Montana wheat and barley acreage supply functions : the effects of Federal farm commodity programs
by Robert Gene Aukes

Abstract:
This study is an analysis of the effects of various government farm commodity program policies on Montana wheat and barley acreages planted for harvest from 1961-1973. This analysis was facilitated by specification and estimation of Montana wheat and barley acreage supply functions.

An important part of this analysis was the construction of variables capable of expressing relative value and attribute information of the government program policies of the 1961-1973 period. On this basis, variables representing weighted diversion payment rates and weighted price supports were constructed. Montana wheat and barley acreage supply functions were specified, and were estimated by ordinary least squares regression analysis. Effects of farm commodity program policies on Montana wheat and barley acreages were analyzed by calculating elasticities of Montana wheat and barley acreage supply with respect to all explanatory variables, including policy variables.

Important conclusions of this study are: Montana farmers are very unresponsive to diversion or set-aside payment rates while making wheat and barley planting decisions, and Montana farmers are generally more responsive to relevant market prices than has been indicated by national and other regional studies.

MONTANA WHEAT AND BARLEY ACREAGE SUPPLY FUNCTIONS:

THE EFFECTS OF FEDERAL FARM COMMODITY PROGRAMS

by

ROBERT GENE AUKES

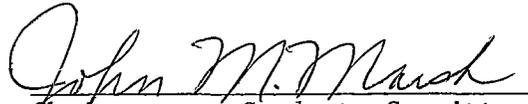A thesis submitted in partial fulfillment
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iv

TABLE OF CONTENTS

v

LIST OF TABLES

LIST OF ILLUSTRATIONS

vii

ABSTRACT

This study is an analysis of the effects of various government farm commodity program policies on Montana wheat and barley acreages planted for harvest from 1961-1973. This analysis was facilitated by specification and estimation of Montana wheat and barley acreage supply functions.

An important part of this analysis was the construction of variables capable of expressing relative value and attribute information of the government program policies of the 1961-1973 period. On this basis, variables representing weighted diversion payment rates and weighted price supports were constructed. Montana wheat and barley acreage supply functions were specified, and were estimated by ordinary least squares regression analysis. Effects of farm commodity program policies on Montana wheat and barley acreages were analyzed by calculating elasticities of Montana wheat and barley acreage supply with respect to all explanatory variables, including policy variables.

Important conclusions of this study are: Montana farmers are very unresponsive to diversion or set-aside payment rates while making wheat and barley planting decisions, and Montana farmers are generally more responsive to relevant market prices than has been indicated by national and other regional studies.

Chapter 1

INTRODUCTION

Montana wheat and barley production has taken place in an environment dominated by national agricultural commodity programs for the past several decades. The intent of these programs has been to effect changes in many phases of the agricultural production and agricultural marketing sectors, to effect changes in the market for agricultural inputs, and to change certain existing conditions of farm life in general. The desired changes of these programs have ranged from increased market prices for commodities and increased returns to factors of production, to reduced and more or less stabilized supplies of the agricultural commodities in question. The primary concern of program formulators has been increased welfare of the agricultural community.

Competing goals and policies of agricultural legislation are apparent when reviewing past policy. This characteristic of competing goals and policies has tended to compound, or even create, problem areas in agriculture. Past farm problems have been defined as price problems, supply problems, farm income problems, over-production problems, or return on investment problems; attacking one of these has invariably aggravated another.

In discussing the nature of the real farm problem, Shepherd describes it as an agricultural adjustment problem that results from two basic elements: Continued overproduction of farm products relative to the demand for them, keeping national farm income low, and low per capita farm income due to an excessive supply of farmers.[1]

The Problem

This thesis addresses the first element of the farm problem as defined by Shepherd. It attempts to identify and measure the effects of farm production control provisions on wheat and barley acreages planted in the State of Montana.

Unique climatic, geographical, and institutional factors influence agricultural production and marketing practices in the State of Montana. It is not unreasonable to assume that certain institutional production parameters, such as national agricultural production control policies, would influence Montana agricultural production differently from that of the remaining U.S.

This thesis concerns the existing understanding of the effects of farm production control legislation on annual production of Montana wheat and barley. It also concerns the differences of these effects observed between Montana and other production regions.

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[1] Geoffrey S. Shepherd, _Farm Policy: New Directions_, (Ames, Ia.: Iowa State University Press, 1964), p. 90.

The farm programs examined in this study were those developed
and enacted between 1961 and 1973, a period during which farm com-
modity surpluses were at record levels. During this period, control
of agricultural production appeared to be the primary objective of
agricultural policies. Nonetheless, keeping in mind past programs
and their numerous and conflicting goals, one must note that elements
in these programs deviated from strictly a production control objec-
tive. Maintenance of farm income and reduction of government costs
were major auxiliary concerns.

Justification

Wheat and feed grain policies, very important factors deter-
mining the organization of agricultural production in the State of
Montana, become the most important factors determining the organiza-
tion of agricultural production during periods of wheat and barley
surpluses and depressed market conditions.

Recent research employing national data has identified and
empirically measured the relevant farm commodity program policy
variables that significantly affect acreages of most major feed
grains and wheat in the United States (US). Much of this work
was focused on the voluntary farm commodity supply controls of the
1960's, in the belief that future farm legislation would be of a
form similar to these programs. The voluntary nature of these pro-
grams and provisions of the set-aside program (1971-1973) whereby

producers could plant any crops after meeting certain basic set-
aside requirements are thought to have increased the difficulty of
measuring producer responses to adjustments in program provisions.

Past research of this nature has focused on the analysis of
acreage supply relationships for wheat and the feed grains, and
the development of theoretical models for evaluating farm commodity
program effectiveness. The effect of relevant market prices on
acreages of wheat and feed grains, and the effect of support prices
and acreage restrictions for competing crops on acreages of wheat
and feed grains was also measured.

A considerable body of theory was developed in the construc-
tion of policy variables which would accurately represent the quan-
titative framework of the wheat and feed grain programs. The pur-
pose of constructing policy variables from measurable program data
was to simplify the model, incorporating more than one measurable
term into a single term subject to empirical measurement or estima-
tion. Statistical models included policy variables and relevant
market prices as explanatory variables in a model with acres of a
specific crop as the dependent variable. The net effect of all
other acreage supply determinants and random effects was assumed
to constitute a mean-zero random variable with constant and finite
variance over the sample period. This assumption permitted the

use of ordinary least squares for measuring individual effects of the specified variables.

Analysis of the effects of farm program policy variables and market prices on acreages of wheat and feed grains analyzed at the national level may not accurately identify and measure the variables relevant at a given regional level (the State of Montana). Regional characteristics of agricultural organization that appear relevant to Montana would include: (1) Soil and climatic conditions requiring specific production practices and permitting less substitutability among crops in production; (2) existing regional production functions which may differ from production functions of other areas due to differences in technology and the natural resource base; (3) regional characteristics of both primary and derived demand for wheat, feed grains, and their substitutes in production and consumption; (4) locational characteristics of the region, implying differences in costs of transporting farm commodities to the major consuming centers.

Given that the existing set of economic and institutional factors that determine acreages of wheat and barley planted in the State of Montana is unique, identification and measurement of the relevant farm commodity program policy variables as they influence Montana wheat and barley production would appear justified. Information pertaining to supply of wheat and barley production in

Montana, and producer responses to both market prices and farm

commodity program policies are needed.

Objectives

The primary objective of this thesis is to provide informa-

tion required for evaluating past government farm commodity supply

control programs, and to suggest a farmework for evaluation of such

farm programs in the future. Specific objectives of this thesis

are:

1. Identification and empirical measurement of underlying

    structural relationships between wheat and barley acreage

    in the State of Montana, especially as related to govern-

    ment farm commodity programs.

2. Estimation of own price and cross elasticities of supply

    for wheat and barley in Montana.

3. Determination of the marginal rates of transformation in

    production between wheat and barley in the State of

    Montana over the time period studies.

Methodology

Annual time series data on production, market prices, and farm

commodity programs relevant to Montana wheat and barley were collected

for the priod beginning in calendar year 1961 and extending through

1973. Data gathered from administrative interpretations of the annual wheat and feed grain programs was used to construct policy variables capable of capturing quantitative magnitudes and variations in these programs. Complete descriptions of all variables employed in this study will be found in Chapter 2. The explanatory variables employed in the acreage supply functions of wheat and barley were specified on the basis of economic theory and observed production practices. Since the objectives of this study center on identification and measurement of acreage supply determinants, multiple regression analysis was chosen as the method of investigation.

A brief historical survey of past farm commodity legislation is presented in the second chapter of this thesis. This survey begins with the Federal Farm Board of 1929, and it discusses the farm problem, objectives of farm policy, and the effects of this policy on agriculture. Chapter 3 presents the theory of supply. In Chapter 4 is found the construction of variables representing certain agricultural policies. Also presented in Chapter 4 are econometric theory, development of the general linear model, analysis of certain statistical problems, and discussion of related research. The estimated Montana wheat and barley acreage supply functions are presented in Chapter 5. Also discussed are the significance and magnitude of the estimated coefficients. Chapter 6 presents a summary and concluding remarks.

Chapter 2

HISTORICAL REVIEW OF AGRICULTURAL LEGISLATION

Major farm commodity legislation originated with the onset
of the 1929 depression and has remained within the institutional
structure of agriculture to this day. Early farm commodity legi-
slation was directed primarily toward the control of food and feed
grain surpluses. In 1929 the Federal Farm Board was empowered by
Congress to make loans to cooperatives for the purpose of control-
ling grain surpluses by purchasing excess supplies and constructing
new storage facilities. Cash advances were made to farmers for
their crops, thus indicating some farm income objectives of this
early program.

The development of farm commodity programs since 1929 has
been shaped by certain basic problems of American agriculture and
by problems caused by the programs themselves. Different programs
have had varying goals from year to year, depending on the particu-
lar problem at hand. In recent years farm commodity legislation
has encompassed a wider range of goals to include consumer interests,
market structure issues, and world trade issues.

Stable supplies and prices of wheat and feed grains is a goal
of commodity programs desired by commercial farming interests, the
livestock industry, the food processing industry, consumers and the

federal government.

Inherent in the Agricultural Marketing Act of 1929 and all major farm commodity programs since that time is an assumed imbalance of supply and demand of food and feed grains. Periods of scarcity of these grains in the U.S. have occurred during major wars or during periods of drought in heavily populated countries which required substantial food relief. These periods have seen a depletion of stocks or reserves. The livestock industry which utilizes feed grains as a primary input experienced disruption during these periods as a result of violently fluctuating factor prices; however, domestic consumption of primary food and feed grain products has never been threatened by an inability of American agriculture to produce an adequate supply of these grains. Unless there is an extreme outward shift in demand for wheat and feed grain exports, or conditions which require a large relief effort, inability to produce an adequate supply of wheat and feed grains is not a problem of American agriculture.

Historically, overproduction of wheat and feed grains (excess production capacity), with its accompanying large stocks or surpluses, has been the dominant problem in American agriculture. Excess capacity is defined by Tweeten as "the surplus of production capacity

over market utilization at socially acceptable prices."[2] Excess

production capacity with the accompanying grain surpluses and de-

pressed market prices leads to farm incomes judged by agricultural

policymakers to be socially unacceptable. Stabilizing farm incomes

at some level deemed acceptable by agricultural policymakers has

been a primary goal of farm commodity programs over the past several

decades.

Associated with excess capacity and the resulting wheat and

feed grain surpluses are other social problems. The cost to society

of storing excess supplies of grain has often been determined as

a primary farm commodity problem, and a problem at which farm com-

modity legislation was directed. Given a carry-over of wheat in

July of 1960 of 1.4 billion bushels, or a carry-over of corn in

October of 1961 of 2.0 billion bushels, it can be seen that the

cost of storage facilities of this scale could be burdensome to

society.[3]

The concern for efficient resource allocation in reference

to the resources employed in grain storage seems valid; however,

a more pressing problem appears to be inefficient resource alloca-

tion in reference to wheat and feed grain production in surplus

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[2]Luther Tweeten, Foundations of Farm Policy, (Lincoln, Nebr.: University of Nebraska Press, 1970), p. 155.

[3]Ibid., p. 309.

quantities. The existence of given quantities of commodities not clearing the market at some established minimum price level, or simply the existence of a price floor not allowing market prices to fall to an equilibrium level, would signal a market misallocation. Estimates of excess production capacity in agriculture in the period 1956-1966 fall between 5-10 percent of farm output. Estimates of excess supplies of individual farm resources have found farm labor to be in relatively greatest excess. From 1952-1961, approximately 40 percent of all agricultural labor was estimated to be in excess supply. A continuing goal of agricultural policy has been the efficient allocation of resources. While past policies have supported farm prices, farm receipts, and net farm income, they have not substantially slowed the outflow of labor from agriculture.[4]

Feed and food grain reserves and excess production capacity have proven to be beneficial to the U.S. economy in periods of war and world food emergencies. Because of high capital costs and uncertainty, it cannot be assumed that private enterprise would provide some socially desirable level of either grain stockpiles or excess productive capacity. Thus, food reserves and agricultural productive capacity are concerns of national agricultural policy.

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[4]Ibid., pp. 156, 168, 324, 328.

Stability and support of farm commodity prices and farm incomes
has been a major goal of agricultural policy since 1929. In the
1920's and 1930's the agricultural problem was diagnosed as a problem
of farm commodity price instability as prices received by farmers
varied considerably more than did prices paid by farmers. This
price instability problem evolved into a problem of low prices
of farm commodities during the industrial depression of the 1930's,
and different price support tools of agricultural policy have been
employed continually to this day.

Domestic price instability of food and feed grains is caused
by unstable export demand, livestock production cycles, and highly
variable supplies of grains as a result of exogenous forces affecting
growing conditions. The problem is accentuated by the fact that de-
mand for farm products is very inelastic. The problem of low farm
commodity prices is due to the continued presence of excess produc-
tion capacity and expanding supplies of farm commodities in the
face of this higly inelastic demand. Increasing price flexibility
in recent periods in the presence of increased excess capacity and
decreasing income elasticy of farm products has tended to worsen
the condition of low and unstable farm commodity prices.

It is felt by most agricultural economists that the agricul-
tural problem was incorrectly diagnosed as a price problem, and

that price support measures may have impeded the necessary resource adjustments required for long run income stability of farmers.[5]

Low prices are not the problem, but a symptom of the problem. Despite this, price supports have had a major impact on aggregate farm income and remain in present agricultural programs.

Price support measures have generally been tied to some form of production controls, and benefits of price support programs have been distributed among farmers in proportion to their sales or production. For this reason the problem of rural poverty has been poorly addressed by price support programs, with the lion's share of program benefits being received by the group of farmersthat controls the major portion of farming's resource base. The problems of supply control of feed and food grains and rural poverty are related but separate issues, and it should not be expected that these two different situations can be corrected with one set of actions.

The choice between voluntary and mandatory supply controls is a decision that must be made if farm income is to be increased through supply control mechanisms. The term "mandatory" may over-emphasize restrictions on the freedom of farmers, because in the past supply control programs have become mandatory only if approved by a substantial majority of producers in a referendum vote. Given

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[5]Shepherd, p. 34.

a supply control program in the presence of excess production capacity and excess supplies of feed and food grains, increments to farm income can be attained from either larger consumer outlays or larger Treasury costs. In the past, mandatory control programs have tended to increase farm income through the market while voluntary control programs imply greater Treasury costs. Mandatory control programs represent a regressive "tax" on consumers by increasing food expenditures. Low income consumers spend a higher proportion of their incomes on food than do more affluent consumers, and would therefore bear a relatively larger portion of program costs. Mandatory control programs also have relatively high administrative costs, tend to freeze production patterns which may be inefficient, and tend to restrict the freedom of farmers to produce and market their commodities. Voluntary control programs are supported with funds from the Treasury and therefore represent a progressive form of taxation on consumer-taxpayers.

The general tendency of farm commodity legislation in the U.S. has been a growing commitment of the federal government to support farm income. The voluntary supply control programs, commodity storage programs, and direct payments used in the past to facilitate this commitment have resulted in high Treasury costs. It is a goal of agricultural policymakers to minimize Treasury costs of farm commodity programs without depressing farm incomes to unacceptable levels.

In ranking farm commodity programs in terms of efficient use of government dollars, Tweeten ranks mandatory supply control programs as being the most efficient, followed by long-term land retirement, short-term land retirement, direct payments, and lastly commodity storage.[6]

A more recently stated goal of farm commodity legislation is reliance on the market for determining efficient production patterns. Crop by crop allotments were eliminated. This enabled farmers to maximize income by growing crops they can grow most efficiently. Under earlier programs, farmers attempted to maximize income by diverting acreage from the production of commodities whose supply was controlled by government programs to the production of commodities whose supply was not controlled. Supply controls on specific commodities were found to be much less effective in attacking the farm income problem if cross-compliance with all other existing farm commodity supply control programs was not enforced.

In international trade, the U.S. has long had both a comparative and an absolute advantage in the production of feed and food grains.

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[6]Tweeten, p. 346.

Due to a recent increase in export demand and abundant domestic

production, U.S. exports of feed and food grains have helped to main-

tain and improve the balance of payments position of the U.S. in

international trade. Maintaining a competitive position in world

markets through exports of farm commodities has become a primary

goal of U.S. agricultural policy.

In 1929 the Federal Farm Board employed the technique of pur-

chase and storage to attack the perceived problem of excess supplies

and low prices of farm commodities. With a revolving fund of $500

million, the Board made loans to cooperatives. Regional marketing

cooperatives were developed to prevent and control surpluses of

certain commodities and to prevent extreme price responses to exis-

ting surpluses or shortages. Provisions of the Agricultural Marketing

Act were broadly interpreted, justifying the attempted maintenance

of U.S. wheat and cotton prices at a level above world market levels.

According to J.S. Davis in December, 1930, domestic wheat prices

would have been 30 to 40 cents lower without the program.[7] However,

the Board's operating funds were soon exhausted and all domestic

grain prices moved with world prices to the lowest level in history.

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[7]Rainer Schickele, Agricultural Policy: Farm Programs and National
Welfare, (New York: McGraw-Hill Book Co., 1954), p. 189.

In its failure, the Federal Farm Board learned that a very large quantity of feed and food grains must be purchased if a noticeable effect on the market is to be made. This observation is consistent with the contemporary theory that price levels of feed and food grains are dependent upon carryover levels. For future reference, the Board also recommended that effective production controls must accompany any effort to maintain grain prices. The Federal Farm Board was abolished in 1933.

The Agricultural Adjustment Act, enacted in 1933, authorized strong policies for the purpose of raising farm prices and incomes. In addition to the objectives of bringing immediate relief to farm families and increasing farm income, the failure of the Federal Farm Board convinced policymakers that price-depressing surpluses must be prevented by the use of production controls.

The domestic allotment plan was the name of the wheat program in the Agricultural Adjustment Act. The domestic allotment plan was comprised of production controls and income distribution. The production control mechanism consisted of a contractual agreement between farmers and the USDA for the farmers to reduce their average wheat acreage by as much as 20 percent depending upon the existing supply situation. In return for this reduction of wheat acreage, farmers were guaranteed adjustment payments on that proportion of their wheat to be used for domestic food. Certificates

were issued to farmers for their allotment (that portion of their wheat production to be used for domestic food), and these certificates were sold by farmers for a value equal to the difference between market price and some assumed "fair" price established by policymakers.[8] Adjustment payments were designed to equal the difference between market price and the parity price on allotment production only. The parity price would be the average price for wheat during the 1910-1914 base period multiplied by a current prices paid or parity index number. Adjustment payments were made on about 54 percent of the wheat production of producers who complied with the production controls. The certificates were purchased by millers or other processors with the purchase of food wheat and hence constituted a use tax on wheat.

In the feed grains arena, the Agricultural Adjustment Act employed both production controls and income distribution provisions. Nonrecourse loans facilitated the income distribution objectives. Nonrecourse meant that the advance loans made to farmers on given commodities, at some rate per unit of commodity, need not necessarily be repaid. If the market price of this given commodity remained below the loan rate, farmers could deliver the commodity to the

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[8] Don F. Hadwiger, Federal Wheat Commodity Programs, (Ames, Ia.: Iowa State University Press, 1970), p. 122.

Commodity Credit Corporation as payment of the loan. If the market price of the commodity in question were greater than the loan rate, farmers could sell the commodity on the open market and repay the loan. The Commodity Credit Corporation was a government financed corporation created in 1933 by executive order. The loan rate was adjusted to some ratio of parity price and constituted a price floor for those farmers who complied with the accompanying production controls. Barley was not a feed grain included in this program. Nonrecourse loans were used in subsequent feed and food grain programs and have remained in these programs as major policy tools until quite recently.

Allotments for the domestic allotment plan were based on the average wheat acreage raised on each farm during a base period extending from 1930 to 1932. Farmers who had not grown wheat during this period received no allotment and no certificates. In addition to bringing no income relief to farmers who had planted no wheat during the base period, the plan tended to lock resources into a rigid production pattern without regard for economic efficiency.

Another difficulty of the Agricultural Adjustment Act was that the processing tax on food wheat was regarded as a tax on bread. This tax was regressive in nature in that lower income families spent a larger proportion of their income on staples such as bread than did higher income families.

It was felt by policymakers that the Agricultural Adjustment

Act would not stimulate production as much as the policies of the

Federal Farm Board had because price subsidies covered only part of

the existing production and not any additional or marginal produc-

tion. Also, because the domestic allotment was based on past pro-

duction, it was felt that present or future production decisions

would be relatively unaffected. Economist John D. Black disagreed

with these ideas, basing his argument on traditional marginal

analysis. He theorized that price subsidies would help to cover

most of the fixed costs in farming and farmers would expand pro-

duction as long as returns on additional acres exceeded variable

costs on these acres.[9]

Weather proved to be the main influence on production and

prices of feed and food grains from 1933-1935. The problem with

voluntary controls of the Agricultural Adjustment Act can be ex-

emplified by the fact that while complying farmers reduced their

wheat acres by 19 percent in 1935, noncomplying acreage increased

by 70 percent.[10] It was generally concluded that if voluntary

controls were to be effective, more persuasive incentives would

have to be offered. In 1936, the U.S. Supreme Court ruled the

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[9]Ibid, p. 123.

[10]Ibid, p. 128.

production control and processing tax features of the Agricultural

Adjustment Act unconstitutional.

Soil conservation practices were combined with production con-

trols in the Soil Conservation and Domestic Allotment Act of 1936

in hopes that the U.S. Supreme Court would not find that combina-

tion unconstitutional, as it had the combination of production con-

trols and a processing tax. Under this format, farmers were rewarded

for voluntarily shifting production from the production of soil-

depleting crops to the production of soil-conserving grasses and

legumes. Many soil-depleting crops such as wheat and feed grains

were in excess supply at this time. In fact, "soil depleting"

crops were almost defined as those in surplus. The Supreme Court

did not disturb this policy combination and it was employed in sub-

sequent legislation. A stated goal of income parity for farmers

was emphasized in this act. Income parity was defined as the ratio

of purchasing power of the net income per person on farms to that

of income per person not on farms which prevailed during the August

1909 to July 1914 period.[11] The base period used offered a very

favorable standard to farmers. In operation, price parity was the

concept employed. Drought adequately controlled grain production

in 1936, and in absence of drought in 1937, the program did not give

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[11] Tweeten, p. 303.

adequate control.

The components of the Agricultural Adjustment Act of 1938 were
not novel, however the combination of provisions employed was unique,
and became the pattern for subsequent legislation. Price supporting
loans, conservation payments, parity payments, export subsidies,
and federal crop insurance were combined to support farm income. As
a condition for receiving price support loans, conservation payments,
and parity payments, complying farmers had to control production
by planting within acreage allotments or removing given acreages
from the production of soil-depleting crops. A more restrictive
control method was introduced for the first time in this act with
the employment of marketing quotas for crops such as corn, cotton,
and wheat. Marketing quotas were not to be enforced unless surpluses
became great, and then only after farmer approval by two-thirds
affirmative vote on the question in a referendum. If approval was
not granted in such a referendum vote, no farm program for that given
commodity would operate during the ensuing year.[12]

Nonrecourse loans were employed as a means of supporting prices
of commodities. Such loans were made available to farmers whenever
prices of commodities such as corn or wheat fell below 52 percent of
parity price. The price of wheat did fall to less than 52 percent of

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[12]Hadwiger, p. 153.

parity during the first year of the program, and the loan rate was in effect acting as a price support from the beginning of the program.[13] The loan rate for certain "basic" crops (corn, cotton, and wheat) was adjusted by the Secretary of Agriculture at levels between 52 and 75 percent of parity price. These support levels on the basic crops were mandatory. The Commodity Credit Corporation was also authorized to support prices of virtually any other commodity. These commodities were called "permissive" commodities, and the support was not mandatory. Price supports for barley were initiated in 1940 under this provision. The nonrecourse loan served as a mechanism for holding crops off the market during periods of market surplus, and as the primary method for establishing and maintaining an "ever-normal granary." The objective of the "ever-normal granary" was to assure adequate food and feed supplies during poor crop years, and to provide an outlet for surpluses during good crop years to prevent large market price declines.

The Secretary of Agriculture was instructed by the Agricultural Adjustment Act of 1938 to make parity payments to producers of wheat, corn, and other "basic" crops, providing returns to these producers as nearly equal to parity prices as the available public funds would

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[13]Ibid., p. 167.

permit. The base period for parity price calculations was August

1909-July 1914. Parity payments were to be made on a normal pro-

duction figure determined from a reported history of production per

acre in prior years.

Estimates of the effects of policies of the Agricultural Ad-

justment Act indicate that acreages of wheat and other soil-depleting

crops would have been as much as 30 million acres greater per year

in the U.S. in the absence of existing controls. The reduction of

wheat acres due to commodity program production controls was esti-

mated to be 18 million acres per year between 1939 and 1941, and an

acreage even greater than that in 1942. Wheat price studies have

indicated that during the period from 1938-1942, wheat prices could

have been as much as 50 percent lower than the prices that actually

existed had price support programs not been in effect.[14]

A program of export subsidies as provided for in the Agricul-

tural Adjustment Act was announced in 1938 whereby the Federal

Surplus Commodity Corporation purchased wheat on the open market

and sold it to exporters at a price enabling them to sell abroad.

Foreign sales of wheat amounting to 94 million bushels during the

1938-1939 marketing year were assisted by the Federal Export Pro-

gram in this manner. Due to the war, foreign sales decreased in

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[14]Ibid., pp. 160-161.

following years, and by 1942 a wheat storage crisis had developed.
To alleviate the storage problem, wheat was channeled into alterna-
tive uses such as livestock feed and grain alcohol production. Sub-
sidies were used to facilitate domestic sales of surplus wheat
stocks. Other agricultural commodities were similarly disposed of
domestically with the aid of subsidies.

During active involvement of the U.S. in World War II, emphasis
of agricultural policy changed from production controls to production
encouragement. High price guarantees in the form of price support
loans at price levels ranging between 85 and 90 percent of parity
price were common during the war. Surpluses gained before the war
changed from burdens to blessings, and benefits from conservation
practices were reaped in the form of increased production during the
war. Nonbasic commodities, commodities other than corn, cotton,
rice, wheat, and tobacco, were included in price support programs
via the Steagall Amendment in 1941 at support levels equal to 85
percent of parity price. The Secretary of Agriculture was empowered
to include these nonbasic commodities in price support programs if
he found it necessary to increase their production. The minimum
rate of support for the nonbasic commodities was raised to 90 percent
of parity by the Stabilization Act of 1942. This act also extended
price supports for both basic and non-basic commodities at 90 percent
of parity for a length of time extending two years after the end of

the war. The extension of price supports at such a high level
past the end of the war was in anticipation of post-war relief
requirements, and to show farmers that increased wartime agricul-
tural production would not be rewarded with an instant production
adjustment due to falling prices. The post-war price supports
provided for in the Stabilization Act of 1942 were to be available
only to those farmers who complied with acreage or marketing
quotas that had been announced by the Secretary of Agriculture and
approved by the growers.

Due to the three-year food crisis in Europe following World
War II, the United States was able to export just over one billion
bushels of wheat during that period. Production of wheat was ex-
panded in the U.S. as much as possible, and U.S. officials would
have preferred to export even greater quantities if such supplies
had been available. Coarse grains such as corn were shipped from
the U.S. to be used as food abroad. Surpluses of farm commodities
were replaced by a severe scarcity situation, and this atmosphere
paved the way for commodity legislation in 1948 that was quite
favorable for farmers.

Price supports for basic commodities were supposed to drop
back to the range of 52 to 75 percent of parity after December 31,
1948, due to the termination of the Stabilization Act. However
the Agricultural Act of 1948 was approved and mandatory price

supports for basic crops at 90 percent of parity were established

for crop year 1949. Price supports of other commodities such as

barley were authorized "at levels in a fair relationship" with

prices of the basic commodities.[15] These price supports were again

facilitated through price support loans. This law also provided

for a revised method of making parity calculations in the future.

Beginning January 1, 1950, parity prices for individual crops were

to be computed so as to take into consideration both the 1910 to

1914 base period, and average prices for the previous ten years.

A transitional parity scheme was devised to limit the drop from

old to new parity to steps of not more than five percent of old

parity per year.

The Agricultural Act of 1949 provided for price supports for

the basic crops at 90 percent of parity for 1950, 80 percent of

parity for 1951 (for crops with allotments or marketing quotas),

and 75-90 percent of parity after 1951.[16] However, from 1949 to

1954 price supports for basic crops and "permissive" crops such as

barley remained at the 90 percent of parity level. During this

period the effective parity prices on basic crops was the old,

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[15]U.S. Department of Agriculture, Agricultural Stabilization and
Conservation Service, Commodity Programs and Related Legislation
through the Years, BI No. 11 (1975), p. 4.

[16]Ibid.

higher parity calculation, or the higher of the two parity measures.
Price supports were continued in 1955 for basic crops at a level
within the flexible 82.5 to 90 percent of parity range. Support
levels dropped in 1956 and thereafter to the 75 to 90 percent of
parity range.

Acreage controls and marketing quotas were imposed in 1954 for
the first time since World War II. It was expected that lower price
supports in the years 1955 and 1956 would reduce production of wheat
and feed grains; however even with the subsequent acreage controls
and marketing quotas, surpluses mounted. The Soil Bank Program es-
tablished by the Agricultural Act of 1956 was designed as a program
to counteract surpluses of farm commodities. The Acreage Reserve
provision of the Soil Bank Program allowed payments for farmers to
reduce plantings of allotment crops, wheat, cotton, corn, tobacco,
peanuts, and rice. The other major provision of the Soil Bank Pro-
gram, the Conservation Reserve, was a general cropland retirement
program which allowed payment to farmers for diversion of part or
all of their cropland to soil-conserving uses. The Soil Bank Pro-
gram was enacted in addition to the existing price support and allot-
ment program, and in practice, participation in the Soil Bank was not
a necessary condition for receiving price supports. In the case of
corn, producing within allotments was not a necessary condition for
Soil Bank participation. Drought conditions prevailed in 1956, and

many of the acres participating in the Acreage Reserve Program

were acres on which production had already failed due to natural

causes. In this respect, the Soil Bank Program was a vehicle for

relief rather than just a means of controlling production. The

dual objectives of drought relief and production control persisted

in the 1957 Acreage Reserve Program, with most emphasis on relief

goals. Reductions in wheat and feed grain acreages were accomplished,

however, at an extremely high cost. In 1957 reductions in wheat

production, costing $230 million, were estimated at 175 million

bushels.[17] Prospects of better growing conditions for wheat greatly

reduced participation in the wheat Acreage Reserve Program in 1958.

Given the price support and allotment program, farmers simply found

it more profitable not to commit wheat acres to the Acreage Reserve

Program. From the producer's standpoint, the Acreage Reserve Pro-

gram was more a drought relief program than an acreage control pro-

gram. Amid speculations that appropriations for a 1959 acreage

reserve program could not be obtained from Congress because of the

program's record of ineffective production controls, the acreage

reserve concept was phased out. Funds were instead increased for

the longer term Conservation Reserve Program. Shepherd claims that

Conservation Reserve rental rates overpaid the poor land, relative

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[17]Hadwiger, p. 219.

to the good land, and the percentage effect of the program on pro-
duction was only one-half or one-third as great as the percentage
reduction in acres.[18]

The corn farmers' referendum of 1958 terminated corn allotments
for the following years with the condition that price supports at
90 percent of the average price of the preceding three years be main-
tained. The status of barley changed from that of the "permissive"
price support category to the nonbasic category with the stipulation
that price supports be made available for barley "at such level of
its parity price as the Secretary of Agriculture determined to be fair
and reasonable in relation to the level of support made available
for corn."[19] Because price support for corn was mandatory, price
support for barley was also mandatory.

Tweeten refers to the Benson programs of the 1950's as an
unworkable combination of price supports with ineffective produc-
tion controls at a time when technological revolution had struck
agriculture full force. At the end of the 1950's, carry-over stocks
of wheat had reached 1.4 billion bushels and carry-over stocks of

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[18]Shepherd, p. 45.

[19]USDA, ASCS, Commodity Programs, p. 8.

corn had reached 2.0 billion bushels.[20] Production controls had indeed failed.

The emergency Feed Grain Act of 1961 established the basic form of feed grain program for the 1960's. The program created by this act was voluntary, offering producers generous rewards for participation. The dominant functional element of this act was an acreage diversion program for corn and grain sorghums under which payments were made to producers who diverted acreage from the production of these feed grains to conserving uses. Producers who complied with this program qualified for price supports at 74 percent of parity, and diversion payments for those acres diverted from production. No price supports were offered to producers who did not comply with the program at the minimum level of participation. Higher payment rates were offered to producers who chose to divert acreages larger than the minimum qualifying level. This program indirectly authorized a higher price support level for barley because support rates for barley were tied to the level of support made available for corn. The feed grains program for crop year 1962, approved as the Agricultural Act of 1961, continued the policies employed in 1961 and included barley as a diverted acre crop.

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[20]Tweeten, p. 309.

Emergency wheat programs were enacted in 1962 and 1963 which extended acreage diversion provisions to wheat. The primary objective of these programs was to reduce wheat production below the 55 million acre national wheat allotment by approximately ten percent. Price supports for producers were made dependent upon compliance with the wheat acreage diversion program. Price supports during these years were maintained within the 75 to 90 percent of parity range. The acreage allotment and marketing quota system originated in 1954 continued through 1963.

The feed grains programs through 1970 remained basically as extensions of the emergency feed grain program of 1961, employing acreage diversions with generous rewards for participation.

The wheat program for 1964 was basically a two-price plan. Complying producers were required to divert land from wheat production to soil-conserving uses. Diversion payments were made on diverted acreage, and complying producers received price supports in the form of both domestic certificates and export certificates. This program was voluntary; however producers who did not comply received no certificates and no program benefits. Programs similar to the 1964 Wheat-Cotton Act continued throughout the 1960's, with acreage diversion and marketing certificates remaining as the primary policy tools for the wheat sector.

The voluntary feed grain program established under the Agricultural Act of 1970 was a set-aside program, under which participating farmers were required to set aside feed grain acreage or other cropland in order to be eligible for price support loans and set-aside payments. The set-aside provision of this program functioned similarly to the diversion provision of the 1960's programs.

A set-aside program was also established for the wheat sector under the Agricultural Act of 1970. Under this program producers were required to set aside given acreages from the production of wheat or other substitute crops to qualify for price support loans, certificates, and set-aside payments. For the 1971 to 1973 crop years, marketing quotas and acreage allotments were suspended.

The 1961 and 1962 feed grains and wheat programs were quite effective in reducing both acreages and total production of these grains. Feed grains acreage reduction in 1961 for the country as a whole was about 13 percent, and the reduction in feed grains production was about 10 percent.[21] The difference between the reductions in acreage and production is due to the fact that participants removed their poorer acres from production and applied more variable inputs to the remaining grain acres. Also, nonparticipants in the program tended to increase their production. When examining the

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[21]Shepherd, pp. 49-51.

Conservation Reserve program of 1960 for these effects, Shepherd found that eight percent of the total cropland was removed from production, and 4.5 percent of the total value of all 1960 crops could have been produced on this land removed from production.[22]

Whether measuring acres removed from production, or percent of total farm product eliminated, the feed grain and wheat programs of the 1960's appear to have been more effective than the Conservation Reserve program. Studies also indicate that the feed grain and wheat programs of the 1960's were more costly to the government, both in an absolute sense, and when measured by the standard of the reduction in value of crops produced per dollar of rental payment. Rental payments under the feed grain and wheat programs of the 1960's tended to be much higher than for the Conservation Reserve program, and the range of rental rates accomodating differing productivity levels of land was about twice as great for the programs of the 1960's.[23]

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[22]Ibid., p. 45.

[23]Ibid., p. 49.

Chapter 3

THEORETICAL CONSIDERATIONS

Theory of Supply

The theory of supply is a logical development from the theory
of the firm. A firm is a technical unit in which single or multiple
commodities are produced. Inherent in this technical unit is an
aggregation of scarce resources for which economic returns exist.
The firm is assumed to maximize profits via the postulate of ration-
ality. Profits are defined as the difference between revenue from
the sale of outputs and the costs of all inputs. The determination
of optimum profits is based on a technical production function and
given sets of factor and product prices. These sets of prices are
determined by the supply functions of the factor markets and the
demand functions of the product markets respectively.

The production function is a purely physical input-output
relationship relating physical units of inputs to physical units
of output. It represents the set of technical rules reflecting
the "state of the arts" which specifically quantify the transfor-
mation of inputs into outputs. The concept of the production func-
tion is general, as a specific production function may be given by
a single point, a single continuous function, a single discontinuous

function, or a system of equations.[24] Production functions given

by a single continuous function with continuous first- and second-

order partial derivatives will be discussed.

The production process takes place over time, and both input

and output levels are measured as flows over time. The relevant

time period for a short-run production function is such that it is

sufficiently short to prevent changing technology from altering its

shap, sufficiently short to prevent the entrepreneur from altering

the level of employment of certain inputs (plant, equipment, tech-

nology), yet sufficiently long enough to allow the completion of the

production process. Fixed and variable inputs are defined relative

to the time frame. Levels of usage of fixed inputs cannot be altered

in the short-run, whereas levels of usage of variable inputs are

totally variable within this time frame. By extending the length

of the planning period, more and more inputs become variable; in the

long run, all inputs become variable. Given the production functions

of the firms of an industry, the factor supply functions facing the

firms in the input market, and the demand functions facing the firms

in the product market, cost functions and equilibrium output relevant

to the industry firms can be calculated.

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[24]James M. Henderson and Richard E. Quandt, _Microeconomic Theory: A Mathematical Approach_, (New York: McGraw-Hill Book Co., 1971), p. 52.