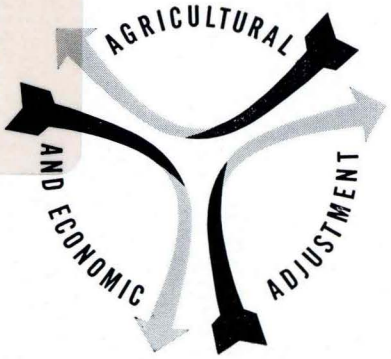

Comparison of Resource Returns Of Well-Organized Iowa Farms With Selected Nonfarm Opportunities

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SUMMARY

The primary objective of this study was to determine whether the evidence on factor incomes and factor opportunity costs for well-organized Iowa farms supports the hypothesis of an imbalance in the level of output of Corn Belt products.

This presented four subsidiary problems: (1) identifying and selecting a group of well-organized farms, (2) determining the level and pattern of market clearing prices, (3) estimating factor incomes on the selected farms and (4) estimating the factor opportunity costs of the resources employed on these units. The 2-year period, 1954-55, was selected for study.

The farms to be analyzed were selected by Iowa's six district extension economists to represent approximations to optimally organized units under recent price conditions and known technology. After screening the initial selection of 26 farms for effects of abnormal weather and major shifts in resource organization, a residual group of 16 units remained for intensive study.

It was assumed that markets would have cleared at a price level of 65 percent of parity with relative prices equal to the average for the 1946-52 period. After the computations for this study had been completed, the results of an investigation of feed-livestock prices under market-clearing conditions in the 1952-58 period became available. On the basis of this investigation, it appears that the price assumptions for market-clearing conditions used in the present study were quite realistic.

Estimates of factor income (the total net return realized by those supplying management, labor, land and capital on the farm) for each farm were prepared on an accrual basis from information obtained from farm business records and personal interviews with the operators. The original record data required a number of adjustments to permit (1) accurate estimates of receipts and expenses associated with farm production and (2) a consistent accounting of factor income in relation to the resources producing this income.

Factor incomes were estimated for three alternative price situations: (1) actual prices prevailing in 1954 and 1955, (2) actual 1954 and 1955 prices, except that hog and cattle prices were normalized for the effects of their respective production cycles, and (3) the assumed set of market-clearing prices. The estimates for 1954 and 1955 were averaged to represent factor income in the 1954-55 period.

The factor income estimates under actual price conditions provide a measure of the resource earnings actually experienced during the 1954-55 period. The estimates reflecting normalized prices for hogs and cattle and actual prices for other products provide an indication of what resource earnings would have been in 1954-55 had not prices of hogs and cattle been abnormally depressed by heavy cyclical marketings. The estimates under market-clearing conditions provide a measure of what resource earnings would have been if markets had cleared at the prices assumed with input and output quantities the same as those actually experienced in 1954 and 1955.

The estimates of total factor opportunity cost (the cost, measured in alternative earning opportunities, of the working capital, land capital and the labor-management used in production) for each farm were based on earning rates for resources in nonfarm employments. The opportunity cost of land and permanent improvements was computed by multiplying the capital value by the prevailing rate of interest on first mortgage farm loans. The opportunity cost of operating capital was computed by multiplying an adjusted value by the annual rate of interest paid for agricultural production credit. Family labor, other than operator labor, was priced at a rate equivalent to the average monthly wage, without board and room, paid hired farm labor in Iowa during 1954 and 1955.

Three alternative bases of evaluating the opportunity cost of operator labor-management were used: (1) adjusted labor income of managers of Iowa farm supply companies, (2) adjusted labor income of managers of Iowa cooperative elevator companies and (3) average labor income of production line foremen in two of Iowa's largest manufacturing firms.

The 16 farms selected to represent well-organized units were much larger, on the average, than the typical Iowa commercial farm. They employed more labor and much more land and operating capital. The average total investment in land, permanent improvements (excluding dwelling) and operating capital was $117,400 in the 1954-55 period. Investment in land and permanent improvements (excluding dwelling) averaged $81,400, compared with an average value of land and buildings (including dwelling) for all Iowa commercial farms in 1954 of $37,900.

Under actual price conditions in 1954-55, the 16 farms earned an estimated average factor income of $11,967 per farm. The adjustment of hog and cattle prices for cyclical effects raised this figure by $3,263, or about 27 percent. With prices at assumed market-clearing levels, estimated average factor income dropped to $9,725 per farm.

The estimates of total factor opportunity cost exhibited only minor variation for the different price situations. Under each price situation, the highest total factor opportunity cost occurred when operator labor-management was priced on the basis of the manufacturing foreman alternative. The farm supply manager alternative gave a higher average total factor opportunity cost than the cooperative elevator manager alternative.

Under actual prices, the average difference between total factor income and total factor opportunity cost was $574 per farm when operator labor-management was priced on the basis of the cooperative elevator manager alternative. When operator labor-management was priced on the basis of the farm supply manager and the manufacturing foreman alternatives, however, the average difference between total factor income and total factor opportunity cost was negative. In the case of the farm supply manager alternative, the average difference was −$1,300 per farm. The comparable figure for the manufacturing foreman alternative was −$1,898.

With actual prices adjusted for cyclical effects in hogs and cattle, the average difference between total factor income and total factor cost was $3,795 when operator labor-management was evaluated in terms of the cooperative elevator manager alternative. When

operator services were priced on the basis of the farm supply manager alternative, the average difference between total factor income and total factor cost declined to $1,922. The average difference amounted to $1,324 when operator labor-management was priced in terms of the manufacturing foreman alternative.

The differences between total factor income and total factor cost under the assumed set of market-clearing prices stand in sharp contrast to those under the previously stated price situations. With the assumed market-clearing prices, the average difference between total factor income and total factor cost stood at −$1,327 when operator's services were priced on the basis of the cooperative elevator manager alternative. The disparity increased to −$3,200 for the farm supply manager alternative and to −$3,798 for the manufacturing foreman alternative.

Because of potential errors in the estimates of factor income and factor opportunity cost under market-clearing conditions, this study does not provide a conclusive test of an imbalance in output, though the evidence in support of this hypothesis is impressive. The estimates, even after liberal allowance for error, strongly point to the conclusion that during 1954-55 the level of output of Corn Belt products was too large to clear markets at prices that would permit labor and capital on well-organized farms to earn "comparable returns."

An important part of the ultimate solution of the farm income problem, therefore, lies in a better balance between demand and the capacity to produce. Achieving a reasonable balance between demand and the capacity to produce can eliminate the disparity in income-earning opportunities on well-organized farms. This, however, is not sufficient for poorly organized units. Income-earning opportunities on such farms reflect the effects of both an imbalance in total farm output and an imbalance in internal organization. The ultimate solution to this problem lies in a better organization of resources on individual farms—a solution which depends on more widespread use of up-to-date technology and adjustment in the number of farms, farm size and total inputs of labor and capital.

Comparison of Resource Returns of Well-Organized Iowa Farms With Selected Nonfarm Opportunities[1]

BY DON KALDOR, RAYMOND BENEKE AND RUSSELL BRYANT[2]

A well-balanced (efficient) farm industry will exhibit three important characteristics: (1) The output of each product will be produced at the lowest possible resource cost. (2) The composition of farm output—the product mix—will be meshed with the pattern of demand for farm products. (3) The total output of the industry will be geared to the total demand for farm products.

If the output of each product is produced at the lowest possible cost, all farms will be using the best technology and the most effective combination of resources. Land, labor and capital will be combined in production on the basis of relative productivities and prices. When output is being produced at minimum cost, returns to comparable inputs of labor and capital will be similar on all farms producing the same products. Evidence of persistent disparities in these returns points to an imbalance in resource cost. Such an imbalance means that there are opportunities in the industry to (1) increase total output without increasing total resource input, (2) produce the same total output with less total input or (3) increase total output and at the same time reduce total input.

If the composition of farm output is geared to the pattern of demand for farm products, returns to comparable inputs of labor and capital will be similar in all lines of farm production. Different farm enterprises will be about equally profitable. Evidence that returns in some enterprises are persistently out of line with those in other enterprises points to an imbalance in the industry's product mix.

If total farm output is geared to the total demand for farm products, markets will clear at prices that permit labor and capital on well-organized farms to earn returns on a par with those earned by similar resources in other sectors of the national economy. An imbalance in the level of farm output is indicated by a persistent disparity between the returns to labor and capital on well-organized farms and returns to comparable resources in nonfarm employment.

Each type of imbalance has a particular effect on income-earning opportunities in farming. An imbalance in resource cost is associated with a disparity in the terms on which income is earned on different farms. An imbalance in the product mix means a disparity in income-earning opportunities in different lines of farm production. And an imbalance in total output is associated with a disparity in income-earning opportunities between farm and nonfarm employments.

When one or more of these imbalances exist, opportunities are open to increase the per-capita income of farm families and at the same time raise the level of national income. For this reason, the identification and measurement of these imbalances are an essential step in the development of policies to improve income-earning opportunities in farming that are compatible with national economic growth.

SCOPE OF STUDY

A number of hypotheses can be advanced concerning the kinds of imbalance currently troubling the farm industry:

(1) *Imbalance in the level of total output.* Farm output is too large under full employment conditions to permit a level of market-clearing prices that would enable producers on well-organized farms to earn comparable returns on their labor and capital.

(2) *Imbalance in resource cost.* Total farm output is optimum in terms of the above criterion, but it is being produced at excessive resource cost. Factor returns on well-organized farms are equal to opportunity cost levels (i.e., equal to returns earned by similar resources in alternative nonfarm employments), but returns on other farms are below such levels.

(3) *Imbalance in the composition of output.* Total farm output is optimum and is being produced at the lowest feasible cost, but the product mix is out of gear with the pattern of demand for farm products. The output of some products is too large, while the output of other products is too small. As a result, returns to labor and capital are relatively low in the first group of enterprises and relatively high in the second group.

(4) *Various combinations of the three types of imbalance.* One possibility is that the farm industry is experiencing serious imbalance of all three types. Total farm output is too large. It is being produced at excessive resource cost. And the product mix is out of gear. Another possibility is that the composition of output is in reasonable balance, but total output is too

[1]Project 1316, Iowa Agricultural and Home Economics Experiment Station, Center for Agricultural and Economic Adjustment cooperating.

[2]The authors wish to express their appreciation to extension economists L. J. Bodensteiner, Charles O. Greenlee, Herbert B. Howell, Dean M. Huston, Leslie G. Kral, Everett G. Stoneberg and W. J. Turner and to the farmers and business firms supplying data. Without their cooperation, this study would not have been possible.

large, and the resource cost of producing this output is too high. The high level of output keeps returns to labor and capital below opportunity cost levels on well-organized farms under market-clearing conditions. And utilization of outmoded technology and inefficient resource combinations with attendant high costs compounds the problem on other farms.

This study focuses on the first of these hypotheses; i.e., imbalance in the level of farm output. Numerous farm management studies indicate that factor incomes and resource combinations vary widely among farms operating under essentially similar factor and product price conditions. If all farms were arrayed on the basis of the ratios of factor income to factor opportunity cost, farms with the highest ratios could be considered well organized. The optimum level of farm output could be defined as that level which would consistently clear markets at prices high enough to permit well-organized farms to earn factor incomes equal to the opportunity costs of the inputs employed.

A test of the hypothesis that the farm industry has been experiencing an imbalance in the level of total output would be provided by a comparison of factor incomes and factor opportunity costs on well-organized farms under market-clearing conditions. If it could be established that under these conditions, well-organized farms earned factor incomes that equaled factor opportunity costs, a basis would exist for rejecting the proposition that the level of total output is too large. On the other hand, if it could be shown that factor incomes were below opportunity costs on well-organized farms, a basis would exist for accepting the hypothesis.

A comparison of recent or current factor incomes and factor opportunity costs on well-organized farms, however, would not necessarily provide a test of the hypothesis. The reason is that for several years factor incomes have been influenced by government price-support programs. Prices have not been permitted to fall to market-clearing levels. Even if it could be established that factor incomes on well-organized farms compared favorably with opportunity costs under prices actually experienced, this would not provide a basis for rejecting the hypothesis of an imbalance in total output. This would require accurate estimates of what factor incomes and opportunity costs would have been if markets had been allowed to clear. Yet, if it could be shown that, under prices actually experienced, factor incomes were below factor opportunity costs on well-organized farms, the hypothesis could be accepted without further study. For, if factor incomes failed to cover factor opportunity costs when prices were supported, it is clear that this also would be true under market-clearing conditions.

Acceptance of the hypothesis that the level of farm output is too large to permit opportunity cost returns on well-organized farms under market-clearing conditions implies in principle that other farms would experience an even greater disparity between factor incomes and factor opportunity costs. If these farms were not as well organized, it means that their ratios of factor income to factor opportunity cost would be smaller than on well-organized farms under given price conditions. If the ratios were less than unity on well-organized farms, they would be still smaller on farms that were not as well organized.

The primary objective of this study was to determine whether the evidence on factor incomes and factor opportunity costs on well-organized Iowa farms would tend to support or reject the hypothesis of an imbalance in total farm output. This presented a number of subsidiary problems: (1) the identification and selection of a group of well-organized farms, (2) the determination of the level and pattern of market-clearing prices, (3) the estimation of factor incomes for the selected farms and (4) the estimation of the opportunity costs of the resources employed on these units.

METHOD

Ideal solutions to these problems were not possible. Limited resources and information necessitated procedures which were less than optimum from both the economic and statistical standpoints. Nevertheless, the estimates presented herein are believed to be reasonably accurate and typical of well-organized Iowa farms for the conditions specified.

Identification and Selection of Well-Organized Farms

The identification and the selection of the group of well-organized farms were based on the judgments of farm management specialists. The six district extension economists in Iowa were asked to select several farms in their respective areas which most closely approximated an optimum economic organization under recent price-cost conditions and known technology. These extension workers were familiar with the resource arrangements and financial results on many of the state's best farms. Farms were to be selected only if complete business records were available for the 2-year period, 1954-55. It appears, however, that this was not an important restriction, since many of the best organized farms keep comprehensive business records. The initial judgment sample selected by the district economists consisted of 26 farms.

Each of these farms then was screened on the basis of yield experience during the years 1953 to 1955. Since this was a period of significant geographical weather variation, it was necessary to determine whether any of these farms experienced abnormal weather. This was done by fitting a linear least squares trend line to the yields of principal crops on each farm for the 1948-56 period. Farms on which yields deviated appreciably from trend values in the 1953-55 period were eliminated. Six of the original 26 farms were excluded on this basis. At a later stage, it was necessary to eliminate four additional farms because of accounting complications arising from major shifts in resource organization during the period under study. This left a total of 16 farms for further analysis.

It should be emphasized that the selection of farms was a subjective evaluation by the district economists. Basically, they were seeking farms in which the quantity and combination of land and capital resources fitted the skills of the operator and in which the product mix and the timing of production were well fitted to the resources available and to price and market conditions prevailing. The judgment of the district econo-

TABLE 1. AVERAGE PRICES RECEIVED BY IOWA FARMERS, 1954-55, ASSUMED MARKET-CLEARING PRICES, 1954-55, AND ESTIMATED AVERAGE MARKET-CLEARING PRICES, 1952-58, FOR SELECTED PRODUCTS.

Product	Unit	Average prices received by Iowa farmers, 1954-55[a]	Assumed market-clearing prices 1954-55[b]	Estimated average market-clearing prices, 1952-58[c]
Corn	bu.	$ 1.37	$ 1.01	$ 1.01
Oats	bu.	0.69	0.54	[d]
Soybeans	bu.	2.63	1.82	[d]
All hay	tons	17.75	11.81	[d]
Hogs	cwt.	17.70	13.10	12.58
Cattle	cwt.	19.20	16.03	16.59
Sheep	cwt.	4.70	6.27	6.40
Lambs	cwt.	19.15	15.84	[d]
Chickens	lb.	0.15	0.16	0.14
Eggs	doz.	0.30	0.24	0.31
Butterfat	lb.	0.64	0.50	[d]
Wool	lb.	0.46	0.36	[d]

[a] Prices of Iowa farm products. Iowa Farm Science. 13:188. Feb. 1959.
[b] Prices used in the present study.
[c] Shepherd, Geoffrey, Paulsen, Arnold, Kutish, Francis, Kaldor, Donald, Heifner, Richard and Futrell, Gene. Production, price and income estimates and projections for the feed-livestock economy under specified control and market-clearing conditions. Iowa Agr. and Home Econ. Exp. Sta. Spec. Rpt. 27. 1960.
[d] No estimate prepared.

mists, of course, is not infallible, and it may well be that some farms which were better organized were overlooked.

It became clear in working with this group of farms that, to remain well organized, a farming operation must be adjusted periodically to changes in prices, technology and the resource position of the operator. This was reflected in the high percentage of farms that were in the process of major adjustments during the 2 years studied.

Market-Clearing Prices

The problem of determining market-clearing prices for the 1954-55 period was resolved by assuming that markets would have cleared at a price level of 65 percent of parity with the ratios of the prices of individual commodities equal to the average for the 1946-52 period.[3] The resulting prices for Iowa's principal farm products, together with the average prices received by Iowa farmers in 1954-55, are presented in table 1.

After the computations for this study had been completed, the results of an investigation of farm prices under market-clearing conditions became available.[4] These results provide some check on the realism of the price assumptions used here. The study estimated what average prices would have been in the 1952-58 period for the principal products of the feed-livestock economy if markets had been permitted to clear. These estimates also are shown in table 1.

The price estimates from the 1952-58 study, except for eggs, are very similar to the market-clearing prices assumed in the present study. Prices for corn are identical at $1.01 per bushel. The hog price in the present study is 4 percent higher and the cattle price is 3 percent lower than the estimated average market-clearing prices for the 1952-58 period. The egg price used in the present study, however, is 22 percent lower.

In general, it appears that the market-clearing prices assumed in the present study are quite realistic for those products providing the main sources of income on Iowa farms for the 1954-55 period.

Estimating Total Factor Income

Total factor income for each farm was defined as the total net return to land and permanent improvements, operating capital, family labor and operator labor-management. This was computed on an accrual basis. It represents the income that could be consumed by the owners of the farm's resources without affecting the unit's future productive capacity. Total factor income is equivalent to net farm income in cases where the farm family supplies all of the land, labor and capital used in the farm business. In the case of tenant-operated farms, however, part of the total factor income accrues to the landlord as rent.

[3] Sixty-five percent of parity refers to the parity ratio, i.e., the ratio of the index number of prices received by farmers (1910-14=100) to the index number of prices paid by farmers (1910-14=100), as calculated by the United States Department of Agriculture and published in the monthly report *Agricultural Prices*. In applying these assumptions, prices received were adjusted to an Iowa level on the basis of the postwar relationship between Iowa farm prices and national farm prices.

[4] Shepherd, Geoffrey, Paulsen, Arnold, Kutish, Francis, Kaldor, Donald, Heifner, Richard and Futrell, Gene. Production, price and income estimates and projections for the feed-livestock economy under specified control and market-clearing conditions. Iowa Agr. and Home Econ. Exp. Sta. Spec. Rpt. 27. 1960.

The estimates of total factor income were based on information from farm business records and personal interviews. Complete business record summaries, showing income and expense items, were available for each farm during the 1954-55 period. In studying these records, it became clear that additional information would be needed to rigorously evaluate factor incomes and the quantity and quality of resource inputs. This additional information was obtained by personal interviews with the operators.

The completed schedules provided detailed information on land and permanent improvements, machinery, livestock and miscellaneous equipment, breeding stock and farm cash balances. Information was also obtained on the rental value of the farm dwelling, the allocation of automobile and truck expense and other nonfarm income and expense items included in the original business records.

Before income and expense summaries could be prepared for each farm, it was necessary to make several adjustments in the original record data. These adjustments served a twofold purpose: (1) they permitted more accurate estimates of the incomes and expenses associated with farm production, and (2) they provided a more consistent accounting of factor income in relation to the resources producing this income.

All nonfarm business activities were excluded from the farm income accounts. Such items as income from nonfarm labor, stocks and bonds and urban rental properties were dropped. Debit items requiring adjustment included auto repairs and fuel, interest, taxes, insurance, depreciation and miscellaneous operating expenses. Interest paid, along with that portion of taxes and insurance for the farm dwelling and household goods, was not counted as business expense. Interest on borrowed funds was not included because the measure of capital input reflected both owned and borrowed capital. Food produced on the farm and later consumed by the farm family was counted as income.

Estimates of factor income on each farm for 1954 and 1955 were prepared for three price situations: (1) the actual prices prevailing in 1954 and 1955, (2) actual 1954 and 1955 prices, except that hog and cattle prices were normalized for the effects of their respective production cycles, and (3) the assumed set of market-clearing prices shown in table 1. The estimates for 1954 and 1955 were averaged to represent total factor income in the 1954-55 period.

The estimates of total factor income under actual price conditions provide a measure of the resource earnings actually experienced during the 1954-55 period. The estimates reflecting normalized prices for hogs and cattle and actual prices for other products provide a measure of what resource earnings would have been in 1954-55 if prices of hogs and cattle had not been abnormally depressed by heavy cyclical marketings and input and output quantities on each farm had been the same as those actually experienced. The estimates under market-clearing conditions provide a measure of what resource earnings would have been if markets had cleared at the prices set forth in table 1 and if input and output quantities had been the same as those actually experienced during the 1954-55 period.

The terms of trade for farm products, as measured by the parity ratio, stood at 89 in 1954 and 84 in 1955, averaging 86.5 for the 2-year period. Hog and cattle prices in this period were strongly influenced by cyclical changes in marketings. Whereas hog prices were relatively high in 1954 with marketings near a cyclical low, they declined rapidly during 1955 as marketings reflected the expansion phase of the production cycle. Cattle prices were relatively low in both years as a result of heavy marketings during the liquidation phase of the production cycle.

Hog and cattle prices were normalized for cyclical effects by using the average price over the preceding cycle adjusted to reflect 1954 and 1955 farm price levels. For hogs, this involved a downward adjustment of 14 percent in the 1954 price and an upward adjustment of 12 percent in the 1955 average price. Cattle prices were adjusted upward by 12 percent in 1954 and by 9 percent in 1955.

In estimating the income and expense effects of prices other than those actually prevailing in 1954 and 1955, price adjustment coefficients were applied to the appropriate 1954 and 1955 income and expense items on each farm. These coefficients were computed as the ratio of the new (adjusted) price to the actual price, both values representing average prices received or paid by farmers. This method was adopted to minimize the distortion in factor income that would result from applying average prices directly to input and output quantities where significant interfarm differences in product qualities and marketing decisions existed. Adjustments in input prices were made only for inputs of farm origin, such as feeder cattle and commercial feed. Similar adjustments also were made in inventory values.

It was pointed out previously that the estimates of total factor income under market-clearing conditions represent what resource earnings would have been if the 1954-55 quantities of inputs and outputs on each farm had prevailed with product prices at assumed free-market levels. Presumably, the 1954-55 quantities were close approximations to the optimum quantities for the price conditions of that period. It is necessary to recognize that these quantities may not represent equal approximations to the optimum quantities under the assumed free-market prices. Insofar as the operators of these farms would have found it profitable to adjust these quantities because of lower product prices, estimates based on constant quantities would tend to understate the factor incomes that would be earned under the assumed market-clearing conditions. It also needs to be recognized that to the extent these operators would have adjusted input quantities by substituting effort for leisure and current output for future output, the relative attractiveness of farming compared with other employments over time would have declined more than in proportion to the fall in the current ratio of factor income to factor opportunity costs.

Estimating Total Factor Opportunity Cost

Total factor opportunity cost was defined as the total income that would have been earned by the resources employed on the farm if they had been paid a rate of return equal to that earned by comparable resources in nonfarm employments. Exceedingly difficult problems are encountered in estimating opportunity

costs for farm resources. Only two of these problems can be mentioned here. One is the problem of determining the comparability of resources. The other is the problem of selecting the specific nonfarm employments for comparative purposes.

If estimates of total factor opportunity costs are to be meaningful, the earning rates applied to farm resources must reflect resource qualities that are reasonable approximations to those employed on particular farms. This requirement, however, can be interpreted in both a short-run and long-run context. In a short-run context, it could mean that the nonfarm earning rates should reflect resource qualities similar to those that currently exist on each farm. With respect to operator labor-management, this refers to the existing bundle of operator talent as influenced by such factors as inherent ability, training, initiative and employment experience. In a long-run context, it could mean the qualities that would have characterized the resources on each farm if they had been employed in particular nonfarm employments with the same preparation and experience. Again, with respect to operator labor-management, this refers to what the operator's talents would have been in particular nonfarm employments with the same amount of training and work experience in these employments.

The problem of selecting specific nonfarm employments would not arise if it were true that a given resource input of specified quality earned the same return in all nonfarm employments. This would be approximately true if the nonfarm economy were in economic balance internally. However, nonfarm industries are confronted with imbalance problems also, even though generally these problems have not been as acute or as difficult to resolve as those in agriculture. Yet, there are disparities in resource returns among nonfarm employments. Ideally, these differences should be recognized in estimating factor opportunity costs of farm resources. In principle, the solution to this problem would be to select the alternative nonfarm employment characterized by the highest earning rate for the specific quality of each particular resource.

Limited information necessitated "second best" solutions to these and other related problems in estimating factor opportunity costs for the farms in this study. The resources on these farms were grouped into three categories: (1) land and permanent improvements, (2) operating capital and (3) labor and management. Estimates of opportunity cost were prepared for each category.

LAND AND PERMANENT IMPROVEMENTS

The input of land and permanent improvements was measured by its market value during the 1954-55 period. This value was estimated by the district economist in consultation with the operator. The value of the dwelling, estimated as the price at which it could be sold if it were located in the nearest town, was subtracted from the total market value of the farm in arriving at a measure of the land and permanent improvement input in production. Real income supplied the farm family by housing on the farm was excluded in estimating factor income.

The opportunity cost of land and permanent improvement input was computed by multiplying the capital value by the prevailing interest rate on first mortgage farm loans (table 2). This assumed that the return sacrificed by having this amount of capital tied up in land and permanent improvements could be represented by the earnings which would accrue to an equivalent sum invested in first mortgage loans on farm real estate.

This procedure raises two obvious questions: (1) Does not the value of land partly depend on the level of farm prices and, therefore, would not the capital sum be different under the assumed level of free-market prices? (2) Is not the risk involved in land ownership greater than that reflected in the interest rate for first mortgage loans on farm real estate?

Undoubtedly, an affirmative answer must be given to both questions. Yet, there is no reliable basis for estimating what land values would have been under the assumed level of market-clearing prices, or for adjusting interest rates to a land-ownership basis. If land values had been lower and the interest rate higher, however, there would have been compensating effects on the estimated opportunity cost of land and permanent improvements. A lower value of land would have reduced opportunity cost, whereas a higher rate of interest would have increased it. Thus, the net effect of these two factors might have been small.

OPERATING CAPITAL

The input of operating capital was measured by the sum of the adjusted values for all livestock, feed, machinery, equipment and cash balances. The adjusted values reflected the amount of capital tied up in each type of input during the accounting year. For example, $1,000 tied up for 6 months was considered equivalent to $500 tied up for 1 year. Estimates of the transformation periods for different types of input were based on inventory and monthly sales and purchase data from business records.

Inventory values for most operating inputs were available from the records of each farm. These were "book values," however, and failed to accurately reflect the value of inputs under 1954 and 1955 price conditions. In some cases, the rates at which items had

TABLE 2. EARNING RATES APPLIED TO LAND AND PERMANENT IMPROVEMENTS, OPERATING CAPITAL AND FAMILY LABOR.

Item	Earning rate	
	1954	1955
Land and permanent improvements:		
Interest rate on first mortgage farm real estate loans in Corn Belt[a]	4.2 percent	4.3 percent
Operating capital:		
Interest rate on agricultural production credit in Corn Belt[a]	6.3 percent	6.4 percent
Family labor:		
Monthly wages of hired labor, without board and room, in Iowa[b]	$196	$200

[a] U.S. Department of Agriculture, Agricultural Research Service, Production Economics Branch. (Private communication.) 1958.
[b] Iowa Crop and Livestock Reporting Service, Des Moines, Iowa. (Private communication.) 1958.

been depreciated in the accounts did not correspond to actual rates of depreciation. As a result, items were carried on the books at unrealistically low values. In a few instances, machines were still in service even though they had been depreciated to zero in the records. In other cases, changes in input prices since the date an item was originally entered in the inventory resulted in distorted values.

For these reasons, all items were reappraised in terms of market prices in 1954 and 1955. Data from machinery auctions and surveys of used machinery markets compiled by trade organizations were used for this purpose. In a few instances, market prices for comparable items were not available. These values were estimated on an auction sale basis by the district economist in consultation with the operator. The cash balance component of total operating capital was estimated by the operator to represent the average monthly minimum balance needed to carry on the farm business.

The opportunity cost of total operating capital was computed by multiplying the sum of the adjusted values by the annual rate of interest paid for agricultural production credit (table 2). During 1954 and 1955, these rates were substantially above the average yield for Standard and Poor's list of 425 industrial stocks. However, the total return on industrial stocks was quite similar, since it included a sizable appreciation component.

LABOR

The labor employed on each farm consisted of operator, hired and family labor. Labor input was measured in terms of man-months. No attempt was made to ascertain the intensity of work or the length of the working day. However, where operators performed off-farm work (a rare practice among the farm operators under study) or took extended vacations, the estimates of operator labor were adjusted accordingly. Family labor consisted of the housewife or, more often, youngsters helping with the farm work. Their contribution to the labor input was measured in terms of the amount of adult labor each replaced on the farm. Thus, on many jobs, such as tractor operation, they were considered the equivalent, hour for hour, of an adult worker. Estimates of family labor were made by the district economist in cooperation with the operator.

Estimates of the opportunity costs of family and operator labor were prepared separately. Family labor was valued at the going wage rates for hired labor, since this was considered the most likely alternative use for the skills of family workers (table 2). These values represented average monthly wages, without board and room, paid in Iowa during 1954 and 1955. They were applied to the estimates of man-months of labor performed by family members on each farm.

Several alternative methods of evaluating the opportunity cost of operator labor-management were considered. With their management skills and personal resources reflecting years of farming experience, typical operators of well-organized farms might have short-run opportunities for nonfarm employment as farm supply business managers, grain elevator managers and feed mill operators. Or, had these same farmers committed their talents to specific nonfarm occupations before developing specialized talents in farming, they might have progressed to supervisory or managerial positions with companies in industries such as manufacturing, wholesaling and retailing.

Three alternatives were finally selected: (1) local manager of a farm supply company, (2) local manager of a cooperative elevator company and (3) a supervisory employee in two of the larger manufacturing companies in Iowa. This selection was partly based on the availability of data relating labor returns to management input. These data were supplied by cooperating firms. The problem was narrowed to a determination of the appropriate size of business and management level in these employments that would utilize the physical and mental resources of the particular operators under study. There are a variety of measures of the amount of managerial attention required in a business activity — none of which is wholly satisfactory. Among them are value of product added, the number of employees supervised and total capital managed. Upon reviewing the nonfarm business data made available by farm supply and cooperative elevator companies, it became apparent that estimates of the value of product added could not be prepared for these businesses. Also, because of wide differences between farm and nonfarm operations in the amount of labor combined with capital, the number of employees supervised would not afford an adequate measure of management input. Instead, the quantity and type of capital managed was used as an index of management input.

To refine this measure, capital was classified by types and then weighted according to estimates of the managerial time and ability required to manage various forms of capital. Capital in land and buildings was given a weight of one. Operating capital, such as machinery and equipment, was given a weight of four. A weight of six was applied to inventories of livestock and feed, in the case of farm businesses, and to inventories of grain and merchandise, in the case of cooperative elevators and farm supply companies. A regression of manager salary on the weighted value of assets managed was computed for 1954 and 1955 for the 22 farm supply companies and similarly for the 44 cooperative elevator companies supplying information. As noted below, these regressions were used in estimating the opportunity cost of operator labor-management in terms of management positions in farm supply and cooperative elevator companies.

In estimating opportunity cost of operator labor-management in terms of a supervisory position in manufacturing firms, no attempt was made to relate managerial rewards to the value of capital managed. It was assumed that each of the 16 operators would have progressed to at least the foreman level had they originally become manufacturing plant production workers instead of committing their efforts to farming. Personnel managers in two of Iowa's largest manufacturing firms provided information on foreman salaries and the monetary values of employee fringe benefits. These benefits included (1) retirement and pension plans, (2) life, disability and health insurance, (3) paid vacations and (4) 1954 and 1955 bonuses.

Earnings of farm supply firm managers. The average salary of the managers of the 22 farm supply firms

providing data was $8,485 in 1954 and $8,824 in 1955, with a 2-year mean of $8,656. The average value of assets managed during the 1954-55 period was $106,839. When the various types of capital were weighted according to the procedure described earlier, this figure became $426,946.

The correlation of manager salary and the weighted value of assets managed during the 2-year period gave a coefficient of 0.750. The equations for the regression of manager salary on weighted asset value were as follows:

$$1954: \quad Y = 3{,}937 + 0.0108X$$

$$1955: \quad Y = 4{,}543 + 0.0098X$$

where Y = expected operator labor-management salary in dollars, and
X = weighted value of assets managed in dollars.

Substituting the estimated weighted value of assets managed on the 16 farms into the regression equation resulted in estimates of the opportunity cost of labor-management in terms of the farm supply firm employment.

Earnings of cooperative elevator managers. Compared with the farm supply group, salaries were lower and values of capital managed were higher among managers of cooperative elevator firms. The average labor return of managers of cooperative elevators was $5,407 in 1954 and $5,466 in 1955. The mean for the 2-year period was $5,445. During the same period, the average value of assets managed was $118,014, which after weighting increased to $343,545.

The correlation of manager salary and value of assets managed gave a coefficient of 0.512, substantially smaller than that for farm supply firms. A partial explanation may be that more of the management responsibility is assumed by the boards of directors of cooperative elevators, leaving less of the management responsibility in the hands of salaried managers.

The equations for the regression of cooperative manager salary on the value of assets managed are as follows:

$$1954: \quad Y = 4{,}451 + 0.0030X$$

$$1955: \quad Y = 4{,}479 + 0.0025X$$

where Y = expected labor-management return in dollars, and
X = weighted value of assets managed in dollars.

On the basis of these regression equations, estimates of the opportunity cost of operator labor-management in terms of the cooperative elevator employment were prepared for each of the 16 farms.

Earnings of manufacturing plant foremen. The average labor income of production line foremen in the two Iowa manufacturing firms was $7,541 in 1954 and $7,933 in 1955. Table 3 shows the distribution of labor income between salary and fringe benefits for each firm in 1954 and 1955.

It is interesting to note that in 1954 nearly 17 percent and in 1955 nearly 16 percent of the labor income of production line foremen in these two plants consisted of fringe benefits. Failure to include the value of fringe benefits in comparing labor returns of farm operators and plant foremen would result in a substantial overestimate of the relative earnings of farm operators.

TABLE 3. LABOR INCOMES OF PRODUCTION-LINE FOREMEN, 1954 AND 1955.

	Company A		Company B		Average	
Income	1954	1955	1954	1955	1954	1955
Salary	$6,840	$7,440	$5,698	$5,914	$6,269	$6,677
Fringe benefits[a]	1,006	1,033	1,539	1,479	1,272	1,256
Total	7,846	8,473	7,237	7,393	7,541	7,933

[a] Includes the value of retirement plans, insurance benefits, paid vacations and bonuses.

RESOURCE CHARACTERISTICS OF THE 16 FARMS

The 16 farms under study had an average total investment in land, permanent improvements (excluding dwelling) and operating capital of $117,400 in the 1954-55 period (table 4). Total investment ranged from a low of $38,400 to a high of $205,300. Only two farms had a total investment of less than $50,000, whereas, half of the farms had a total investment of more than $100,000.

Investment in land and permanent improvements (excluding dwelling) averaged $81,400, ranging from $13,400 to $151,900. This compares with an averaged value of land and buildings (including dwelling) for all Iowa commercial farms in 1954 of $37,900. Nine of the 16 farms had a land and permanent investment of over $75,000, whereas only two farms had less than $40,000.

The average investment in operating capital stood at $36,000, varying from $15,900 to $65,300. Only one farm had an operating capital investment under $20,000; 10 farms had $30,000 or more of operating capital.

The proportioning of total investment between land and permanent improvements on the one hand and operating capital on the other varied widely. While the average land and permanent improvement investment per dollar of operating capital was $2.25, it ranged from a low of $0.54 to a high of $4.08. In part, this variation reflected differences in enterprise combinations, particularly differences in the degree of specialization in crop and livestock production.

The average area of land per farm was 310 acres. This compares with an average acreage for all commercial farms in Iowa of 189 acres in 1954. Two farms had approximately 160 acres, and five farms had 400 or more acres. While the average quality of land (as measured by value per acre) on these farms was much above that for the average commercial farm in the state, there was considerable variation among units. The two farms with the smallest land area had relatively high-quality land, whereas several of the larger area farms had relatively poor-quality land. Thus, variation in land area was partly compensated for by opposite variation in land quality. As a result, the effective input of land varied less than the acreage of land.

During 1954-55, the farms in this study harvested an average of 224 acres of crops. The comparable figure for all commercial farms in the state was 117 acres in 1954. Harvested acreage for the 16 farms

TABLE 4. RESOURCE CHARACTERISTICS OF THE 16 WELL-ORGANIZED FARMS, AVERAGE FOR 1954-55.

Farm number	Investment in land and permanent improvements[a]	Investment in operating capital	Total investment	Total acres	Acres harvested	Man-months of labor
1	$ 89,200	$30,100	$119,300	320	289	19
2	102,100	25,100	127,200	290	148	16
3	102,500	35,300	137,800	300	272	20
4	118,200	37,600	155,800	424	316	24
5	140,000	65,300	205,300	472	366	23
6	77,000	30,800	107,800	320	214	19
7	143,400	56,400	199,800	440	373	21
8	96,200	62,700	158,900	266	222	30
9	30,800	24,900	55,700	313	169	15
10	60,600	37,000	97,600	160	110	22
11	56,600	15,900	72,500	190	176	14
12	57,100	31,200	88,300	158	99	13
13	17,400	26,300	43,700	200	142	14
14	45,200	28,400	73,600	400	180	27
15	13,500	24,900	38,400	226	140	16
16	151,900	44,600	195,500	480	368	21
Average	81,400	36,000	117,400	310	224	20

[a]Excluding the value of dwelling.

ranged from 99 to 373 acres. Five farms harvested less than 160 acres, and six farms harvested more than 250 acres.

Labor input averaged 20 man-months. Four farms employed less than 15 man-months; only two farms employed more than 25 man-months. About one-third of the farms hired year-around labor, whereas the other two-thirds hired only seasonal help. Nine of the 16 farms employed some family labor other than operator labor. However, operator and family labor made up the larger part of the input on nearly all farms. While the labor input on these farms was considerably greater than that on the typical Iowa commercial farm, the percentage difference for labor was much smaller than for land and permanent improvement investment and operating capital.

TOTAL FACTOR INCOMES

The estimates of 1954-55 average total factor income for each of the 16 well-organized farms under the three price situations are presented in table 5. Under actual price conditions, the average total factor income was estimated at $11,967 per farm. It varied from a low of $5,438 to a high of $18,084. The median value was just over $11,000.

The adjustment of hog and cattle prices for cyclical effects increased total factor income substantially. On the average, the increase per farm amounted to $3,263, or about 27 percent. The adjustment had the greatest effect on farms heavily specialized in cattle production, since cattle prices were cyclically depressed in both 1954 and 1955.

TABLE 5. ESTIMATED TOTAL FACTOR INCOME ON THE 16 WELL-ORGANIZED FARMS UNDER THREE ALTERNATIVE PRICE SITUATIONS, AVERAGE FOR 1954-55.

Farm number	Actual prices	Actual prices with cylical adjustments for cattle and hogs	Assumed market-clearing prices
1	$13,106	$14,858	$ 9,163
2	11,004	13,053	11,012
3	15,352	21,378	12,298
4	12,832	14,418	7,468
5	16,124	24,696	15,019
6	11,498	14,547	9,994
7	14,651	19,830	11,826
8	18,084	25,496	17,308
9	5,438	6,611	4,198
10	11,676	14,100	8,021
11	9,353	10,985	7,005
12	7,141	10,441	7,069
13	11,046	13,299	9,286
14	6,368	9,369	6,713
15	10,252	11,542	7,832
16	17,554	19,062	11,384
Average	11,967	15,230	9,725

With prices at assumed market-clearing levels, average total factor income dropped to $9,725 per farm. It ranged from $4,198 to $17,308. The average level was about 19 percent below that for actual prices and nearly 36 percent below that for actual prices adjusted for cyclical effects in hogs and cattle.

TOTAL FACTOR OPPORTUNITY COSTS

The estimates of the opportunity cost for each resource category, based on the procedures outlined earlier, are shown in table 6. These estimates were summed to give an estimate of total factor cost for each farm as presented in table 7. This table shows the total factor opportunity cost for each combination of price situation and operator labor-management alternative.

Under actual prices, the average total factor opportunity cost per farm was estimated at $11,394 when operator labor-management cost was based on cooperative elevator manager employment. It stood at $13,267 when operator labor-management cost was based on farm supply manager employment. When operator labor-management cost was based on manufacturing foreman employment, the average total factor opportunity cost per farm amounted to $13,866.

The adjustment of actual prices for cyclical effects in hogs and cattle raised the average total factor opportunity cost per farm for each alternative employment for operator labor-management. The increases were relatively small, however, amounting to less than 1 percent. The differences reflected the variation in operating capital associated with different price levels.

With prices at the assumed market-clearing levels, the average total factor opportunity cost per farm was smaller for each operator labor-management alternative than with actual prices. Again, the differences were relatively small and reflected the variation in operating capital resulting from differences in price levels.

The variation in total factor opportunity cost among farms was large under all three price situations. For example, it ranged from $8,884 to $19,713 under actual prices when operator labor-management was priced in terms of the farm supply manager alternative. The range

TABLE 6. ESTIMATED FACTOR OPPORTUNITY COSTS ON THE 16 WELL-ORGANIZED FARMS, AVERAGE FOR 1954-55.

Farm number	Land and permanent improvement investment	Operating capital			Family labor	Operator labor-management		
		Actual prices	Actual prices with cycle adjustments for hogs and cattle[a]	Assumed market-clearing prices[b]		Farm supply manager alternative	Cooperative elevator manager alternative	Manufacturing foreman alternative
1	$3,795	$1,913	$1,914	$1,595	$ 594	$6,839	$5,183	$7,737
2	4,360	1,594	1,595	1,462	990	6,684	5,140	7,737
3	4,359	2,238	2,200	1,901	792	7,192	5,280	7,737
4	5,024	2,386	2,398	2,009	0	7,544	5,377	7,737
5	5,952	4,157	4,326	3,530	0	9,604	5,944	7,737
6	3,272	1,956	1,996	1,752	0	6,750	5,158	7,737
7	6,095	3,575	3,701	3,004	0	9,064	5,795	7,737
8	4,098	3,982	4,106	3,288	1,284	8,923	5,759	7,737
9	1,308	1,578	1,603	1,359	0	5,998	4,951	7,737
10	2,576	2,346	2,415	1,956	496	7,060	5,243	7,737
11	2,407	1,011	1,038	845	0	5,768	4,888	7,737
12	2,426	1,983	2,014	1,661	0	6,605	5,118	7,737
13	741	1,669	1,674	1,395	198	5,891	4,921	7,737
14	1,924	1,806	1,851	1,611	594	6,293	5,032	7,737
15	616	1,582	1,591	1,332	984	5,784	4,891	7,737
16	6,459	2,835	2,848	2,433	100	8,222	5,566	7,737
Average	3,463	2,288	2,329	1,946	377	7,139	5,265	7,737

[a]Inventory values of hogs and cattle adjusted for cyclical price variations.
[b]Values of operating inputs adjusted on the basis of market-clearing prices.

TABLE 7. ESTIMATED TOTAL FACTOR OPPORTUNITY COST ON THE 16 WELL-ORGANIZED FARMS UNDER THREE PRICE SITUATIONS, AVERAGE FOR 1954-55.

Farm number	Actual prices— with operator labor-management cost based on:			Actual prices with cyclical adjustment— with operator labor-management cost based on:			Assumed market-clearing prices— with operator labor-management cost based on:		
	Farm supply manager	Cooperative elevator manager	Manufacturing foreman	Farm supply manager	Cooperative elevator manager	Manufacturing foreman	Farm supply manager	Cooperative elevator manager	Manufacturing foreman
1	$13,141	$11,485	$14,039	$13,142	$11,486	$14,040	$12,823	$11,167	$13,721
2	13,628	12,084	14,681	13,629	12,085	14,682	13,496	11,952	14,549
3	14,582	12,670	15,127	14,544	12,632	15,089	14,245	12,333	14,790
4	14,954	12,787	15,147	14,966	12,799	15,159	14,577	12,410	14,770
5	19,713	16,053	17,846	19,882	16,222	18,015	19,086	15,426	17,219
6	11,978	10,386	12,965	12,018	10,426	13,005	11,774	10,182	12,761
7	18,734	15,465	17,407	18,860	15,591	17,533	18,163	14,894	16,836
8	18,287	15,123	17,101	18,411	15,247	17,225	17,593	14,429	16,407
9	8,884	7,837	10,623	8,909	7,862	10,648	8,665	7,618	10,404
10	12,478	10,661	13,155	12,547	10,730	13,224	12,088	10,271	12,765
11	9,186	8,306	11,155	9,213	8,333	11,182	9,020	8,140	10,989
12	11,014	9,527	12,146	11,045	9,558	12,177	10,692	9,205	11,824
13	8,499	7,529	10,345	8,504	7,534	10,350	8,225	7,255	10,071
14	10,617	9,356	12,061	10,662	9,401	12,106	10,422	9,161	11,866
15	8,966	8,073	10,919	8,975	8,082	10,928	8,716	7,823	10,669
16	17,616	14,960	17,131	17,629	14,973	17,144	17,214	14,558	16,729
Average	13,267	11,394	13,866	13,308	11,435	13,907	12,925	11,052	13,523

of variation was very similar to this for the cooperative elevator manager alternative. Both of these alternatives reflected differences among farms in management requirements as measured by the weighted capital managed estimates. In the case of the manufacturing foreman alternative, however, the charge for operator labor-management was the same for all farms. For this reason, the variation among farms was smaller for this alternative. A similar pattern of variation existed for the other price situations.

COMPARISON OF TOTAL FACTOR INCOME AND TOTAL FACTOR OPPORTUNITY COST

On the basis of the estimates of total factor income and total factor cost, intrafarm differences were computed for each price situation. When these differences are positive, it indicates that the estimated total net return to land and permanent improvements, operating capital, family labor and operator labor-management *exceeded* the total income these resources would have earned if they had been employed in the specific nonfarm alternatives set forth earlier. When the differences are negative, it indicates that the total net return to these resources was *less* than the total income that would have been earned if they had been employed in the particular nonfarm alternatives.

Differences Under Actual Prices

The derived differences between total factor income and total factor opportunity cost under prices actually experienced for each operator labor-management alternative are found in table 8.

When operator labor-management was priced on the basis of the cooperative elevator manager alternative, the average total factor income exceeded total factor opportunity cost by $574 per farm. Total factor income was greater than total factor opportunity cost on 12 farms, whereas it was less than total factor opportunity cost on 4 farms (fig. 1).

When operator labor-management was priced on the basis of the farm supply manager and the manufacturing foreman alternatives, however, the average difference between total factor income and total factor opportunity cost was negative. In the case of the farm supply manager alternative, the average difference was –$1,300

TABLE 8. DIFFERENTIAL BETWEEN ESTIMATED TOTAL FACTOR INCOME AND ESTIMATED TOTAL FACTOR OPPORTUNITY COST ON THE 16 WELL-ORGANIZED FARMS UNDER ACTUAL PRICE CONDITIONS, AVERAGE FOR 1954-55.[a]

Farm number	With operator's services valued on basis of cooperative elevator manager's labor income	With operator's services valued on basis of farm supply manager's labor income	With operator's services valued on basis of manufacturing foreman's labor income
1	$ 1,621	$ –35	$ –933
2	–1,080	–2,624	–3,677
3	2,682	–770	225
4	45	–2,122	–2,315
5	71	–3,589	–1,722
6	1,112	–480	–1,467
7	–814	–4,083	–2,756
8	2,961	–203	983
9	–2,399	–3,446	–5,185
10	1,015	–802	–1,479
11	1,047	167	–1,802
12	–2,386	–3,873	–5,005
13	3,517	2,547	701
14	–2,988	–4,249	–5,693
15	2,179	1,286	–667
16	2,594	–62	423
Average	574	–1,300	–1,898

[a]Negative value means an excess of total factor opportunity cost over total factor income.

per farm. The comparable figure for the manufacturing foreman alternative was –$1,898. Under actual prices, only 4 of the 16 farms earned factor incomes in excess of factor costs when operator labor-management was priced on the basis of the farm supply manager and manufacturing foreman alternatives.

Thus, the answer to whether the 16 farm operators, selected originally because they were thought to have well-organized businesses, earned "market rates" for the resources employed under price conditions actually experienced depends on the price placed on their services. If cooperative elevator managers' labor incomes are used as the basis for comparison, apparently most of the farms earned "comparable returns" on resources. On the other hand, if the higher earnings of farm supply managers and manufacturing foremen are used, most farms failed to earn "comparable returns."

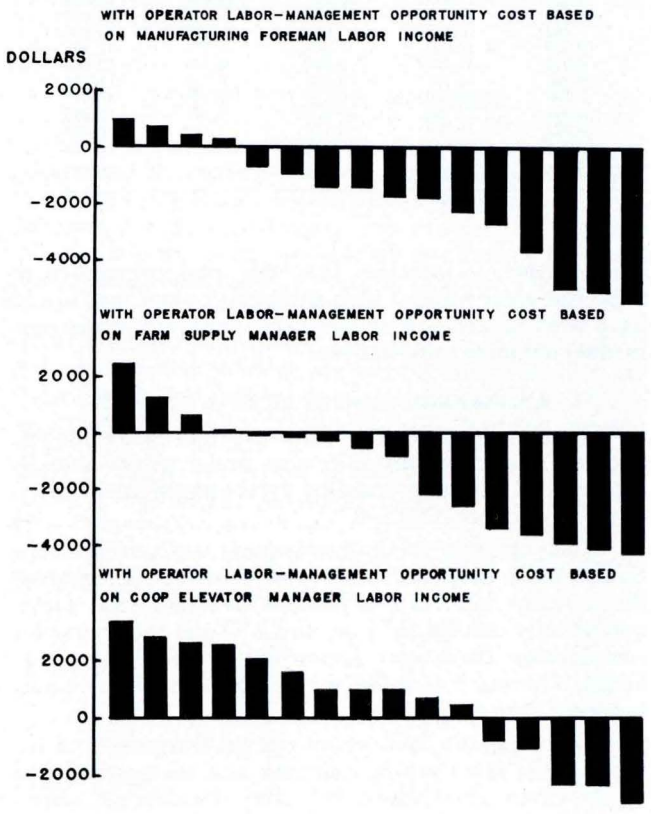

Fig. 1. Individual farm differences between total factor income and total factor cost under actual price conditions with alternative labor-management opportunity costs.

Differences Under Actual Prices Adjusted for Cyclical Variation

The years 1954 and 1955 presented a somewhat less favorable picture of factor income on these farms than would similar comparisons for the years immediately preceding or following. All of the 16 farms depended heavily upon income from hogs and cattle. As indicated earlier, normalizing hog and cattle prices in these years had the effect of raising factor income.

With actual prices adjusted for cyclical effects in hogs and cattle, the average difference between total factor income and total factor cost was $3,795 when operator labor-management was priced on the basis of the cooperative elevator alternative (table 9). Only two farms failed to earn total factor incomes in excess of total factor costs. When operator services were priced in terms of the farm supply manager alternative, the average difference between total factor income and total factor cost declined to $1,922. In this case, factor income fell short of factor cost on five farms (fig. 2). The average difference between total factor income and total factor cost amounted to $1,324 when operator labor-management was priced on the basis of the manufacturing foreman alternative. Here six farms failed to earn factor incomes in excess of factor costs.

If hog and cattle prices had not been cyclically depressed during 1954-55, apparently the majority of the 16 well-organized farms would have earned "comparable returns" on their resources. However, a few—the number depending on the pricing of operator services—would not have earned "comparable returns" even with the parity ratio averaging 86 percent of parity and hog and cattle prices at their cyclical average.

Differences Under Assumed Market-Clearing Prices

The differences between total factor income and total factor cost under the assumed set of market-clearing prices stand in sharp contrast to those under the above price situation (table 10). When operators'

TABLE 9. DIFFERENTIAL BETWEEN ESTIMATED TOTAL FACTOR INCOME AND ESTIMATED TOTAL FACTOR OPPORTUNITY COST ON THE 16 WELL-ORGANIZED FARMS UNDER ACTUAL PRICE CONDITIONS ADJUSTED FOR CYCLICAL EFFECTS IN HOGS AND CATTLE, AVERAGE FOR 1954-55.[a]

Farm number	Farm operator's services valued on basis of cooperative elevator manager's labor income	Farm operator's services valued on basis of farm supply manager's labor income	Farm operator's services valued on basis of manufacturing foreman's labor income
1	$ 3,372	$ 1,716	$ 818
2	968	−576	−1,629
3	8,746	6,834	6,289
4	1,619	−548	−741
5	8,474	4,814	6,681
6	4,121	2,529	1,542
7	4,239	970	2,297
8	10,249	7,085	8,271
9	−1,251	−2,298	−4,037
10	3,370	1,553	876
11	2,652	1,772	−197
12	883	−604	−1,736
13	5,765	4,795	2,949
14	−32	−1,293	−2,737
15	3,460	2,567	614
16	4,089	1,433	1,918
Average	3,795	1,922	1,324

[a] Negative value means an excess of total factor opportunity cost over total factor income.

services were priced on the basis of the cooperative elevator manager alternative, the average difference between total factor income and total factor cost stood at −$1,327. The disparity increased to −$3,200 for the farm supply manager alternative and to −$3,798 for the manufacturing foreman alternative.

Only two farms earned factor incomes in excess of factor costs when operator labor-management was valued in terms of the cooperative elevator manager alternative (fig. 3). When operator services were priced on the basis of the farm supply manager and manufacturing foreman alternative, only one farm—although a different unit in each case—earned a factor income sufficient to cover factor cost.

Under the 65 percent of parity price level assumption with relative prices averaging the same as in the 1946-52 period, very few of the 16 well-organized farms earned "comparable returns" on the resources employed.

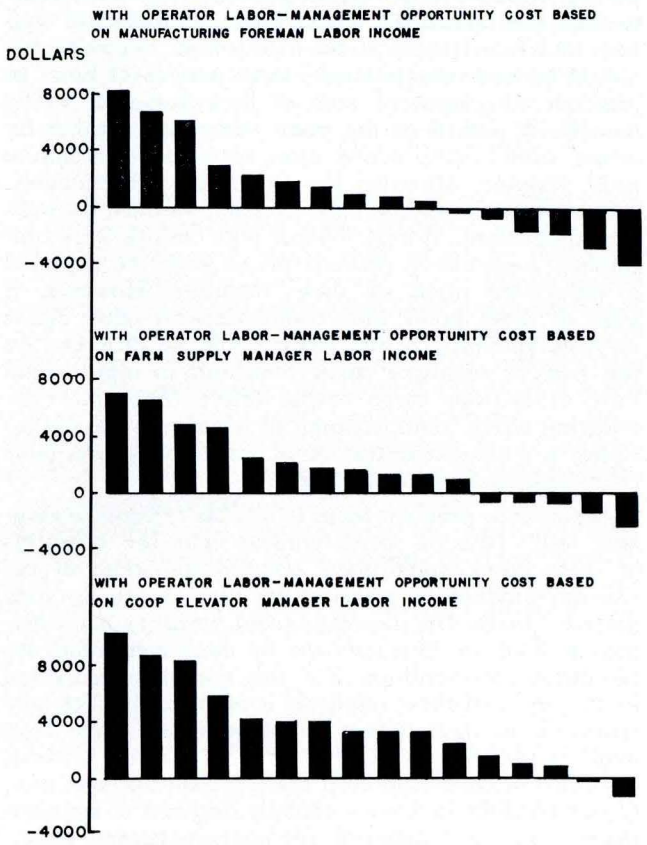

Fig. 2. Individual farm differences between total factor income and total factor cost under actual price conditions adjusted for cyclical effects in hogs and cattle with alternative labor-management opportunity costs.

APPRAISAL OF FINDINGS

The comparisons under market-clearing conditions may exaggerate the disparity that would have existed between total factor incomes and total factor costs had there been no price support activity during the period. As pointed out earlier, the estimates of factor incomes represent what total resource earnings would have been if the 1954-55 quantities of inputs and outputs on each farm had prevailed with product prices at assumed free-market levels. Insofar as the operators of these farms would have found it profitable to adjust these quantities because of lower product prices, the estimates based on constant quantities would tend to understate the factor incomes earned under market-clearing conditions.

What short-run adjustments would have been made by the operators of these well-organized farms? And how large are the errors in the estimates of factor income because of these adjustments? Unfortunately, no clear-cut answers can be given to these questions. The quantity and quality of information on production response is so inadequate as to preclude definitive answers. If sufficient information had been available, there would have been a basis for estimating input and output quantities under the assumed free-market conditions. As things stand, any judgment must rest largely on deductive considerations.

It is apparent from table 1 that the assumed pattern of relative prices under market-clearing conditions is quite similar to the pattern of relative prices in the 1954-55 period. Therefore, it is likely that the composition of output on each farm would be much the same. If it were reasonably well adjusted to relative prices in 1954-55, the same product mix would be nearly as well adjusted to the assumed pattern of market-clearing prices.

TABLE 10. DIFFERENTIAL BETWEEN ESTIMATED TOTAL FACTOR INCOME AND ESTIMATED TOTAL FACTOR OPPORTUNITY COST ON THE 16 WELL-ORGANIZED FARMS UNDER ASSUMED MARKET-CLEARING PRICES, AVERAGE FOR 1954-55.[a]

Farm number	With operator's services valued on basis of cooperative elevator manager's labor income	With operator's services valued on basis of farm supply manager's labor income	With operator's services valued on basis of manufacturing foreman's labor income
1	$ -2,004	$-3,660	$-4,558
2	-940	-2,484	-3,537
3	-35	-1,947	-2,492
4	-4,942	-7,109	-7,302
5	-407	-4,067	-2,200
6	-188	-1,780	-2,767
7	-3,068	-6,337	-5,010
8	2,879	-285	901
9	-3,420	-4,467	-6,206
10	-2,250	-4,067	-4,744
11	-1,135	-2,015	-3,983
12	-2,136	-3,623	-4,755
13	2,031	1,061	-785
14	-2,448	-3,709	-5,153
15	9	-884	-2,836
16	-3,174	-5,830	-5,344
Average	-1,327	-3,200	-3,798

[a]Negative value means an excess of total factor opportunity cost over total factor income.

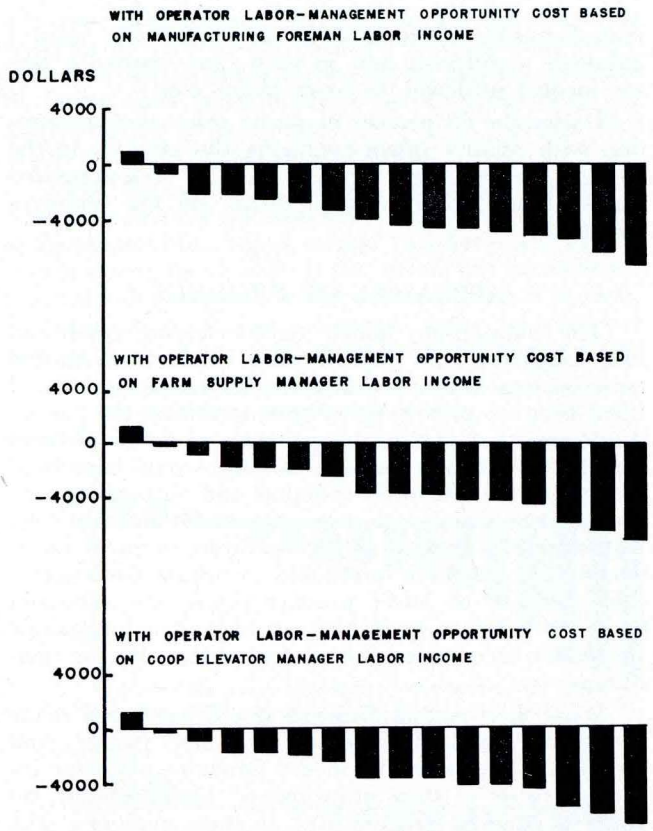

Fig. 3. Individual farm differences between total factor income and total factor cost under assumed market-clearing prices with alternative operator labor-management opportunity costs.

The more difficult question concerns the effect of the assumed change in the level of farm prices on total output and input on each farm. It seems reasonably clear that the drop in prices would have had no appreciable short-run effect on the quantity of land and permanent improvements, machinery, equipment and operator-family labor available for production. Any transfer of these resources to nonfarm employments over the near term would have been highly unlikely. Nevertheless, the intensity of use of these resources might have been affected by the price change. This would depend on the nature of the substitution relationships—temporal substitution between income and nonincome activities for operator and family labor and intertemporal substitutions for land, machinery and equipment.

While such substitutions could have increased, decreased or left unchanged the effective input of these resources, a small increase seems to be the most probable short-run outcome. This likely would have involved more hours of work by operator and family labor and perhaps somewhat more intensive land use. The long-run effects, however, could be quite different.

The farms under consideration also employed a number of current operating inputs. Among the important ones were petroleum products, fertilizer, commercial feed and hired labor. These resources are typically purchased each production period; commitments can be revised over relatively short periods of time. In principle, the input of each of these resources would have been pushed to the point where any further increase would have added more to total cost than to total revenue, allowing for uncertainty. Presumably, this condition would be approximately fulfilled on well-organized farms. If input-output relationships were continuous, a decline in product prices might be expected to reduce the input of these resources. However, if some of these inputs were combined with other inputs in fixed proportions, the result could be different. In this case, a relatively small reduction in input could have a relatively large output effect. Since the cost-reducing effect could be small in relation to the output effect, a cut-back in this input might be unprofitable even with lower product prices.

Petroleum products seem to fit this category reasonably well. Thus, it seems unlikely that the operators of these farms would have reduced the input of petroleum products appreciably because of the assumed drop in prices. On the other hand, fertilizer and commercial feed are characterized by more continuous input-output relationships. For this reason, a reduction in the input of these resources is more likely. Yet, any reduction in these inputs probably would have been small in the short run. In the period since 1954-55, the price of corn—the crop that typically receives most of the fertilizer in Iowa—actually declined to approximately the level assumed for market-clearing conditions. There seems to have been no appreciable reduction in fertilizer use on the farms under study. This,

however, is not conclusive evidence of what would have happened in 1954-55 if the price of corn had been at the assumed level. There may have been other factors operating recently to offset the effect of lower corn prices on fertilizer use.

Prices of commercial feed would have declined with the fall in feed-grain prices, although not in the same proportion. This would have compensated in part for the drop in product prices and tended to limit the reduction in the use of some types of commercial feed. The fact that corn prices would have been lower relative to the prices of protein supplements would have encouraged the substitution of corn for protein. The substitution relationships, however, are apparently such that failure to adjust protein - corn combinations to changes in their price ratio would have little influence on cost.[5]

The effect on the use of hired labor probably would have varied significantly among the farms in this study. About one-third of the group hired year-around labor. The other two-thirds hired labor only by the month and/or day. Farms hiring year-around labor are likely to have less opportunity to economize on this input without a major reorganization of resources. The reason is that there is likely to be substantial discontinuity in labor input in going from year-around labor to monthly or day labor. Such a decision is likely to require a major reorganization of resources, and operators probably would be reluctant to make the change in the short run. However, some reduction in the input of monthly and/or day labor might have occurred. Again, it is likely that the decrease would have been small in the short run. Probably much, if not all, of the decrease in hired labor would have been offset, as far as output effects are concerned, by more intensive use of fixed resources, particularly, more intensive use of operator and family labor.

Undoubtedly, the assumed decline in product prices would have encouraged some reduction in inputs for plant maintenance. Inputs that could be postponed without serious effects on current output would tend to be decreased first. Somewhat less labor might have been used for building and fence repair. And there might have been a small decline in outlay for machine and equipment maintenance. While these adjustments would reduce cash expenses and restrain the drop in cash inflow, they also would tend to decrease future income-producing capacity. Insofar as they involved higher than "normal" depreciation or below "normal" replacement, the stock of durable farm capital would tend to diminish. The measurement of factor income, however, provides for "normal" depreciation and maintaining capital intact.

On balance, it appears that these short-run adjustments would have had only minor effects on output. They would have reduced operating expenses more than total receipts. But it seems likely that the impact on factor incomes would have been relatively small—almost certainly less than the estimated disparities based on constant quantities.

It might be argued, on the other hand, that the nonfarm alternatives selected in evaluating the opportunity cost of operator labor-management represent a quality of labor service much below that employed on the selected farms. In this case, the estimates of total factor cost would be too low, and the disparities, therefore, would be underestimated. While it must be recognized that this could be true, available information did not permit a more systematic and refined evaluation of operator labor-management. Insofar as this were true, the resulting error would tend to offset any error in the estimation of factor incomes based on constant quantities.

Because of these and other potential errors in the estimates of factor income and factor opportunity cost under market-clearing conditions, this study does not provide a conclusive test of the output imbalance hypothesis. However, the evidence in support of this hypothesis is impressive. The estimates, even after liberal allowance for error, strongly point to the conclusion that during 1954-55 the level of output of Corn Belt products was too large to clear markets at prices that would permit labor and capital on well-organized farms to earn "comparable returns."

An important part of the ultimate solution of the farm income problem, therefore, lies in a better balance between demand and the capacity to produce. Until a better balance is reached through a growth of demand and/or the withdrawal of sufficient resources from farming to reduce output, depressed returns to resources on well-organized farms may be expected to persist under market-clearing conditions.

Achieving a reasonable balance between demand and the capacity to produce can eliminate the disparity in income-earning opportunities on well - organized farms. However, it cannot do the job for poorly organized units. Income-earning opportunities on such farms reflect the effects of both an imbalance in total farm output and an imbalance in resource cost. Because of high costs per unit of output, these farms are not able to earn "comparable returns" under prices which permit such returns on well-organized farms. The ultimate solution to this problem lies in a better organization of resources on individual farms—a solution which depends on more widespread use of up-to-date technology and adjustment in the number of farms, farm size and total inputs of labor and capital.

[5]Heady, E. O., et al. New procedures in estimating feed substitution rates and in determining economic efficiency in pork production. Iowa Agr. and Home Econ. Exp. Sta. Res. Bul. 462. Nov. 1958.