reduction of basic commodities by means of direct payments at first and after 1936 through conservation programs.
    b. by channelling output away from the market by diverting it into storage.

Direct payments may be an effective means of transferring income in the short run. To the extent that the administration is able to secure funds for a program of direct payments it can increase farm income to whatever level it wishes. Direct payments, however, may achieve side effects that are inconsistent with alternative objectives of farm policy such as long run adjustment. These side effects depend largely upon what determines the size of the payment. If the size of the payment depends to any extent upon the quantity produced, farmers will be encouraged to produce more. Adjustment and conservation payments were widely used between 1934-41. The total amount disbursed by the government during the period reached nearly 3.5 million dollars,[40] or equal to about 7 per cent of the net income originating in agriculture.

The power of making "parity payments" was used significantly in the cases of wheat and cotton. Parity payments amounted to about half of the government payments made to wheat and cotton growers between 1938 to 1941.[41] Parity payments can be regarded as a type of minimum prices with no effective production control. Minimum prices with no production controls encourage the formation of above

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[40]Benedict, Farm Policies. . ., Table 29, pp. 344-45.

[41]Benedict, Farm Policies. . ., pp. 256-257.

equilibrium price expectations. High price expectations lead to the overcommitment of resources, more than desired output and downward pressure on prices. Hence sustaining a given income target under a system of parity payments seems to be contingent upon devoting increasing resources to finance payments or alternatively upon committing funds for the diversion of redundant output away from regular marketing channels. Conservation payments also seem to have been in conflict with long run adjustment objectives because they encouraged output expanding practices.

> The importance of conservation policies. . .implies that large increases in productivity are gained through practices defined as conservation. Therefore. . .a main part of the government conservation subsidy program is in direct conflict with other government programs which are aimed at a stabilized or reduced supply of agricultural products.[42]

The government attempted to bring supply in line with demand by forcing a decrease in the use of land. Originally this objective could be regarded as a long run objective. Land was selected as the proper variable because it was implicitly believed that it was a near perfect complement for all other agricultural inputs. The fact that substitution is possible seems to have been neglected.

Adjustment and conservation payments increased the salvage value of land and persuaded farmers to withdraw land from the production of basic commodities. The reduction

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[42]Larsen, p. 155.

in land use increased the MPP of good land substitutes and encouraged their use. Simultaneously, efforts to sustain prices above market clearing levels led to high expected prices. High price expectation tended to increase expected MVP of all inputs including good land substitutes. This was an additional force inducing more intensive use of good land substitutes.

Most land devoted to the production of basic crops could be put to alternative agricultural uses if prices were adequate. The adjustment or conservation payments could be inputed to the best alternative crop the profitability of which could be sufficiently enhanced to warrant a switch in land use. Agricultural commodities are competitive in consumption. Increases in the supply of alternative crops decreased their prices and encourage consumers to spend relatively more on them. As a result less of the basic commodity would be desired at all prices. The demand for the basic commodity would be shifted left and the problem of excess production further complicated.

Consider next the case of a factor such as labor which is neither a good complement nor a good substitute to land. As land is withdrawn from production, the MPP of labor would decrease more than the MPP of good substitutes. Thus the forces that operate in the direction of raising the expected MVP of labor (i.e. high level of price supports) were partially compensated for by a decrease in physical

productivity. Labor with higher salvage value was encouraged to leave farming while labor with lower salvage value remained fixed in agriculture. Labor fixed in agriculture may profit from the acquisition of more cooperating factors such as land and capital as more cooperating factors increase the productivity of labor. A posteriori such factors increase output and depress prices.

The encouragement of high price expectations, the financing of output expanding practices and the existence of good substitutes to the only controlled input conflicted with the objectives of long run production adjustment. As soon as weather normalized in 1937 the supply of farm commodities far outstripped demand at desired prices. The administration was faced with the alternative of abandoning price supports or letting stocks accumulate. It chose the latter course of action. By the end of 1940 carry-overs had reached alarming proportions. The CCC which had originally been conceived as a mechanism to absorb short run market fluctuations became the instrument of long run price policy. The CCC appears to have succeeded in supporting prices. Prices received by producers for wheat, corn, tobacco and cotton were on the average higher during the 1934-41 period than during 1930-33 and in general the index of prices received by farmers grew faster than the index of prices paid. High price support and no production control treated the symptoms of over-production but aggravated the basic disease rather than curing it.

Relief policies

Credit was the main instrument used by the new administration to rescue farmers from their financial difficulties. One of the most important credit programs was launched by the Federal Emergency Relief Act in May 1933. The Federal Emergency Relief Administration (FERA) was given the power to grant supervised rehabilitation loans. The basic features of the program have survived to the present.[43]

The first objective of the program when launched in 1934 was to permit farmers to acquire basic elements of production which with proper supervision could contribute to their subsistance. In fact, the program was meant to supersede direct relief. With the betterment of economic conditions the emphasis of the program shifted and new features were added. The Bankhead-Jones Farm Tenancy Act "personalized" the credit system and emphasized the conversion of tenants into owner operators.[44] With time, the purpose of the program shifted from subsistance to permitting farmers to acquire "adequate" levels of living and later on to an outright assistance to commercial farmers.

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[43]FERA became in 1935 the Resettlement Administration (RA); early in 1937, RA's programs were transferred to the USDA's Farm Security Administration (FSA) which in 1946 became the Farmers Home Administration (FHA).

[44]Credit could be granted up to 40 years at 3 per cent interest on the unpaid balance.

Bob F. Jones made a detailed study of the effect of supervised credit upon mobility of labor in agriculture.[45] After implicitly granting that the initial, purely relief actions of the program were effective given the chaotic conditions of agriculture, Jones gathered sufficient evidence to conclude that the supervised credit encouraged entry into farming and discouraged withdrawal from it, but particularly the former. Jones shows that from 1936 until 1939 about 8.3 per cent of all farm operators had participated in the program. Further, during that period, 60 per cent of the credit was granted to producers below age 45. By being geared toward younger postulants and by availing resources which would not be forthcoming through commercial channels, supervised credit made farming more attractive relative to alternative occupations. Finally, Jones, estimated that about 68 per cent of the money loaned was to finance factors complementary to labor thus tending to raise the MPP of labor. These conditions led Jones to hypothesize that supervised credit encouraged the use of labor in farming.

Jones tested the validity of his hypothesis by means of single equation, multiple regression analysis. Jones assumed the average annual family labor employed in farming (N) to be dependent upon relative sector income (R); an industrial unemployment term (UR); the equity-liability

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[45]Jones, especially Chapter V, pp. 202-250.

ratio in farming lagged one year (E_{t-1}); the number of initial farm operating loans made during the fiscal year (L) and a trend element. In addition, Jones fitted variants of this equation including lagged values of the independent variables and replacement of UR with an estimate of the salvage value of farm labor (R').

The equation provided a good fit and significant coefficients with the signs that could be reasonably expected. The results suggest that in the short run the credit program led to more use of labor input. The use of complementary inputs plus technical advice increased the MPP of labor and total output. A larger supply depressed prices. Due to the characteristic of the demand for farm products the pressure on prices was more than in proportion to the increase in output. A fortiori price declines depressed income and the MVP of labor. Thus, in the long run the program may have encouraged capital-labor substitution and have contributed little to the overcommittment of labor to agricultural production.

An additional point that Jones brings to the surface is that by depressing prices, initially efficient farmers, who would have otherwise expanded the size of operations through conventional financing, were discouraged to do so.

Summary

Although domestic demand for farm products improved there was not a substantial increase in foreign demand during this period. At the beginning of the period, the capacity of the United States' agricultural plant remained in excess of needs. Consequently, a reduction in the rate of farm output expansion was in order. This reduction was never really achieved. If allowance is made for exceptionally unfavorable weather, farm output decreased by only a negligible amount during the early years of the period despite adverse economic conditions. A priori the decrease in farm output from 1933 to 1936 could be attributed to: (1) a reduction in the use of agricultural resources resulting from adverse price relationships and (2) government control programs. There are sufficient indications, however, that the force most responsible for the reduction in farm output was in fact the onslaught of a severe, persistent and general drought. As soon as weather conditions normalized after 1936, farm output resumed its growth.

In this period farm population and farm labor force decreased rapidly. Some authors have argued, however, that the heavy labor outflow was made up mainly of underemployed and unemployed people who had accumulated in agriculture from 1930 to 1933. Although farm wage rates increased they fell relative to non-farm wage rates indicating that outmigration was not proceeding fast enough to bring returns

in agriculture to levels which farmers would have attained had they left as young men. The rates of withdrawal in older age brackets was very low suggesting that off-farm labor salvage values were so low as to leave a substantial amount of farm labor fixed in agriculture at low marginal value productivities.

The use of land increased from 1934 to 1941. Both current and expected value productivities of land increased due to increased use of capital (other than land substitutes) and to higher actual and expected prices. The higher value productivity of land was also due to a related series of additional factors among which the most important appear to be: conservation payments resulting in increasing productivity, acreage controls, and direct government payments capitalized in land values. As a result land appreciated considerably during the period with a good deal of impovement of land values resting upon such government programs as price supports, conservation payments and acreage controls.

There was substantial investment in most types of durables and expendables between 1934 and 1941. Except for draftstock and farm buildings there was an increase in all categories of durables. There was an increase in the use of both farm produced and non-farm produced expendables. Estimates indicate that specialized durables often failed to earn enough to cover acquisition costs.

Stocks did not accumulate in the hands of

government between 1933 and 1936. Governmentally held stocks increased every year between 1937 and 1941. The lack of stock accumulation that occurred in the early years of the period despite price supports and generally ineffective production controls is attributed to the drought. As soon as weather conditions normalized government stock began accumulating. By 1941 the Commodity Credit Corporation held 10 million bales of cotton, 419 million bushels of wheat and 403 million bushels of corn. These carry-overs became the most notable, though not sole, symptom of the overcapacity of American agriculture.

Both in nominal and real terms, net income originating in agriculture averaged higher during 1934-41 than during the preceding period. On the average, farming made capital gains during this period although capital losses appeared at the end of the period. The capital losses that appeared by the second part of the decade indicate that carry-overs were not the sole sign of overcapacity and that public expenditures were not sufficient to completely transfer the cost of overcommittment from farmers to the government and taxpayers.

The study of U. S. agriculture between 1934 and 1941 reveals a propensity to overproduce and overvalue even under a regime of price supports and production controls. It is submitted, however, that overproduction during this period was not solely the result of price support stimulation

with ineffective production controls. As soon as weather conditions normalized, the farm sector failed to achieve returns, at support prices, which were sufficient to simultaneously cover acquisition costs of all assets categories. Either farms paid too much for farm assets, used too much of them or did both. Capital losses to the sector as a whole, losses on some categories of non-human capital and relative decreases in the rewards of farm labor despite large government payments to farmers tend to support that contention.

CHAPTER VII

1942-47: THE SECOND WORLD WAR

In 1939 the Second World War began. By early 1940, after the fall of France, world agricultural production was seriously disrupted. In March 1941, the United States launched the Lend-Lease program. This program marked the first impact of the war on U. S. agriculture.

Agricultural producers and policy makers who probably still did not realize problems exist in adjusting supply to demand (with or without government programs) were suddenly faced with a phenomenal increase in demand. Due to the stocks accumulated during the late thirties, the increase in demand did not result immediately in higher prices.

On December 7, 1941, the United States became fully engaged in the War. That part of the war effort which consisted in supplying the Allies with food and other farm products fell upon U. S. agriculture. Under the pressure of the war, agricultural farm policy had to switch from stepping on the brakes to mixed braking and acceleration and, in some instances to full acceleration.

Agricultural Prices

Between 1942 and 1947 prices received by farmers increased faster than prices paid. Table 7.1 shows that the index of prices received by farmers climbed from 59 in 1942 to 102 in 1947. The parity ratio reached 105 at the end of the period, a level above any other since World War I.

Despite the fact that real farm prices were riding a favorable tide, long run price expectations declined between 1942 and 1944. This is not totally surprising as: (1) the relapse of the recession in the late thirties must have suggested caution to farmers, (2) price ceilings were a possibility debated in political circles and partially implemented from the beginning of the war,[1] and (3) the lessons of the First World War were relatively fresh in many minds. In short, the elasticity of long run expectations with respect to current prices seemed to have been rather low. According to Lerohl, long run expected product prices were consistently below the averages of the prices received during the period for which expectations were formulated indicating that expectations were being more than fulfilled.

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[1]The Executive was considering price controls as early as July, 1941, trying to establish them late that year. See Murray R. Benedict, Farm Policies of the United States, 1790-1950, (New York: The Twentieth Century Fund, 1953), p. 408.

Table 7.1: Selected Indices of Agricultural Prices (1947-49=100),[1] United States, 1942-47

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices		
				Ten Years Average Expected Prices[3]	Ten Years Average Price Received[4]	Ratio of Expected to Received
1917-29	59	67	89	70	54[5]	124
1930-33	32	50	63	67	42	161
1934-41	39	50	78	53	41	132
1942	59	61	97	67	57	118
1943	71	68	104	75	61	123
1944	73	73	100	79	67	118
1945	76	76	100	77	74	104
1946	87	83	105	82	80	103
1947	102	96	106	84	85	99
1942-47	78	76	102	79	71	128

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100.

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 year planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Sources: See Table 4.1, pages 76, 77.

Farm Labor

Table 7.2 shows that between 1941 and 1947 farm population decreased by 4.3 million persons, slightly over 14 per cent of the initial population. All the outflow took place between 1941 and 1945 as, in fact, 1946 and 1947 were years of farm population inflow. The population outflow of 1941-45 was pressed by the need of the armed forces and the desire to take advantage of plentiful job opportunities in factories. Examination of regional changes in farm population led Jones to conclude that decreases were clearly smaller in industrialized areas such as New England and larger in those areas where pockets of underemployment were known to exist.[2]

The size of the labor force was reduced by only 2.6 per cent during 1942-47 compared with 14 per cent in farm population. The large difference was probably because many rural women and children joined the labor force in response to need and patriotic appeals when men left for the War. Labor requirements fell at a similar rate as farm population hence much faster than the quantity of farm labor. The decrease in labor requirements appears at first sight paradoxical in view of the fact that many forms of labor saving inputs were in short supply. There are strong indications that during the thirties a backlog of farm

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[2]Jones, p. 267 ff.

Table 7.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years 1941-1947

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(Mill. hours)	(Mill. hours)	(Per cent)
-	1917-29	-	-1,850	- 5.7	-	- 805	- 5.9	-	- 593	- 2.5
-	1929-33	-	1,813	5.9	-	- 24	..	-	- 604	- 2.6
-	1933-41	-	-2,275	- 7.0	-	-2,070	-16.2	-	-2,508	-11.1
1941	-	30,118	-	-	10,669	-	-	20,046	-	-
-	1941-42	-	-1,204	- 3.9	-	- 165	- 1.5	-	537	2.6
-	1942-43	-	-2,728	- 9.4	-	- 58	- .5	-	- 286	- 1.3
-	1943-44	-	-1,271	- 5.2	-	- 227	- 2.1	-	- 134	- .6
-	1944-45	-	- 395	- 1.5	-	- 219	- 2.1	-	-1,325	- 6.5
-	1945-46	-	983	4.0	-	295	2.9	-	- 758	- 4.0
-	1946-47	-	1,426	1.6	-	87	.8	-	- 884	- 4.8
1947	-	25,829	-	-	10,382	-	-	17,196	-	-
-	1941-47	-	-4,289	-14.2	-	- 287	- 2.6	-	-2,850	-14.2

(-) Does not apply

(..) Negligible

Source: See Table 4.2, page 80.

capacity and overcommitted labor was built up but suppressed, in part, by output restrictions. This capacity was unleashed by the outbreak of the War. A closer examination of the figures on labor requirements in Table 7.2 shows that up until 1944, no change in labor requirements took place and all the decrease occurred during 1945-47. The years 1945-47 mark the beginning of the reconversion of the U. S. to a peace economy and the renewal of the flow of capital goods to agriculture. Furthermore, many inputs such as fertilizers were never really in short supply and even some new types of insecticides and herbicides were made available during the War.

Almost without exception the residual returns to operator and family labor computed on typical farms were substantially higher during 1942-47 than during 1934-41.[3] Considering the sector as a whole, the residual hourly earnings to all farm labor and to family labor trebled. These relative changes compare favorably with relative changes in the average hourly earnings of factory workers during the same period and the absolute difference in labor earnings between farm and off-farm work narrowed down during the period. It can be added that residual earnings to farm labor grew faster than the average price level and that thus part of the gains were real.

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[3]Goodsell and Jenkins.

Table 4.3, Chapter IV shows adjusted age specific rates of entry and withdrawal of farm operators. This table, based on census data, does not provide specific information for the five years of the War. However, comparison of data for 1940-50 with data for 1945-55 and 1950-59 makes it possible to make inferences about the changes occurring during the first and second half of the forties.

The rate of entry during 1940-49 of age groups under 34 is exceptionally large, particularly the 25-34 age bracket. Comparing figures of the interval 1945-55 with those of 1950-59 it can be observed that the first of those two periods shows overwhelmingly higher rates of entry for farmers below 34 than the second. It would follow that the large rates of entry of 1940-49 occurred mostly during the second half of the decade. By examining average annual per cent change in number of farm operators by age groups, Jones concludes that contrary to the case of farmers of less than 25 years of age, a good deal of the exceptionally high rates of entry of the group 25-34 occurred before 1945.[4] Examination of figures on average annual change in number of farm operators[5] indicates that the age group of farmers under 25 decreased much more in the early forties and early

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[4]Jones, pp. 273-276.

[5]Jones, Table VI-9, p. 273.

fifties - both at times that the U. S. was at war - than the 25-34 age groups. Younger persons were more subject to induction than older groups. The figures of 1945-55 show unusually large increases in the number of operators both of less than 25 years of age and between 25-34. As it will be discussed later in more detail, government programs and policies were partly responsible for this particular pattern of development.

The series of expected earnings on and off-farms according to age group developed by Chennareddy[6] indicates that the opportunity cost of young farmers (as reflected by the expected earnings in manufacturing) fell more relative to expected earnings in farming than the opportunity cost of older farmers (as reflected by the expected earnings in laundries). (See Figure 7.1). The wage in manufacturing remained more stable than in laundry suggesting that the assumption of fixed wages in manufacturing could be used in Chennareddy's model. Chennareddy's model would then predict the following development for the period 1942-47:[7] (1) The ratio RM of expected earnings in laundry to farming decreased, encouraging more older farmers Q45 to remain in farming, (2) More farmers in farming drove labor earnings down

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[6]Chennareddy.

[7]A key to the symbols used in this section may be found in Chapter IV. See p. 87.

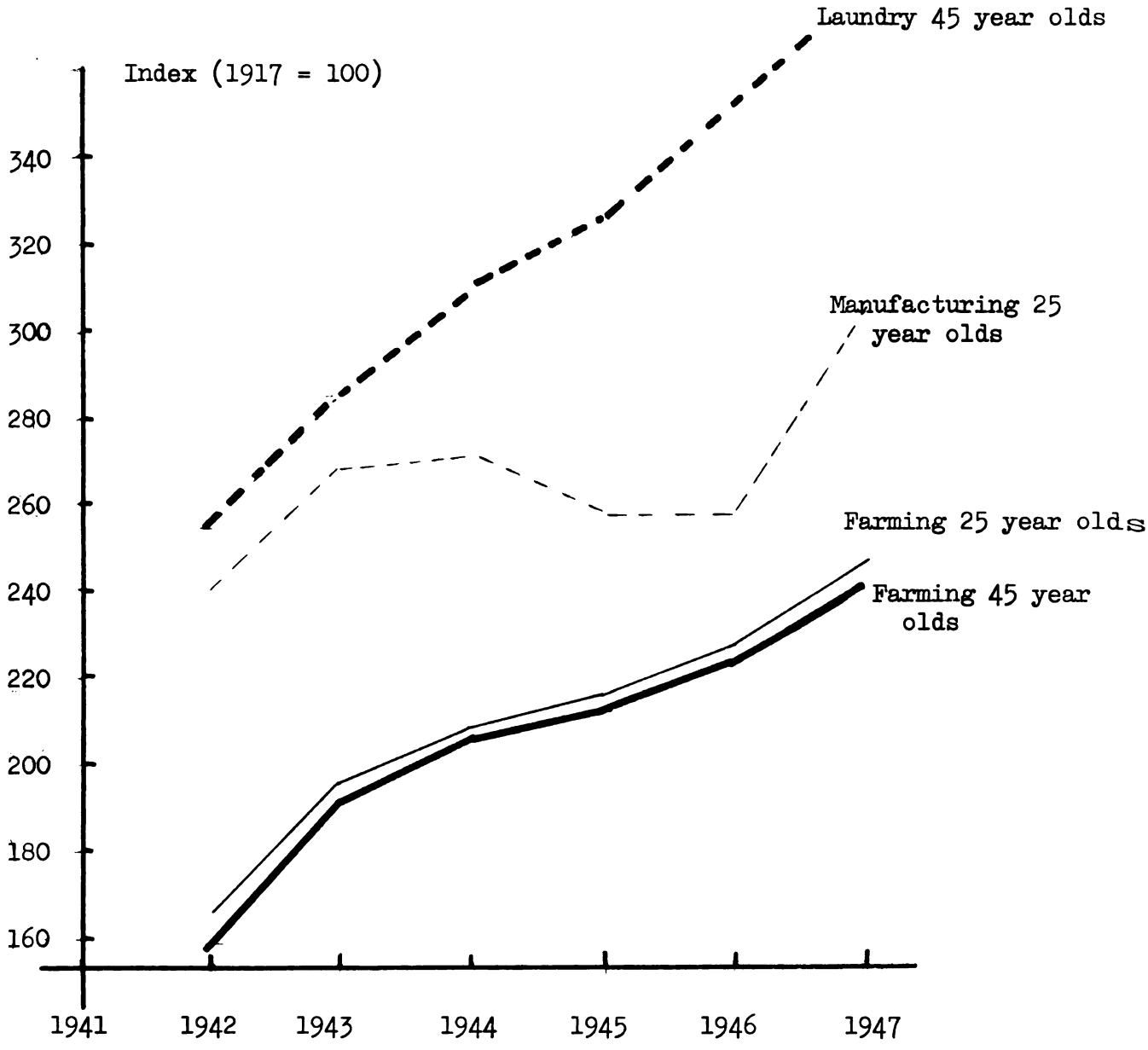

Figure 7.1: Indices of the present value of expected income streams for 25 and 45 years old workers in selected occupations United States, 1942-47.

Source: Chennareddy Venkareddy, "Present Values of Expected Future Income Streams and their Relevance to Mobility of Farm Workers to the Nonfarm Sector in the United States, 1917-62", Appendix D, Table 2.

raising the ratio RL of expected earnings in manufacturing to farming, and (3) As younger farmers Q45 are assumed to respond to changes in RL, less of them were encouraged to choose farming as a career. The total number of farmers (Q25 + Q45) however, would increase as, according to the model, the change in Q45 would exceed those in Q25.[8] Exactly the opposite to what the data has shown.

Clearly the allocation of factors under war conditions responded to different forces than those expected under "normal" conditions. Induction into the armed forces; draft deferment policies, wage controls; and response to patriotic appeals are factors that conceivably may have offset the forces generated by change in relative price. Such effects of war manpower policies on the structure of the farm labor force will be discussed in more detail later in this chapter. See page 232 to page 234 .

Farm Durables

Real estate

Table 7.3 shows that land use increased by 1.7 per cent between 1941 and 1947, that is at a slower pace than during either 1929-33 or 1933-41.

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[8]For a rigorous proof see, Chennareddy, pp. 104-111 and Appendix F.

Table 7.3: Units of Pasture Acre Equivalents and Percentage Change by Regions and United States 1941-1947

Region	Pasture Acre Equivalents							Percentage Change			
	1941	1942	1943	1944	1945	1946	1947	1917-29	1929-33	1933-41	1941-47
	(000,000)							(Per cent)			
United States	1,805	1,814	1,823	1,833	1,833	1,834	1,835	1.2	2.0	2.7	1.7
Northeast	107	107	107	108	106	103	101	-19.2	2.7	- 5.3	- 5.6
Corn Belt	480	480	480	482	478	475	472	- 4.9	.6	.8	- 1.7
Lake States	150	150	150	149	148	147	145	- 1.7	4.3	4.2	- 3.3
Appalachian	157	156	155	154	153	152	151	- 7.8	1.9	- .6	- 3.8
Southeast	85	86	86	87	87	87	87	- 7.5	3.3	7.6	2.3
Delta States	73	73	73	73	73	74	74	1.7	4.5	4.3	1.4
Southern Plains	213	213	214	214	216	217	219	14.9	4.9	0	2.8
Northern Plains	216	217	218	219	220	220	221	10.9	1.4	2.8	2.3
Mountain	118	121	125	129	130	131	133	30.9	0	20.4	12.7
Pacific	207	211	215	218	223	227	231	12.4	0	5.6	11.6

Source: See Table 4.5, page 92.

The concept of pasture acre equivalents attempts to go beyond measuring land in terms of crude units of surface by incorporating the idea of intensity of use. Shifts from less intensive uses such as grazing range to improved pastures result in increases in land input in terms of pasture acre equivalents. So would investments in irrigation and drainage. Shifts in land use aimed at fulfilling war production requirements seem to have been the driving force behind the increase in land use during 1941-47.

Land use increased in the Southern States where labor was relatively abundant and where the production of alternatives to cotton (such as peanuts, soybeans and corn) was encouraged through price incentives and removal of acreage restrictions. In the Plain States, part of the increase in land input may be attributed to physical expansion of the land base. This was achieved by bringing back into cultivation land which the drought had forced out of production during the thirties.[9] In the Lake States and Corn Belt land input decreased rather than increased during the period.

According to Rossmiller[10] there was an increase in land productivity (value productivity) during the War

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[9]Sherman E. Johnson.

[10]Rossmiller, p.124 f.

and up to 1948 in all the cases he investigated. This increase was faster at the beginning of the period than later on. The main force behind increases in land value productivity were increases in farm prices. The physical productivity of land, as reported by Rossmiller[11] generally increased more in those regions where land input decreased and increased less or even decreased in those where land input increased. Never-the-less output price increases were generally sufficient to offset decreases in land productivity in the cases where it occurred.

Other durables

The unusually high demand for farm output coupled with the manpower drain resulted in high demand for farm capital. However non-farm produced capital goods were in short supply during the War. This of course, did not mean that the flow of non-farm produced capital equipment was completely cut off; instead it was slowed down and rationing was exercised.[12]

Table 4.6, Chapter IV indicates that a net addition of 6.2 per cent was made to the physical volume of

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[11]Rossmiller, Tables 21 through 39 and Table 45.

[12]Benedict, Farm Policies. . ., p. 435-36.

agricultural durables between 1940-45. Table 7.4[13] shows that the stock of durables built up to a maximum in 1945 and decreased during the two years immediately following the War. The decrease in farm durables between 1945 and 1947 does not seem reasonable, particularly in items such as implements and machinery, and is contradicted by alternative official statistics. Estimated investment in machinery and motor vehicles (net of capital consumption) from the USDA's Economic Research Service[14] when deflated by the index of prices paid from farm machinery[15] indicate large net positive investment during the immediate post war. Further,

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[13]Table 4.6, Chapter IV and Table 7.4, are sufficient although not completely consistent. Table 4.6 uses information generated by Tostlebe while the source of Table 7.4 is the USDA's Balance Sheet of Agriculture. This latter source is convenient as it provides yearly figures. Both sources provide data for 1940, 1945 and 1950. The overlapping information indicates that they are consistent with each other. Minor inconsistencies between the two tables arise from the fact that the deflator used on the data of the Balance Sheet is different from that used by Tostlebe. The differences are of magnitude but not of sign.

[14]U.S., Department of Agriculture, Farm Income Situation, July, 1965, (Washington: U.S. Government Printing Office, 1965).

[15]U.S., Department of Agriculture, Prices Paid by Farmers for Commodities and Services, United States, 1910-60, Statistical Bulletin No. 319, (Washington: U. S. Government Printing Office, 1962), p. 105.

Table 7.4: Value of Physical Assets in United States' Agriculture in Constant Prices (1910-1914 Average), 1940-1947

Year	Real Estate[1]	Implements and Machinery[2]	Livestock[3]	Crops[4]	Total
	(----------Billion Dollars----------)				
1940[5]	39.6	1.4	4.7	1.5	47.2
1940	39.5	1.9	4.7	2.5	48.6
1941	41.4	2.1	3.3	2.8	49.6
1942	42.1	2.5	3.8	2.6	51.0
1943	43.8	2.9	4.5	2.7	53.9
1944	44.6	3.1	4.8	3.1	55.6
1945	44.5	3.7	4.1	3.3	55.6
1946	44.8	3.1	3.9	2.8	54.5
1947	44.5	2.8	3.8	2.7	53.8

[1]Nominal values deflated by the Index of Real Estate Values, average of November preceeding year and March current year except 1940-42 for which average of year was used; 1912-14 = 100.

[2]Nominal values deflated by the Index of Prices Paid by Farmers for Machinery of December previous year; 1910-14 = 100.

[3]Nominal values deflated by Index of Prices Paid by Farmers for Livestock; 1910-14 = 100.

[4]Nominal values deflated by Index of Prices Received by Farmers, All Crops, 1910-14 = 100.

[5]Information for 1940 is presented from two sources: Tostlebe and USDA. The first row corresponds to Tostlebe.

Sources: U. S., Department of Agriculture, The Balance Sheet of Agriculture 1965, Agriculture Information Bulletin, 290, Revised, (Washington: U. S. Government Printing Office, 1965); U. S., Department of Agriculture, Mayor Statistical Series of the United States Department of Agriculture, Vol. 6, "Land Values and Farm Finance," (Washington: U. S. Government Printing Office, 1957); U. S., Department of Agriculture, Agricultural Statistics 1962 and 1963; U. S., Department of Agriculture, Prices Paid by Farmers for Commodities and Services, 1910-1960, Statistical Bulletin, 319, (Washington: U. S. Government Printing Office, 1962); Alvin S. Tostlebe, The Growth of Physical Capital in Agriculture 1870-1950, (New York: National Bureau of Economic Research, Inc., Occasional paper 44, 1954).

estimates of number of machinery on farms[16] indicate that the quantity of major pieces of equipment on farms (motor trucks, automobiles, grain combines, corn pickers, etc.) increased from 1945 to 1947. The net negative investment in durables of the immediate post war reported in Table 7.4 appears questionable. The outlook for farming was particularly bright at the end of the War and agriculture was capital hungry.

During the period 1942-47, Quance found net additions to the stock of all the farm durables he considered except horses and mules. The number of horses and mules decreased between 1942 and 1947 at a rate of 600,000 per year although *ex post* capital values suggest that even a faster rate could have been profitable.[17] Quance estimates show that with few exceptions, mostly attributable to specification bias in measuring factor shares of good substitutes, the *ex ante* capital values of durables were higher than acquisition cost.[18] It appears that strong forces were present prompting farmers to add to their stock of farm durables. *Ex post* estimates, however, indicate that investments

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[16]U.S., Department of Agriculture, Number of Selected Machines and Equipment on Farm, Statistical Bulletin No. 258, (Washington: U.S. Government Printing Office, 1960).

[17]Quance, Table 5.1, p. 98.

[18]Quance, Chapter V and VI, p. 94 f.

in specialized farm durables, such as grain combines and corn pickers, did not fulfill expectations and resulted in capital losses.[19]

Expendable Capital

The use of fertilizer, electricity and gasoline, the non-farm produced expendable inputs studied by Quance,[20] increased by more than 50 per cent between 1942 and 1947. Farm produced expendables used in the production of beef increased while those used for production of milk, pork and poultry tended to remain stable or decrease.

Quance's estimates of ex post capital values show slight but consistent capital losses for non-farm produced expendable inputs while, as a rule, gains and losses alternated for farm produced expendables. This contrast tends to suggest producers had more difficulties in adjusting to desired levels the use of farm produced inputs than was the case with non-farm produced inputs. Farm produced inputs tend to be more fixity prone because their acquisition cost, value productivity and salvage price of farm produced inputs tend to fluctuate synchronically. In the case of non-farm produced inputs these variably are more independent of each other.

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[19] Quance.

[20] Quance, pp. 160-162.

Farm Output

Despite the existence of adverse factors such as: (1) loss of manpower, (2) relative scarcity of non-farm produced capital, particularly of the labor saving type, and (3) the need for many farmers to shift into unknown lines of production, agriculture responded well to the incentives generated by the War. To a large extent, as argued by Sherman Johnson,[21] this response was possible thanks to the accumulation of capacity during the thirties which a variety of restrictions and adverse weather conditions held in check. The policies of the War relaxed these restrictions while subjecting production to strong price and other stimuli.

Sherman Johnson's study compares changes in farm production during the two World Wars. What follows draws substantially from his analysis. The index of the average farm output during 1942-44 - the three full years of war for the United States - increased 28 per cent over the index of the average output of 1935-39. However, part of this increase may be attributed to generous weather. If the index of output is deflated by a weather index,[22] the increase in output is still remarkably high for such a short time

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[21]Sherman E. Johnson,

[22]Stallings, Journal of Farm Economics, Vol. 42, pp. 180-186.

interval: nearly 16 per cent. This record compares very favorably with the response of farming during the First World War. Though the average index of farm output of 1917-20 was 6.5 per cent above the average 1910-14, no change in output can be detected when the index of farm output is deflated by Stalling's weather index.[23] During the First World War most of the expansion in the volume of farm production was due to the spurious influence of weather.

Increases in output occurred across the board with the exception of sugar crops and cotton. Less cotton price incentives, the relaxation of restrictions on corn acreage and the encouragement of peanut and soybean production help explain the relative decline in cotton production. Livestock led over crops with large gains in meats relative to dairying. In crops, the spectacular gains was in oil-bearing seeds - whose prices were supported. The increase of 150 per cent between 1942-47 and 1935-39 overshadows sustained gains for both food and feed grains. Vegetable oils were a high war priority. Sherman Johnson reports that the acreage of soybeans harvested for beans in 1944 was more than three times larger than in 1939 (the largest increase occurred in the Corn Belt and Southern States)

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[23]Stallings, Journal of Farm Economics, Vol. 42, pp. 180-186.

while the acreage of peanuts picked and threshed nearly doubled during the same interval (mostly in the Southern Plains) and the area planted with flaxseed was during 1943-44 between two to three times the figures of 1935-39.

Overcommittment of resources to agriculture during the thirties was beginning to be felt after 1938 when it became increasingly difficult to control both prices and the volume of production. The incipient but steady accumulation of stocks speaks for itself. Capacity accumulated through many avenues:

1. Mechanization permitted a much more flexible supply of farm power than animals while freeing land resources for alternative farm production. In 1934 there were about 1 million tractors on farms; in 1942, 1.8 million and in 1947 2.6 million.[24]
2. An increased use of fertilizers prompted by the work of the Extension Service, by subsidies to the production of fertilizers and by cost sharing schemes under conservation programs. The total quantity of plant nutrients used during 1935-39 was 1.5 million tons per year. It increased to 2.7 million tons per year

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[24]U.S.D.A., Number of Selected Machines and Equipment on Farms with Related Data.

during 1942-47.[25] The increase in liming materials is even more spectacular.

3. Improvements in plant breeding such as hybridization of corn. In 1933 the quantity of acreage planted with hybrid corn was negligible (it was a recent innovation); in 1941 about 40 per cent of U. S. corn acreage was hybrid and by 1945 more than 60 per cent. "Corn production in 1944 was about a third above the average 1935-39. The average harvested was 1 per cent greater and yields per acre were 31 per cent higher."[26] Varietal improvements in other species, though of less spectacular results compared to hybrid corn, were also important.
4. Improvements in livestock production achieved by a variety of means: better breeds, improvements in feeding techniques, improvements in methods of sanitation, availability of more feed through improvements in feed production and specialization in productive stock at the expense of draft stock.

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[25]U.S., Department of Agriculture, Changes in Farm Production and Efficiency, Statistical Bulletin No. 233, (Washington: U. S. Government Printing Office, 1965).

[26]Sherman E. Johnson, p. 36.

5. Expansion of land input.
6. Phenomenal accumulation of knowledge by farmers, through formal and informal education, which improved their ability to make managerial decisions.
7. And last, but not least, the observed tendency of agriculture with and without 1 to 6 above, to overcommit resources to production relative to acquisition costs.

The Utilization of Farm Output

Carry-overs were smaller at the end of the period 1942-47 than at the beginning despite the fact that during the interim production had increased substantially. Two forces accounted for these large disappearances: (1) large wartime exports relative to the immediately preceding period, particularly through non-conventional means and (2) increase in domestic consumption as a result of war needs and high civilian per capita incomes.

The volume of U. S. agricultural exports which had remained low during the second part of the thirties picked up momentum with the Lend-Lease arrangements of 1941. The total volume of exports was no higher, however, than the figures of 1929-33 and clearly lower than during

the twenties.[27] Information concerning supply utilization of agricultural food products[28] reveals that the Department of Agriculture's purchases for exports for the fulfillment of Lend-Lease type commitments accounted for between 2 and 5 per cent of yearly food disappearances between 1942 and 1947. Both commercial exports and USDA's purchases for export amounted to about 5 per cent per year of the total supply of food of the United States, a larger amount than any time since 1925. The USDA contribution to these foreign deliveries was about 85 per cent of the total.

Domestic consumption increased on three accounts: (1) population growth, (2) substantial increase in per capita consumption and (3) military needs. The U. S. population including armed forces overseas was about 7 per cent larger in 1947 than in 1942 and had increased 16 per cent from 1934 to 1947.[29] Per capita consumption, specifically per capita food consumption, reached an index of 104.4 for the average 1942-47 (1947-49 = 100), higher than any other

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[27]U. S., Department of Agriculture, Foreign Agriculture Trade Statistical Handbook, Statistical Bulletin No. 179, (Washington: U. S. Government Printing Office, 1956), p. 3.

[28]U. S., Department of Agriculture, Consumption of Food in the United States, Agricultural Handbook No. 62, (Washington: U. S. Government Printing Office, 1955), p. 4.

[29]Vera J. Banks, et. al., Farm Population Estimates for 1910-62, (Washington: U. S. Government Printing Office, 1963), p. 19.

previous six consecutive years since 1917.[30] The increase in per capita consumption was principally in response to two forces: (1) income redistribution toward sectors with higher propensity to consume farm products (2) narrow range of choice opened to consumers as a result of the diversion of resources to war production and (3) the feeding of members of the armed forces.

Carry-overs were depleted at the end of the war as a result of larger domestic and foreign demand. Between the end of 1941 and 1947 carry-overs of wheat decreased from 631 million bushels to 196 million bushels; those of corn from 422 million bushels to 252 million bushels and those of cotton from 11 million bales to 3 million bales.[31]

Income and Wealth

The combination of a larger output and sustained demand for farm products resulted in higher net incomes originating in agriculture than in any previous period. Table 7.5 shows that the average net income originating in agriculture reached 15.7 billion dollars per year. Income

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[30] U. S., Department of Agriculture, Consumption of Food in the United States 1909-52, Supplement for 1961 to Agricultural Handbook No. 62, (Washington: U. S. Government Printing Office, 1962), Table 38, p. 45.

[31] U. S., Department of Agriculture, Agricultural Statistics 1952, (Washington: U. S. Government Printing Office, 1952).

Table 7.5: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1942-47

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(000,000 Dollars)							
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808
1930-33	4,557	7,214	- 5,916	- 9,114	33	59	- 1,329	- 1,841
1934-41	5,950	9,913	1,397	2,307	514	860	7,861	13,080
1942	11,996	17,137	6,511	9,301	650	929	19,157	27,367
1943	14,408	19,470	6,561	8,866	645	872	21,614	29,208
1944	14,404	19,205	5,619	7,492	776	1,035	20,799	27,732
1945	15,154	19,681	5,337	6,931	742	964	21,233	27,575
1946	18,448	22,226	11,729	14,131	772	930	30,949	37,288
1947	19,563	20,378	12,342	12,856	314	327	32,219	33,561
1942-47	15,662	19,683	8,016	9,929	650	843	24,328	30,455

[1]Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: See Table 4.7, page 109.

increased faster than the price level and thus these gains were real gains.

The development of a favorable outlook for farming coupled by inelasticities in the supply of factors of production and government payments resulted in an upward revaluation of agricultural assets and consequently in capital gains to asset owners. Capital gains however, particularly when expressed in real terms, were not as large on the average as during the period 1917-29. This can be explained by the fact that during the Second World War, agricultural supply was more responsive to stimuli than during World War I.

Total income, that is the sum of conventional and nonconventional income, was on the average, higher than ever before. In real terms the average yearly total income just matched the corresponding figures of the period 1917-29. Since farm population had decreased drastically during the interwar period, per capita real farm incomes were substantially higher during 1942-47 than during 1917-19.

Policies

In addition to the increase in demand generated by the war, three other demand shifters were at play during the early forties: (1) the economy was reaching full employment-high income levels of activity, (2) there was in the process a redistribution of income in favor of sectors of presumably high propensity to consume farm products, and

(3) the range of consumer choice had been sharply narrowed as productive capacity was being geared to war priorities. These forces and the direct war requirements interacted in creating unusually strong upward pressures on farm prices.

During the War years, the government undertook the task of encouraging farm production with the same thoroughness it used in supporting prices during the thirties. The government was in addition committed to preventing rises in the general price level comparable to those of World War I. Since farm products were an important element entering in the computation of the cost of living, the government was faced with the task of attaining the objective of plentiful production of farm products subject to the restriction that it be achieved at relatively stable prices.

The major agricultural policies of the Second World War may be viewed as:

I. Policies geared to securing adequate supplies of farm products.
   - A. Price policies, (price supports, changing price relatives through changes in parity levels, forward prices, etc.)
   - B. Quantity policies.
     1. Output policies (definition of targets coupled with penalties for non-compliers; relaxation of marketing quotas)

2. Input policies.
    a. Labor policies (the draft, draft deferments and GI Bill of Rights; import of foreign labor, etc.)
    b. Capital policies (rationing non-farm produced inputs, credit policies).
    c. Relaxation of acreage allotments.

II. Policies directed at holding the price level,
    A. Price policies
        1. Input policies (wage ceilings)
        2. Output prices (product price ceilings and forward prices).
    B. Quantity Policies (rationing).

A detailed study of the above mentioned policy package is beyond the purpose of this dissertation. Thus, only the general principles behind major programs will be examined.

Agricultural policies of the Second World War attempted to commit as many resources as could be spared from the War to agriculture. The extent to which resources moved into agriculture, resulting in a larger output, tests the adequacy of the measures used. The performance of agriculture during the War years shows that these measures coupled with the build up of capacity in the previous years were very successful.

Increasing farm production during the War implied committing more resources into farming, many of which would almost certainly become redundant after the War. This was regarded as an unavoidable evil. It is relevant however to examine whether, in addition, the stage had been set for encouraging overcommitment of resources after the disappearance of war needs. The answer seems to be affirmative in at least two accounts: (1) the agricultural policies of the War carried with them a mechanism to perpetuate high long run price expectations and (2) resources, particularly labor, continued to be subsidized into farm production after the end of the hostilities. These two points will be discussed in turn.

War farm price policies and long run expectations

The policy measures which seem most responsible for the projection of bullish farm expectations into the post-War were those designed for simultaneously tackling the production and inflation problems. The commitment of resources into production was encouraged by either offering high immediate returns and by guaranteeing high future flow of returns. Since the government wished to hold farm prices as low as possible, it chose mainly the second course of action. Thus, it achieved high war production with relatively low farm prices in exchange for the promise that farm prices were to be supported at specified levels

of parity for at least two years after cessation of the hostilities.[32] This alternative posed several problems: (1) it deprived decision makers of "true" price guidance in planning production for post war needs, (2) as forward prices are risk decreasing, their discounted stream is larger than the discounted stream of similar but unguaranteed prices and consequently it was easy for policy makers to underestimate the effect of these prices on output after the war, and (3) it created, as experience tends to confirm, vested interests in perpetuating high levels of price supports.

While effective in achieving the immediate goals of plentiful supply of farm products, the farm price policies of the war made no provision to neutralize the bullish expectations they created. By creating high expectations, the stage was set for the commitment of resources after the War, in addition, of course, to the resources which had already been committed to meet the War's exceptional conditions of demand.

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[32]The Stabilization Act of October 1942 guaranteed 90 per cent of parity for basic commodities and for any commodity which production had been encouraged as a contribution to the war effort for two years after the cessation of hostilities. See Benedict, Farm Policies. . ., pp. 414-416.

War labor policies

It has been pointed out[33] that the relatively low off-farm mobility of farm labor during the forties (characterized by a high rate of entry into farming) suggests the presence of other factors in addition to high farm income prospects. Jones[34] has hypothesized that both (1) the draft deferment[35] mechanism of World War II and (2) the aid to vocational agriculture[36] for veterans reduced off-farm mobility and increased entry into agriculture.

The policy of deferring certain farmers from military duty resulted from the need to hold under control the phenomenal man power drain to which agriculture was subjected. The drain was particularly worrisome in terms of managerial power. The scarcity of unskilled farm labor was partially solved by importing labor and later by using War prisoners.[37]

The high demand for non-farm labor lured labor out of agriculture. The draft deferment mechanism acted

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[33]See page 209.

[34]Jones, Chapter VI, pp. 251-310.

[35]For a summary account of this program, see Jones, p. 276 f.

[36]Servicemen's Readjustment Act of 1944 also called GI Bill of Rights, see Jones, pp. 281 f.

[37]Benedict, Farm Policies. . ., p. 439.

to neutralize farm-non-farm earnings differentials. The so-called Tyding Amendment[38] provided the immediate reclassification of any person leaving agriculture without previous permission. As 45 was the age limit for military duty, the draft deferment system was a highly selective mechanism in its effect on off-farm migration. Thus, the rates of withdrawal of farmers 45 years old and older was particularly high during the forties.[39] Young farmers "forced" into farming during the early forties accumulated farm assets and raised their expected earnings in agriculture while by aging and neglecting urban skills in the process they lowered the salvage value of their labor.[40]

The GI Bill of Rights made veterans eligible for financial aid for post-War education and training. In the particular case of agricultural training, the objective was that of "increasing both the technical knowledge of the trainee and his organizational and managerial ability."[41] Financial help was made effective by means of subsistance allowances graded to the marital status of the veteran.

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[38]Benedict, Farm Policies. . ., p. 277.

[39]See page .

[40]Jones adds that a sense of moral obligation may have encouraged many deferred farmers to remain in farming after the War decreasing further mobility. See Jones, p. 280.

[41]Jones, p. 286.

Eligibility was contingent on working on adequate type (size) of farms although there is evidence that laxitude was exercised in this regard. Off-farm work was discouraged. In short, it seems clear that the spirit of this legislation was to secure full commitment to farming.

As would be expected, most veterans engaged in agricultural training were farm reared. About 93 per cent of those taking such training were of farm extraction. Of all the farmers and farm laborers who entered the armed forces more than half took agricultural training.[42] Jones reports that most veterans took their agricultural training in those regions where the opportunities were the poorest, i.e., the Southern States. This appears reasonable since the allowance was all the more attractive the smaller the income provided by farming. Jones concludes that the high farm incomes achieved during 1945-47 coupled with high GI allowances were a strong force luring many veterans to enter farming by raising their income expectations relative to alternative trades.

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[42]The GI Bill of Rights provided the opportunity for other than farm training. As such it could be regarded from the viewpoint of the prospective trainees of farm extraction as a factor lowering his acquisition cost in off farm trades, thus fostering mobility. However this opportunity was seldom taken by veterans of farm extraction.

Summary

In the War period unanticipated new demands allowed a fuller use, relative to previous periods, of the resources committed to agricultural production. Thus the typical signs of overcommitment that were observed in various opportunities before were generally lacking between 1942 and 1947. This period is never-the-less a revealing one for what is called in the study "agriculture's inherent propensity to overcommit resources." The reaction of agriculture to the lifting of acreage and other typical restrictions of the thirties and to limited price incentives shows very clearly that excess capacity was latent in agriculture. As U. S. agriculture developed such capacity both with and without price supports prior to World War II, it may be argued that this capacity was the result of both the price supports of the thirties and of the inherent nature of agriculture.

Early in this period, Lend-Lease arrangements made a substantial addition to foreign demand for United States farm products. In addition to increases in foreign demand there was an increase in domestic demand for farm products on account of the armed forces, growing non-farm incomes and the limited range of consumer choice. Hence, suddenly an unanticipated acceleration in the growth rate of agricultural output became desirable. This acceleration

was subject to the restriction that it should be achieved with moderate increases in the level of farm prices.

The compromise between output expansion and increases in farm prices was achieved through the Stabilization Act of 1942 which guaranteed 90 per cent of parity after the cessation of hostilities for basic commodities and for any commodity in which production had been encouraged as a contribution to the war effort. The Stabilization Act exchanged high actual prices against the certainty of a stream of high future prices.

Agriculture responded well to the incentives generated by the War despite the existence of adverse factors such as: (1) loss of manpower, (2) relative scarcity of non-farm produced capital, particularly of the labor saving type and (3) the need for many farmers to shift into unknown lines of production. The index of average farm output during 1942-44 - the three full years of war for the United States - increased 28 per cent over the average of the index, 1935-39. Part of this increase may be attributed to generous weather; however, if the index of output is deflated by an appropriate weather index, growth is still remarkably high for such a short interval: nearly 16 per cent. A slight increase in land input, a relatively small increase in farm durables other than land and good weather did not appear sufficient to explain the phenomenal

increase in farm output of the war. An important contribution to output expansion was the excess capacity that had built up during the thirties and had remained partially hidden by unfavorable weather and all sorts of production restrictions. The termination of these restrictions and normal weather unleashed this accumulated capacity. This is an additional evidence of overcommitment of agricultural resources during the period 1934-41 beyond the stimuli of price supports.

Labor left agriculture during the Second World War. The decrease in farm population was nearly six times greater than the estimated reduction in the labor force during the same interval. The difference is probably due, to some extent, to many rural women and children joining the labor force in response to patriotic appeals when men left for the War. The difference could also be interpreted as a drain on accumulation of overcommitted and farming's previously underemployed labor. This explanation seems to be substantiated by cohort analysis which shows for the period exceptionally high rates of withdrawal in "older" age brackets which includes farmers whose salvage value of labor is typically the lowest during times of high unemployment such as those just prior to the War. Simultaneously, cohort analysis also shows relatively high rates of entry for the "younger" age groups. Jones has argued that the high rate

of entry in young age brackets may be explained by draft deferments. Draft deferment increased the commitment of young farmers to agriculture and thus contributed to achieving the necessary output expansion at relatively low output prices. The use of labor was more intensive than if deferments had not existed and prices had been permitted to rise freely.

Land input increased by 1.7 per cent between 1942 and 1947. Value productivity of land and thus the value of land increased substantially during the period. The stock of other farm durables and the use of expendables increased during the period. All categories of durables increased except draftstock. In general, but by no means always, farm durables paid their acquisition costs. Earnings of specialized farm durables, however, often failed to cover acquisition costs.

Farm incomes increased sharply during the Second World War. With few exceptions returns during the War were sufficient to cover simultaneously acquisition costs of all factors engaged in agriculture. Adjustments gave the appearance of proceeding in the right direction - for example, farm labor earnings gained relative to non-farm labor earnings.

The study of the period 1942-47 indicates that farming was relatively prosperous and, contrary to the previous period, the improvement of farming's economic lot

was not a purposive transfer of wealth from society at large. It took the exceptional - and not obviously desirable - conditions of the War to hide the symptoms of overexpansion that had become "classical" since the First World War.

CHAPTER VIII

1948-1954: POST WORLD WAR II AND KOREAN WAR

The post World War II period was characterized by an optimistic farm outlook. To a large extent, the environment was the offspring of previous agricultural programs based on a strong commitment to support farm prices. The consequences of a high price support policy devoid of effective production controls were delayed by: (1) the operation of the Marshall Plan from 1947 onward and (2) the outbreak of the Korean War in June 1950. These two events provided new demands for agricultural products. The accumulation during the War of purchasing power in farmers' hands coupled with a bullish outlook resulted in heavy commitments of resources to farming.

Agricultural Prices

During the period 1948-54 both prices received and prices paid by farmers increased, but the latter faster than the former. Table 8.1 shows that despite an index of farm prices at all time highs, the parity ratio decreased relative to the war years. The table also indicates during most of the period, that: (1) expected prices were below prices actually received, (2) both series moved upward and (3) the series of expected prices increased at a faster rate than prices actually received.

Table 8.1: Selected Indices of Agricultural Prices (1947-49=100),[1] United States, 1948-54

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices		
				Ten Years Average Expected Prices[3]	Ten Years Average Price Received[4]	Ratio of Expected to Received
1917-29	59	67	89	70	54[5]	124
1930-33	32	50	63	67	42	161
1934-41	39	50	78	53	41	132
1942-47	78	76	102	79	71	128
1948	106	104	102	102	90	113
1949	92	100	92	105	94	112
1950	95	102	93	101	96	105
1951	112	113	99	106	97	111
1952	106	115	94	110	96	115
1953	95	111	86	108	96	113
1954	92	111	85	108	95	114
1948-54	100	108	93	105	95	112

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100.

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 year planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Source: See Table 4.1, page 76, 77.

The fact that expectations were relatively low despite the long period of farm prosperity indicates that farmers were reluctant to believe that inflation rather than depression would prevail during the after-War. The experience of the post-World War I period was still fresh. Although the level of expected prices was low, the rate of growth of expected prices was high. Agricultural programs appeared to be a driving force behind the improvement of farmer's expectations.

Farm Labor

The decrease in farm population continued during 1948-54. Table 8.2 shows that outmigration from rural areas speeded up relative to 1941-47. The net population outflow was nearly 60 per cent larger during 1948-54 than during 1941-47. Still the labor force decreased less during the period than labor requirements. While the labor force decreased by 17 per cent, labor requirements shrunk by about 23 per cent.

It is difficult to assess the direction in which the value productivity of labor moved during the period. The fact that labor requirements fell faster than the size of the farm labor force coupled with substantial investment in machinery (mostly labor saving investment) and a small increase in land input, suggests that the physical productivity of labor was falling. On the other hand, prices received and more so long run expected prices were improving.

Table 8.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years 1947-1954

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(Mill. hours)	(Mill. hours)	(Per cent)
-	1917-29	-	-1,850	- 5.7	-	- 805	- 5.9	-	- 593	- 2.5
-	1929-33	-	1,813	5.9	-	- 24	..	-	- 604	- 2.6
-	1933-41	-	-2,275	- 7.0	-	-2,070	-16.2	-	-2,508	-11.1
-	1941-47	-	-4,289	-14.2	-	- 287	- 2.6	-	-2,850	-14.2
1947	-	25,829	-	-	10,382	-	-	17,196	-	-
-	1947-48	-	-1,446	- 5.5	-	- 19	..	-	- 363	- 2.1
-	1948-49	-	- 189	- .7	-	- 399	- 3.8	-	- 631	- 3.7
-	1949-50	-	-1,146	- 4.7	-	- 38	- .3	-	-1,065	- 6.5
-	1950-51	-	-1,158	- 5.0	-	- 380	- 3.8	-	72	.4
-	1951-52	-	- 142	- .6	-	- 397	- 4.1	-	- 767	- 5.0
-	1952-53	-	-1,874	- 8.6	-	- 285	- 3.1	-	- 572	- 3.9
-	1953-54	-	- 855	- 4.3	-	- 213	- 2.4	-	- 621	- 4.4
1954	-	19,019	-	-	8,651	-	-	13,249	-	-
-	1947-54	-	-6,810	-26.3	-	-1,731	-16.6	-	-3,947	-22.8

(-) Does not apply

(..) Negligible

Source: See Table 4.2, page 80.

Since the two elements making up MVP and E (MVP) moved in different direction, it cannot be said for sure what was the end result. The residual earnings of labor, both those computed on typical commercial farms[1] and those computed for the sector (Table 4.4, Chapter IV) increased relative to prior periods. Assuming that labor earnings fluctuate with labor's value productivity, it would follow that the forces making for a larger MVP prevailed. However, the absolute earnings of labor in agriculture are not as revealing in explaining labor mobility as earnings in agriculture relative to those in other occupations.

Chennareddy's estimates of expected labor earnings in and off-farm for different age groups[2] may be found in Figure 8.1. The figure indicates that non-farm expected earnings increased faster than expected farm earnings. In addition, it suggests that labor earnings in manufacturing were more variable than those in laundries. The relatively smaller variance of earnings in laundry permits using the assumption of constant earnings in laundrying in Chennareddy's model.[3]

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[1]Goodsell and Jenkins.

[2]Chennareddy, Appendix D, pp. 177 f.

[3]See Chennareddy, pp. 107-111 and Appendix F, pp. 189-190 for a fuller development of the model.

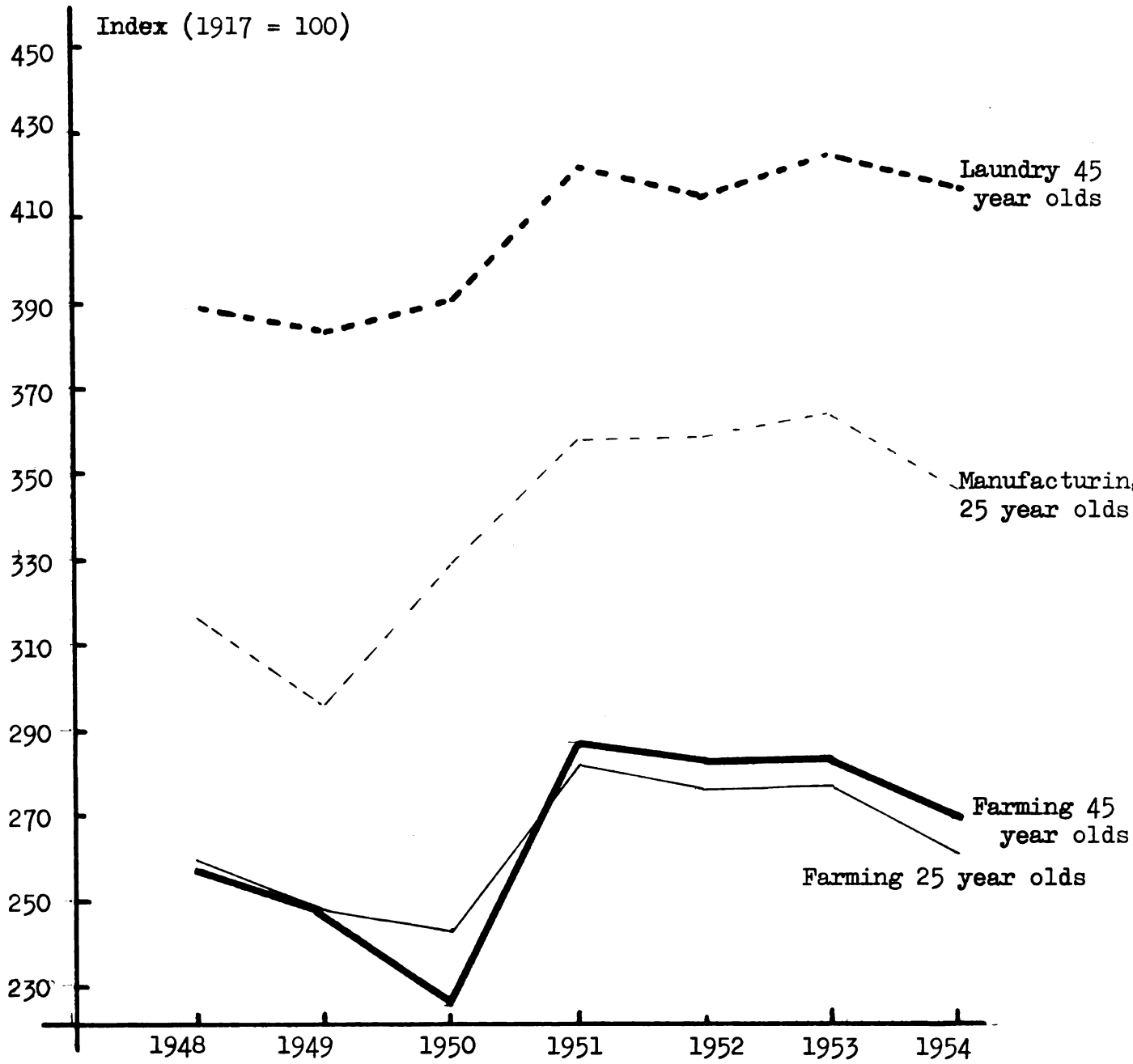

Figure 8.1: Indices of the present value of expected income streams for 25 and 45 years old workers in selected occupations, United States, 1948-54.

Source: Chennareddy Venkareddy, "Present Values of Expected Future Income Streams and their Relevance to Mobility of Farm Workers to the Nonfarm Sector in the United States, 1917-62", Appendix D, Table 2.

Applying Chennareddy's model to his information on expected earnings lead to the following results:[4] (1) RM, the ratio of wages in manufacturing to wages in farming increased because WM increased faster than WF. As a consequence, less young farmers Q25 would be lured into farming. (2) A lesser entry of young labour into farming would cause WL to be smaller and hence RL to be larger than otherwise. Older farmers who regard WL as their opportunity cost, would be discouraged from leaving farming. (3) It can be shown that under the assumption of the model[5] the change in Q25 would be larger than in Q45 and consequently the end result would be a reduction in the total number of farmers (Q45 + Q25).

It is unfortunate that information relative to age specific rates of entry and withdrawals is only available over ten year periods which in most instances do not coincide with the periods of this study. Table 4.3 provides information for the decades 1940-50, 1945-55 and 1950-59. The period 1948-1954 extends over six years that overlap to some extent all three decades for which information exists. Thus the rates of entry and withdrawal of 1948-54 can be approximated by contrasting the information of

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[4]A key to the symbols used in this section may be found in Chapter IV. See p. 87.

[5]Chennareddy, Appendix F.

1945-55 with that of 1950-59 as was done for the period 1942-47.

Table 4.3 shows unusually high rates of entry in the less than 34 years of age bracket in both 1940-50 and 1945-55 and low rates of entry (the lowest on record) for 1950-59. On the basis of this information, it was concluded in Chapter VII that larger rates of entry occurred during 1942-47 rather than later on. It would then follow that low rates of entry, more akin to those recorded for 1950-59, occurred during 1948-54. This is in accord with Chennareddy's results. The rates of withdrawal do not conform to the predictions of the model. Contrary to these predictions, rates of withdrawal of farmers above age 34 increased steadily. The predictions of the model in this particular case, it will be recalled, were contingent upon assuming that the wage in laundrying WL remained fixed. Of course, WL did not actually remain fixed during the period, but rather increased relative to the wage in farming WF. Less entry of younger farmers made WF larger than it would otherwise have been but most certainly not large enough to prevent many "older" farmers from being lured by more promising off-farm opportunities.

Farm Durables

Real estate

Between 1948 and 1954, the increase in land use was smaller than during any other period before. Table 8.3

Table 8.3: Units of Pasture Acre Equivalents and Percentage Change by Regions and United States 1947-1954

Region	Pasture Acre Equivalents								Percentage Change				
	1947	1948	1949	1950	1951	1952	1953	1954	1917-29	1929-33	1933-41	1941-47	1947-54
	(000,000)								(Per cent)				
United States	1,835	1,835	1,836	1,838	1,841	1,844	1,847	1,849	1.2	2.0	2.7	1.7	.7
Northeast	101	99	97	96	95	94	93	92	-19.2	2.7	- 5.3	- 5.6	- 8.9
Corn Belt	472	469	466	465	465	465	464	464	- 4.9	.6	.8	- 1.7	- 1.7
Lake States	145	144	143	142	142	141	141	141	- 1.7	4.3	4.2	- 3.3	- 2.7
Appalachian	151	150	149	147	145	144	142	140	- 7.8	1.9	- .6	- 3.8	- 7.3
Southeast	87	87	87	87	86	86	85	85	- 7.5	3.3	7.6	2.3	- 2.3
Delta States	74	74	74	75	75	75	75	75	1.7	4.5	4.3	1.4	1.3
Southern Plains	219	220	222	223	224	225	226	227	14.9	4.9	0	2.8	3.6
Northern Plains	221	222	222	224	225	226	228	229	10.9	1.4	2.8	2.3	3.6
Mountain	133	134	136	137	138	140	141	142	30.9	0	20.4	12.7	6.8
Pacific	231	235	239	243	246	249	253	256	12.4	0	5.6	11.6	10.8

Source: See Table 4.5, page 92.

indicates an overall increase of less than one per cent. In fact, if acres of farm land were regarded as the proper measure of land input rather than pasture acre equivalents it would be found that land input reached a peak somewhere between 1945 and 1955 and declined thereafter.[6] The increase in the number of pasture acre equivalents coupled with the reduction in acres of land in farms indicates that "intensification" of land use was sufficient to offset decreases in acreage of land in farms. These changes suggest a clear trend toward the use of land substitutes.

Table 8.3 shows that land use decreased in the Western and Northwestern states. Net increases took place in the Delta States, Great Plains, Mountains and Pacific. There are indications that a substantial amount of the land improvements resulted from government sponsored projects such as irrigation, drainage and conservation practices under the Agricultural Conservation program. Irrigated land in farms increased by about 3.8 million acres between 1949 and 1954.[7] Almost half of the increase in irrigated land was located in the Southern states; one quarter in the

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[6]According to census data total land in farm, in million acres, was: 1,142 in 1945; 1,159 in 1950 and 1,158 in 1954. See U. S., Department of Agriculture, Agriculture Statistics, 1957 (Washington: U. S. Government Printing Office, 1958).

[7]U. S., Department of Agriculture, Major Uses of Land in the United States, Summary for 1954, Agricultural Information Bulletin No. 168, (Washington: U. S. Government Printing Office, 1957), Table 20, p. 53.

Pacific Region and most of the rest in the Northern Plains and Delta States. The Southern States, particularly Delta States, lead in land drainage.[8]

Of the 1.1 million acres subjected to pasture improvement between 1944-53, under conservation programs, nearly 80 percent was in the Southern States.[9] It seems that the large increase in pasture acre equivalents in the Mountain States was due to the tillage of previously open range land.

Rossmiller found that there was an increase in the MPP of land between 1950-54[10] in most of the types of commercial farms he investigated. He also found, however, an almost general decrease in the MVP of land indicating that output prices moved in opposite direction to and in absolute value more than MPP's. The price change reported by Rossmiller depends upon the particular interval he selected. On the average, output prices were higher during 1948-54 than in any period before, but they did not follow a constant trend. Rather, they built up to a maximum near 1950 and decreased thereafter. Rossmiller's interval included prices which were falling from the mentioned high.

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[8]U.S.D.A., Major Uses of Land in the U. S., Summary for 1954, p. 52.

[9]U.S.D.A., Major Uses of Land in the U. S., Summary for 1954, Table 19, p. 50.

[10]Rossmiller, Table 45, p. 96.

Further, if attention is centered upon expected land productivity, assuming that expectations are only formulated with respect to the price portion of MVP, it must be submitted that the expected MVP of land was generally rising through 1948-54 since both MPP and long run expected prices were rising.

Other durables

Table 8.4 shows the estimated stock of farm durables on a yearly basis for the period 1948-54, expressed in dollars of constant value.[11] The total volume of farm durables increased during the period by about 2 per cent despite a decrease in real estate, the largest item of the group.

The decrease in the volume of farm real estate resulted from a decline in farm building inventory that overshadowed the incipient expansion in land base. Quance reported that the value of farm building inventory decreased at an average yearly rate of 131 thousand dollars per year.[12] The same author estimated that a dollar invested in farm building during this period was worth on the average only

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[11]The figures of Table 8.4 are reasonably comparable to homologous estimates of Alvin Tostlebe. The total value of durables in 1950, according to Table 8.4 is 1.5 per cent larger than Tostlebe's corresponding figures. Item by item the differences vary from 2.2 per cent in machinery to 12 per cent in livestock.

[12]Quance, Table 6-10, p. 140.

Table 8.4: Value of Physical Assets in United States' Agriculture in Constant Prices (1910-1914 Average), 1948-1954

Year	Real Estate[1]	Implements and Machinery[2]	Livestock[3]	Crops[4]	Total
	(----------Billion Dollars----------)				
1948	45.3	3.4	3.4	3.5	55.6
1949	43.3	4.0	4.2	3.8	55.3
1950	43.5	4.5	3.2	3.3	54.5
1951	44.4	5.0	3.5	3.0	55.9
1952	43.8	5.5	4.7	3.3	57.7
1953	43.3	5.6	5.0	3.8	57.7
1954	43.0	5.9	3.9	3.8	56.6

[1]Nominal values deflated by the Index of Real Estate Values, average of November preceeding year and March current year except 1940-42 for which average of year was used; 1912-14 = 100.

[2]Nominal values deflated by the Index of Prices Paid by Farmers for Machinery of December previous year; 1910-14 = 100.

[3]Nominal values deflated by Index of Prices Paid by Farmers for Livestock; 1910-14 = 100.

[4]Nominal values deflated by Index of Prices Received by Farmers, All Crops, 1910-14 = 100.

Sources: See Table 7.4, page 216.

.74 dollars.[13] Hence, net investment in this asset category was prompted by low expected productivity.

Table 8.4 shows that livestock inventory increased until late in the period after which it started to decline. The number of horses and mules declined throughout the period. Quance reported an average decline of 790 thousand head per year.[14] The beef herd increased on the average by slightly over one million head per year while the dairy herd decreased at an average rate of 320 thousand head per year.[15] For the period 1948-54, Quance found that draft stock, milk and dairy cows generated ex post capital gains implying that the beef herd could have been profitably expanded still more and that expansion rather than contraction was in order for both draft stock and milk cows.[16] With respect to horses and mules Quance argues that "After World War II, horses were not a significant input in farm production and estimates for that period are rather meaningless."[17] The average capital gains on milk cows are strongly influenced by high capital gain during the immediate post war. Examination of yearly estimates of capital gains on

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[13] Quance.

[14] Quance, Table 5.1, p. 98.

[15] Quance, Tables 5.3, p. 103 and 5.6, p. 110.

[16] Quance, Tables 5.1, p. 98; 5.3, p. 103; and 5.6, p. 110.

[17] Quance, p. 99.

milk cows show a steady decline through the period and some capital losses at the end of it.[18] It appears that dairymen were adjusting the size of the herd in the right direction.

Table 8.4 shows that the stock of implements and machinery increased by nearly 74 per cent. Quance found increases in the number of all the types of machinery and equipment he investigated.[19] This author reports that farm machinery inventory was increased at a yearly rate of 220,000 tractors; 68,000 grain combines; 57,120 corn pickers; 43,000 pickup balers; 19,000 field forage harvesters and 133,000 motor trucks.[20] Quance estimated that capital losses were incurred on specialized non-farm produced durables such as grain combines and corn pickers.[21] These losses indicate that ex ante expectations had not been met and that further many overcommitted specialized durables could not be profitably salvaged and had to be reevaluated downward instead, due to lack of employment alternatives. Specialized non-farm produced inputs such as pickup balers and field forage harvesters produced capital gains.[22] This may have been so because pickup balers and field forage harvesters were a

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[18]Quance, Appendix table B.16, p. 237.

[19]Quance, Chapters V and VI, p. 94 f.

[20]Quance.

[21]Quance, Tables 6.5, p. 130; 6.6, p. 131 and 6.7, p. 135.

[22]Quance, Tables 6.8 and 6.9, p. 137.

recently introduced technology which was in the process of substituting for less efficient systems of production and hence still had wide possibilities for expansion.

Expendable Capital

The use of non-farm produced expendables was increased greatly between 1947 and 1954. The use of fertilizers and electricity nearly doubled and the use of gasoline increased by 20 per cent.[23] According to Quance, the farm sector as a whole suffered slight but consistent capital losses on account of non-farm produced expendables indicating that expected earnings did not materialize.[24]

The use of the farm produced expendables studied by Quance was higher at the end than at the beginning of this period except for those used in poultry production. Farm produced expendables in beef and dairy production increased consistently while farm produced expendables in pork production reached a peak in 1950-51.[25] Similarly to what occurred in the non-farm produced category, ex post capital losses were common in the case of farm produced expendables. Here too expected earnings were often frustrated. The changes in the capital value of farm produced expendables

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[23] Quance, Appendix Tables B.8, p. 229; B.9, p. 230 and B.10, p. 231.

[24] Quance.

[25] Quance.

were more variable than was the case for their non-farm counterparts indicating more propensity to become fixed.

Farm Output

During 1947-49, the average index of farm output was 85 (1957-59 = 100) and 94 for the average 1953-55. Thus during the period 1948-54 farm output rose by about 12 per cent, that is at simple average rate of growth of 1.7 per cent per year.[26]

The largest increases in output occurred in livestock products which expanded by about 17 per cent compared with only 3 per cent for all crops. Meats and poultry products clearly led over dairy products. In crops, oil bearing crops, and hay and forages showed the largest gains. Oil crops were good substitutes in production for various crops under acreage control. Hay and forages fit well into the soil conservation scheme. Substitution in production of livestock for cash crops is suggested by the expansion of hay and forages, and feed grains. The production of food grains appears to have declined by some 11 per cent during the period. This figure is exaggerated by the fact that production was exceptionally high at the beginning of the period and exceptionally low at the end of it. When the end years of the period are discarded, the decrease in production is only 4 per cent.

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[26]U.S.D.A., Changes in Farm Production and Efficiency, A Summary Report, 1962, Table 1, pp. 11-12.

The Utilization of Farm Output

Total U. S. population increased by about 10 per cent between 1948-54 and at almost the same rate as farm output.[27] This and the increase in per capita incomes were forces tending to increase domestic disappearance, although income growth is a weak force in that direction at high levels of income.

Exports of agricultural commodities were at unprecedentedly high levels between 1948 and 1951. The quantity index of agricultural exports reached 120 in 1950 (1951-53 = 100) and attained an average index of 112 during 1948-51.[28] The high levels of exports achieved during these four years were the result of Marshall Plan purchases and beginning in 1950 of Korean War pressures.

Thus until 1952, both domestic and foreign disappearances were taking care of the high levels of production attained by U. S. farming. Some carry-overs, especially of corn, cotton and wheat developed between 1948 and 1950 when the need for post-War relief activities slowed down. Though carry-overs were mostly depleted between 1950 and 1952, they began to build up rapidly after 1952. Sometime

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[27] Banks, et. al., Table 1, p. 19.

[28] U. S., Department of Agriculture, Foreign Agricultural Trade, Statistical Handbook, Statistical Bulletin No. 179, (Washington: Government Printing Office, 1956) Table 4, p. 3.

between 1952 and 1953, total disappearance become insufficient relative to total supply at "acceptable" prices.

Income and Wealth

Table 8.5 indicates that the average total income over the period 1948-54 was lower in both nominal and real terms than the average of the preceding period but particularly in real terms. The average total real income over the period 1948-54, including conventional and nonconventional income plus government payments, was 35 per cent lower than during the immediately preceding period.

During the war, farm income originating in agriculture increased at a faster rate than the price level and thus increased in real terms as well. Real farm income originating in agriculture built up to a maximum in 1948. Beginning in 1947 this portion of farm income increased at a slower pace than the general price level or decreased altogether. Hence during 1948-54, net income originating in agriculture fell in real terms.

Government payments were smaller on the average than during any previous period since they became accepted practice. Although product prices were a powerful force in determining the value of land, they are not the only force nor apparently the most important. Larsen's analysis[29] indicates that farm programs were a powerful influence on

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[29]Larsen, p. 128 f.

Table 8.5: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1948-54

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(000,000 Dollars)							
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808
1930-33	4,557	7,214	- 5,916	- 9,114	33	59	- 1,327	- 1,841
1934-41	5,950	9,913	1,397	2,307	514	860	7,861	13,080
1942-47	15,662	19,683	8,016	9,929	650	843	24,328	30,455
1948	21,999	21,358	1,655	1,607	257	250	23,911	23,215
1949	16,751	16,423	- 4,158	- 4,076	185	181	12,778	12,527
1950	17,698	17,183	16,190	15,718	283	275	34,171	33,176
1951	20,281	18,271	13,197	11,889	286	258	33,764	30,418
1952	19,372	16,993	- 5,628	- 4,937	275	241	14,019	12,297
1953	17,170	15,061	- 5,829	- 5,113	213	187	11,554	10,135
1954	16,372	14,237	2,380	2,070	257	223	19,009	16,530
1948-54	18,520	17,075	2,544	2,451	251	231	21,315	19,757

[1]Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: See Table 4.7, page 109.

land values, particularly after the Second World War. The slowing down in the increase in land values in 1949 and 1953/54 coincides with the slowing down in government conservation expenditures, a variable that Larsen found particularly significant. Thus, smaller Government payments seem to have been partially responsible directly and indirectly via the nonconventional portion of income, for the deterioration of total farm income.

Negative changes in asset position took place in 1949, 1952 and 1953. It is fair to presume that the large capital gains of 1950 and 1951 would not have occurred in the absence of the Korean War. Thus farmers were beginning to suffer the consequences of the phenomenal increase in capacity built up since the end of the depression and accentuated during the post-Second World War. The downward re-evaluation of farm assets indicates that resources were not capable of supporting the earnings expected at the time they were engaged in agriculture.

Policies

From the view point of agricultural policy, there is not a marked difference between this period and the immediate postwar. It was the economic environment of agriculture that changed. The demand generated by the War and the period of reconstruction was disappearing except for a brief outburst created by the Korean War.

During the Second World War, the reconciliation of stimulus to agriculture and stable prices was achieved by guaranteeing farmers minimum levels of price support for two years after the cessation of hostilities. The protection of farmers' interest from a post-War slump was further complemented by sustaining foreign demand through the Marshall Plan and related programs.[30]

After 1948, the Congress had the choice to go back to 1938's Agriculture Adjustment Act (AAA) which provided for ". . .only discretionary support for nobasic commodities,"[31] or to enact new legislation. The theme of the congressional battles over farm policies in 1948 and 1949 was flexible farm price supports versus rigid supports. Rigid (and high)

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[30]Since the beginning of the Second World War a substantial portion of total agricultural exports was handled through government channels. Between 1942 and 1944 more than 65 per cent of the volume of agricultural exports were of this latter type, mostly under Land-Lease arrangements. Land-Lease arrangements expired with the end of the war. However, direct loans and Marshall Plan resources permitted to handle through nonconventional means, i.e., government channels, more than 20 per cent of the agricultural exports from 1946 through 1949. See Elmer L. Menzie, Lawrence W. Witt, et. al., Policy for United States Agricultural Export Surplus Disposal, Agricultural Experiment Station, Technical Bulletin 150, (Tucson: The University of Arizona, 1962).

[31]Wayne D. Rasmussen and Gladys L. Baker, "A Short History of Price Support and Adjustment Legislation and Programs for Agriculture, 1933-65" Agricultural Economics Research, XVIII (July 1966), p. 74.

price supports prevailed at that time.[32] The demand generated by the Korean War postponed the time of reassessing farm income policies and thus a high-rigid price support mechanism prevailed until 1953 inclusive.

Glenn L. Johnson analyzed in detail the effect of agriculture price support programs from 1946-1962.[33] Johnson approached the problem by examining "case commodities" selected according to their respective relation to the price support mechanism. He dealt with the following cases:

1. Commodities subjected to price supports and lax production controls, i.e. wheat, corn and cotton.
2. Commodity subjected to price support and rigid production controls, i.e. tobacco.
3. Commodity subjected to price support and lax production controls followed by removal of price supports, i.e. potatoes.
4. Commodity subjected to flexible price support and lax production controls, but affected by rigid price supports for feed grains, i.e. dairy.

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[32]For a discussion on the forces behind these two doctrines and the national political developments that resolved the conflict see: Benedict, Farm Policies of the United States 1790-1950, pp. 474-490. For a summary of support schedules of 1948 AAA and 1949 AAA see: Rasmussen and Baker, pp. 74-75.

[33]Glenn L. Johnson, "An Evaluation of. . ."

5. Commodities not subjected to price support, but affected by rigid price support of feed grains, i.e. pork and beef.

In the discussion that follows, S will stand for support price, E for equilibrium price, e for expected price and r for prices actually received by farmers.

The price support mechanism had to face up to three problems: (1) the consumption effect which would result in increases or decreases in consumption relative to equilibrium levels, depending upon the ratio $\frac{S}{E}$ of support to equilibrium price, (2) the market effect which depends not only upon $\frac{S}{E}$ but also upon policies affecting disappearance. For example, if $\frac{S}{E}$ is larger than one and in addition, there is no provision to take care of the market's excess demand, carry-overs will probably build up and (3) the production effect which in turn depends upon:

a. The ratio of expected farm prices to prices actually received by farmers $\frac{e}{r}$ and

b. The government's policies of input management.

A ratio $\frac{e}{r}$ larger than 1 indicates that expectations are being more than fulfilled and that there exists a pressure toward output expansion. Depending upon the prevailing type of input policy, the above mentioned pressure may or may not materialize. Table 8.6 and 8.7 offer information

Table 8.6: Ratios of Price Support to Equilibrium Price and Ratios of Long-run Expected Price to Average Price Received in Wheat, Corn, Cotton and Potatoes; United States, 1946-1962

Year	Wheat		Corn		Cotton		Potatoes	
	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received
1946	.8	.6	.8	.7	.7	.5	4.1	.6
1947	.8	.7	.6	.7	.8	.6	1.8	.7
1948	1.5	.7	1.7	.7	.9	.7	3.5	.8
1949	1.6	.7	1.4	.7	1.1	.6	1.4	.9
1950	1.5	.7	1.2	.6	.8	.6	1.9	.8
1951	1.4	.7	1.1	.7	.8	.7	--	.8
1952	1.8	.8	1.5	.8	.9	.8	--	.9
1953	2.0	.9	1.6	.9	1.5	.8	--	.9
1954	2.1	.9	1.8	.9	2.1	.9	--	1.0
1955	2.3	.9	2.0	.9	2.4	.9	--	1.0
1956	2.5	1.0	2.0	1.0	2.9	1.0	--	1.0
1957	2.4	1.0	2.0	1.2	2.2	1.0	--	1.1
1958	2.8	1.0	2.3	1.1	2.2	1.0	--	1.1
1959	2.8	1.0	2.0	1.2	2.1	1.0	--	1.0
1960	3.0	1.1	1.9	1.2	1.7	1.0	--	1.0
1961	3.0	na	2.2	1.2	na	na	--	--
1962	3.3	na	2.2	na	na	na	--	--

[1]Average of early, medium and late

(na) Not available

(--) Does not apply

Source: The information on price support and equilibrium prices is from Glenn L. Johnson "An Evaluation of U. S. Agricultural Programs, 1956 to 1960". The estimates of expected commodity prices are from Milburn H. Lerohl, "Expected Prices for U. S. Agricultural Commodities, 1917-1962" (unpublished Ph.D. Thesis, Michigan State University, 1965).

Table 8.7: Ratios of Price Support to Equilibrium Price and Ratios of Long-run Expected Price to Average Price Received in Tobacco, Milk, Pork and Beef; United States, 1946-1962

Year	Tobacco[1]		Milk		Pork		Beef	
	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received	Support / Equilibrium	Expected / Received
1946	.9	.5	-	.6	--	.5	--	.6
1947	1.0	.7	-	.6	--	.7	--	.6
1948	1.1	.8	-	.7	--	.7	--	.6
1949	1.0	.8	.8	.8	--	.7	--	.6
1950	1.1	.8	.8	.7	--	.7	--	.6
1951	1.3	.7	1.0	.7	--	.7	--	.6
1952	1.4	.8	.8	.9	--	.9	--	.7
1953	1.6	.9	1.2	.9	--	1.2	--	.9
1954	1.6	.9	1.1	1.1	--	1.1	--	1.0
1955	2.0	.9	1.1	.9	--	1.1	--	1.0
1956	1.9	.9	1.1	1.0	--	1.1	--	1.1
1957	2.0	.9	1.0	1.0	--	1.0	--	1.2
1958	2.0	.9	.8	1.1	--	1.1	--	1.1
1959	1.7	.9	.8	1.0	--	1.1	--	.8
1960	1.5	.9	.8	1.0	--	1.1	--	.9
1961	1.4	na	1.0	na	--	na	--	na
1962	1.4	na	1.1	na	--	na	--	na

[1]Burley tobacco

(na) Not available

(--) Does not apply

Source: See Table 8.6, page 264.

in regard to the abovementioned price ratios for the case commodities analyzed by Johnson.[34]

In the case of cotton $\frac{S}{E}$ was below one between 1946-52. Carry-overs did not accumulate between 1946 and 1951, although there was an accumulation in 1952 due to an abrupt decrease in exports.[35] As demand was firm, farmers were receiving high prices. Since $\frac{S}{E}$ was below one, there were no special marketing or consumption problems. However, relatively high prices received by cotton farmers were more than fulfilling expectations and thus there was an upward pressure on capacity. Between 1946 and 1953 acreage planted increased from 18.6 to 26.8 million acres. Yields increased from 273 lbs./acre for the average 1946/50 to 295 lbs./acre for the average 1950-54. After 1952, with the disappearance of the demand created by the Korean War, equilibrium prices fell relative to support prices. The ratio of $\frac{S}{E}$ became larger than one resulting in stock accumulation. High

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[34]The information on price support S and equilibrium prices E are taken from G. L. Johnson's report, "An Evaluation. . ." Johnson computed two types of equilibrium prices: a) assuming "normal" carry-overs and b) assuming existing carry-overs. Unless otherwise stated, in this report E refers to the second type. The ratio of expected commodity price e to price received by farmers r are both the long run concepts that have been used throughout this report. The estimates of expected commodity prices, like expected prices received by farmers are Lerohl's.

[35]The index of the quantity of cotton exported was 73 (1951-53 = 100) while the average of the four preceding years had been 124. See U. S., Department of Agriculture, Foreign Agricultural Trade, Statistical Handbook, Statistical Bulletin No. 179 (Washington: Government Printing Office, 1956).

price supports discouraged cotton consumption (the consumption of substitutes, particularly synthetics, was encouraged) while developing excess productive capacity.

The case of corn, wheat and tobacco are almost the exact replica of the cotton case. In corn, except for 1948, $\frac{S}{E}$ was below or near one and stocks did not accumulate. After 1952 $\frac{S}{E}$ was substantially larger than one and stocks built up. More than fulfilled expectations encouraged additional production. Between 1946 and 1954 acreage planted decreased from 86 to 82 million acres but yields increased from 36.6 bu./acre to 38.6 bu./acre. An additional indication of investment in corn production was the trebling of the number of corn pickers in farm between 1946 and 1954. Similar forces were at work in wheat production. Signs of expanding capacity were evident throughout the period. Both acreage planted and yields increased from 1948 to 1950. The number of combines on farms almost doubled during the same period. From 1953 on, impressive stocks of wheat accumulated. Stocks of tobacco also accumulated throughout the period but at an increasing rate after 1953. Although acreage restrictions were enforced, they were not sufficient to permit clearing the market at acceptable prices. The pressure on capacity showed up in the form of a 10 per cent increase in yields between 1946-50 and 1950-54.

Potato prices were supported up to 1950. Simultaneously, acreage allotments attempted to hold output in

check. Between 1946 and 1950, support prices for potatoes fluctuated around a level twice of that which would have cleared the market. Production remained out of hand despite a decrease in acreage allotments of nearly 35 per cent between 1946 and 1950. Increases in yield over the same period kept total output at nearly an unchanged level. The consumption effect was particularly important in the case of potatoes due to availability of various good substitutes. Further, the perishability of potatoes ruled out storage as a measure to deal with excess supply. The government terminated the potato price support program in 1951. The withdrawal of support was preceded by an educational campaign making producers aware of the need to reduce production.[36] Producers were encouraged to decrease potato acreage below the quantity planted during the last year of acreage allotment. As a result, the use of expendables such as fertilizers decreased and yields did not increase between 1950 and 1954. Stable yields and lower acreage resulted in smaller output and increased gross revenue. Between 1950 and 1954 production stayed at levels well below the average 1946/50 despite rising prices. Apparently, the E(MVP) of resources suited for potato production were smaller than acquisition prices and no incentive existed to expand production.

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[36]Glenn L. Johnson, "An Evaluation. . .", p. 103.

Hog and beef production though unsupported and unrestricted were affected by feed grain supports. Dairying, in addition, was subjected to flexible price supports beginning with 1949.

The ratio $\frac{S}{E}$ in dairying was near or below one from 1945 through 1952, thus, no dramatic changes took place in government stocks of dairy products. The ratio $\frac{e}{r}$ was below one between 1946 and 1954 indicating that expectations were being fulfilled and that additions to capacity were being encouraged. Beginning in 1952, dairy production began growing. This upward trend was the result of: (1) the forces pressing for expanded capacity and (2) decrease in the salvage value of milk cows - their value as beef - which discouraged culling.

In summary, the price support policies of 1948-54 kept farmer's expectations at high levels. There is evidence that these expectations coupled with lack of production controls resulted in the expansion of productive capacity in farming. In the case when high levels of price support were discontinued - as with the termination of the potato price support program - the forces that tended towards the creation of excess capacity appeared to have slowed down. In most other cases the dangers of excess capacity were kept latent by the fortuitous circumstances of the Korean War which prevented the accumulation of carry-overs which are one of most obvious symptoms of excess capacity.

Summary

Price support levels which had been exceeded by actual prices during the war became effective after the cessation of hostilities and were stretched into the peace by successive acts of Congress. Weak production controls were ineffective in preventing the development of production capacity which was profitable at price support levels. However, resource commitments were so substantial that prices failed to cover acquisition costs even at price support levels. The general tendency, observed since 1917, of agriculture to overcommit resources relative to existing prices (supported or unsupported) was apparent. The Marshall Plan took care of overproduction during the first years of post-World War II. Stocks began to accumulate in 1948 and 1949 when agriculture in Europe and Japan began producing heavily. The outbreak of the Korean War provided a new source of demand that partially hid obvious signs of over-production.

With post-war recovery of agricultural production abroad there was a need to slow down the rate of growth in domestic agricultural production. However, despite acreage allotments, output grew 12 per cent between 1948 and 1954, slightly faster than the United States' population. Exports of agricultural commodities were at unprecedentedly high levels between 1948 and 1951. The high levels of exports were the result of the operation of the Marshall Plan and

beginning in 1950, when European countries began to stand on their own feet, of Korean War pressures. Carry-overs developed between 1948 and 1950 but in general were mostly depleted between 1950 and 1952. After 1952, carry-overs rebuilt rapidly. At the end of 1954 the United States had stocked 934 million bushels of wheat, 920 million bushels of corn and 11 million bales of cotton.

The period 1947-54 was one of rapid outmigration of farm population relative to previous periods. Even so government programs such as the G.I. Bill retarded the mobility of farm labor. Although labor earnings appear to have increased absolutely between 1948 and 1954, they lost ground relative to urban labor earnings. This relative deterioration of farm labor earnings suggests that farm labor was overcommitted to agriculture.

There was a small but positive increase in land use, between 1948 and 1954. There are indications that the expected value productivity of land may have increased during the period. The trend in appreciation of land values showed signs of slowing down after a sharp upsurge during the Korean War. This was associated with a reduction in conservation expenditures, one of the means through which the government supported land values.

Use of farm-produced durables increased during the period by about 2 per cent, despite a decrease in farm buildings the largest item of the group. Livestock except

horses and mules and machinery inventories increased throughout the period. Quance estimated that many farm-produced durables failed to cover acquisition costs. Milk cows at the end of the period and various types of specialized farm durables were sources of capital losses. The use of expendable forms of capital was substantially expanded. The use of non-farm produced expendables such as fertilizers and gasoline increased between 20 and 50 per cent. Farm incomes, in total, did not simultaneously cover acquisition costs of both farm and non-farm produced durables and expendables.

During the period 1948-54 farm incomes were lower in both nominal and real terms than in the preceding period but particularly in real terms. The average real farm income over the period 1948-58 (conventional and nonconventional plus government payments) was 35 per cent lower than during the immediately preceding period.

An examination of individual price support programs reveals that the high levels of price supports prevailing during 1948-54 kept farmer's price expectations high. These high expectations coupled with lack of production controls accentuated the "natural" over expansion of productive capacity. Not all of the resulting excess capacity can be blamed on price supports. The capital losses recorded on specialized durables in the production of corn and wheat indicates the development of excess capacity even for the prevailing level of supported prices.

Practically all signs of excess capacity were present in agriculture between 1948 and 1954: farm incomes showed consistent deterioration, earnings were not sufficient to cover simultaneously acquisition costs of all farm inputs despite price supports, stocks accumulated, exports had to be subsidized at taxpayers expense and consumers had to pay high prices for some commodities. The Korean War masked the more severe symptoms of the disease. Government programs shifted part of the burden of overproduction away from the farmers by means of price supports. These price supports encouraged further expansions in production. There are indications that output increased beyond the stimulus of price supports. Production controls geared solely at limiting the use of land input were ineffective in containing the formation of excess capacity because land has fertilizer as a good substitute.

Many farmers who had been encouraged to remain in agriculture through draft deferments and others who were subsidized back to farming through the G.I. Bill and credit programs became fixed in agriculture. The labor that joined agriculture after the war also acquired complementary wealth, in the form of farm training, which enhanced its productivity as farmers while making it a "specialized" farm input. Managerial errors of overcommitment were no doubt made. Falling returns prompted by uncontrolled excess production encouraged further loss-minimizing investment

in inputs complementary to those that had become fixed. These loss-minimizing, output-expanding investments tended to further depress farm prices thereby making public expenditures less effective in sustaining farm incomes. Asset fixity, output expansion in the presence of falling prices and capital losses suggest that agriculture behaved during 1948-54 in reasonably close accord with the theory presented in Chapter III.

CHAPTER IX

1955-1962: THE POST KOREAN WAR

By 1954 the Second World War seemed relatively remote. Recovery from the devastation of the war had been completed throughout most of the world. The effects of the Korean War had disappeared.

Agricultural Prices

Table 9.1 shows that the index of prices received by farmers remained stable in the neighborhood of 88, about 10 per cent below the average 1948-54. The index of prices paid by farmers increased from 110 in 1954 to 122 in 1962. The parity ratio was lower than during 1948-54 and falling.

Between 1954 and 1958 (1958 is the last year for which long run product price expectations are available), long run expected prices were above the average price received by farmers during the period for which expectations were formulated (Table 9.1). Further, while increasing prices seem to have been expected, falling prices resulted. Hence there exists the presumption that some resources may have failed to support the earnings expected from them at planning time.

Table 9.1: Selected Indices of Agricultural Prices (1947-49=100),[1] United States, 1955-62

Year	Prices Received by Farmers	Prices Paid by Farmers	Parity Ratio[2]	Long Run Prices		
				Ten Years Average Expected Prices[3]	Ten Years Average Price Received[4]	Ratio of Expected to Received
1917-29	59	67	89	70	54[5]	124
1930-33	32	50	63	67	42	161
1934-41	39	50	78	53	41	132
1942-47	78	76	102	79	71	128
1948-54	100	108	93	105	95	112
1955	87	110	79	103	94	110
1956	87	111	78	98	94	104
1957	87	115	76	98	91	108
1958	92	117	79	97	90	108
1959	89	119	75	96	--	---
1960	88	120	73	96	--	---
1961	89	121	74	96	--	---
1962	90	122	74	99	--	---
1955-62	89	117	76	98	92[5]	108[5]

[1] Originally 1910-14 = 100 shifted to 1947-49 = 100.

[2] Ratio of the index of prices received by farmers to the index of prices paid by farmers.

[3] Price expectation formulated at time t-5 for a 10 year planning horizon of which t is the mid-period year.

[4] Average of prices actually received during years t and the 9 subsequent years centered at t+5.

[5] Average of years for which data was available.

Sources: See Table 4.1, page 76, 77.

Farm Labor

Table 9.2, indicates that the farm population was reduced by one-fourth between 1954 and 1962. Meanwhile the farm labor force decreased by 22.6 per cent and farm labor requirements decreased by 31.6 per cent.

It is difficult to establish with any degree of precision the direction of the changes in the productivity of labor. The presumption is that value productivity decreased. The indications that the MPP of labor decreased are: (1) land input, a good complement to labor, decreased, (2) machinery, mostly labor substitutes, decreased slightly, and (3) labor requirements fell faster than the farm labor force. It appears that the decrease in land input relative to labor coupled with labor saving technological change, partly embodied in capital replacement, decreased the MPP of farm labor. The fall in product prices emphasizes the presumption of a decrease in MVP of labor. Further, considering that farmers were formulating decreasing long run price expectations, the expected MVP of labor may have been falling as well.

Information on residual earnings of farm labor computed for the sector (as in Table 4.4, Chapter IV) and for typical commercial farms[1] indicate a decrease in labor value productivity relative to the preceding period. Table

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[1]Goodsell and Jenkins.

Table 9.2: Number and Changes in Farm Population, Farm Labor Force and Farm Labor Requirements, United States, Selected Years 1954-1962

Year	Interval	Farm Population			Farm Labor Force			Farm Labor Requirements		
		Number	Change		Number	Change		Number	Change	
		(000)	(000)	(Per cent)	(000)	(000)	(Per cent)	(Mill. hours)	(Mill. hours)	(Per cent)
-	1917-29	-	-1,850	- 5.7	-	- 805	- 5.9	-	- 593	- 2.5
-	1929-33	-	1,813	5.9	-	- 24	..	-	- 604	- 2.6
-	1933-41	-	-2,275	- 7.0	-	-2,070	-16.2	-	-2,508	-11.1
-	1941-47	-	-4,289	-14.2	-	- 287	- 2.6	-	-2,850	-14.2
-	1947-54	-	-6,810	-26.3	-	1,731	16.6	-	-3,947	-22.8
1954	-	19,019	-	-	8,651	-	-	13,249	-	-
-	1954-55	-	59	.3	-	- 270	- 3.1	-	- 454	- 3.4
-	1955-56	-	- 366	- 1.9	-	- 529	- 6.3	-	- 733	- 5.7
-	1956-57	-	-1,056	- 5.6	-	- 252	- 3.2	-	- 900	- 7.4
-	1957-58	-	- 528	- 2.9	-	- 97	- 1.2	-	- 450	- 4.0
-	1958-59	-	- 536	- 3.1	-	- 161	- 2.1	-	- 193	- 1.8
-	1959-60	-	- 957	- 5.7	-	- 285	- 3.9	-	- 545	- 5.1
-	1960-61	-	- 832	- 5.3	-	- 138	- 2.0	-	- 386	- 3.8
-	1961-62	-	- 490	- 3.3	-	- 219	- 3.2	-	- 528	- 5.5
1962	-	14,313	-	-	6,700	-	-	9,060	-	-
-	1954-62	-	4,706	-24.7	-	-1,951	-22.6	-	-4,189	-31.6

(-) Does not apply

(..) Negligible

Source: See Table 4.2, page 80.

4.4 indicates that while the residual returns per hour of work in agriculture were decreasing, the average hourly earnings of factory workers increased. The evidence from typical commercial farms is less conclusive. Residual returns to labor on typical farms decreased in about one-half of the cases.

Figure 9.1 summarizes Chennareddy's information on expected earnings from farming and alternative occupations by age groups. The figure indicates that: (1) off-farm expected earnings increased more than expected earnings from farming in the two age groups considered, and (2) expected earnings from manufacturing were more variable than those in laundry. The pattern of expected earnings duplicates that of 1948-54. The same consequences should result: (1) less young people would be expected to enter farming permitting wages in farming to be higher than otherwise, (2) this would raise the ratio of expected earnings in laundry to expected earnings in farming persuading fewer older farmers to leave farming, and (3) the total number of farmers would decrease. It would be repetitious to go over the argument which invites these conclusions. The reader may wish to turn to the appropriate section in Chapter VIII.

Table 4.3, Chapter IV shows that the rates of entry into farming in young age brackets were particularly low during 1954-62 while the rates of exit of older farmers

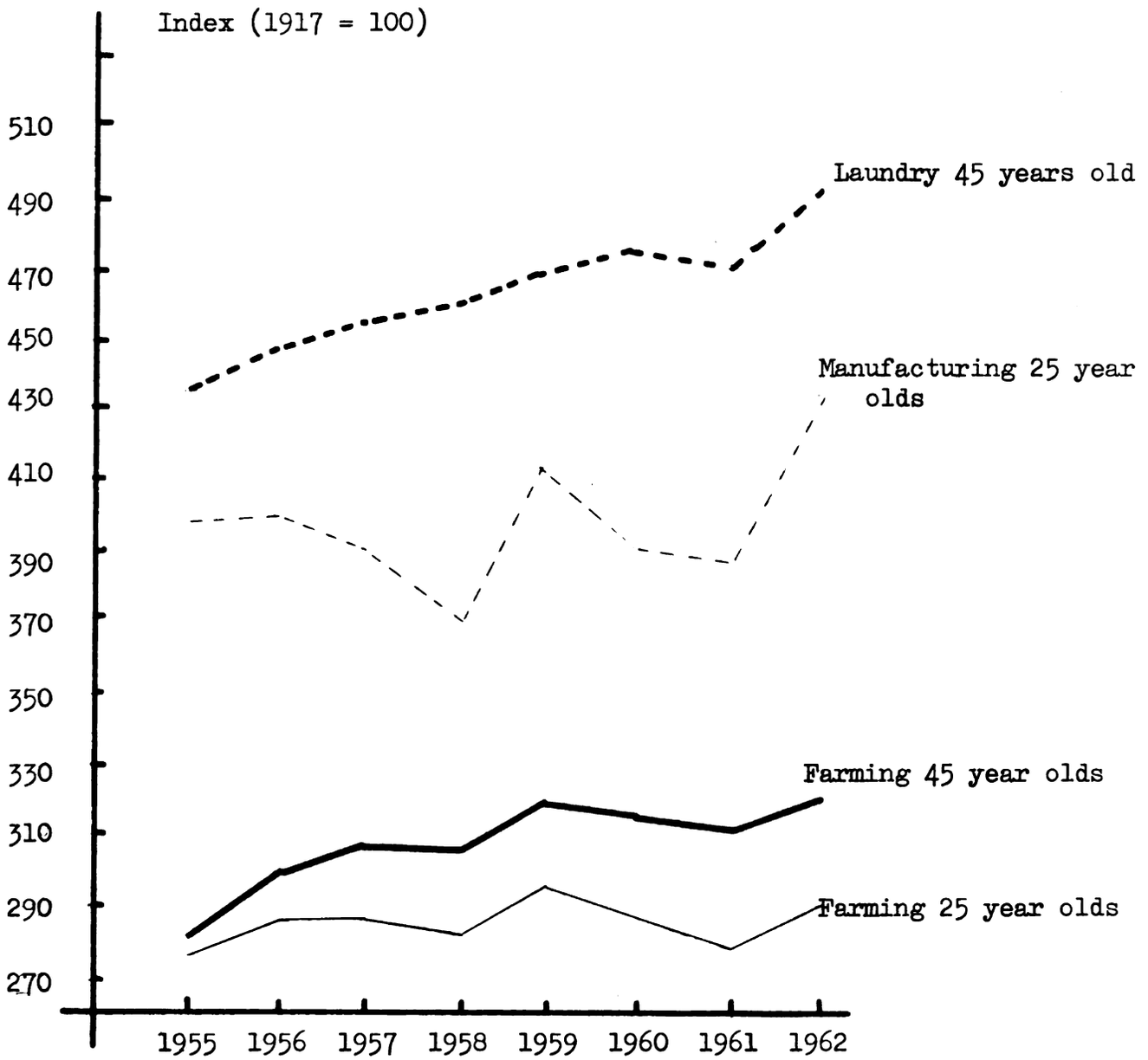

Figure 9.1: Indices of the present value of expected income streams for 25 and 45 years old workers in selected occupations, United States, 1955-62.

Source: Chennareddy Venkareddy, "Present Values of Expected Future Income Streams and their Relevance to Mobility of Farm Workers to the Nonfarm Sector in the United States, 1917-62", Appendix D, Table 2.

were particularly high. This duplicates the experience of 1948-54. By overlapping the rates of entry and withdrawal of 1940-50, 1945-55, and 1950-59, it appears that: (1) the rates of entry were the lowest on record during 1950-59, (2) they were particularly low in the latter part of the fifties as the data of 1945-55 indicate, and (3) the rates of exit of farmers older than 34 years of age were higher than ever before during both 1945-55 and 1950-59 indicating that they were probably high during the latter part of the period. Low rates of entry in the group under 34 years of age are in accord with Chennareddy's figures while high rates of exit are not necessarily in conflict with that information.[2]

Farm Durables

Real estate

Table 9.3 shows that between 1954 and 1962 land input decreased by 4 per cent. This is the only period, among those considered in this study when a net decrease in land input took place. The quantity of land in farming decreased by as much as one-fourth in the Southeastern States and by more than 15 per cent in the Northeast Appalachian and Delta States. Land input increased in the Mountain States, Northern Plains, and Pacific.

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[2]The argument is identical to that held in the similar case of Chapter VIII. Low rates of exit in older age groups are contingent upon the assumption of a constant wage in laundry. The wage in laundry clearly did not remain constant.

Table 9.3: Units of Pasture Acre Equivalents and Percentage Change by Regions and United States 1954-1962

Region	Pasture Acre Equivalents									Percentage Change					
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1917 -29	1929 -33	1933 -41	1941 -47	1947 -54	1954 -62
	(000,000)									Per cent					
United States	1,849	1,840	1,831	1,822	1,812	1,803	1,794	1,784	1,775	1.2	2.0	2.7	1.7	.7	- 4.0
Northeast	92	90	87	85	83	81	78	76	74	-19.2	2.7	- 5.3	- 5.6	- 8.9	-19.5
Corn Belt	464	462	460	459	457	455	454	452	451	- 4.9	.6	.8	- 1.7	- 1.7	- 2.8
Lake States	141	139	138	137	136	135	133	132	131	- 1.7	4.3	4.2	- 3.3	- 2.7	- 7.0
Appalachian	140	137	134	131	128	126	123	120	117	- 7.8	1.9	- .6	- 3.8	- 7.3	-16.4
Southeast	85	82	80	77	75	72	70	67	65	- 7.5	3.3	7.6	2.3	- 2.3	-23.5
Delta States	75	73	72	80	69	67	65	64	62	1.7	4.5	4.3	1.4	1.3	-17.3
Southern Plains	227	226	226	226	226	226	225	225	225	14.9	4.9	0	2.8	3.6	- .8
Northern Plains	229	230	230	231	231	232	233	233	234	10.9	1.4	2.8	2.3	3.6	2.1
Mountain	142	143	144	145	146	146	147	418	149	30.9	0	20.4	12.7	6.8	4.9
Pacific	256	258	259	260	262	263	265	266	267	12.4	0	5.6	11.6	10.8	4.2

Source: See Table 4.5, page 92.

Policies in regard to land were partially responsible for the decrease in land input. The Agricultural Act of 1956 established the Soil Bank. Under this program land could be shifted away from farming by placing it in either the Acreage Reserve or the Conservation Reserve. More will be said about these programs as the chapter progresses. Between 1957 and 1962 about 25 million acres were diverted from farming under the Soil Bank.[3] From 1959 on, eligibility for price supports in "problem" commodities was made contingent upon diverting acreage to soil conserving practices.

Acres of irrigated land in farms increased from 29.6 to 33.2 million acres between 1954 and 1959.[4] Of the 3.6 million additional irrigated acres, one-sixth were located in the Pacific region. The largest gains, however, took place in Northern Plains where land under irrigation nearly doubled.[5] There were some gains in irrigated land in the Mountain Region, Lake States, and Corn Belt. In the last two regions, reversion of other land to lower uses more than offset, in terms of pasture acre equivalents, increases in irrigated area.

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[3]U. S., Department of Agriculture, Agricultural Statistics, (Washington: U. S. Government Printing Office) various issues.

[4]U. S., Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1964, (Washington: U. S. Government Printing Office, 1964), p. 623.

[5]Bureau of the Census, Statistical Abstract of the United States, 1964.

Rossmiller's findings indicate that the average yearly change in real estate's MPP during 1955-62 was positive and larger than in any other period in nearly all the cases he investigated.[6] The average yearly changes in real estate's MVP are in the same direction and larger than the changes in MPP. Hence Rossmiller's figures imply an average increase in product prices during the period, a fact that is not supported by the data of Table 9.1. Rossmiller's results are influenced by his selection of 1955 as a base year. In 1955 product prices were at their lowest in the decade. Considering that long run expected product prices were falling, it is probable that actual MVP's exceeded expected MVP's.

Other durables

According to Table 9.4, the total value of physical assets in agriculture in constant dollars built to a maximum in 1959, decreasing thereafter. The physical volume of assets was smaller in 1962 than in 1954. There was no net addition to stocks except in the case of livestock. The volumes of real estate, machinery and equipment decreased. It had been indicated in the preceding section that the land component of real estate decreased between 1954 and 1962. Although there are indications that net additions

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[6]George E. Rossmiller.

Table 9.4: Value of Physical Assets in United States' Agriculture in Constant Prices (1910-1914 Average), 1955-1962

Year	Real Estate[1]	Implements and Machinery[2]	Livestock[3]	Crops[4]	Total
	(0----------Billion Dollars----------0)				
1955	43.1	6.0	3.8	4.2	57.1
1956	43.4	6.1	3.8	3.5	56.8
1957	44.0	6.1	3.5	3.7	57.3
1958	43.9	5.8	3.7	3.4	56.8
1959	44.1	6.1	4.7	4.2	59.1
1960	43.9	5.9	4.4	3.5	57.7
1961	41.8	5.7	4.3	3.5	55.3
1962	41.6	5.7	4.4	3.8	55.5

[1]Nominal values deflated by the Index of Real Estate Values, average of November preceeding year and March current year except 1940-42 for which average of year was used; 1912-14 = 100.

[2]Nominal values deflated by the Index of Prices Paid by Farmers for Machinery of December previous year; 1910-14 = 100.

[3]Nominal values deflated by Index of Prices Paid by Farmers for Livestock; 1910-14 = 100.

[4]Nominal values deflated by Index of Prices Received by Farmers, All Crops, 1910-14 = 100.

Sources: See Table 7.4, page 216.

were made to the stock of buildings,[7] these became smaller as the period progressed and apparently did not offset the decrease in land. Independent estimates confirm that there were net negative investments for both motor vehicles and other equipment between 1954 and 1962.[8]

Quance reports that beef cows on farms increased at an average rate of 680,000 head per year while draft stock and milk cows decreased respectively by 280,000 and 500,000 heads per year.[9] The same author indicates that farmers invested in buildings[10] and in all the forms of machinery and equipment covered by his study[11] during the period. Investments in machinery and equipment did not contradict the previous claim of a decrease in the total stock of machinery and equipment on farms. A close examination of Quance's figures shows that the addition to the number of machinery and equipment items on farms had slowed down dramatically during this period relative to two preceding periods. It is thus most probable that the addition to this form of capital was smaller than capital consumption.

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[7]For estimates of gross investment and capital consumption in buildings see: U. S., Department of Agriculture, Farm Income Situation, (Washington: U. S. Government Printing Office, 1965).

[8]U.S.D.A., Farm Income Situation (1965).

[9]Quance, Chapter V, p. 94 f.

[10]Quance, Table 6.10, p. 140.

[11]Quance, Chapter VI, p. 117 f.

As a consequence there may have been during 1954-62 a larger number of machines on farm than in years before but they were also conceivably older and cheaper on the average.

Estimates of expected productivity of farm durables generally display a slower growth during this period than does acquisition cost. The downward revision of expectations explains the slowing down in the pace of investment. No figures are available for this period on capital gains and losses by categories of durable inputs.

Expendable Capital

Fertilizer and gasoline are the non-farm produced forms of expendable capital for which information is available during 1955-62. According to Quance the quantity of fertilizer used increased by about 35 per cent,[12] during the period while the amount of gasoline used decreased.[13] For the farm sector as a whole, slight but sustained capital losses resulted from the use of these forms of capital.[14] The decrease in the use of gasoline reflects increasing use of more efficient engines rather than a decrease in the use of farm power.

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[12]Quance, Appendix Table B.8, p. 229.

[13]Quance, Appendix Table B.10, p. 231.

[14]Quance.

The use of farm produced, expendables in beef production increased between 1955 and 1962.[15] There were fewer dairy heifers on farms at the end of the period than at the beginning although as the period went on more corn and hay were used. Similarly the number of sows on farms decreased while the number of feeder pigs and the amount of corn fed to hogs increased. In the case of poultry production, the number of chickens on farms decreased while the quantity of corn feed went up.

In the case of dairy, pork and poultry production the increase in the use of expendable inputs such as corn and hay coupled with decreases in other inputs such as milk cows and heifers, sows and chickens can be interpreted as a manifestation of technological change. Since the output of pork and dairy and poultry products did not decrease and in some cases even increased it seems evident that substitution was taking place in favor of both feed and more efficient feed consuming animals.

Farm Output

The index of farm output increased from 94 to 109 (1957-1959 = 100) between 1953-55 and 1961-63.[16] The

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[15] Quance.

[16] U. S., Department of Agriculture, Changes in Farm Production and Efficiency, Statistical Bulletin No. 233, Revised July 1964, (Washington: U. S. Government Printing Office, 1964), pp. 7-8.

rate of increase in farm output was slightly higher than that of U. S. population. Output expansion was achieved in the presence of: (1) stable farm output prices, (2) rising prices paid by farmers, and (3) falling long run expected output prices.

Contrary to what had been the rule since the post World War I period, crop production grew at a faster rate than livestock production. The largest gains were in feed grains which grew at a rate of above 3 per cent per year. Large gains were achieved for hay and forage and in food grains. There was little change in tobacco output and a decrease in cotton production. Among livestock products, the largest gains were in poultry products which grew at almost 4 per cent per year.

Among the "problem" commodities, the production of cotton, tobacco and dairy products seemed to be under control. This was not so with respect to feed (corn and corn substitutes) and food grains (wheat and wheat substitutes).

The Utilization of Farm Output

The supply of farm products increased between 1954 and 1962 due to increases in output. Nevertheless, the phenomenal increase in carry-overs of the immediate post Korean War was brought under control during the second half of the fifties. Part of the credit is due to the aggressive programs of foreign disposal.

The average quantity index of agricultural exports (1957-1959 = 100) of the period 1948-53 was 70, and increased to 105 for the average of 1954-62; a gain of 50 per cent.[17] The quantity exported of animal and animal products increased relative to 1948-53 by 65 per cent with exports of poultry products doubling.[18] Relative to the preceding period, exports of grains increased by 64 per cent.[19] Exports were during 1954-62 a positive force in increasing disappearance. A substantial portion of the increase in agricultural exports may be attributed to government policies. During the period 1953-1961 only about 45 per cent of the value of U. S. agricultural exports moved through strictly regular channels.[20]

Income and Wealth

Real income to agriculture from all sources, Table 9.5, was lower on the average during 1955-62 than during 1948-54. The fact that it was higher in current terms indicates that income grew at a slower rate than the price level.

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[17]U. S., Department of Agriculture, Agricultural Statistics, (Washington: U. S. Government Printing Office, 1964) Table 818, p. 591.

[18]U.S.D.A., Agricultural Statistics, (1964).

[19]U.S.D.A., Agricultural Statistics, (1964).

[20]Elmer L. Menzie, Lawrence W. Witt, et. al., Table IV-2, p. 36.

Table 9.5: Net Income Originating in Agriculture, Change in Asset Position of Agriculture, Government Payments and Total Income, Nominal and Real,[1] United States, 1955-62

Years	Net Income		Changes in Asset Position		Government Payments		Total Income	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(000,000 Dollars)							
1917-29	8,764	12,272	- 12	537	0	0	8,753	12,808
1930-33	4,557	7,214	- 5,916	- 9,114	33	59	- 1,327	- 1,841
1934-41	5,950	9,913	1,397	2,307	514	860	7,861	13,080
1942-47	15,662	19,683	8,016	9,929	650	843	24,328	30,455
1948-54	18,520	17,075	2,544	2,451	251	231	21,315	19,757
1955	15,309	13,429	2,235	1,961	229	201	17,773	15,590
1956	15,082	13,002	8,543	7,365	554	478	24,179	20,844
1957	14,554	12,128	11,014	9,178	1,016	847	26,584	22,153
1958	16,935	13,657	14,611	11,783	1,089	878	32,635	26,319
1959	15,237	12,190	407	326	682	546	16,326	13,061
1960	15,820	12,457	2,347	1,848	693	546	18,860	14,850
1961	16,139	12,609	8,216	6,419	1,484	1,159	25,839	20,182
1962	16,191	12,551	5,888	4,564	1,736	1,346	23,815	18,461
1955-62	15,658	12,753	6,658	5,430	935	750	23,251	18,932

[1]Corresponding nominal values deflated by Consumer Price Index (1947-49 = 100).

Sources: See Table 4.7, page 109.

Net income originating in agriculture was smaller on the average than in the previous period both in current and constant dollars; nearly 25 per cent lower in real terms. This loss was partially made up by larger government payments which increased threefold relative to the yearly average of 1948-53, and by capital gains. About 85 per cent of the change in the value of assets originated in real estate.[21] It was argued earlier[22] that there is evidence that the changes in the value of real estate are associated with government payments. Thus the income position of farming of the late fifties-early sixties was made very dependent upon government help.

Policies

Three major agricultural programs will be touched upon in this section:

1. The price support program (complemented by some production restriction).
2. The Soil Bank programs aimed at controlling overall farm output.
3. The program of foreign disposals of farm commodities directed at relieving stocks.

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[21] Glenn L. Johnson, "An Evaluation. . .", Table 3, Estimates for 1959-62 are the author's.

[22] See page 260.

After a brief mention of the most salient features of these programs, attention will be turned, as in last chapter, to the analysis of case commodities. This method has the advantage of permitting an appraisal of the major results of all three programs simultaneously.

The Korean War was terminated under a Republican administration. The Republican party had campaigned for flexible price supports since late 40's. The AAA of 1954 finally provided for flexible prices through a sliding range of support prices from which specific levels would be chosen according to the stock situation. This type of flexibility was maintained throughout the rest of the period. Marketing quotas were in effect in 1954 for wheat, cotton, peanuts, and tobacco, but not for corn. From 1959 on, eligibility for grain price support was made contingent upon diverting acreage from production.[23]

The AAA of 1956 established the Soil Bank which had the immediate objective of diverting land from farm production. The Soil Bank included two programs:

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[23]Good summary accounts of these programs are found in: U. S., Department of Agriculture, Farm Production, Trends, Prospects and Programs, Agricultural Information Bulletin No. 239, (Washington: U. S. Government Printing Office, 1961), pp. 26 f. and Wayne Rasmussen and Gladys L. Baker, "A Short History of Price Support and Adjustment Legislation and Programs for Agriculture, 1933-65", Agricultural Economics Research, 18 (July 1966), pp. 76-77.

1. The Acreage Reserve under which land from allotment crops could be diverted from production. Diversion of allotted acreages of wheat, corn, cotton, rice, peanuts, and tobacco was compensated with cash. No farm product of any kind could be collected from the diverted acreage. This program was no longer in effect in 1959.
2. The Conservation Reserve which was primarily for crops not allotted, but was made to cover also these crops after the termination of the Acreage Reserve program. This program provided for contracts of 3, 5, or 10 years duration. As in the Acreage Reserve, no fruits could be collected from diverted land and soil protecting covers were mandatory. In addition to rental payments, farmers were compensated for part of the cost incurred for establishing soil protecting measures.

Between 1957 and 1962 about 25 million acres were diverted from farming under the Soil Bank.

PL 480, The Agricultural Trade and Development Act, was passed in August 1954.[24] PL 480 provided several channels by means of which surplus commodities might be moved into the world market. Title I provided for disposing of surpluses in exchange for foreign currencies. Title II allowed food grants to relieve natural disasters abroad and to be given as wages in foreign development works. Title III provided for distribution to needy groups within and outside of U. S. It further permitted disposal through barter. Title IV authorized sales through subsidized long-term loans. Between 1954 and 1962 more than one-half of U. S.'s agricultural exports moved via this program.

Effect of agricultural policies on selected case commodities[25]

In the discussion that follows, S will stand for support price; E for equilibrium price; e for expected price and r for price actually received by farmers. Tables 8.6 and 8.7 allow two comparisons: (1) price supports versus market clearing equilibrium prices and (2) expected prices versus prices actually received. The first contrast

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[24]For a more detailed account of this program see: Lawrence W. Witt, "Development Through Food Grants and Concessional Sales" in Agriculture in Economic Development, Carl Eicher and Lawrence Witt (eds.), (New York: McGraw-Hill Book Company, 1964), pp. 339-359 and Elmer L. Menzie, Lawrence W. Witt, et. al.

[25]The following discussion draws on G. L. Johnson, "An Evaluation. . ." Expected price in formation was updated according to Lerohl's estimates.

is achieved by means of the ratio of support to equilibrium prices. A ratio larger than one indicates that the support price is above equilibrium levels and thus the market is unlikely to clear through regular channels. The second contrast is represented as the ratio of expected prices to prices actually received. A ratio larger than one suggests that expectations are being met whereas a ratio smaller than one shows the opposite. There exists the presumption in the latter case that forces are at work in the direction of revising expectations upward thus encouraging output expansion.

Corn, cotton and wheat were commodities subjected to high price supports and insufficient production controls. In the case of corn, price supports were adjusted downward between 1954 and 1962 from 1.62 dollar/bu. to 1.08 dollar/bu. Prior to that adjustment, high price supports had resulted in excess capacity and large carry-overs. The excess capacity built in previous years prevented rapid adjustment in supply and thus a downward pressure on the equilibrium prices remained latent. As a result, price supports continued to be above equilibrium. The decrease in price supports was not enough even to hold carry-overs constant. After 1956 the ratio e/r of long-run expected corn prices to prices received was above one indicating that previously committed resources were not meeting the earnings expected from them. Capital losses must have occurred. Corn production, however, kept increasing because the limitations

imposed on corn acreage made the use of land substitutes such as seeds, fertilizers and herbicides all the more profitable. Further, in recent past, farmers had accumulated a series of specialized farm durables, with low off-farm opportunity cost, which they did not find profitable to salvage. Some of the latter were land complements and as such made the MPP of land substitutes still higher than otherwise. More liberal use of land substitutes plus embodied technological progress increased corn yields.

High price supports kept corn land from being diverted to the Soil Bank. In effect the government was bidding against itself. Higher than equilibrium prices prevented corn from moving into either the livestock economy or international channels. Corn exports under PL 480 were pushed aggressively but were insufficient to prevent further accumulation of surpluses.

The case of wheat duplicated the corn experience. During most of the period prices actually received for corn remained above expected prices. Hence, it appears that forces were present pressing for the expansion of corn output. Although the Administration made several downward readjustments in the support price of wheat, it was not successful in equating price supports with equilibrium prices. The latter fell rapidly. Acreage allotments were decreased from 73 million acres in 1950 to 55 million in 1959. Simultaneously, however, yields increased from 17.3 bushels per acre during 1950-54 to 24.9 bushels per acre in

1958-62. As a result it became increasingly difficult to clear the market domestically. Except for 1959 stocks did not build up, however, due to an aggressive disposal policy under PL 480.

In cotton after 1953, price supports became larger than equilibrium price. It has been estimated that equilibrium prices for cotton fell by nearly 50 per cent between 1952 and 1954.[27] Meanwhile the price support for cotton kept increasing until 1955. Naturally stocks accumulated. High price supports prompted the formulation of high expected prices until 1955. It is possible that expansion in cotton production may have been planned for as late as 1960. Acreage controls and the Soil Bank cut cotton acreage from 30 million acres in 1951 to 12.4 million acres in 1958. High expected prices and restricted use of land encouraged the use of land substitutes. As a result, yields increased and output was not reduced. The use of nonconventional export channels prevented further accumulation of carryovers after 1956.

The following conclusions apply to the cases of wheat, cotton and corn:

1. High support price prompted the formulation of high expected prices which in turn encouraged investment. Investing often meant incorporating new output-expanding technology.

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[27]Glenn L. Johnson, "An Evaluation. . .", Table 16, p. 82.

2. High support prices relative to equilibrium prices prevented clearing the market through conventional outlets.
3. Attempts at controlling output by restricting the use of land proved to be unsuccessful. Restricted use of land coupled with additional quantities of other inputs brought about by high price expectation encouraged the use of land substitutes such as fertilizers and herbicides. Subsequent decreases in price support do not seem to have been sufficient to free the resources that had been called into production by previous high price expectation.
4. High price supports made the Soil Bank less attractive to farmers than otherwise. Hence, less land entered that program than could have been otherwise possible.
5. The impossibility of clearing the domestic market forced a conspicuous use of PL 480 in order to prevent the accumulation of excessive carry-overs. This program was successful in preventing the formation of disproportionate stocks in the cases of wheat and cotton. Since PL 480 made various types of price concessions, the prevention of carry-overs entailed additional costs to the U. S. Government.

6. In the case of grains, high price support may have contributed in keeping livestock prices higher than otherwise.

Before 1950, both potatoes and burley tobacco were subjected to price support and acreage control. In 1950 the potato program was discontinued because despite acreage control, the government was left now and again with unsalable stocks of perishable potatoes. Contrary to what occurred with the potato program, production controls were tightened for tobacco.

After the suspension of the potato program, long-run potato price expectation was being just fulfilled and in cases overfulfilled. Consequently no capital losses were being imposed on the potato industry as a whole.[28] The immediate result of the suspension of the potato program was the introduction of price risk into potato production. Risk caused producers to discount expected prices sufficiently to persuade many of them - mostly marginal producers - to abandon potato production. Potato output was drastically reduced during the early fifties. This reduction in output promptly resulted in actual prices reaching the levels previously supported. These prices, however, encouraged less permanent production expansion than similar but supported

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[28]It may be mentioned that some reallocations of wealth among potato producers must have resulted as a consequence of the suspension of the support program.

prices because of the risk element involved. Cautiously producers increased production until reaching around 1960 a volume of production comparable to the period of price supports. It should be noted, however, that the expansion did not take place through increased acreage but apparently by means of the use of more expendable forms of capital which may be adjusted with more flexibility. It may be argued too that there are strong indications that the average cost of the potato industry may have been lower during the late fifties than under price support due to the elimination of marginal producers.

During the 1954-62 period, expected tobacco prices were consistently below prices actually received. Hence, expected tobacco prices improved steadily and pressure for increased capacity was present. Throughout the period, prices were supported at levels substantially above equilibrium and until 1958 there was an increasing divergence between supported and equilibrium prices. Until 1955 stocks of burley tobacco accumulated. High price expectation and restricted acreage caused yields to increase dramatically[29] through the encouragement of the use of land substitutes. Between 1954 and 1955 tobacco allotments were reduced by

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[29]Glenn L. Johnson reports that yield in burley tobacco production increased by 60 pounds per acre annually during the years of the tobacco program. See: Glenn L. Johnson, Burley Tobacco Control Program, Kentucky Agricultural Experiment Station Statistical Bulletin No. 580, (Lexington: 1952), p. 47.

over 25 per cent. As a consequence of this reduction, carry-overs decreased from 1956 to 1960. In 1960 new signs of overproduction became evident and acreage allotments were again reduced by almost 5 per cent.

The following conclusions apply to potato and tobacco:

1. In the cases of both tobacco and potatoes, high levels of price support resulted in pressures toward output expansion. In the case of potatoes, production could not be brought in line with disappearance by means of acreage controls. Contrary to the potato case, acreage controls were effective in preventing the accumulation of excessive carry-overs of tobacco.
2. The difference in results between these two seemingly similar programs rests in part upon the different nature of the products concerned. Potatoes are a perishable crop, affording little storage and having many substitutes in consumption. High price support encouraged consumers to shift to substitutes, leaving the supporting authority with excess supplies of perishable goods. Tobacco, on the other hand, stores well and being a habit has few substitutes in consumption. Under such circumstances, it was relatively easy for the Government by

means of successive cuts in acreage allotments to force supply to intersect demand at near desired prices.

3. There were reallocations of wealth in both the cases of potato and tobacco. In potato production there was reallocation of wealth among potato producers caused by the suspension of the price support program. In tobacco, the industry made capital gains at the expense of consumers.
4. By the late 50's potato production had reached levels comparable to the period of price support, although probably at a lower average industrial cost.

Hog and beef production were indirectly affected by price support programs via the support of grain prices. Dairy production, in addition, was itself subjected to flexible support prices.

Up to about 1953, high price supports for corn limited the amount of feed entering the hog economy, reduced the output of pork and drove pork prices above what they would have been otherwise. High prices for pork created high price expectation which prompted enlargements in productive capacity. After 1953 price supports for corn were lowered encouraging heavier feeding and higher pork output. Higher output lead to lower pork prices. After 1953, expected pork

prices were above prices actually received indicating that expectations were not met. Presumably previously invested capital was not yielding expected earning. Resulting capital losses, however, were probably not too large, particularly in the livestock part of total inventory, due to the shortness of the pig cycle.

Developments in beef production are similar though not identical to those in hog production. Beef production was stimulated by the growth in per capita incomes due to the fact that the income elasticity for beef is high relative to other farm products. Between 1954 and 1958 long-run expectations were not being met and some capital losses may have resulted. There was also a slow-down in the build up of cattle stocks. Prices received picked up considerably after 1958 and remained from then on above expected prices prompting the formation of an optimistic outlook. Cattle inventories built up again. Available estimates indicate however that between 1958 and 1964 beef cattle earnings were sufficient to cover acquisition costs. The overall prosperity enjoyed by the U. S. economy after 1958 may have contributed substantially to that on account of the relatively high elasticity of the demand for beef.

Dairy production was subjected to flexible price supports. Any time stocks accumulated, price supports were adjusted downward. Table 8.7 shows that during 1953 and 1955 milk support prices were above equilibrium and stocks accumulated. After 1956 readjustment in support

prices eliminated stocks. Up until 1953 price expectations were more than fulfilled and investment was encouraged. After 1953 expected and effective prices reached and stayed at about the same level. Although falling prices were expected after 1953, production kept increasing. This can be explained by the fact that: (1) capacity developed prior to 1953 was encouraged by prevailing high price supports, (2) after 1953 and until 1958 the salvage value of milk cows (their value as beef) decreased at least as fast as milk prices and discouraged contractions in the size of milk herds,[30] and (3) the fall in corn prices encouraged heavier feeding.

The following conclusions apply to hog, beef, and dairying:

1. All three industries were affected by high price support of corn. Lower output than otherwise and conceivably high prices resulted.
2. After 1954 with the fall in corn prices, farmers were encouraged to feed more corn to their hogs thereby increasing the quantity marketed. Larger output resulted in lower prices, particularly lower than expected. Capital losses in some of the previously

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[30]Fixity in the presence of falling prices imposed upon farmers capital losses. Glenn L. Johnson calls the attention to the fact that capital losses in livestock were large after 1952 and that part could be due to devaluation of milk herds. See Glenn L. Johnson, "An Evaluation. . .", p. 93.

invested assets must have resulted. The fact that the pig cycle is short prevented severe capital losses in livestock.

3. Beef production was subject to similar forces. Beef, however, faced a firmer demand due to relatively high income elasticity of demand coupled with larger per capita incomes. Hence, except for a short period (1956-58) expectations were met and no major capital losses resulted.

4. In dairying flexible price supports prevented the accumulation of stock, but the industry was subjected to the same stimulus as hogs and beef. During the 50's output increased rather than contracted as prices fell due to: (1) the salvage value of milk stock decreased synchronically with milk prices and, (2) feed prices decreased. As a result, milk producers suffered capital losses.

The examination of the eight case commodities presented above leads to the following general conclusions:

1. High price supports and the elimination of risk, the latter particularly noticeable in the potato case, stimulated investment in productive capacity.

2. Adequate production controls were only viable in the case of tobacco. In this case, the inducement to expand production generated by high price supports could be neutralized by acreage control. No countervailing mechanism existed on the consumption side due to the fact that tobacco has few good substitutes.
3. In the cases where production controls were not very effective, support programs resulted in a "combination of extra costs"[31] such as:
   a. Disposal of commodities by nonconventional means at a loss.
   b. Cost of holding huge stock when as in the case of corn, disposal programs could not prevent additional accumulations.
   c. Capital losses to all producers as in the case of dairy producers.
   d. Redistribution of wealth among producers as in the case of potatoes.
4. Whenever land substitutes were available, acreage reduction was not effective in controlling any one specific commodity. This was so because land substitutes were used in the production of the specific commodity and

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[31]Glenn L. Johnson, "An Evaluation. . .", p. 108.

in addition the redundant land could be used in the production of a competitive commodity. The Soil Bank programs were an attempt at obviating the second effect. The removal of whole farms approached the concept of attempting to salvage simultaneously a bundle of resources.

5. The price support system induced investment in farming. The presumption exists that price supports entered the calculus of investors and thus the value structure of farm assets was made to rest in part upon the existence of the system. Its removal would, as was the case for potatoes, impose capital losses upon some farmers.

Summary

During this period flexible price supports and on occasion relatively strict production controls were in operation. These measures were not sufficient to contain the development of excess capacity in United States' agriculture. Despite the inauguration of agressive disposal programs and the entrance in an unusually long period of overall prosperity carry-overs could not be completely avoided. Other symptoms of excess capacity, namely falling incomes and the inability to cover acquisition costs of all factors of production even with supported prices indicate that overexpansion was not the sole result of price supports.

After the Korean War, United States' agriculture relied heavily upon the domestic market, a competitive world market and disposal programs abroad. Although a reduction in the rate of expansion of agricultural output was in order in the United States, the rate of growth accelerated. Between 1955 and 1962 agricultural production grew at a faster rate than population. This acceleration in growth took place in the presence of worsening actual terms of trade, worsening price expectations, diminishing incomes and capital losses part of which were borne by taxpayers and part of which were borne by the actual investors who made the errors of overcommitment.

The phenomenal increase in carry-overs of the immediate post Korean War was brought to a halt during the second half of the fifties through (1) aggressive, subsidized foreign disposal programs launched during the period and (2) in some cases by increasingly severe production controls. The index of agricultural exports doubled relative to the average of the period 1948-53. Less than half of the value of U. S. agriculture exports, however, moved through strictly commercial channels.

Off-farm prosperity encouraged farm outmigration between 1955 and 1962. During this period the farm population was reduced by one fourth. This sharp decrease in the use of labor input was not sufficient however to close the gap between farm and non-farm labor earnings. Labor

earnings on farms, decreased relative to their urban counterparts. Moreover, information on residual earnings of farm labor both for the sector and for typical commercial farms indicate a decrease in farm earnings relative to the preceding period.

The use of land decreased by 4 per cent between 1955 and 1962. Though there are some indications that the value productivity of land fell throughout the period, it appears that land use policies were responsible for the decrease in the use of land. The Agricultural Act of 1956 established the Soil Bank. Under this program land was shifted away from farming by placing it either under the acreage or conservation Reserves. Either of these forms of land diversion subsidized the exit of land from agricultural production. Between 1957 and 1962 about 25 million acres were diverted from farming under the Soil Bank. Though the high level of price supports increased the marginal value productivity of land, the expanded use of fertilizers as a substitute for land also decreased it. Government payments for conservation were found to be a factor in the increase in land values between 1955 and 1962.

The total stock of farm durables (in constant dollars) decreased after 1959. Livestock and building inventories increased while the machinery inventory decreased. The decrease was not sufficient to maintain earnings high enough to cover acquisition costs for many asset categories.

The use of most farm-produced expendables increased but their earnings often fell short of acquisition costs.

Net farm income originating in agriculture was smaller on the average than in the previous period both in current and constant terms. This loss was partially made up by larger government payments which increased threefold relative to the yearly average of 1948-53, and by capital gains. About 85 per cent of these capital gains originated in real estate. Evidence exists that changes in the value of real estate are associated with government payments. The income position of farming in the late fifties and early sixties would have been considerably worse had the government not indulged in direct support of the nonconventional portion of total farm income.

Flexible but higher than equilibrium price supports were in effect after 1954 for several commodities. Production controls were also in effect mostly as restrictions on the use of land. The examination of individual programs indicated that (1) High price supports created high price expectations and encouraged additional investment in land substitutes and other durables thereby increasing yields. (2) Many farm durables specialized in the production of the supported commodities were a source of capital losses as producers overinvested relative to both market clearing equilibrium prices and the level of price supports. (3) Successive reductions in price supports did not <u>per se</u> result automatically in output contractions. This was

because many of the resources previously committed to agriculture were specialized resources with low off-farm opportunity cost. Under these conditions farmers often find it profitable to bring more resources into production in order to raise the productivity of fixed factors, further expanding output. (4) High support prices reduced disappearance. As a result of increased supply and diminished disappearance either carry-overs increased or disposal programs had to be operated. Both systems of market clearing were expensive.

The livestock economy though free of direct government intervention was affected by the support program in the grain economy. Higher feed prices discouraged heavy feeding and restricted output of livestock products. Restricted output resulted in higher actual livestock prices and these led to higher expected prices. High expectations in turn encouraged investment in the livestock economy. The primary forces encouraging output expansion were later reinforced by successive decreases in feed price supports which encouraged heavier feeding and thus still larger output. As a result expected prices were no longer being fulfilled at the end of the period. The reaction to frustrated price expectations varied according to the enterprise concerned: (1) In hog production only small capital losses ensued because of the shortness of the productive cycle. (2) The beef economy appears to have been spared, at least during the period from major capital losses because of the high income demand

elasticities for beef. (3) It appears that serious capital losses occurred in dairying because while the milk prices tended to fall the salvage value of milk cows fell to their value as cutter and canner beef.

Study of the period 1955 to 1962 shows that agriculture displayed a propensity to overinvest over and beyond the stimulus generated by price support programs. Falling relative farm earnings and capital losses on non-human wealth despite price supports are evidence offered in substantiation of this argument.

The performance of agriculture between 1955 and 1962 is not satisfactorily described by a model that assumes perfect knowledge and inputs with acquisition costs equal to salvage values. Such a model fails to explain production expansion in the presence of falling prices nor does it account for capital losses. The theory developed in Chapter III is in closer accord with the historical record.

CHAPTER X

SUMMARY AND CONCLUSIONS

Objectives, Method and Sources

Except for very short periods, since the First World War the agricultural plant of the United States has tended to develop excess capacity or, in other words, to overproduce. Overproduction is taken as a state of affairs where the product, priced at market prices, is not worth enough to meet simultaneously the acquisition cost of all factors engaged. It has often been argued that agricultural overproduction is the result of exogeneous shocks such as wars, recessions and technological advances and would be self-liquidating if price support programs did not exist. Contrary to that view, this dissertation explores the hypothesis that the observed propensity to overproduce is inherent to the sector. This inherence results from: (1) the existence of imperfect knowledge which leads to allocative errors on the part of producers and (2) a divergence between factor's acquisition and salvage price. Thus, it is argued that although imperfect knowledge about exogeneous shocks is a necessary condition for the development of excess capacity in agriculture, it cannot be made solely responsible for it. Theoretically, the existence of a divergence between factor's acquisition and salvage prices

is an essential condition for explaining agriculture's inherent propensity to develop excess capacity.

The method consisted in the historical examination of United States agriculture during the period 1917-1962.

This thesis belongs to a family of studies completed during the last five years as contributions to a master project sponsored by Resources for the Future, Inc. Six authors have made direct contributions to the overall project: Jones and Chennareddy on labor, Lerohl on product price expectations, Rossmiller and Larsen on farm real estate and Quance on capital. These contributions plus an analysis of selected agricultural programs of post World War II by Glenn Johnson have been the principal sources of information for this study. Information beyond that provided by the direct contributors was sought in the work of agricultural historians, documents of the United States Department of Agriculture, other official documents, newspapers and periodicals.

The Time Dimension of the Study

The period 1917-62 was selected for this study because it is a long, statistically well-documented period of history that promised to offer a unique opportunity to study the impact of a wide variety of economic and institutional changes on the allocation of agricultural resources. For analytical convenience, the period 1917-62 was broken down into six subperiods. These six subperiods may be

viewed as belonging to two different groups. During the first two subperiods price supports did not exist and agricultural prices were left to change freely as market conditions changed. During the four subperiods following 1933 price support programs were in operation except during war years.

The first period runs from 1917 to 1929. During the first years of the period agriculture received the stimulus of the First World War. This stimulus was promptly reversed when a serious fall in foreign demand for U. S. agricultural products occurred after 1920. Between 1920 and 1929 agriculture was a depressed sector in the midst of a relatively prosperous economy. The second period covers the years between 1930 and 1933. The beginning of this period is marked by the financial collapse of 1929 which submerged the United States economy in one of the worst economic crisis on record causing a further decrease in demand for agricultural products. Between 1929 and 1933 agriculture was a depressed sector within a depressed economy.

The beginning of the third subperiod coincides with a major change in attitude towards the role of government in economic affairs. The subperiod extends from 1934 to 1941 and is characterized by a public commitment to support farm prices and by some attempts at controlling production. Most of the farm recovery programs of the thirties had to be abruptly suspended with the outbreak of the Second World War which is taken as the breaking point between this study's

third and fourth period. The fourth period covers the years between 1942 and 1947, that is the Second World War and the immediate post war. The fifth subperiod runs from 1948 through 1954. It is a subperiod of transition when the exceptional demands generated by the Second World War and recovery disappeared except for a short outburst generated by the Korean War. The sixth and last subperiod covers 1954 to 1962. During this subperiod relative peace and relative prosperity prevailed in the United States and agriculture had to readjust to a competitive world market.

The time period selected for this study offers examples of a variety of circumstances under which agriculture had to evolve. The different subperiods cover wars; inflation; farm depression - off-farm prosperity and overall depression in the presence of a variety of government programs.

The Conceptural Framework

The unmodified neo-classical analysis assuming perfect knowledge, perfect mobility and instantaneous adjustments has not been found completely satisfactory in explaining the behavior of American agriculture, particularly: (1) lack of appropriate adjustment to changing relative prices and (2) capital losses. Glenn L. Johnson[1] has argued that some refinements, particularly T. W. Schultz's,

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[1]Glenn L. Johnson, "An Evaluation. . ."

D. Gale Johnson and hypotheses about technological progress improve upon neo-classical analysis but fall short of an adequate explanation of observed developments. Schultz[2] predicted a secular process of substitution of capital for labor with a tendency for agricultural labor earnings to remain below earnings in other sectors but for those of capital to be consistently above earnings in alternative occupations. The observed process of capital-labor substitution that has taken place in American agriculture in the presence of sub-standard agricultural labor earnings tends to confirm Schultz's hypothesis. Contrary to his analysis, however, the historical experience tends to suggest that more often than not agricultural capital earnings have not been sufficient to cover acquisition costs. D. Gale Johnson[3] correctly shows that the removal of ignorance would lead to a long run static equilibrium but that uncertainty results in less than optimum production for static conditions. Available evidence indicate that, contrary to D. Gale Johnson's analysis, uncertainty tends to resolve in excess rather than underproduction. W. W. Cochrane,[4] finally, represents a school of thought that hypothesizes that technological change is the principal cause of the development

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[2]Schultz, Agriculture in an Unstable Economy.

[3]D. Gale Johnson, Forward Prices. . .

[4]Cochrane, Farm Prices. . .

of agriculture's excess capacity and of the irreversibility of agriculture's supply function. The existence of a large subsector of American agriculture that is observed sticking to different forms of obsolete technology and the existence of a considerable adoption gap between the time when new technology is revealed and the time of widespread adoption, casts strong doubt upon the validity of this hypothesis.

The theoretical backbone of this study is Glenn L. Johnson's fixed asset theory which assumes that:

1. Producers have imperfect knowledge and hence are forced to plan production based on expectations. Actual data affects expectations through some expectation function.

The lack of perfect knowledge makes ex post errors likely. Under the unmodified neo-classical analysis, errors of overproduction may be corrected by liquidating redundant resources at no loss. Under fixed asset theory, this is not always possible because it is recognized that:

2. There exists a divergence between the acquisition and salvage cost of assets.

This gap may make it unprofitable to reduce the quantity of input used when product prices fall in the way that the unmodified neo-classical apparatus would suggest. The production of a constant volume of output by means of an unchanged input mix in the presence of falling prices leads to less than expected returns to the factors of production,

falling income and capital losses. Further it can be shown that once an error of overproduction has been committed:

1. from an erroneous position of less than optimum production,
   a. some producers will find it profitable to expand production to the high profit point
   b. some producers, instead, will try to minimize losses by expanding production to a level in excess of the original optimum level of production
2. from a position of more than expected optimum production,
   a. some producers will not find it profitable to make any adjustment in the factor mix
   b. some others will be able to make a partial correction at more than expected optimum production
   c. some others will find it profitable to <u>further</u> <u>expand</u> production.

Hence assuming that errors are made at random - that is, that the expected value of the difference between actual production and expected optimum production is zero - individual adjustments will lead in the aggregate to more than expected optimum production.

United States Agriculture Between 1917 and 1962

The exceptional demand generated by the First World War spent itself principally in high prices and capital gains rather than in larger output. High prices and capital gains resulted in an optimistic outlook. Land input was increased and many veterans were encouraged to go back to farming. No substantial decrease in resource use followed, even after 1925 when long run price expectations were revised downward. Resources had become fixed in agriculture. The opportunity cost of most agricultural land was near zero while that of agricultural labor was low and falling as some signs of industrial unemployment began to appear in the second half of the twenties. Thus there was little incentive to contract the use of either of these two inputs. Most startling is the fact that during the late twenties there was net positive investment in durables despite falling expected product prices. This development is in accord with fixed asset theory which indicates that some adjustments from over-production may entail further investment. The changes in the value of assets are the unequivocal signs of overproduction during 1920-29. Agricultural durables did not produce expected earnings. Since it was not profitable to withdraw some such assets from farm production their value had to be brought in line with earnings with resultant capital losses.

Farmers continued to develop excess capacity during 1930-33 despite worsening terms of trade and despite existence of falling price expectations. During 1930-33: (1) the farm labor force increased, (2) the use of land increased, (3) there were decreases in some categories of durables more or less offset by increases in others and (4) there were increases in the use of farm produced expendables. The increased use of farm resources resulted in a larger output and decreases in total farm incomes which eventually became negative. The commitment of additional farm resources was accomplished during the depression despite a massive devaluation of land, a relative decrease in farm labor earnings and the failure of non-human forms of capital to pay their acquisition costs. This factoral adjustment can be interpreted as an attempt to raise the productivity of farm resources that had become fixed in agriculture either as a result of errors committed prior to the depression or during the depression.

Agriculture emerged from the great depression with capacity in excess of needs. Never-the-less no substantive deceleration in the rate of agricultural growth could be detected during 1934-41. The decrease in output recorded between 1934 and 1937 is attributed to bad weather rather than to either a process of agricultural adjustment or successful production controls. As soon as weather normalized, carry-overs and other signs of excess capacity

developed. During the period, labor migrated out of agriculture but not rapidly enough to prevent further deterioration of relative earnings. The use of most forms of non-human inputs increased substantially. After 1937 capital losses appeared indicating that the prevailing combination of farm resources was not capable of earning sufficiently to cover the acquisition cost of all inputs simultaneously. Government expenditures supported land values and prevented the occurrence of additional capital losses. Insufficient earnings to cover acquisition costs and hence, capital losses occurred under price supports to indicate that overcapacity could not be blamed exclusively on price supports.

The Second World War generated sufficient demand for agricultural products to prevent the development of the most obvious signs of overcapacity. In fact the quick response of agriculture to war needs despite limited availability of non-farm produced inputs and to a policy of price containment further confirms the hypothesis that excess capacity had developed during the thirties beyond the stimulus of price supports. Draft deferment policies and relatively low farm prices achieved the necessary volume of farm output during the War with a combination of farm resources more labor intensive than would have resulted otherwise. The high level of price supports that followed the war - which had been guaranteed in exchange for relative low prices during the war - contributed to fixing part of

the deferred labor in farming while prompting further output-expanding but loss-minimizing adjustments in the use of inputs.

High price supports and weak production controls became the rule after the Second World War. During the period labor left agriculture but not sufficiently fast to prevent further declines in farm labor earnings. Land input increased although the rate of land appreciation declined in association with the decline in government conservation expenditures. The use of the different forms of capital inputs increased despite their failure, particularly after 1952, to earn sufficiently to cover acquisition costs for all categories simultaneously. Until 1952 some of the signs of excess capacity were hidden successively by the operation of the Marshall Plan and by the Korean War. After 1952 carry-overs developed at an alarming rate. Carry-overs, disposal programs, falling earnings and capital losses indicate that weak production controls could not contain the overcommitment of farm resources during 1948-52. Falling earnings and capital losses in particular, indicate that resources were overcommitted relative to the prevailing level of price supports and thus excess capacity was not solely due to price supports.

Accidental sources of agricultural disappearance such as post war reconstruction and the Korean War were no longer in operation between 1955 and 1962. The rate of

agricultural growth, however, did not decline despite flexible price supports and occasional strict production controls. Despite the sharp decrease in the use of farm labor, labor earnings not only kept falling relative to off farm earnings but further fell relative to their level during the preceding period. Some decline in the use of land input was achieved thanks to the establishment of the Soil Bank. This program and government conservation programs were an important factor in preventing land value from falling during this period. After 1959, the use of some farm durables decreased but the use of many expendables kept increasing. The decrease in the use of durables was not sufficient to sustain earnings high enough to cover acquisition costs for many asset categories. Farm incomes continued to deteriorate despite substantial government expenditures to (1) finance carry-overs, (2) to subsidize foreign disappearance, and (3) transfer income to the farm sector through the support of land values. As during the periods immediately preceding and following the Second World War, falling returns to the factors of production and capital losses indicate that overcommitment had proceeded beyond the stimulus of price supports.

General Conclusions

Agriculture was observed between 1917 and 1962 under a variety of circumstances and yet no clear signs could be found of adjustment towards sectoral levels and

combinations of resources that would secure factor earnings similar to those achieved elsewhere in the economy. Overcommitment of farm resources was observed in the presence and absence of price supports, and during different phases of the business cycle. Only during World War II did the most obvious signs of excess capacity fail to appear although there are some indications that excess capacity may have been latent even during the war years.

The fact that excess capacity developed during different phases of the cycle and regardless of the presence or absence of price support programs tends to confirm the hypothesis that the U. S. agricultural sector has an inherent propensity to overcommit resources. This inherent propensity is not explained satisfactorily by the unmodified neoclassical theory of production economics. The unmodified theory fails to explain the expanded use of agricultural resources that was recorded despite falling prices between 1920 and 1933. Neither does it explain the commitment of resources beyond the stimuli of price supports which was indicated after 1933 by: (1) the existence of unused capacity at the outbreak of World War II and (2) lack of appropriate adjustment in factor's earnings and capital losses even at existing levels of price supports.

The behavior of agriculture during the period under study is in reasonably close accord with fixed asset theory. This theory shows that unforseen errors of management

may result in asset fixity. Asset fixity in turn may cause less than expected returns and capital losses. The theory also shows that in some initial situations of overcommitment individual producers may be wise to indulge in additional investment in order to minimize losses, thereby increasing production.

Some Lessons of the Study

The study of U. S. agriculture during the period 1917-62 reveals the existence of an inherent propensity to overcommit resources in the absence of effective production controls. The contrast of agriculture's performance during periods with and without price support programs suggests that this propensity is to a large extent independent of the support programs. The study of case commodities not subjected to support programs confirms this relative independence. The study of case commodities subjected to price supports that were later removed suggests that the removal of price supports did not lead *per se* to proper adjustment.

Agriculture's inherent propensity to overcommit resources is the result, according to fixed asset theory of:

1. imperfect knowledge and
2. inequality between inputs' acquisition costs and salvage values.

Imperfect knowledge causes errors of over and of undercommitment of farm resources. Some errors of undercommitment

are fully correctable. Some errors of overcommitment are only partially correctable while another type of errors of overcommitment resolves in further commitment of resources in order to minimize losses. If errors of over and under-commitment are random, decisions made by uncontrolled producers under imperfect knowledge have in the aggregate a bias towards overproduction.

Making policy recommendations is beyond the purpose of this dissertation. Never-the-less, it is worth stressing the most general policy guidelines that emerge from studying agriculture from the vantage point of fixed asset theory. These guidelines may be summarized as:

I. Preventing overproduction from occurring
   A. Improving producers knowledge
   B. Controlling production by means of
      1. Private control
      2. Public control

II. Mobilizing resources that have become fixed.

Since overproduction originates primarily with imperfect knowledge it appears that continuous emphasis in the production and dissemination of knowledge will contribute to the reduction in errors of management. The existence in the United States of the world's largest and most refined apparatus of agricultural information has not proved sufficient in the past, however, to reduce to tolerable proportions the problem of overproduction. Hence the production

and dissemination of knowledge may be viewed as a valuable element of agricultural adjustment policy but hardly its sole component.

The experience of the burley tobacco industry shows that effective government production controls are capable of preventing overproduction. These controls need not be confined to the use of any one input in particular but could be extended to or complemented by quantitative restrictions on the product sold.

There is no reason to confine production controls to public control. As Glenn Johnson has argued,[5] there are several examples of effective private production controls such as the sugar beet industry, the pickle industry, lemon industry and various milk marketing boards. The same author further argues that widespread and effective private controls may require a shift in public policy in the direction of preventing monopolistic behavior.

There exist currently unwanted fixed agricultural resources and since perfect knowledge cannot be achieved many more may be expected to become fixed in the future. Resources become fixed in production because their salvage value is sufficiently low to make it unprofitable to remove these resources from production. Raising the salvage value of fixed inputs by means of subsidies may contribute to

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[5]Glenn L. Johnson, "An Evaluation. . .", pp. 163-4.

free agriculture of redundant resources. Retraining programs aimed at raising the opportunity cost of farm labor and the Soil Bank are programs currently in operation that follow this general guideline.

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