IMPLICATIONS OF THE CHANGING INPUT MIX ON SELECTED TYPE-OF-FARMING SITUATIONS

by

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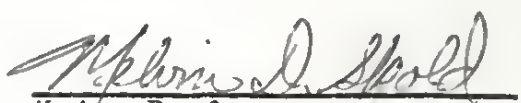

Major Professor

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I. INPUT TRENDS IN U.S. AGRICULTURE

In the last century the composition of inputs used to produce the agricultural output of the United States has undergone definite changes. As seen by Table 1, the changes in the input mix in American agriculture have been extensive. From 1870 to 1940, the indexes reveal that the percentage share of labor employed on American farms was reduced by about 24 percent and concurrent with this was a 24 percent increase in the percentage share of capital employed. Real estate inputs, on the other hand, accounted for a relatively constant proportion of inputs during this period. These changes took place when human and animal power were gradually being replaced by mechanical power.[1]

Table 1

CHANGES IN COMPOSITION OF INPUTS,
UNITED STATES AGRICULTURE 1870-1940
(Inputs Based on 1935-37 Price Weights)

YEAR	LABOR %	REAL ESTATE %	CAPITAL %*	TOTAL %
1870	65	18	17	100
1880	62	19	19	100
1890	60	18	22	100
1900	57	19	24	100
1910	53	20	27	100
1920	50	18	32	100
1930	46	18	36	100
1940	41	18	41	100

*All inputs other than labor and real estate
Source: Loomis and Barton, Productivity of Agriculture, United States 1870-1958, U. S. Department of Agriculture Tech. Bull. No. April, 1961, p. 11.

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[1]Ralph A. Loomis, and Glen T. Barton, Productivity of Agriculture, United States 1870-1958 U. S. Department of Agriculture Tech. Bull. No. 1238 (Washington: U.S. Government Printing Office, April, 1961), p. 6-9.

Table 2

Percent of Total United States Farm Inputs
Represented by Capital, Labor and Land, 1940-60

Year	Labor %	Capital %	Land %	Total %
1940	58.6	32.3	9.1	100.0
1945	56.5	38.6	8.9	100.0
1950	41.8	49.3	8.9	100.0
1955	35.0	56.5	8.5	100.0
1960	30.1	61.4	8.5	100.0

Source: Earl O. Heady, Edwin O. Haroldson, Leo V. Mayer, Luther G. Tweeten, Roots of the Farm Problem (Ames, Iowa: Iowa State University Press, 1965), p. 12.

Table 3

Index Numbers of Farm Inputs in Major Subgroups
United States, Selected Period and Years, 1940-64
(1957-59=100)

Year	Farm Labor	Farm Real Estate	Mechanical Power and Machinery	Fertilizer and Liming Materials	Feed Seed and Livestock Purchases[1]	Miscellaneous
1940	192	92	42	28	45	73
1945	177	88	54	45	72	76
1950	142	97	86	68	72	85
1955	120	100	99	90	86	94
1960	92	100	100	110	109	106
1964[2]	79	102	101	155	123	120

1. Non-farm Portion of Feed, Seed and Livestock Purchases.

2. Preliminary

Source: Changes in Farm Production and Efficiency, 1965, U. S. Department of Agriculture, Stat. Bull. No. 223, Revised July, 1965 (Washington, U. S. Government Printing Office), p. 36.

The changing composition of inputs during this period was therefore characterized by the decreased role of labor, with real estate changing very little anc capital and intermediate products increasing substantially.

In the last few decades, greater changes have occurred in the composition of agricultural inputs than in many previous decades.[2] This may be verified by table 2 which reveals the post 1940 trends in mix of inputs of United States agriculture. During this period, inputs of "farm-owned" labor decreased about 28 percent, (as seen by the indexes on table 2) while the proportion of capital inputs increased about 29 percent. Land inputs decreased by .6 percent of total inputs.

Subclassification of capital and intermediate product inputs since 1940 provides a more detailed view of the changing input mix. A more detailed breakdown of the indexes shown in Table 3 is given in Table 4.

Table 4

Index Numbers of Farm Inputs in Major Subgroups
United States, Selected Period and Years 1940-64
(1957-59=100)

	1940	1964
Farm labor	192	79
Farm real estate	92	102
Mechanical power and machinery	42	101
Fertilizer and living materials	28	155
Feed, seed and livestock purchases	45	123
Miscellaneous	73	120

[2]Wylie D. Goodsell, "Technology and Capital" Power to Produce A yearbook of Agriculture, 1960 (Washington: The U. S. Government Printing Office), p. 370.

The outstanding post-1940 change in the input mix in American agriculture has been the movement of labor from, and the movement of labor-saving inputs such as machinery, motor vehicles, fertilizers and improved feeds and seeds into agriculture. This movement has essentially been simultaneous and is related to the relative costs between labor and substitute inputs. In general, the labor-substitute input relationship is such that as the cost of labor increases relative to the cost of machinery, as it has done since 1940, there is an economic incentive to substitute labor-extensive inputs (mechanical power and machinery) for labor intensive, farm produced power inputs.[1]

Purchased and Nonpurchased Inputs

Another method of analyzing the changing input structure of United States agriculture is to use the U.S.D.A.'s classification of purchased versus nonpurchased inputs. Several economists have noted the significance of the trends in the use of purchased and nonpurchased inputs.[2] Inputs are classified as purchased or nonpurchased depending upon the point of origin of a particular input that is used in the agricultural production process. Included in the nonpurchased category are unpaid operator and operator-family labor, operator-owned portions of machinery and equipment capital and operator owned portions of the real estate input.[3] Purchased

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[1]Loomis and Barton, Productivity of Agriculture United States 1870-1958, p. 21.

[2]Loomis and Barton, Heady and Ball, Heady and Tweeten, Scofield and Barton.

[3]Loomis, Barton, Productivity of Agriculture, United States 1870-1958, pp. 40, 50.

inputs are then treated as a residual and in this category are placed all other inputs. Hence, purchased inputs would include hired labor; farm real estate other than interest on operator-owned items; machinery and equipment other than interest on operator owned items; fertilizer and liming materials; feed; seed and livestock purchases excluding the value of interfarm transactions and numerous other cost items such as taxes, insurance, pesticides, supplies and irrigation equipment and maintenance.[1]

Essential to the understanding of the purchased-nonpurchased input classification scheme is an explanation as to how inputs in the two categories are measured. Because of lack of homogeneity and the interrelationship of factors used in production, measurement of inputs may pose a problem.

In this study, trends in capital inputs in aggregate and selected type-of-farming situations were examined. Aggregate trends had already been calculated. This had been accomplished by employing the flow of resource services concept to compute capital inputs and the weighted aggregate method to compute the indexes.[2] Similiar techniques were employed in establishing trends of input mixes for selected type-of-farming situations.

In the selected type-of-farming situations (discussed under II) nonpurchased inputs were calculated in the following manner:

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[1] Changes in Farm Production and Efficiency, 1965 U. S. Department of Agriculture, Stat. Bull. No. 233, Revised July, 1965, (Washington: U. S. Government Printing Office, 1965), p. 13.

[2] Loomis and Barton, Productivity of Agriculture, United States 1870-1958, see Appendix.

For the 1940-64 period, annual amounts of land (acres) for the different farming situations were tabulated. Deflated indexes of land in farms were established by using the 1957-59 period as 100. The value, or the price, of land in farms for the 1957-59 base period was then determined. This was accomplished by dividing the 1957-59 amount of land and buildings by the 1957-59 amount of land in farms. From these values the operator owned portions of real estate inputs were determined. To do this the annual amount of land in farms for the different years was multiplied by the price of land for the base period. The value derived in each case was then multiplied by 4.2 percent, or the average rate of interest charged by Federal Land Banks on farm mortgage loans outstanding during the 1940-64 period.[1] This final value was the value of operator owned real estate inputs.

The operator hours of labor for each year of the 1940-64 period and for each selected type-of-farming situation were recorded next. To determine an hourly wage rate for the base period, the cash expenditures for hired labor (for the 1957-59 base period) were divided by the amount of labor hired for the same period. The value of unpaid operator and family labor was then determined by multiplying the hours of operator and family labor by the base period wage rate for hired labor.

The portion of operator owned machinery and equipment capital, the third major input in the nonpurchased category, was then

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[1]See Costs and Returns on Commercial Farms Long terms study, 1954-1963. U.S. Dept. of Agriculture Economic Research Service, Statistical Bulletin No. 368 (Washington: U.S. Govt. Printing Office 1966), p. 15.

determined. To do this, the values of machinery and equipment capital for the 1940-64 period, and again for each selected type-of-farming situation, were recorded. A deflated index of prices paid for machinery and equipment was established by using the 1957-59 base period as 100. The value of machinery and equipment was then divided by the respective index to establish the deflated value of machinery and equipment capital. The deflated value of machinery and equipment capital was then multiplied by the historical interest rate on machinery and equipment of 5 percent[1] to give the operator owned value of this input category for the period under study.

A final step in determining the total value of nonpurchased inputs was to add the value of operator owned real estate inputs, the value of unpaid operator and family labor, and the value of machinery and equipment capital owned by the operator. This total value of nonpurchased inputs was expressed as a percent of 1940, the first year in the period under study, to establish a trend in nonpurchased inputs.

To establish trends for purchased inputs similar calculations were conducted. First the total cash expenditures were tabulated, again for each year of the 1940-64 period and for each type-of-farming situation studied. A deflated index of total cash expenditures was derived by dividing the cash expenditures for the different years by their respective deflated index.

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[1]See "Farm Costs and Returns, Commercial Farms by Type, Size and Location," U.S. Department of Agriculture Information Bulletin No. 230, Revised August, 1965, (Washington: U.S. Government Printing Office, 1965) p. IV.

These values were then expressed as a percent of the 1940 value to establish an index trend in purchased inputs.

The indexes for purchased and nonpurchased inputs for the selected type-of-farming situations were then transferred to graphs and charts.

Most of the analysis reported in the literature have stressed the divergent trends in the use of purchased and nonpurchased inputs in the aggregate of American agriculture. These trends are shown in Table 5 and also in Figure 1. The trends are presented as a percent of 1940. When one examines the same statistics for a given farm or type-of-farm, observed deviations from aggregate trends would be expected.

The objectives of this study are:

(1) To review the trends in input mix as applied to agricultural production in the United States.

(2) To examine the trends in input mix as applied to selected type-of-farming situations.

(3) To consider some of the implications of these trends in the use of inputs.

Table 5

Index Numbers of Total Farm Inputs
United States, Selected Period and Years 1940-64
(1957-59=100)

Year	All Inputs	Nonpurchased Inputs[1]	Purchased Inputs[2]
1940	97	142	72
1941	97	135	75
1942	100	138	79
1943	101	140	79
1944	101	144	77
1945	99	140	76
1946	99	132	79
1947	99	125	84
1948	100	125	86
1949	101	125	87
1950	101	119	91
1951	104	121	94
1952	103	120	94
1953	103	118	94
1954	102	114	95
1955	102	111	97
1956	101	108	98
1957	99	101	100
1958	99	99	100
1959	102	100	103
1960	101	96	103
1961	101	93	106
1962	101	90	107
1963	102	90	109
1964[3]	103	86	114

1. Includes operator and unpaid family labor, and operator owned real estate and other capital inputs.

2. Includes all inputs other than nonpurchased inputs.

3. Preliminary

Source: Changes in Farm Production and Efficiency, 1965 U. S. Department of Agriculture, Stat. Bull. No. 223, Revised July, 1965 (Washington: U. S. Government Printing Office), p. 36.

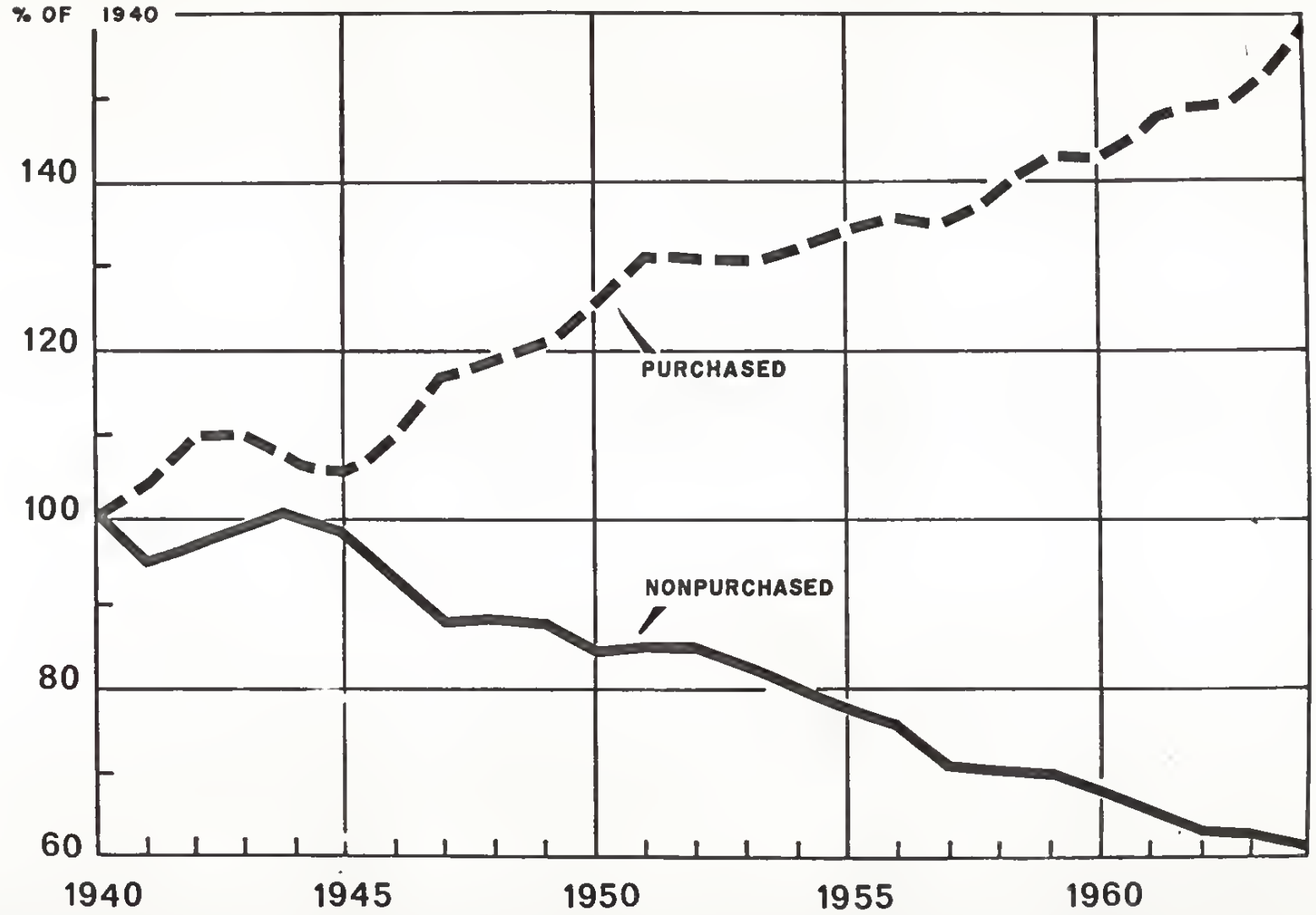

Figure 1. Trends in purchased and nonpurchased inputs in United States Agriculture

II. TRENDS IN SELECTED TYPE-OF-FARMING SITUATIONS

Up to this stage in the examining of agricultural inputs, this study considered the American agricultural economy as being a single unit. No distinction was made between different agricultural practices as distinguished by regional or geographical differences and the corresponding combination of inputs used. In aggregate, the American agricultural economy experienced a trend of increasing purchased and decreasing nonpurchased inputs. In selected type-of-farming situations, the trend of increasing purchased and decreasing nonpurchased inputs need not apply. Because of the directions and rate of growth of farm capital varied greatly in different parts of the United States, input trends in selected type-of-farming situations were studied.[1] In the study of input mix as applied to the different farming situations the purchased and nonpurchased classification of inputs was employed.

Differences in aggregate and selected farming trends have been attributed to two factors:

(1) Deviations of micro-trends from aggregate trends implied by structual changes within agriculture, and

(2) Variations in structural changes of specific type-of-farming situations as compared to aggregate changes.[2]

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[1] Alvin S. Tostlebe, Capital in Agriculture (Princeton: The University of Princeton Press, 1957), p. 6.

[2] Melvin D. Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", Paper to be presented before Western Farm Economics Associations, August 14-17, 1966, Los Angeles, California, p. 1.

In the case of (1), the declining number of farms, the variation in farm size, plus the declining amount of labor employed in agricultural production have been mentioned as causes for deviation in micro- and aggregate trends. As seen in figure 1, nonpurchased inputs in American agriculture have experienced a steady downward trend. We know that the amount of land under cultivation has not increased significantly.[1] The increase in farm size has therefore been due to either renting or buying of adjacent holdings by farm operators. Greater acreages would then come under the management of a single operator. In order to manage these increased holdings, operators would be expected to increase machinery assets. Also, the amount of labor employed on such a farm might remain constant, if not increase. This would suggest that there need not be a decrease in nonpurchased inputs in the case of the individual farming operation.[2]

Variations in structual changes in specific type-of-farming situations as compared to aggregate trends would again suggest that trends in purchased and nonpurchased inputs for the two situations need not be the same. This aspect is examined later in the study.

Areas studied. For an examination of the trends of purchased and nonpurchased inputs on different type-of-farming situations, the following four different type-of-farming areas were selected:

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[1]Tostlebe, Capital in Agriculture, p. 34.

[2]Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", pp. 1-2.

(1) The Piedmont: Cotton Farms

(2) The Corn Belt: Cash Grain Farms

(3) The Pacific Northwest: Wheat-Fallow Farms

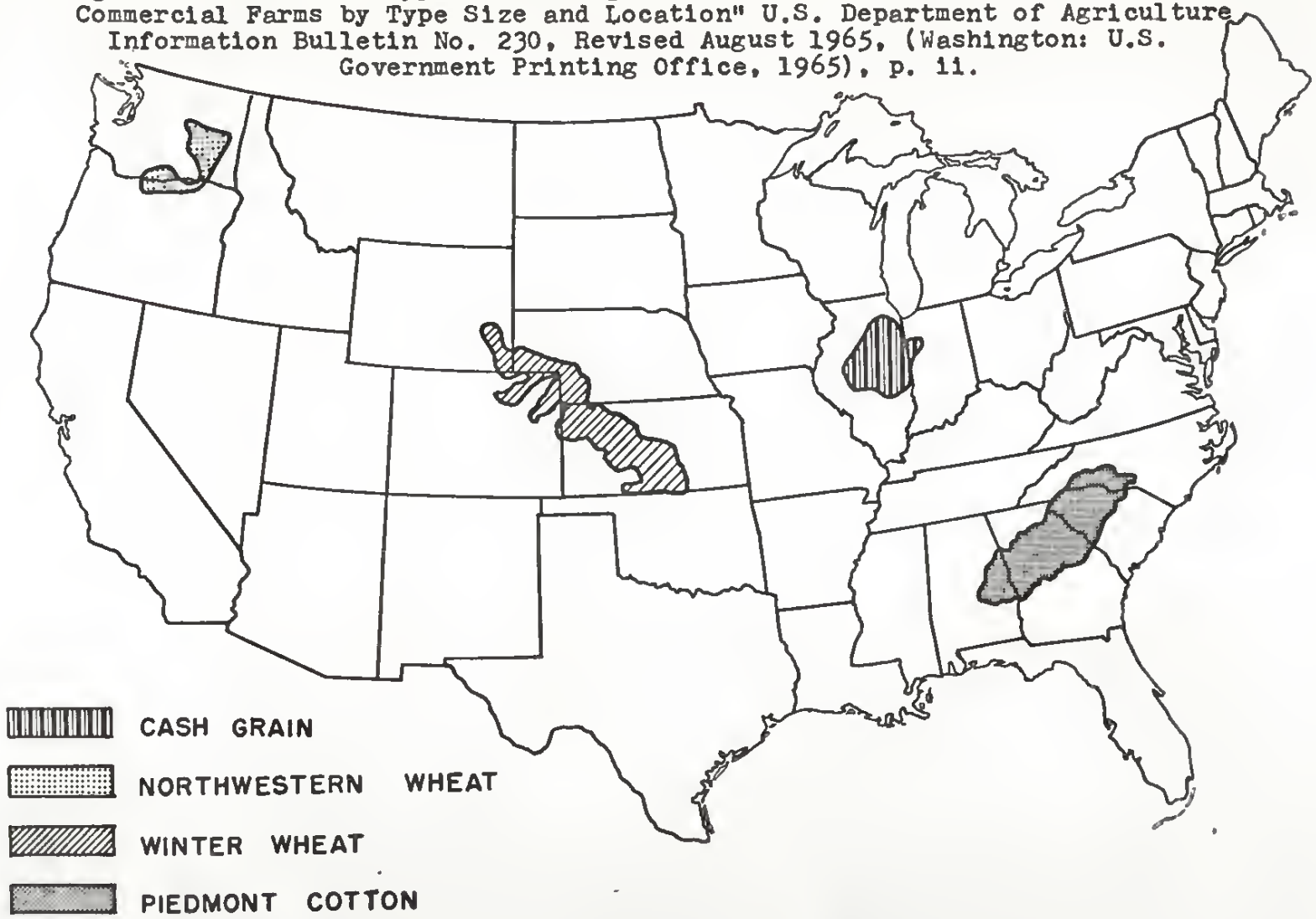
(4) The Southern Plains: Winter Wheat Farms

Figure 2 indicates the location of these type-of-farming situations.

These areas were selected to point out the contrasts in input mixes which might exist on different farming situations.

Input trends. An examination of input trends for selected type-of-farming situations reveals marked differences from aggregate trends in the amount of purchased and nonpurchased inputs used. In figure 3, trends in inputs for Piedmont Cotton Farms are represented. We see that the amount of nonpurchased inputs used in the 1940-1964 period fluctuated and increased only slightly. The increased use of purchased inputs, on the other hand, was substantial. As shown by the indexes on table 6 for the period under study, nonpurchased inputs increased from 100 to 102 while purchased inputs increased from 100 to 197. In the Piedmont Cotton Farm situation the type of agricultural practices employed are generally considered intensive practices. In such a situation purchased inputs use would be expected to exceed nonpurchased input use. In this case the sharp upward trend in purchased inputs was attributed to the increased use of mechanization, chemicals and fertilizers. In the nonpurchased category, expansion of land and machinery capital were evident. Nonpurchased inputs, however, did not increase substantially during the

Fig. 2. Location of type-of-farming situations from "Farm Costs and Returns, Commercial Farms by Type Size and Location" U.S. Department of Agriculture Information Bulletin No. 230, Revised August 1965, (Washington: U.S. Government Printing Office, 1965), p. ii.



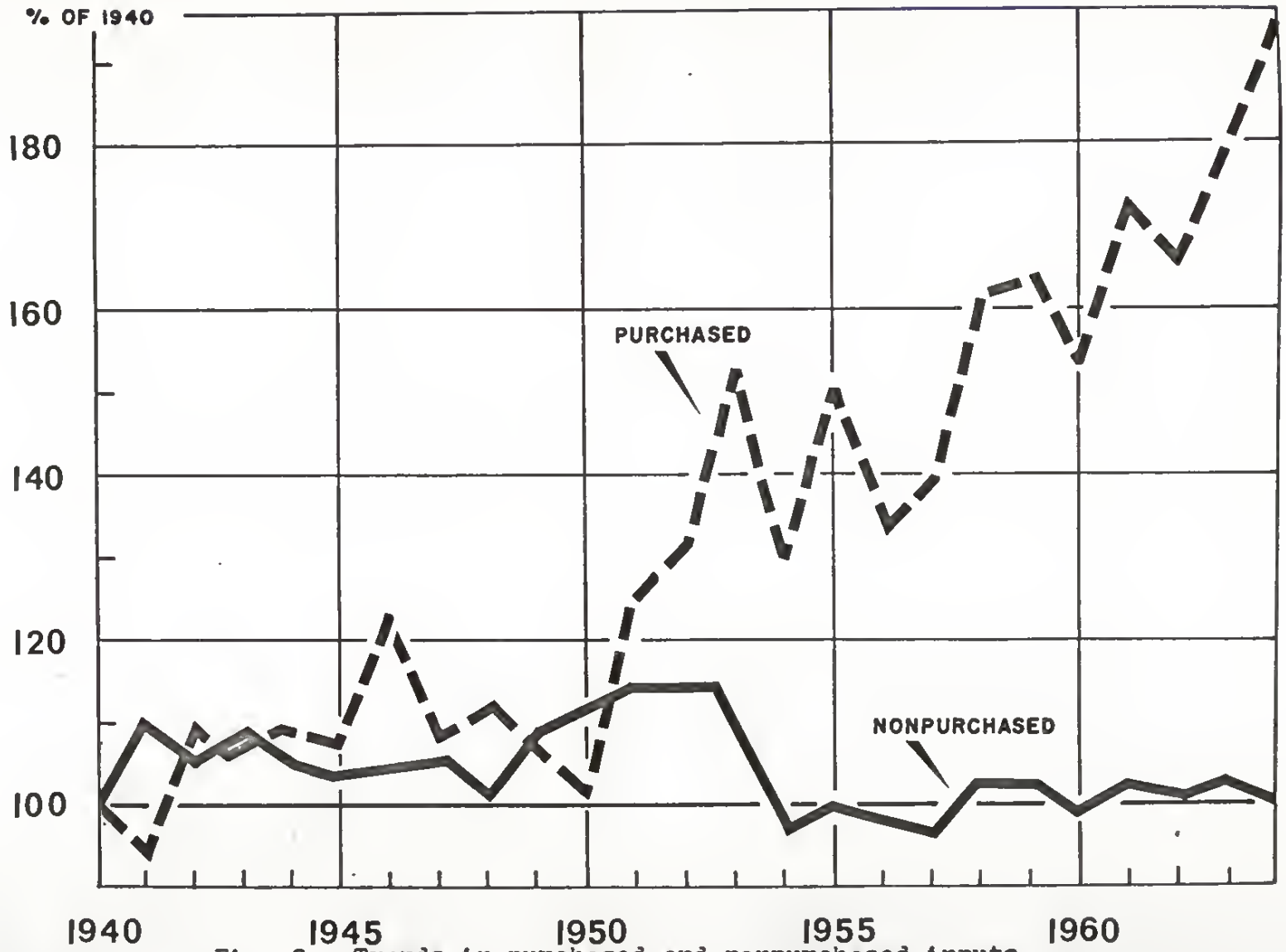


Fig. 3. Trends in purchased and nonpurchased inputs, Southern Piedmont Cotton Farms.

Table 6

INDEX NUMBERS OF PURCHASED AND NONPURCHASED FARM INPUTS

Southern Piedmont: Cotton Farms (1957-1959 Index)

YEAR	NONPURCHASED INPUTS (% of 1940)	PURCHASED INPUTS (% of 1946)
1940	100	100
1941	109	94
1942	106	108
1943	107	106
1944	106	109
1945	103	107
1946	105	123
1947	105	109
1948	102	111
1949	109	107
1950	102	102
1951	105	126
1952	104	132
1953	105	152
1954	98	130
1955	97	150
1956	96	134
1957	98	139
1958	104	161
1959	103	163
1960	98	154
1961	102	173
1962	101	166
1963	104	181
1964	102	197

period under study because of the dampening effect of the decline of operator and farm labor.[1]

In the Corn Belt farms, trends of inputs, were distinct as shown by Fig. 4. Both the purchased and nonpurchased inputs experienced an upward trend, the former much more so than the latter. As indicated by the indexes in table 2, nonpurchased inputs increased from 100 to 120 while purchased inputs increased from 100 to 193. The use of purchased inputs would be expected to exceed the use of nonpurchased inputs because of the intensive agricultural practices employed in the Corn Belt. In this case, as in the case of the Piedmont farms, the increase in nonpurchased inputs was attributed to increased mechanization and expansion of operator land holdings. Acting as a brake in the increasing trend of nonpurchased inputs was the decline in operator and family labor. The rapid increase in purchased inputs was attributed to the increased use of fertilizers, lime and other chemicals as well as repairs and fuel for machinery.[2]

In the case of the two farming situations examined practicing intensive agricultural production, micro-input trends differed from aggregate input trends for the nonpurchased input category. In these areas of intensive agricultural productions, expansion of farms has been relatively limited. Individual farms, however, have increased production by specialization. As a result of

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[1] IBID., p. 2.

[2] Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", p. 3.

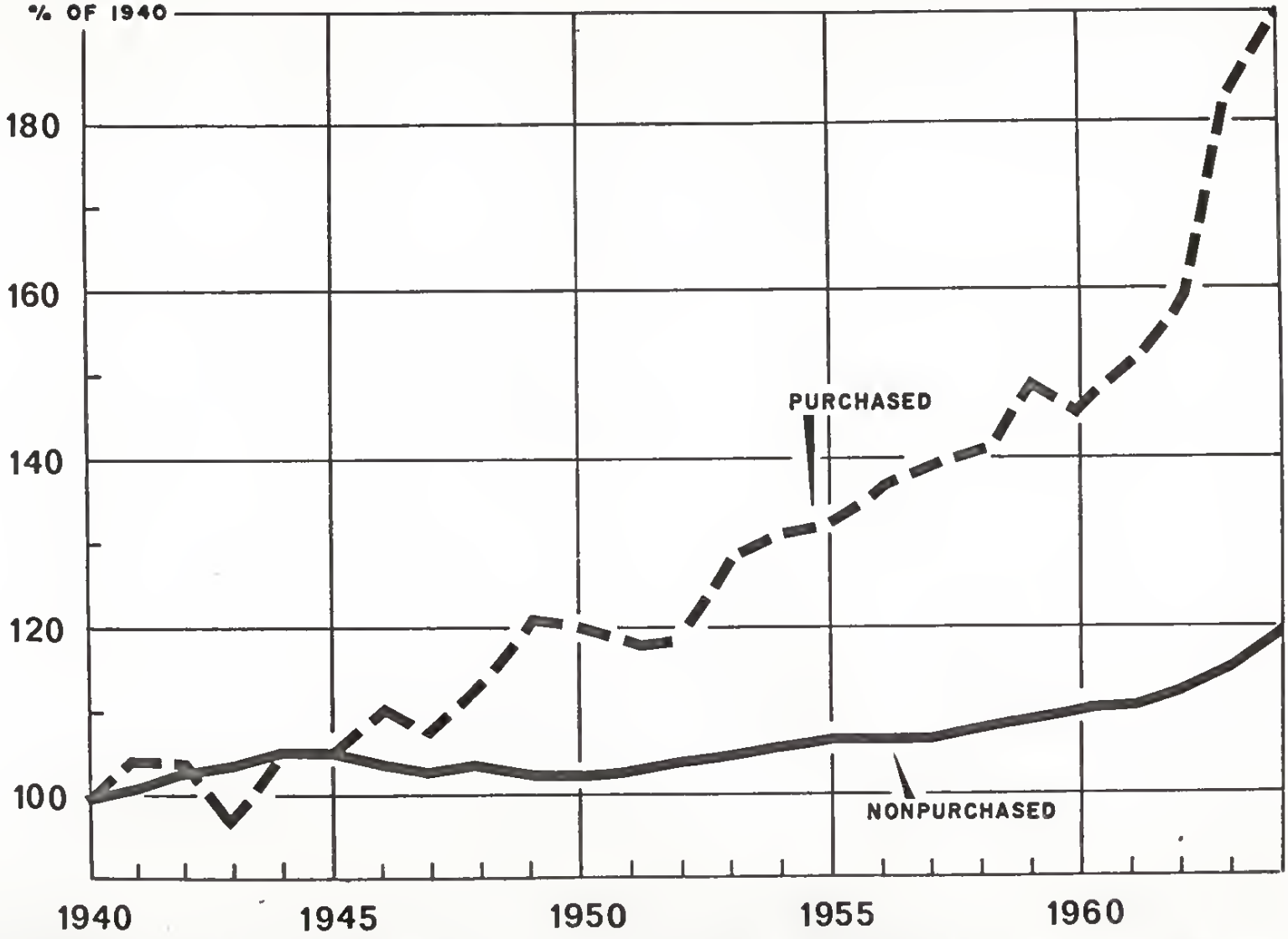

Fig. 4. Trends in purchased and nonpurchased inputs, Corn Belt Cash Grain Farms

Table 7

INDEX NUMBERS OF PURCHASED AND NONPURCHASED FARM INPUTS

Corn Belt: Cash Grain Farms (1957-1959 Index)

YEAR	NONPURCHASED INPUTS (% of 1940)	PURCHASED INPUTS (% of 1940)
1940	100	100
1941	101	104
1942	103	103
1943	104	96
1944	105	103
1945	105	103
1946	104	110
1947	104	108
1948	104	113
1949	104	121
1950	102	120
1951	103	119
1952	104	119
1953	105	128
1954	105	131
1955	106	133
1956	107	137
1957	107	139
1958	108	147
1960	110	147
1961	110	151
1962	112	160
1963	115	184
1964	120	193

highly specialized dairy, hog or poultry enterprises, specialized housing is required. This feature has added to the increase in nonpurchased inputs.[1]

Another feature which has added indirectly to the increase in nonpurchased inputs employed in intensive agricultural production has been the decrease in quantity of operator and family labor. As a result of the decrease in inputs in this category, mechanization has been substituted for labor. The quantity of machinery and equipment introduced to the farm economy as a substitute for labor has been relatively greater than the accompanying decreased quantity of operator and family labor. Again, the net result has been an increasing trend in the nonpurchased input category for an intensive type-of-farming situation as opposed to a decreasing aggregate trend.[2]

For the Pacific Northwest Wheat Fallow farms the increasing trends of both purchased and nonpurchased inputs are seen in Fig. 5. In this case, however, the amount of inputs used increased more for the nonpurchased than for the purchased category. The indexes on table 8 indicate that from 1940-1964, nonpurchased inputs increased from 100 to 156. For the same period, purchased inputs increased from 100 to 135. Trends of this nature where nonpurchased inputs are relatively more important than purchased inputs would be expected on a wheat-fallow type of farm. Because of the relative productivity of different types of inputs, areas

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[1]Tostlebe, Capital in Agriculture, See pp. 34-35.

[2]IBID., p. 86.

such as the Pacific Northwest employ extensive, as opposed to intensive agricultural practices. This would suggest that in general, increases in farm scale of operations would occur through an expansion of farm holdings and not through intensification or the increased use of fertilizers and chemicals.

For the Southern Plains winter wheat farms, input trends were similar to those on the Northwest wheat fallow farms. Nonpurchased inputs again were relatively more important than purchased inputs as seen in Fig. 6. As shown by the index numbers on table 9, nonpurchased inputs increased from 100 to 145 during the period under study while purchased inputs increased from 100 to 118. Trends of this nature reflect agricultural practices in the Southern Plains which are typically extensive.

The input trends in both the Pacific Northwest and Southern Plains show deviation from aggregate trends. Not only do the trends in these selected type-of-farming situations differ from aggregate trends but the use of nonpurchased inputs has also exceeded the use of purchased inputs. Reasons have also been suggested for these discrepancies. In the two areas under study where extensive agricultural practices are employed, topography, type of farming and relatively sparce settlement invited expansion that would make more efficient operations possible. As a result, acreages of the average farms increased about as fast as the value of total physical assets.[1] In order to cultivate the increasingly expanding farms, larger and more expensive implements

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[1] IBID., p. 86.

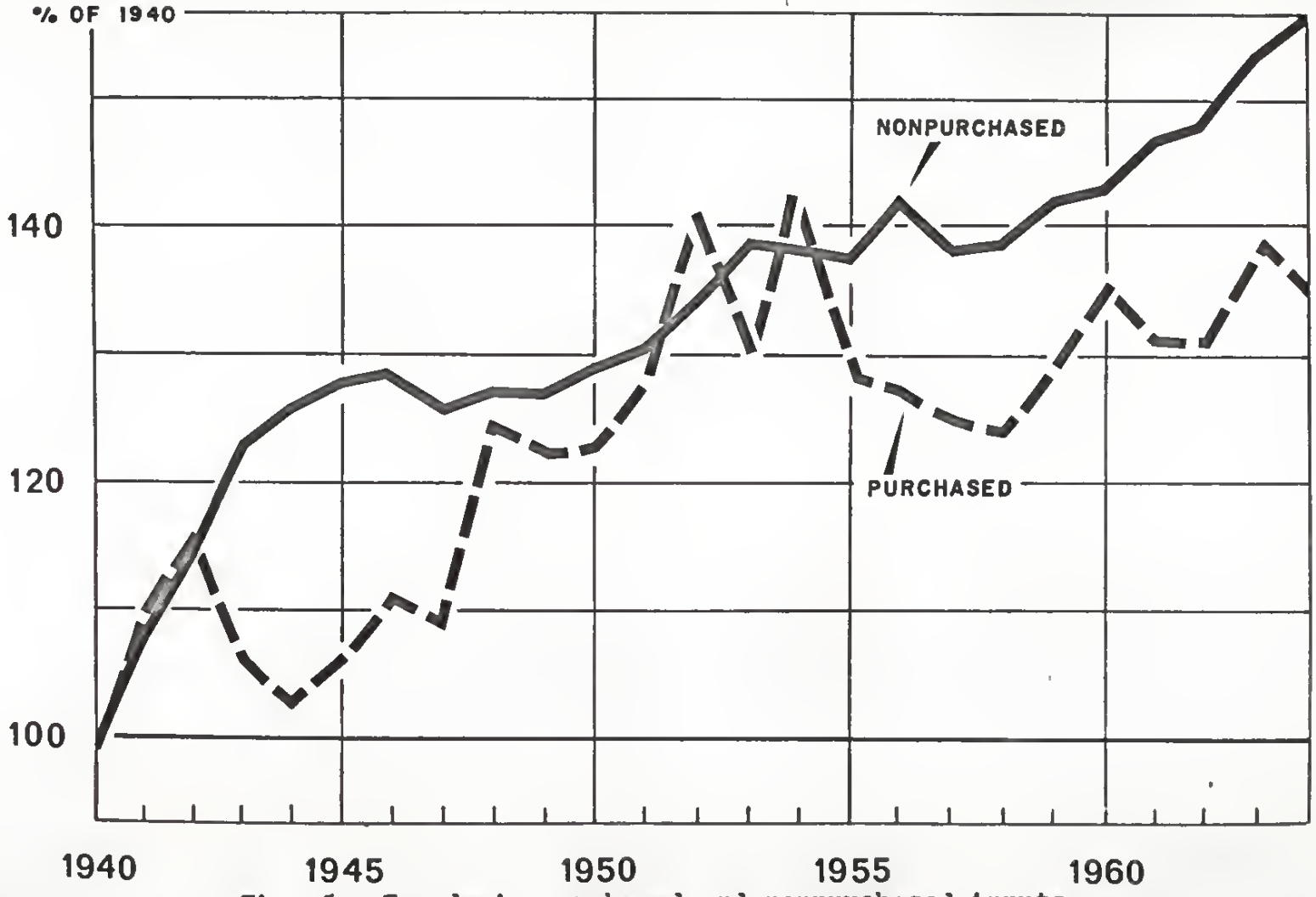

Fig. 5. Trends in purchased and nonpurchased inputs, Pacific Northwest Wheat Fallow Farms.

Table 8

INDEX NUMBERS OF PURCHASED AND NONPURCHASED FARM INPUTS

Pacific Northwest: Wheat Fallow Farms (1957-1959 Index)

YEAR	NONPURCHASED INPUTS (% of 1940)	PURCHASED INPUTS (% of 1940)
1940	100	100
1941	108	110
1942	115	116
1943	123	106
1944	126	103
1945	128	107
1946	129	111
1947	126	109
1948	127	124
1949	127	123
1950	129	124
1951	138	129
1952	134	141
1953	139	130
1954	139	143
1955	137	128
1956	142	127
1957	139	135
1958	137	124
1959	143	130
1960	143	135
1961	147	127
1962	149	131
1963	154	138
1964	156	135

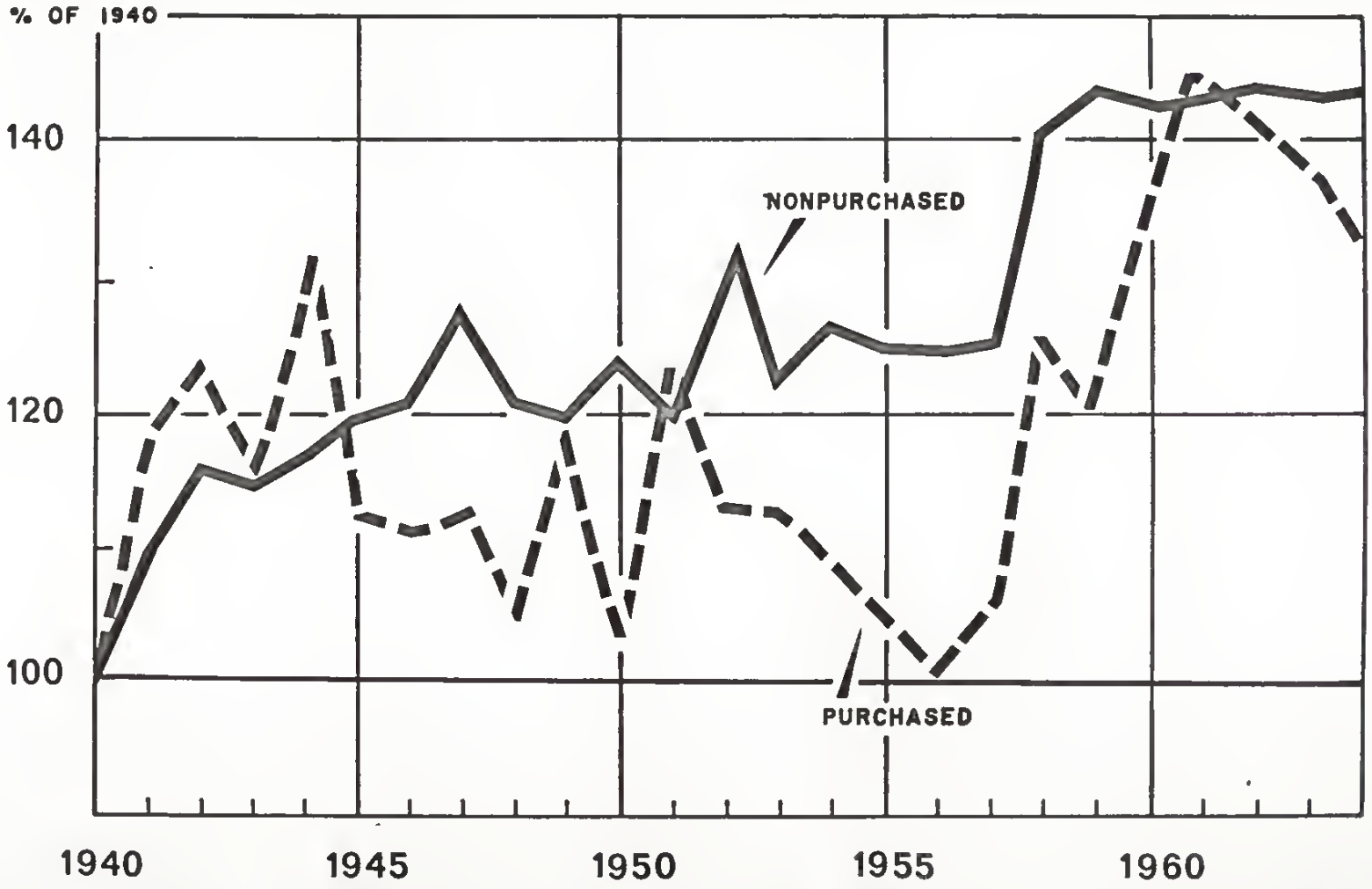

Fig. 6. Trends in purchased and nonpurchased inputs, Southern Plains Winter Wheat Farms

Table 9

INDEX NUMBERS OF PURCHASED AND NONPURCHASED FARM INPUTS

Southern Plains: Winter Wheat Farms (1957-1959 Index)

YEAR	Inputs (% of 1940) NONPURCHASED	PURCHASED
1940	100	100
1941	110	118
1942	116	124
1943	115	117
1944	117	131
1945	120	113
1946	121	112
1947	128	113
1948	121	106
1949	120	119
1950	124	105
1951	120	123
1952	134	113
1953	122	113
1954	127	110
1955	126	106
1956	125	102
1957	126	107
1958	141	127
1959	145	121
1960	143	136
1961	144	144
1962	145	142
1963	144	137
1964	145	118

were required. These too added to the increased nonpurchased trends. Finally, per farm operator labor inputs in these areas increased. The result was that the value of unpaid labor increased to further add to an increasing nonpurchased input trend.

A factor not to be overlooked in these areas of extensive agricultural production is the relatively stable agricultural production practices employed. These practices, as dictated mainly by climate, result in the use of summerfallow rather than fertilizers and chemicals to conserve moisture, control weeds and increase soil productivity.[1] As a result, purchased inputs have not experienced as rapid an increase in use as have nonpurchased inputs.

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[1]Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", pp. 2-3.

III. IMPLICATIONS

The implications of the changing mix in purchased and non-purchased inputs are significant and numerous. It may be hypothesized that the implications may differ for different regions, depending on the type-of-farming situation which predominates.[1]

Risk bearing ability. In agricultural production uncertainties as applied to yields and profits exist. Precautionary measures to meet uncertainty can take one or all of the following forms:[2]

(1) Measures can be adapted to reduce the variability or dispersion of income;

(2) Measures can be adapted to prevent profits from falling below some minimum level;

(3) Measures can be adapted to increase the firm's ability to withstand unfavorable economic outcomes.

These precautionery measures to meet uncertainity are closely related to an economic concept employed to minimize losses in production economies. In order to withstand unfavorable economic situations in agricultural production, producers should continue to produce in the short run as long as variable costs of production were covered. This would mean that a producer, in the short run, even though he might be operating at a loss, should continue to produce in an attempt to cover variable costs and thus minimize

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[1] IBID. p. 3.

[2] Earl O. Heady, Economics of Agricultural Production and Resource Use, (Englewood Cliffs, N.J., Prentice Hall, Inc. 1952) p. 505.

his loss. Since alternatives are limited in the short run, fixed costs might be considered as being equal to zero. For the producer to survive in the long run, however, variable as well as fixed costs of production should be covered by the price of the product.[1] Implications of these concepts as related to input trends on selected type-of-farming situations exist.

Without creating any serious distortions in the meaning of trends or concepts discussed up to this point, different terminology could be applied to purchased and nonpurchased inputs. Purchased inputs such as chemicals, fertilizers and machinery repairs could be considered as variable costs of production. Nonpurchased inputs such as the value of machinery, labor and real estate inputs owned by the operator could be considered fixed costs of production.

Earlier in their study it was pointed out that in the Piedmont Cotton farms and Corn Belt Cash Grain farms, which practiced intensive agricultural production, purchased inputs or variable costs of production were relatively more important than nonpurchased or fixed production costs. It was also pointed out that for the Southern Plains Winter Wheat and Pacific Northwest Wheat Fallow farms, which employed extensive agricultural practices, fixed costs or nonpurchased inputs were relatively more important than variable costs or purchased inputs.

If the cost situations under constant gross returns were to be presented graphically for the two type-of-farm situations

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[1] IBID., pp. 330-331.

employing contracting agricultural practices, a significant difference would be noted. For each of the situations a gap would exist between the variable and total cost curves, total costs being equal to variable plus fixed costs. For an intensive agricultural practice where variable costs were relatively more important than fixed costs, the magnitude of this gap would be less than that for an extensive agricultural practice where fixed costs were relatively more important than variable costs. Because the range within which variable costs could be covered in the short run would be less for an intensive agricultural practice as compared to an extensive practice, the ability of farms to operate in the short run with variations in gross returns and still cover variable costs of production would be more limited for intensive than for extensive agricultural practices.[1] This is where a conflict with traditional concepts enters.

Traditionally, areas pursuing extensive agricultural practices, as in the case of the wheat producers, have been considered high risk areas. Because of the variances in production due to weather, drought and other climate factors, a high degree of variability in crop yield is expected in these areas. For areas of intensive agricultural production such as encountered in the Piedmont and Corn Belt situations, diversity in products produced and fewer climate extremes were thought to contribute to relatively constant yields and returns. The result was that

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[1]Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", p. 4.

areas were considered low risk areas of agricultural production.[1]

These views on low and high risk areas of agricultural productions may have to be revised as trends in the use of purchased and nonpurchased inputs for different farming situations continue. Precautionary means to meet uncertainty may have to be applied in increasing amounts to areas traditionally considered low risk areas. Because of the relatively small gap between variable and total cost curves for the Corn Belt and Piedmont situations, farmers in these areas would be expected not to be able to withstand great variability in crop production and still meet variable production costs. This would not be expected to be the case for producers in the Southern Plains or Pacific Northwest farming situations. Because of the relatively greater gap between the variable and total cost curves in these areas, it would be expected that producers employing extensive agriculturing practices would be able to stand greater variability in crop production.[2]

Discounting. Another of the means which producers may employ to meet uncertainty is discounting. With this technique, whereby the present value of future revenue may be computed, the probability of returns falling below a certain level is decreased. As in all cases employed to meet uncertainty, discounting minimizes the possibility of large losses; it also minimizes the possibility of large gains.

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[1]Heady, Economics of Agricultural Production and Resource Use, See pp. 441 & 522.

[2]Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations," pp. 4-5.

When taken by itself, discounting results in less than the optimum use of resources. If in an attempt to meet uncertainty, discounting is carried too far, the producer restricts his opportunities to realize profits; if not carried far enough, he subjects himself to possible large losses. This is especially important in areas employing a relatively large proportion of purchased inputs. A producer may know the cost of the purchased inputs and have good reason to expect a given yield and price for his crop. This information would suggest to the producer that to maximize his income from this combination of inputs he should employ a certain level of purchased inputs. But to insure a safety margin, the producer would employ less of the purchased inputs than what would appear to be the amount desirable to realize maximum profits.[1]

If current trends in the input mix continue for the type-of-farming situations considered, traditional concepts about "risky" areas of agricultural production may have to be reviewed. While the variability in yields and returns will always be present in an area of variable climatic conditions such as the Great Plains, the ability of firms to withstand this variability is increasing with current shifts between purchased and nonpurchased inputs. On the other hand, the increasing importance of purchased inputs in the Corn Belt and Piedmont can lessen the ability of producers

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[1]Heady, Economics of Agricultural Production and Resource Use, See pp. 507-508.

in these situations to withstand variability. Further, the growing relative importance of purchased inputs will likely result in greater uncertainty discounts and dampen the trends toward more efficient use of resources.[1]

Contract arrangements. Until recently, contract farming, another means of meeting uncertainty, had been most important in the production of sugar beets, broilers, turkeys, vegetables and some fruits. These are typical "high-purchased-input" enterprises. More recently, contract farming has been making some headway in the production of eggs, hogs, and in cattle feeding, again typical high-purchased-input enterprises. Although contracts vary greatly among different products and with respect to supervision and required performance, the farmer surrenders some responsibility in return for sharing price and production risks.[2]

When agreeing to a contract, the producer not only surrenders some responsibility, but is usually not obligated to pay for the production items that the supply company or processor furnish as their part of the contract. The supplier or processor takes a loss if their share of the product sales do not cover the cost of the items. It was found that many producers prefer this type of arrangement. For example, in the broiler industry it was found that most producers could raise the money independently if they

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[1]Skold, "Implications of Changing Input Mix on Selected Type-of-Farming Situations", pp. 5-6.

[2]Iowa State University Center for Agricultural Adjustment (eds.), Problems and Policies of American Agriculture, (Ames, Iowa: Iowa State University Press, 1960), pp. 25-26.

so desired, but did not want to accept the risk of independent production.

It has been established that an increasing amount of purchased inputs are being used on Piedmont cotton and Corn Belt Cash Grain farms. It has also been established that in a type-of-farming situation where purchased input use has been increasing at a relatively faster rate than nonpurchased input use, increasing risk or uncertainty in production is a factor to be considered. In poultry production, an enterprise employing a large proportion of purchased inputs, risk of independent production has been overcome by contractual arrangements. This would suggest that we may expect to see more contractual arrangements in areas of intensive agricultural production as the proportion of purchased inputs employed on these farms increase.

Adjustment Abilities. Still another device employed by producers to meet uncertainty is flexibility. The advantage of flexibility is that it serves a dual purpose. It may be incorporated into production plans to both lessen income variability from year to year and also to increase the expected total value of the income stream. F lexibility allows for changes of plans as added information is obtained or the ability to predict the future improves.[1]

The extent to which flexibility is present largely depends on the combination of purchased and nonpurchased inputs used.

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[1]Heady, Economics of Agricultural Production and Resource Use, p. 524.

Because they are divisible, purchased inputs are the more flexible of the major farm inputs.[1] Greater flexibility would therefore be expected on a type-of-farming situation which employed relatively more purchased inputs.

In areas such as the Piedmont or Corn Belt farm situations the concept of flexibility could be employed to meet uncertainty. In these areas production alternatives are numerous. Yields respond well to increases in purchased inputs. As a result, yields could be increased or decreased on relatively short notice should such changes be warranted by prevailing price-cost relationships.

For areas such as the Southern Plains Winter Wheat Farms and Pacific Northwest Wheat Fallow farms this degree of flexibility would hardly apply. In these type-of-farming situations productive processes require a relatively greater amount of nonpurchased or durable inputs. Once costs of production are committed, they may not be readily altered if funds are limited.[2] Factors influenced by geographic or climatic conditions would also limit the response of purchased inputs in these areas. An example cited earlier was the limited use of fertilizer to increase yields.

The application of flexibility to type-of-farming situations would thus be limited mainly to an intensive type of agricultural production. As a result, the increased risks associated with

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[1]Earl O. Heady, Edwin O. Haroldson, Leo V. Mayer and Luther G. Tweeten, Roots of the Farm Problem, (Ames, Iowa: The Iowa State University Press, 1965), pp. 134-135.

[2]Heady, Economics of Agricultural Production and Resource Use, p. 525.

production employing a relatively large amount of purchased inputs might tend to be dampened.[1]

Degree of intersectional interdependence. The major portion of purchased inputs, especially those which show greatly increasing use, are purchased from the non-farm sector of the economy. Fertilizers, chemical, feeds and seeds are examples of these inputs.[2]

This shift in input mix brings a different emphasis on development and communicating knowledge by private industry. When the main inputs are land and operator labor, private firms have little opportunity to produce and merchandise their resources. However, as farming comes to rest mainly on capital, industry not only has a broad commercial opportunity to produce and distribute the materials so represented, but it also as a great stake in developing and extending knowledge so that these inputs can be retailed. The results are evident, for example, in farm machinery and even in poultry breeding where the significant research is conducted by industry. The same developments are occuring in basic and applied research for plant breeding, the large innovations in animal nutrition, fertilizers, insecticides and other technical fields where research results give rise to materials which can be packaged and retailed.[3]

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[1]Skold, "Implications of the Changing Input Mix on Selected Type-of-Farming Situations," pp. 6-7.

[2]IBID., p. 7.

[3]Earl O. Heady and Gordon Ball, "Economic Growth of the Farm and Projected Changes in Farming," Structural Changes in Commercial Agriculture, Proceedings of a conference held in Chicago, Ill., April 12-14, 1965, (Iowa State University, University of Wisconsin, Farm Foundation, Chicago, Illinois), p. 13.

Farmers are not only relying on the non-farm sector for more purchased inputs, but commercial farming is itself increasingly assuming the characteristics of manufacturing business.[1] For example, the product and production are becoming more standardized. More and more of the capital, labor and management functions are being separated in agriculture as they have been in industry.[2]

The impact of the increasing importance of purchased inputs, as has occured on the Corn Belt and Piedmont farms, on the agri-business firms in these areas has likely been quite beneficial.[3] The increasing use of purchased inputs per farm probably offset some of the tendencies for the non-agricultural sector to contract with the declining farm population in these areas.

On the other hand, the increased use of purchased inputs has not been so important in the wheat areas and the agri-business sectors have probably not flourished as well.[4] In these areas mechanical power has been readily adopted. This has made farmers more dependent on the petroleum industry for "fuel" they once produced by raising hay and grain for their work animals.[5] But the adoption of purchased inputs has been restricted mainly to

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[1]Harold G. Halcrow, (ed.) Contemporary Readings in Agricultural Economics (New York: Prentice Hall, Inc., 1955) p. 59.

[2]Earl O. Heady, Howard G. Diesslin, Harold R. Jensen, Glenn L. Johnson, (ed.), Agricultural Adjustment Problems in a Growing Economy (Ames, Iowa: The Iowa State College Press, 1958) p. 31.

[3]Skold, "Implications of the Changing Input Mix on Selected Type-of-Farming Situations," p. 7.

[4]IBID., p. 7.

[5]Tostlebe, Capital in Agriculture, p. 79.

items such as fuel and repairs for machinery. This was not the case for areas employing intensive agricultural practices. One could hypothesize that the impact of agricultural adjustments on local economics has not been as severe in the Corn Belt and Piedmont areas as compared to the Southern Plains and Pacific Northwest wheat areas.[1]

Population Shift and local economy. Changes in farm inputs suggest shifts in the sociological as well as economic aspects of farm life.[2] In regard to the sociological aspects, farm employment and population have generally declined since 1940. The decline was more extreme in some regions than in others. The decline in farm population and farm jobs was most rapid in purely agricultural regions where there was greatest change in farm size and substitutes of capital for labor. In these purely rural areas the total population declined with farm population. The extent of this adjustment was generally greater in particular areas and counties than in states as a whole because some growing industrial areas could absorb displaced farm and farm-related population.

In states where economies rested principally on agriculture, most counties experienced a decline in total population. In rural areas separated geographically from expanding industry, as in the case of the wheat farms, all economic and social groups

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[1]Skold, "Implications of the Changing Input Mix on Selected Type-of-Farming Situations," p. 7.

[2]Heady, et.al., Roots of the Farm Problem, p. 212.

felt the effect of increasing cost economics and large-scale operations which reduced the number of farms and farmers. There was little industrial development to absorb the labor and families released by substituting capital for human effort.[1].

For the Corn Belt and Piedmont areas, this need not be the case. The increased demand for purchased inputs would be expected to be associated to varying degrees with increased demand for labor in the agri-business sector of the economy. Industries supplying these purchased outputs could be an outlet not only for labor relieved from the neighboring farms, but also for labor attracted from more distant areas. The transfer of managers and technicians to these areas from branch plants is an example. Small towns in these areas, might have been experiencing a decline in population. This trend towards a further decline might be reduced.

For areas in the Pacific Northwest and Southern Plains regions, similar population shifts need not be expected. We know that the total quantity of all agricultural input in recent years has increased very little.[2] The major changes, as already pointed out, have been in the purchased input category. Increases in industries supplying these inputs are therefore not expected in an extensive type of agricultural area. An increasing, if not stable population in small towns in these areas would therefore not be anticipated. The implications of this point in regards to regional planning could be significant.

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[1] IBID., pp. 35-36.

[2] IBID., p. 39.

The sociological implications of the change in agricultural inputs for different types of farming areas might center on cultural as well as demographic aspects. The discussion of the preceeding topic noted the increasing intersectional interdependence of the agricultural and non-agricultural sectors of the economy, especially in areas of intensive agricultural production. The increasing interdependence of these areas could suggest a corresponding intermingling or rural and urban culture.[1] It has been suggested that the farmer is loosing his vocational identity.[2]

Credit structure. The trend toward higher cash costs relative to operating income continues as more purchased technology is added to replace labor.[3] Though technology does assist in lowering absolute or relative unit costs of production, cash costs for the purchased inputs in farming continue to rise.[4] This trend has been apparent for many years and is increasing as more farm inputs are purchased.[5] The application of these costs, however, is not the same for the intensive and extensive type of farming operations.

On an intensive type of operation, non-farm goods today make up a larger proportion of total cost items than formerly. Prices

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[1]Earl L. Butz, "Agri-business in the Machine Age," Power to Produce, p. 384.

[2]IBID., p. 384.

[3]Heady, et.al. Agricultural Adjustment Problems in a Growing Economy, p. 31.

[4]Halcrow, Contemporary Readings in Agricultural Economics, pp. 59-60.

[5]Heady et.al., Agricultural Adjustments Problems in a Growing Economy, p. 31.

of goods and services from non-farm sources, as in the case of chemicals, are more rigid than prices of feed, seed and livestock or wages of farm labor. Also, the proportion of goods and services used in production that come from the non-farm segment of the economy has increased.[1] These purchased inputs, however, are generally not stored on farms for extended periods but are purchased by farmers in quantities considered appropriate for the needs of the productive period.[2] Short term "production credit" necessary to acquire adequate amounts of the resources that are increasingly used in farm production as substitutes for land, is certain to grow in relative importance.[3]

In an extensive type of agriculture where long term production plans prevail, long term credit of a higher magnitude is in order. This may be overcome by renting if the renter is secure of his tenure. Renting involves a smaller financial commitment. Often the land owner shares risks of the operation by paying a share of the expenses and accepting a share of the crop as rental. With the reduction in number and the increased size of farms, however, it is becoming more difficult to lease the additional land needed to create efficient operating units. This element often throws the balance in favor of buying, even though large debt must be incurred to make the purchase.[4] More long term

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[1] James Vermer, Changes in Costs on Spring Wheat Farms in the Northern Plains Production Research Report No. 4 (Washington: Government Printing Office, Sept. 1956), See p. 5-8.

[2] Heady, et.al., Roots of the Farm Problem, p. 134.

[3] Tostlebe, Capital in Agriculture, p. 38.

[4] Fred L. Garlock, "Financing Capital Requirements" Power to Produce, p. 377.

credit is therefore required in areas of extensive agricultural production.

Until a few decades ago, the financing of agriculture was mainly internal.[1] Since 1940, however, this has not applied. The agricultural industry in recent years has become more dependent on external credit as a source of capital (further evidence of increased intersectional interdependency). It is assumed that this dependence will continue and increase. If agriculture is going to require increased credit from the non-agricultural economy, it means, among other things, that the credit structure serving agriculture may need substantial revisions.[2]

Managerial ability of future farmer. The use of purchased and nonpurchased inputs and services has increased in different proportions for the majority of farms. As a result of the increased use of purchased inputs farmers are more vulnerable to changes in cost-price relationships.[3]

The average American farmer today faces a host of different economic situations about which he must make decisions in order to operate efficiently. This decision-making chore is not expected to be lessened in the future. The following are examples of economic issues on which decisions may have to be made:

Should goods and services be bought or should the farmer try to develop, produce or otherwise provide them for himself?

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[1] E. L. Baum, Howard G. Diesslin, Earl O. Heady, (ed.) Capital and Credit Needs in a Changing Agriculture (Ames, Iowa: The Iowa State University Press, 1961), p. 81.

[2] IBID., p. 95.

[3] Agricultural Outlook Charts 1956, United States Department of Agriculture Marketing Service (Washington, D.C.) November, 1956, p. 15.

For some purchased inputs which the farmer could not produce for himself, this need not pose a problem. For other inputs, however, this would resolve itself to the opportunity cost of providing for oneself.[1]

An efficient farm enterprise invariably calls for specialized knowledge and equipment.[2] In which endeaver should the producer specialize, if at all?

In some farm enterprises, profit margins are low.[3] Could this situation be rectified or should another enterprise be chosen?

Judicious increases in purchased inputs will more than pay for themselves on farms that are only partly adjusted to a given cost situation.[4] How could this be brought to the producers attention so that he could realize there internal, and other economics?

It is generally agreed that the future American farmer will be confronted by more numerous and more sophisticated and crucial economic problems than his equivalent of a generation ago. The managerial ability of the future farmer will have to be high.[5]

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[1]Halcrow, Contemporary Readings in Agricultural Economics, p. 62.

[2]Heady, et.al., Agricultural Adjustment Problems in a Growing Economy, p. 26.

[3]Garlock, Power to Produce, p. 379.

[4]Iowa State University Center for Agricultural Adjustment, Problems and Policies in American Agriculture, p. 15.

[5]Structural Changes in Commercial Agriculture, See pp. 14-15.

Again, implications prevail. If the decision making potential of the future farmer will be high, who will be there to guide him? This question is especially important as applied to intensive agricultural production, where profit margins may be low. It has been suggested that the future equivalent of today's county agent might need a Ph.D.[1]

Returns to size. Despite the trend of increased use of purchased inputs and economies of scale, there is evidence to support the view that in the future, in both the extensive and intensive type of farming operation, farmers efficiently operating on different scales will be able to compete favorably with one another. In the case of extensive operations, scale, or cost, economies do not extend over large acreages. It is believed that further cost economics can result from the expansion of modal farms. Variable costs, (purchased inputs) in the agricultural firm, however, eventually dominate total costs and cost reductions per acre become minute as acreages continue to expand with given power and machinery units. Generally, after this point, on the per acre cost function representing full utilization of labor and machine services in a particular season, further expansion of size must come from increase of machine units. From the standpoint of cost economics, the larger unit would not have great competitive advantage over the smaller unit.[2]

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[1] IBID., p. 15.

[2] Heady et.al., Agricultural Adjustment Problems in a Growing Economy, pp. 154-155.

A study of cost economies associated with size of beef cattle feeding operations (a typical intensive type of operation) was conducted recently. This study again revealed that, providing an operation were conducted on an efficient scale, the larger unit would not have great competitive advantage over the smaller unit.[1]

This would suggest that on both the extensive and intensive type of farming operation, an optimum range in size of farm, to realize cost economies, will exist. This range may vary to the degree that heterogeneity of farm size in the future will exist even as it exists today. Based on economics of size, the changes of agricultural firms being united to form a few giant production units appear remote.

Farm policy. It has been pointed out that many changes have taken place in the agricultural sector of the American economy. As a result of these changes, a need has developed for, not only, new facilities and skills but also new policies.

The present and prospective position of agriculture clearly requires a positive form policy. One of the reasons for this is the disparity between the bargaining power of farmers acting individually and that of the few large firms with which they often deal when buying or selling commodities.[2]

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[1] J. H. McCoy and H. D. Wakefield, Economies of Scale in Farm Cattle Feedlots of Kansas--An Analysis of Nonfeed Costs, Tech. Bull. 145, January, 1966 (Agricultural Experimental Station, Manhattan), See content.

[2] Farm Policy in the Years Ahead, A report of the National Agricultural Advisory Commission (Washington: U.S. Dept. of Agriculture, Nov., 1964), p. 3.

The need for new farm policy has been expressed as a result of added technological and managerial skills on the part of the producer. These two factors have increased the spread in earning capacity between the less efficient and more efficient firms in commercial agriculture. Agricultural policy makers will have to decide whether government farm programs, which are basically the same today as originally set up in the 1930's, should be maintained or whether adjustment problems in agriculture could be better attached in other ways.[1]

The need for a dual agricultural policy might be suggested. In areas still practicing traditional types of farming operations (extensive type of agriculture) old agricultural policies, somewhat modified, might suffice.

In areas of intensive agricultural production, this is hardly the case. These areas have experienced changes such as the introduction of future markets for beef cattle, production contracts with non-agricultural sectors of the economy, changes in capital structure and capital requirements to mention a few. New agricultural policies would appear to be in order.

Research. Commercial agriculture in the United States is in the midst of a huge and continuous technological breakthrough that is putting pressure on farm prices and economies and forcing widespread readjustments in resource use.[2] To alleviate those pressures, it has been suggested that research should be directed

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[1]Heady et.al., Agricultural Adjustment Problems in a Growing Economy, p. 33.

[2]IBID., p. 305.

at cost-reducing rather than output-increasing innovations, especially in the production of commodities such as fruit, vegetables, and livestock where the pinch in average and marginal costs might be felt first.[1]

It has also been suggested that research should show the producer how to choose among the major alternatives and how to select the most profitable enterprise on which to concentrate in the process of modernizing. Farmers who keep abreast of all technological changes at the same time encounter problems of absolescense and capital rationing. It has been pointed out that the process of selecting enterprises should include alternatives of off-farm employment. Research, therefore, should be reallocated and devoted to ways of identifying major alternatives.[2]

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[1] IBID., p. 308.

[2] IBID., p. 307.

IV. CONCLUSION

The foregoing analysis indicates that there has been a major change in the organization of agricultural production over the past several decades. An important change has been the mix in inputs used by agriculture and the quantity of the proportional factors employed.[1] Perhaps the most outstanding change in American agriculture since 1940 has been the substitution of capital and non-farm inputs for farm labor.[2]

This changing mix in inputs that is occuring in American agriculture reflects itself quite differently in individual farms contrasted to aggregate statistics. Furthermore, individual farms in different type-of-farming situations also exhibit markedly different trends in the mix of inputs.[3]

The implications of these changes in input mix are numerous. Shifts in the economic and sociological aspects of farm life have been suggested. The higher proportion of purchased inputs as well as a greater investment per farm worker signal an increasingly commercial agriculture. Some of the sociological characteristics of the "farm way of life" will undoubtedly disappear and the nostalgia of farm fundamentalism will become of less interest. These changes will also be associated with an

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[1]Heady, et.al., Roots of the Farm Problem, p. 39.

[2]Baum et.al., Capital and Credit Needs in a Changing Agriculture, pp. 109-110.

[3]Skold, "Implications of the Changing Input Mix on Selected Type-of-Farming Situations," p. 7.

increasing demand for management skills, a revised credit framework and other institutional arrangements to service the changing farm organization.[1]

It would appear to be in order to broaden our thinking about agriculture to include the business as that supply farmers with items used in production, as well as the processing and distributing concerns that handle the food and fiber produced on our farms.[2]

Also, our concept of "high rist" production areas might be revised as a result of the changing input mix. Regional development, as affected by the changing input mix, should not be overlooked. We know that nonpurchased inputs are relatively more important than purchased inputs in areas of extensive agricultural production. We also know that an opposite input relationship applies to areas of intensive agricultural production. Furthermore, there is reason to believe that relatively fewer agri-business relationships would be involved in the production and handling of nonpurchased as compared to purchased inputs. Because of these relationships a further decline in population and industry in small urban centers of areas such as the Piedmont and Corn Belt might not continue or could conceivably reverse. A potential exists for expansion of secondary industries to provide purchased inputs for these areas, and an accompanying increase in the size of the labor force, might be predicted.

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[1]Heady et.al., Roots of the Farm Problem, p. 212.

[2]Butz, Power to Produce, p. 381.

Expansion of this nature would not be so likely in the Southern Plains and Pacific Northwest areas.

The direction taken of these institutional and other arguements will be important.[1] The growing importance of non-farm inputs in agricultural production merits further appraisal and analysis.[2]

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[1]Heady et.al., Roots of the Farm Problem, pp. 212-213.

[2]Baum et.al., Capital and Credit Needs in a Changing Agriculture, p. 109.

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IMPLICATIONS OF THE CHANGING INPUT ON SELECTED TYPE-OF-FARMING SITUATIONS

by

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ABSTRACT

In United States agricultural history, an almost continuous change in the use of purchased and nonpurchased input mix has been a dominant characteristic. This change has produced a trend in which the purchased inputs have become relatively more important than the nonpurchased inputs.

The shift in input use on farms of a specific type differs markedly from the aggregate trends in purchased versus nonpurchased inputs. In the last few decades this trend has been especially pronounced. The object of this study was to examine some of the trends and implications of this changing input mix as applied to different type-of-farming situations.

Four selected type-of-farming situations, employing a contrasting input mix, were chosen for a more detailed study of input use trends. Two of these areas practiced an extensive type of agriculture. The other two areas chosen were areas where intensive agricultural production was practiced.

The implications of the changes in input mix were examined as they applied to the areas of contrasting agricultural production under study. Factors examined included risk in farming, adjustment abilities, intersectional interdependence, the credit structure and sociological implications. The implications as related to farm policy, managerial ability, returns to size and research were also examined.

It was suggested that changes in input mix, as applied to specific type-of-farming situations, could not be ignored.

Further appraisal and analysis of the growing importance of purchased inputs in agricultural production was desirable, if not essential.