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Agricultural Income

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THIS paper briefly discusses certain aspects of the Department of Commerce's farm income series, that is, imputation in farm income, farmer's incomes from all sources, and seasonal adjustment of farm income. It also considers the National Income Division's figures on personal consumption expenditures for food and the question as to where farming begins and ends in our economy.

IMPUTED ITEMS IN NET FARM INCOME

Net farm income includes two major components which are derived by imputation, (1) food and fuel produced and consumed on farms and (2) the rental value of farm houses. In 1953, these items were valued at $2,043 million and $1,751 million respectively. Together they accounted for more than 30 per cent of the total net farm income of $12,253 million.[1]

I am very much in sympathy with the position taken by Everett E. Hagen and Edward C. Budd that imputed values be included in the income accounts. Farm families definitely regard the production of food for their own use as an economic activity, a source of income. Changes in the physical volume of home-produced food consumed on farms have been rather closely associated (inversely) with changes in market prices of the foods involved. The elasticity of demand for these foods as a group seems to have been about —0.4 to —0.5 during the 1924-1941 period. Evidently farm families do apply an economic calculus to this type of income in kind.

If the income accounts are to measure the relative consumption levels or "welfare" of farm and nonfarm people, a strong argument can be made for valuing home-produced food at retail prices rather than (as at present) at farm prices. Some farm families buy these same foods at retail prices. Home-produced foods also pass through what might be called an equivalent "retail store" form on the way to the family table. Equivalent amounts of "food on the fork" should clearly be given the same economic weight in farm-nonfarm comparisons.

[1] Figures based on *Survey of Current Business,* Dept. of Commerce, July 1955, Tables 1 and 39.

One could, of course, argue that farming per se ends when the product is brought into the form which is customary for original sales (for example, a live chicken). If so, income from *farming* would include home-produced foods valued at farm prices. In that case the imputed return for processing these foods should be attributed to "nonagricultural employment" of farm residents. Although such services as transportation, wholesaling, and retailing are dispensed with, the farm family's real income with respect to home-produced food is just as large as though they had been performed. Perhaps the equivalent imputed income should be regarded as a rent—a return for the farmer's locational advantage in living on the premises of a food factory that sells to him at cost.

I am not prepared to go very far into the problem of imputing rental values to farm houses. One might question whether this is an income from the farm *business,* and one could no doubt make interesting calculations, or run multiple regression analyses, as a basis for separating out the residential value of a farm from its value as a business. The fact remains that in the open country a farm house has locational advantages for the man who operates the farm and locational disadvantages for any occupant who must earn his living elsewhere. I am sure that an imputed rental value of farm houses belongs in the national income accounts. However, I am not sure as to the level at which such imputations should be made.

In 1940, I understand, the imputed rental value of farm dwellings averaged only about one-third that of nonfarm dwellings. There is no doubt that a great many farm houses had a low value in 1940. Roughly half of the farm dwellings were in the South, where nonfarm incomes also were low relative to the national average. I have not had time to examine regional figures, but I suspect that the rental value of farm dwellings in the North and West in 1940 was somewhat more than a third that of nonfarm dwellings in the same regions, and that differences in the quality of farm and nonfarm dwellings in those regions are even smaller today. I have no concrete suggestions for improving the present estimates of rental value of farm houses, but it seems to me that this area needs careful re-examination. The rapid decline in farm population and the increase in per capita farm income suggest that the average quality of occupied farm dwellings may be improving.

The two imputed items I have been discussing amount under present estimating procedures to about 1 per cent of gross national product; if home-produced food were valued at retail prices, and if some moderate increase should be found justified in the imputed rental value of farm dwellings, the amount might rise to nearly 2 per cent of GNP.

This change would not be of major consequence for most users of the national income accounts. However, it would show farm-nonfarm income comparisons in a light which I think is more realistic from the standpoint of farm price and income policy. To eliminate imputed items entirely, as suggested by Cohen and Gainsbrugh, would tip the scales still more heavily in the wrong direction.

INCOME TO FARM PEOPLE FROM ALL SOURCES

This series is not carried in the national income accounts as such. However, inasmuch as these estimates of farm income are based upon the work of the Department of Agriculture's Farm Income Branch, series published only by the latter may reasonably be brought within the scope of this conference.

Although "income parity" has never been used directly as a basis for price support programs, the comparison of per capita incomes of farm and nonfarm people has been a major supporting argument. Such comparisons involve a disconcerting number of arbitrary elements. For one thing, the appropriate economic definition of a farm is somewhat obscure. The Bureau of the Census has established a fairly broad definition of farms: nevertheless, there are "nonfarms" whose economic characteristics are virtually the same as the adjacent "farms." On the one hand, many of the families living on what the census calls a farm obtain the bulk of their incomes from nonfarm sources. On the other hand, a fair number of "nonfarm" families probably raise $100 or $200 worth of poultry, eggs, vegetables, and so on (from $200 to $400 worth if the items are valued at retail prices).

The census definition of a farm includes many units that economists might wish to exclude for purposes of comparing farm and nonfarm incomes or measuring the output and efficiency of commercial agriculture. For example, about 50 per cent of the "farms" account for 90 per cent of total cash receipts from farm marketings. Hence, one might be tempted to cut off the frequency distribution of farms at a point other than that used in the census in order to compare the distribution of "commercial farms" with some subdivision of the nonfarm population. It is, of course, extremely difficult to specify the appropriate nonfarm group for this comparison.

Given the census definition of a farm, it is conceptually possible to estimate the total income of farm residents from all sources. In the last year or two, income of farm residents from nonfarm sources has been estimated at nearly $6 billion. An additional $2 billion of income reflects wages received by some farm residents in consequence of labor performed for other farm residents. This means that the total income

of farm people (operators and laborers alike) has been around $20 billion, while the income of farm proprietors from farming has been about $12 billion. The $20 billion total is distributed to a somewhat larger number of individuals than is the $12 billion. However, the average income of farm operator families is significantly increased relative to that of nonfarm families if the income of farmers from nonfarm sources is included and if home-produced food is valued at retail prices.

For special analyses, it is relevant to take account of the relatively greater ratio of dependents to full-time workers in the farm population. At best, our economy might be expected to generate equal incomes per worker of given quality in both farm and nonfarm occupations; it cannot be expected to generate equal incomes *per capita* if the ratios of dependents to workers are different in the two sectors.

ESTIMATES OF PERSONAL CONSUMPTION EXPENDITURES FOR FOOD

The Department of Commerce's series on personal consumption expenditures for food has been remarkably stable over the years when expressed as a percentage of disposable income. Yet there is clear evidence that a declining percentage of our total economic activity is going into farm food production and the commercial processing and distribution of standard food products. The following figures are illustrative:

	Percentage of Disposable Income:			
Year	*Food Expenditures*[a]	*Retail Value of Food Market Basket*[b]	*Col. 2 × Index of Per Capita Food Consumption*[b]	*Col. 1 ÷ Col. 3*
	(1)	(2)	(3)	(4)
1935-1939 average	23	23	23	1.00
1949	26	19	21	1.24
1954 (preliminary)	25	17	19	1.32

[a] Dept. of Commerce.
[b] Dept. of Agriculture.

Column 2 indicates that in 1954 consumers could obtain a given "food market basket" at retail stores for a much smaller percentage of their disposable incomes than the 1935-1939 average. Even though per capita food consumption in 1954 was 13 per cent larger than the 1935-1939 average, the retail store value of the foods actually purchased that year constituted a smaller percentage of disposable income than in 1935 to 1939. In contrast, the Commerce Department's series in column 1 implies that consumers were spending a larger percentage of their incomes for food in 1954 than in the earlier period.

I have grave doubts as to the precision with which the Commerce

Department's series measures actual food expenditures. I feel sure that more accurate estimates can be achieved in the future, even if no satisfactory adjustments prove to be possible for the historical data. I have much greater confidence in the Agriculture Department's series on retail value of farm food products.[2] This series is built up product by product, using price and quantity data the reliability of which can be tested in various ways. Year-to-year changes in the price and quantity components of this series (for individual commodities and for major subgroups) are associated in economically rational ways.[3] In contrast, the Commerce Department series on "food purchased for off-premise consumption" and "purchased meals and beverages" are, I believe, based on thin samples of food stores and restaurants. No use is made of the more solid estimates prepared commodity by commodity in the Department of Agriculture. Surely some method could be devised for integrating the Agriculture data into the Commerce estimates: an intensive sample survey of eating places might be needed to accomplish this for some specific base year.

A few figures should suffice to illustrate the difference between the data of the Departments of Commerce and Agriculture. If the former's estimates of food expenditures (excluding alcoholic beverages) are deflated by the Bureau of Labor Statistics retail food price index and reduced to a per capita basis, they compare as follows with the Agriculture Department's estimates of per capita food consumption:

Year	*Commerce Series*	*Agriculture Series*
	(indexes, 1947-1949 = 100)	
1929	74.5	91.1
1932	65.0	87.8
1939	77.9	93.8
1948	99.1	99.1
1953	107.1	102.4

The Commerce series shows much sharper changes in both upward and downward directions than does the Agriculture series. The association between the two series on year-to-year changes is only moderate; the figures for 1929-1941 and 1949-1953 yield a squared correlation

[2] There are some differences in concept between the two series; I wish here to contrast only differences in precision of *measurement.*

[3] A number of statistical demand analyses based on these data give price-quantity coefficients (based on year-to-year changes) which are more than 10 times as large as their standard errors. This is true for such major subgroups as "all food livestock products" and "all meat," as well as for some individual products. (See my "Factors Affecting Farm Income, Farm Prices and Food Consumption," *Agricultural Economics Research,* July 1951, pp. 71-72.)

coefficient of only 0.44. Two series as close in concept as these should certainly be more closely correlated. To put it a little differently, if the Agriculture series on per capita food consumption were multiplied by the BLS retail food price index, the product should be correlated almost perfectly with a proper estimate of per capita expenditures for food. Lack of correlation should arise primarily from the fact that the two index numbers, being of the Laspeyres type, do not satisfy the factor reversal test—that is,

$$\frac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \cdot \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \neq \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0}.$$

Discrepancies arising from this cause are usually small.

In view of the questionable accuracy of the Commerce series on food expenditures, it would be inappropriate to use it for refined analytical purposes, such as estimating elasticities of demand or marginal propensities to spend for food. The assumption sometimes made that the steeper trend in the Commerce series measures, or is due to, increasing amounts of marketing services, is unwarranted. We simply do not know whether, or to what extent, this is so.[4]

THE SCOPE OF ECONOMIC ACTIVITY

A broader definition of the scope of economic activity, as suggested by Hagen and Budd, would help to clarify a number of issues centering around marketing efficiency and the farmer's share of the consumer's dollar. The Agriculture series on food marketing margins are based on constant quantities of fairly well standardized commodities. Newer products and ready-to-cook specialties are not included, so the decline in the "farmer's share" since 1951 cannot be ascribed to added marketing services. In short, the official series do tell us something about the efficiency with which the marketing system handles a standard market basket of food, but they tell us nothing about the efficiency of our food economy as a whole.

The food production process may be conceived as extending from field to fork. The best measure of the size of our food economy might be given by valuing all foods at the price level charged by middle-class restaurants. The difference between this level and prices charged by retail stores would provide a basis for imputing the value of food-preparation activities in the home. (Other approaches would, of course,

[4] Some discrepancies between the Commerce and Agriculture series result from differences in concept. However, these are not sufficient to account for the limited correlation between year-to-year changes in the two series or for the full divergence in their trends.

be possible, such as adding up costs of acquiring and using stoves, refrigerators, and other utensils and appliances associated with food, along with imputed labor costs.)

The various steps in food production may be shifted from farmers to marketing agencies, or from housewives to marketing agencies, depending on the values they set on alternative uses of their time. In the 1830's some fundamentalists were bewailing a "new-fangled" tendency among farmers to take their wheat to the mill instead of grinding it themselves. Later the bread-baking function was also transferred to marketing agencies. In the home-grinding era, the national income statistics would have reflected only the imputed farm value of wheat, in the home-baking era, the price of flour. Today they reflect the retail price of bread. GNP as now measured would show a substantial increase *per loaf of bread consumed* from one era to the other—in effect, more loaves of bread per loaf of bread! From a commonsense standpoint, it would be preferable to measure this part of the nation's output in all three periods in terms of loaves of bread.

I am not, of course, suggesting early revisions in the official income series. But I would like to see special time series developed to measure the total value of food at the point of final consumption and the changing proportions of the total food-production job done on farms, in the marketing system, and in households.

SEASONAL ADJUSTMENT OF FARM INCOME

The Department of Agriculture has recently published quarterly estimates of realized gross and net farm income at seasonally adjusted annual rates. I believe this is an important step toward meeting the desires of business and government economists. However, much of agricultural production is geared to an annual cycle and the economic significance of changes in farm income from one quarter to the next may easily be overrated. I see little point in publishing seasonally-adjusted *monthly* estimates of net farm income, as is done in *Economic Indicators;* their numerical accuracy must be very poor and the economic significance of month-to-month changes is almost negligible.

If I may digress, I should like to see an analytical appraisal of the seasonal adjustment factors underlying these and other series in the national income accounts. What is their reliability if we treat them as averages subject to sampling error?[5] What is the standard error of the difference between the seasonal adjustment factors for successive

[5] For an elaboration of this approach see R. J. Foote and Karl A. Fox, *Seasonal Variation: Methods of Measurement and Tests of Significance,* Bureau of Agricultural Economics, Agriculture Handbook 48, September 1952.

months or quarters? Differences smaller than these standard errors may be regarded as "statistical noise" rather than statistical information. The error variances of the seasonal factors are superimposed on those of the unadjusted estimates.

I am also curious about the economic significance of "real" month-to-month or quarter-to-quarter changes in farm income. To what extent do they reflect random economic disturbances? To have forecasting value, the "real" changes must have a cumulative component, or at least a component that is systematically related to other known factors in the economy. Combining errors and disturbances as they do, how large and of how long duration must changes in the monthly or quarterly figures be to convey significant information—information on the basis of which government officials or businessmen would be justified in changing their anticipations with respect to the near-future course of farm income?

Seasonal adjustment of the farm income series encounters special problems which arise from the existence of a farm price support program. The income effects of this program appear most directly in the "crops" component of cash receipts from farm marketings.

When production of storable crops exceeds demand at the applicable support prices, many farmers obtain "nonrecourse" loans from the Commodity Credit Corporation. Loans must be obtained either during the first half or the first two-thirds of the marketing year, depending on the crop. These loans are included in "cash receipts from farm marketings" at the time they are made. However, growers retain title to the commodities under loan until late in the marketing year (sometimes, as in the case of cotton, until the following crop year). During the latter months of the marketing year, many growers find it advantageous to repay their loans and redeem their commodities for commercial sale or (in the case of feed grains) for use on their farms. Loan repayments are subtracted from cash receipts from commercial sales. As a result, total cash receipts from wheat, corn, or cotton may even be negative in some months.

Negative values are annoying if one is computing seasonals according to any usual method. The easiest and perhaps the only remedy is to throw the negative values out. But they are not the only distortions introduced by the price support programs, although in other cases adjusted values remain positive. Under these circumstances, it would appear wisest to base seasonal adjustment factors only upon years in which there had been little or no price support activity.

But what do we do with these "normal" seasonal adjustment factors in a year of heavy price support activity? Their use during the first

quarter or two of a marketing year may be seriously misleading as to the basic level of farm purchasing power for the year as a whole. One possible way of dealing with the problem would be to depart from the normal seasonal adjustment factors on the basis of specific forecasts of the pattern of CCC loan activity during the crop year then current. This would place a heavy burden on the Department of Agriculture's commodity specialists. Another possible solution would be to footnote estimates based on the "normal" factors to indicate at least the direction of the apparent distortion.