A Procedure for Estimating Value Added in Food Distribution

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WHILE THE Bureau of the Census, in the Census of Manufactures, has published data on value added for more than a century, similar data were not available for distribution industries until now. In 1965, the Census Bureau published "Measures of Value Produced in and by Merchant Wholesaling Firms, 1963" (12)[1]--a milestone in the collection of primary data for commodity distribution.

Ten years ago, Harold Barger (1) estimated value added by wholesalers and retailers from various margin data and from estimates of the proportions of goods that had passed through the different channels. (The latter were largely based on revisions and extensions of the pioneering work of Simon Kuznets (3)). Barger's estimates of value added (a somewhat grosser concept than that used in the Census of Manufactures) were made for 10-year intervals, 1869-1948, highly aggregated into wholesale and retail sectors.

The new census study examines merchant wholesalers by kind of business. Aside from providing detail, it presents several measures of net output that are in current use. Thus, it opens up new possibilities of making wider comparisons.

That some net output measure of distribution is needed in economic analysis is beyond dispute.[2] The actual or potential uses are in determining trends of output of different processing, transport, storage, and merchandising services; productivity of labor and capital; the nature of and changes in demands for different sets of services; the relation between fluctuations in prices of marketing services and those for farm commodities; and ways in which marketing firms might combine enterprises to provide services. The precise output measure needed in each case would depend on the purpose at hand.

Such basic data for the food distribution sectors still are incomplete. While new primary data for the merchant wholesaling sector are now available, there are no such data for food retailing or the restaurant sector. Moreover, historical data are absent.

In this paper we describe and partially evaluate a method of estimating net output for the food industries, using corporate tax returns. A study was made of a small group of returns of companies whose largest percentage of total receipts was from food manufacturing, food wholesaling, or food retail stores. For comparisons with published Census of Manufactures data, 1947 and 1954 returns were used; for comparisons with published census data on food wholesaling and retailing, 1948 and 1954 returns were used. Characteristics and limitations of the sample of tax returns used will be shown in the course of the discussion.

The corporate tax returns call for the listing of merchandise bought for manufacture or sale in the schedule entitled "cost of goods sold." Other listings in this schedule are inventory at beginning of year, inventory at end of year, salaries and wages, and "other costs per books." Thus, the cost of goods sold schedule is an aggregate whose meaning may vary from company to company according to how much labor and other costs are included along with costs of merchandise. The meaning of merchandise cost (adjusted or unadjusted for inventory change) is less ambiguous, even though nonuniformity in taxpayer responses to this entry may pose a serious problem.

[1] Underscored numbers in parentheses refer to the Literature Cited, p. 95.

[2] Some empirical uses of value added as well as its acceptance as an analytical concept are evident in a number of publications (2 and 4-9).

The difference between the business receipts[3] of a company and its cost of merchandise purchased for manufacture or sale might be a useful measure of net output. This difference may be called the value added, denoting the general idea that a company's output is unduplicated by the output of another group of firms.[4] This is the generic meaning. The problem is to uncover, if possible, the amount of unduplicated output for a given firm. To avoid confusion, in this paper we use value added in its generic sense--except where quotation marks or other indicators of specific meaning are given.

There is reason to believe that value added as derived from tax returns is a grosser measure than census value added by manufactures. The latter excludes the cost of supplies, containers, fuel, electricity, and contract work, whereas the former ordinarily does not. The divergence between the two measures probably would be smaller for food distribution than for food manufacturing because these items of cost are less important in distribution. However, other differences would exist because activities are reported on a corporate basis for tax purposes, whereas they are reported on an establishment basis to the Census of Manufactures. For example, a food processing company that also operates sales branch houses would ordinarily include the sales activity in its tax returns. Similarly, a food retailer might include central warehouse activities in its tax returns. Thus, tax records do not separate data by principal lines of activity as census data do.

A pragmatic test of the estimating procedure is to see how closely it approximates known net output measures. Fairly direct comparisons of tax data with Census of Manufactures data for 1947 and 1954 can be made for five main lines of processing--meat products, dairy products, canned and frozen foods, grain mill products, and bakery products. For wholesaling and retailing sectors, some indirect comparisons with census data and with data in Barger's study (1) are possible. After making these comparisons, we shall have a perspective from which to discuss the sources of noncomparability.

[3] Before 1958, the equivalent to the "business receipts" was called "gross sales and gross receipts from operations" in tax returns.

[4] It should be noted that the corporate tax form provides neither for this computation nor for the language used here.

The Sample

The tax returns used here came from a U.S. Department of Agriculture sample of returns of corporations engaged primarily in food manufacturing, food wholesaling, and food retailing. The sample was selected by the Department from a group of corporation tax returns to which it had official access for research purposes. Representativeness was sought by size of company. Among several problems encountered was the significant loss of data due mainly to the requirements imposed by this study. Adjustments of the usable data were made for over- or under-representation of the different company sizes. Because of these and other sampling limitations, the present results should be used with considerable caution. Even so, they are interesting and suggestive.

The 1954 sample of 341 tax returns used here represents 6 percent of the total corporate sales of five major food processing industries (3-digit Standard Industrial Classification) as shown in the Source Book of the Statistics of Income (13). The 1947 sample of 280 returns represents 7 percent of sales in that year. Sales of the meat and dairy products industries in 1947 and 1954 represent less than 3 percent of their respective totals. In these industries, representation of large firms is deficient.[5] But for bakery products the representation is over 20 percent. The grain mill products and processed fruit and vegetable sectors fall in between (tables 1 and 2).

Such statistical characteristics of the sample suggest that results obtained here for some 3-digit SIC industries may be subject to a high sampling error. But the total sample for the five industries seems sufficiently representative of food processing to be useful for appraising our estimating procedure.

The term "food wholesaling" as used here refers to merchant wholesalers of groceries and related products. The sample includes 35 returns for 1954 and 41 returns for 1948. Their

[5] The sample of meat product corporations for 1954 did not include any firms with assets of over $5 million, whereas the total corporate meat products industry as reported in the Source Book for the same year showed 30 returns with total assets of over $5 million. These 30 firms accounted for over 68 percent of the industry's corporate sales in 1954.

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Table 1.--Number of firms in sample of food processing corporations, and ratio of sales to total sales of corporate food processors, selected 3-digit (SIC) industries, 1947 and 1954

Industry	Firms in sample		Sales of sample as percentage of total	
	1947	1954	1947	1954
	Number	*Number*	*Percent*	*Percent*
Meat products	62	72	1.9	1.9
Dairy products	28	28	2.8	2.9
Canned fruits and vegetables	88	104	12.7	6.5
Grain mill products	54	58	18.1	5.5
Bakery products	48	79	24.5	30.5
Total	280	341	7.1	6.3

Table 2.--Distribution of sales by asset size group: Sample of food processing corporations, and all food processing corporations, selected industries, 1947 and 1954

Industry and asset size group[1]	1947		1954	
	Total corporate[2]	Sample	Total corporate[2]	Sample
	Percent	*Percent*	*Percent*	*Percent*
Meat products:				
under $0.25 mil.	3.9	16.7	4.0	10.3
$0.25 mil. under $1 mil.	22.6	32.9	10.4	36.5
$1 mil. and over	73.5	50.4	85.6	53.2
Dairy products:				
under $0.25 mil.	10.1	6.6	7.8	4.5
$0.25 mil. under $1 mil.	13.2	10.8	9.4	7.5
$1 mil. and over	76.7	82.6	82.8	88.0
Canned fruits and vegetables:				
under $0.25 mil.	7.0	3.2	5.4	4.4
$0.25 mil. under $1 mil.	16.3	10.3	13.7	16.1
$1 mil. and over	76.7	86.5	80.9	79.5
Grain mill products:				
under $0.25 mil.	7.5	1.6	4.6	3.3
$0.25 mil. under $1 mil.	18.7	41.6	11.8	11.3
$1 mil. and over	73.8	56.8	83.6	85.4
Bakery products:				
under $0.25 mil.	14.7	1.4	11.0	1.7
$0.25 mil. under $1 mil.	19.4	3.6	18.1	3.8
$1 mil. and over	65.9	95.0	70.9	94.5

[1] The 3 size groups total 100 percent.
[2] Refers to corporate sales reported in Source Book (13).

sales represent 2.2 percent of total corporate food wholesaling sales in 1954 and 2.5 percent in 1948.

Merchant food wholesalers tend to specialize in product lines. As a result, there are merchant wholesalers of the following types: General-line grocery, confectionery, fish and seafood, meat, specialty line, dairy products, poultry, and fresh fruits and vegetables. For example, listings frequently include subtype specialist wholesalers. A case in point is the specialty line which includes restaurant, bread, canned goods, flour, etc.

The fact that food wholesalers are specialized according to product line or on some other basis means that the different specialist groups provide different types and quantities of marketing services per unit of commodity handled. Consequently, value added would be expected to differ among the several types of food wholesalers. Ideally, it would be desirable to have data for measuring the value of services or value added by each specialty. Estimates of value added by food wholesaling, based on a sample of corporate firms, refer to merchant food wholesalers as a group.

For 1954, the food retailing sample includes 37 returns representing 12 percent of the sales of corporate food retailers shown in the Source Book. For 1948, the sample of 32 returns represents 11 percent of sales. The sector consists of grocery stores and commodity specialty stores such as meat markets and dairy products stores. The type, quantity, and value of marketing services may, and frequently do, differ widely among the different types of food stores. Here, as in the case of food wholesaling, the sample was not designed to measure differences among types of operation. It represents retail food stores in general.

Value Added Estimates and Comparisons

FOOD MANUFACTURING

If business receipts were to correspond closely to census "value of shipments" and the cost of merchandise purchased for manufacture or sales to census "cost of materials, supplies, containers, purchased electrical energy and contract work," then large disparities between value added derived from tax returns and the census "value added by manufacture" would not be due to differences in definition. But an important difference in definition exists--i.e., the cost of merchandise bought for manufacture and sale ordinarily does not include supplies, containers, purchased electrical energy, and contract work. On this count, estimates of the census value added using tax returns would be biased upward.

To get around this difficulty, we used ratios of value added (as we compute it from tax returns) to business receipts, and of census value added by manufacture to value of shipments (columns 5 and 6, table 3). If reasonable stability exists in these ratios between 1947 and 1954, the ratios can be applied to industry business receipts in the Source Book to obtain a fairly accurate estimate of the census value added by manufacture.

Unadjusted census data for 1954 were used in the analysis to maintain comparability with 1947; adjusted data for 1947 were unavailable. Similarly, our estimates of value added from the sample were not adjusted for inventory changes.

Our results for each of the five industries for the 2 census years are fairly constant. The differences are smaller on combining 3-digit industries. The difference between the 1947 and 1954 totals for the five industries (columns 5 and 6, table 3) is only about 2 percent.

The differences in the size of the ratios among 3-digit industries have a separate significance. While our computation of value added from tax returns tends to bias the ratio upward because of definitions used, differences in the composition of activities represented by company statistics versus establishment statistics also tend to bias this ratio. The direction of the latter bias would be up or down, depending on whether secondary lines of company activity reported in the tax returns take a higher or lower markup on sales than the primary manufacturing lines. An industry with many distribution activities outside the scope of the Census of Manufactures would tend to have its ratio biased downward. Because these biases exist, the absolute level of the ratios is less important than their stability.

Table 3.--Sales and value added, census enumeration and sample, selected food processing industries, 1947 and 1954[1]

Item	1947		1954		1947 ratio of census to sample (col. 1 ÷ col. 2) (5)	1954 ratio of census to sample (col. 3 ÷ col. 4) (6)	Percentage change in ratios (col. 6 ÷ col. 5) (7)
	Census (1)	Sample (2)	Census (3)	Sample (4)			
Meat products:							
Sales (mil. dol.).....	11,050	213.7	12,579	249.4	--	--	--
Value added:							
Mil. dol.....	1,280	27.9	1,931	47.3	--	--	--
Percent of sales.....	11.6	13.1	15.4	19.0	0.885	0.811	-8.4
Dairy products:							
Sales (mil. dol.).....	3,322	98.7	3,189	119.5	--	--	--
Value added:							
Mil. dol.....	688	37.1	781	51.9	--	--	--
Percent of sales.....	20.7	37.6	24.5	43.4	.551	.565	+2.5
Canned and frozen food:							
Sales (mil. dol.).....	2,462	277.5	3,758	220.1	--	--	--
Value added:							
Mil. dol.....	914	130.0	1,301	103.4	--	--	--
Percent of sales.....	37.1	46.9	34.6	47.0	.791	.736	-7.0
Grain mill products:							
Sales (mil. dol.).....	[2] 5,687	322.9	[2] 5,886	251.6	--	--	--
Value added:							
Mil. dol.....	[2] 1,129	60.0	[2] 1,394	52.0	--	--	--
Percent of sales.....	19.9	18.6	23.7	20.7	1.070	1.145	+7.0
Bakery products:							
Sales (mil. dol.).....	2,944	620.2	3,824	978.1	--	--	--
Value added:							
Mil. dol.....	1,363	303.0	1,977	553.3	--	--	--
Percent of sales.....	46.3	48.4	51.7	56.6	.957	.913	-4.6
Total:							
Sales (mil. dol.).....	25,465	1,533.0	29,236	1,818.7	--	--	--
Value added:							
Mil. dol.....	5,368	558.0	7,384	807.9	--	--	--
Percent of sales.....	21.1	[3] 25.0	25.3	[3] 30.7	.834	.816	-2.2

[1] Census data published in 1954 Census of Manufactures, Vol. II, Industry Statistics, Part I, Table 2A, excluding dairy products. The latter data appear in table 1 of 20B-5 on a retabulated basis to overcome changes in definition. Neither year includes figures for fluid milk plants. The value added data are unadjusted. The word "sales" is used here to cover 1947 and 1954 gross sales and gross receipts from operations (called "business receipts" in the 1958 and subsequent tax returns) and census value of shipments.

Value added derived from tax data was computed as the difference between business receipts and the cost of merchandise bought for manufacture or sale. It was not adjusted for changes in inventories between the beginning and end of the year.

[2] Includes data for the "corn wet milling" industry to be comparable with sample data classification.

[3] Average of the computed value added ratios for the five industries, using census value of shipments as weights. This system of weights adjusts for the disproportionate representation of individual industries in the sample.

How accurately can the census value added by manufacture for these food industries be estimated? The answers we obtained for 1954 and 1958 were within 5 percent of the census figures. The answer for 1963, based on preliminary data only, was within 10 percent. The estimating procedure is shown in table 4. For example, the 1954 business receipts for the five-industry sector were reported in the Source Book as $29,129 million. From our sample we determined

that value added was 30.7 percent of business receipts in 1954 (column 4, table 3). The product of the two statistics ($8,943 million) was an expansion of the value added (by companies classified in the five-industry group) according to a particular concept. To convert this figure as nearly as we could to the Census of Manufactures definition, we applied the ratio 0.816 (from column 6, table 3). This yielded an estimate of census value added of $7,297 million.

The next step was to identify the proper value added statistic from the census. Starting in 1954, the Census of Manufactures covered fluid milk establishments, thus bringing the scope of the census classification into line with the Source Book classification. Because this inclusion has

Table 4.--Derivation of census value added by manufacture, using sample data, with comparisons, for five major food manufacturing industries

Item	1947	1954	1958	1963
I. Estimate of census corporate establishment data using sample data:				
1. Business receipts (from Source Book) (mil. dol.)	24,459	29,129	39,823	[1] 44,970
2. Value added/business receipts (computed from sample) (percent)	25.0	30.7	(30.7)	(30.7)
3. Estimated value added (item 2 x item 1) (mil. dol.)	6,115	8,943	12,226	[1] 13,800
4. Ratio of census value added/value of shipments to sample value added/business receipts	.838	.816	(.816)	(.816)
5. Estimate of census value added by manufacture (mil. dol.)	5,124	7,297	9,976	[1] 11,260
II. Census establishment data:				
6. Value added by manufacture, total corporate and noncorporate establishments:				
Excluding fluid milk establishments (mil. dol.)	[2] 5,368	[2] 7,384	9,761	[1] 11,735
Including fluid milk establishments (mil. dol.)	n.a.	[2] 8,701	11,752	[1] 13,951
7. Share of value added by corporate establishments:				
Food and kindred products total (percent)	89.2	89.1	91.4	n.a.
Five-industry subset (percent)	[3] 85.9	[3] 85.8	88.0	(88.0)
8. Value added by manufacture, corporate establishments:				
Excluding fluid milk establishments (mil. dol.)	4,611	6,335	8,590	[1] 10,327
Including fluid milk establishments (mil. dol.)	n.a.	7,465	10,342	[1] 12,277
III. Comparison of sample and census data:				
9. Item 5 ÷ item 8:				
Excluding census fluid milk establishments	110.6	115.2	116.1	[1] 109.0
Including census fluid milk establishments	n.a.	97.7	96.5	[1] 91.7

[1] Preliminary.

[2] Includes data for "corn wet milling" industry to make the definition of grain mill products comparable with the definition in 1958 and 1963 censuses, and with Source Book definition.

[3] Estimate using the 1948 ratio of corporate share of value added for the 5-industry sector to the corporate share of value added for total food and kindred products manufacturing.

a notable effect on the total, we show both figures in table 4. The relevant one is $8,701 million. This was reduced to a purely corporate basis to make it comparable with Source Book data. The percentage of value added by corporate establishments in the five-industry sector in 1954 was estimated to be 85.8 (footnote 3, table 4). The 85.8 percent applied to the previous figure gave $7,465 million. This was the most accurate estimate we could make of the census value added in the establishments that most closely correspond to the Source Book industry sector. The estimate based on the sample of corporate tax returns, $7,297 million, was 97.7 percent of the census figure of $7,465 million.

The 1958 and 1963 comparisons were made in the same way. We assumed in each case that the 1954 relation between the ratios would have held constant. This assumption was made for exploratory purposes. It seems most reasonable for recent years. To get more accurate ratios, one would need to extend the coverage of the sample to the later years.

FOOD WHOLESALING

To compute value added from food wholesaler tax returns, we must also estimate what our 1954 sample data would have shown for 1963 to make a valid comparison with the 1963 census figure.[6]

[6] Here the sample and the census data were adjusted for the value of inventory changes during the year.

The sample data are shown in table 5. In total, the value added was 12.8 percent of business receipts in 1954 and 12.9 percent in 1948. Because our wholesaler sample unduly favored large companies, the ratios for the three size groups in the sample were weighted by the proportion of business receipts in each, as revealed by the Source Book.[7] This adjustment lowered the 1954 figure from 12.8 to 11.8 percent in table 6.

With the latter figure, the 1963 statistic was estimated by applying the percentage change from 1954 to 1963 in the Census of Business (11) "operating expenses to sales" ratio (table 6). The resulting figure was 11.4 percent, compared with 10.9--the 1963 census ratio of value added to receipts.

The census ratio would, of course, tend to be smaller than the ratio based on tax data because the census definition always excludes the value of supplies, containers, and so on. Hence, a comparison between the former ratio and the census figure on the gross margin would be more consistent. The gross margin was available for the first time for 1963, and unlike value added it included supplies, containers, and so on.

The derived ratio of 11.4 and the census gross margin of 11.7 are indeed close. Yet, further study would have to be given to this matter, because the USDA sample seems particularly thin in view of the heterogeneity of activities

[7] Such business receipts were 22, 30, and 48 percent, respectively, of the three size groups, from low to high, in table 5 (13).

Table 5.--Value added by food wholesaling for sample of corporate returns, by total and selected size groups, 1948 and 1954

Asset size group	Number of firms		Sales		Value added as percentage of business receipts	
	1948	1954	1948	1954	1948	1954
	No.	*No.*	*Mil. dol.*	*Mil. dol.*	*Pct.*	*Pct.*
Under 250.....	23	18	17.4	13.2	10.9	11.4
250 under 1,200.....	9	7	46.1	23.3	10.8	10.3
1,200 and over.....	9	10	280.9	309.9	13.4	13.0
Total all groups....	41	35	344.4	346.4	12.9	12.8

Table 6.--Measures of output of merchant wholesalers of food products, sample and census data, 1948-63

Year	Sample: value added ÷ business receipts		Census data		
	Unadjusted	Adjusted	Gross margins[1]	Value added ÷ operating receipts[1]	Operating expenses ÷ sales[2]
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*
1948.....	[3] 12.9	--	n.a.	n.a.	10.1
1954.....	[3] 12.8	[4] 11.8	n.a.	n.a.	9.8
1958.....	[5] 12.3	[4 5] 11.3	n.a.	n.a.	9.4
1963.....	[5] 12.4	[4 5] 11.4	11.7	10.9	9.5

[1] From U.S. Bureau of the Census (12).
[2] From Census of Business, Wholesale Trade, 1963 and 1954 (11).
[3] From table 5.
[4] Adjusted for undue representation of large companies (see text).
[5] Estimated from the corresponding figure for 1954 based on the percentage change from 1954 in the ratio of operating expenses to sales shown in the last column.

that fall under the heading of groceries and related products wholesalers. The census throws some new light on the problem. Underlying the 11.7 percent for the sector is a range of margin figures from 8.0 (for general-line grocers) to 17.5 percent (for fresh fruit and vegetable wholesalers).

A comparison can be made with Barger's estimates. The 1947 margin figures he gave for grocery and meat products wholesalers were 11 and 13 percent, respectively (1, p. 84). Our 1948 estimates for the three asset size groups ranged from 10.8 to 13.4 percent (table 5). The average margin was 12.9. If the sample were adjusted for undue representation of the large wholesalers, the average would be 12.1 percent. While differences in years and differences in kinds of business in each study would throw some doubt on any result that might have been obtained in this comparison, these similarities in figures are encouraging.

We next estimated the 1963 census value added by merchant food wholesalers. The procedure was described in connection with manufacturing, and is shown in table 7. The results overshot the mark by a wide amount. Our estimate was $3,000 million; the figure that we imputed to the corporate sector of the census total was $1,995 million.

This comparison may be affected by at least two significant sources of error. One is our probable understatement of the true share contributed by corporate establishments in 1963 to census "value added" by merchant food wholesalers. We estimated this share by applying the 1954 share that we could estimate from 1954 data on operating expenses. It seems reasonable to suppose that over the recent decade, the relative importance of corporations in food wholesaling has increased. But we must await additional evidence before concluding that this has occurred.

The second source of error is more troublesome. The classification of business receipts and sales differs under the Source Book and census reporting systems. Business receipts for the groceries and related products industry were 15 percent higher than the census sales for the corresponding classification in both 1958 and 1963. This difference existed in both corporate and sole proprietorship subsectors (table 8). The difference may reflect the

Table 7.--Derivation of "value added" by corporate food wholesaling merchants, with comparison of sample and census data, 1954, 1958, and 1963

Item	1954	1958	1963
I. Estimate using sample data:			
1. Business receipts (Source Book).....Mil. dol. ..	16,065	20,787	[1] 27,524
2. Value added/business receipts (table 6).....Pct. ..	11.8	11.3	11.4
3. Estimated value added (item 2 x item 1)..Mil. dol. ..	--	--	[1] 3,138
4. Ratio of census value added/operating receipts to sample value added/business receipts.....Ratio ..	n.a.	n.a.	[2] .956
5. Estimate of census value added.....Mil. dol. ..	--	--	[1] 3,000
II. Census data:			
6. Value added, total.....Mil. dol. ..	--	--	[3] 3,347
7. Estimated share of value added by corporate establishments.....	[4] .596	n.a.	(.596)
8. Value added by corporate establishments (item 6 x item 7).....Mil. dol. ..	--	--	1,995
III. Comparison of sample and census data:			
9. Item 5 ÷ item 8).....	--	--	[1] 150

[1] Preliminary.
[2] Based on figures in table 6.
[3] From U.S. Bureau of the Census (12).
[4] Estimate based on share of operating expenses incurred by corporate groceries and related products establishments.

Table 8.--Groceries and related products: Business receipts (or sales) classified by legal form of business, IRS and census, 1958 and 1963

Legal form of business	1958	1963	Legal form of business	1958	1963
	Mil. dol.	*Mil. dol.*		*Mil. dol.*	*Mil. dol.*
Tax returns, total.....	28,987	[1] 35,628	Census establishments, total.....	25,201	30,855
Corporations.....	20,787	[1] 27,524			
Partnerships.....	3,338	3,255	Corporations.....	[2] 18,461	--
Sole proprietorships.....	4,862	4,849	Partnerships.....	3,588	--
			Sole proprietorships...	3,152	--

[1] Preliminary.
[2] Includes data for cooperatively owned establishments which generally are organized as corporations; also includes a negligible amount of "other" business forms.

Source: Statistics of Income, U.S. Business Statistics and Corporation Tax Returns. Census of Wholesaling, U.S. Summary.

unavoidable inclusion in company tax returns of receipts from activities that lie outside merchant food wholesaling. And it could reflect other factors.[8]

FOOD RETAILING

Based on the sample of food retailers, the value added per dollar of sales was 17.9 percent in 1948 and 18.9 percent in 1954 (table 9). When the sample was adjusted for undue influence of different asset size groups, the corresponding figures were 18.3 and 18.8 percent, respectively.[9] There are no similar census data with which to compare these findings.

For 1947, Barger estimated food store gross margins to be 17.5, 18.0, and 20.3 percent for grocery chains, independent groceries, and meat stores, respectively (1, p. 81). Although the chains would come closest to representing the corporate population, the population would also include the independents who were incorporated. On the other hand, the tax return figures probably include the value added in central warehouses and tend to bias them upward. Therefore, the 18.3 percent estimate should be shaded downward and compared with 17.5 which should be shaded upward. Yet, while they are reasonably close, differences in years (1948 versus 1947) and differences in the character of the two samples may have made these comparisons somewhat coincidental. Any conclusions based on this comparison are quite provisional.

Table 9.--Sales and value added by food retailing, sample of tax returns, by total and selected size groups, 1948 and 1954

Asset size groups	Number of firms		Sales		Value added as percentage of sales	
	1948	1954	1948	1954	1948	1954
	No.	*No.*	*Mil. dol.*	*Mil. dol.*	*Pct.*	*Pct.*
Under 250.....	8	7	7.5	9.4	18.7	20.2
250 under 1,000.....	7	9	25.7	30.7	17.9	19.2
1,000 under 2,200.....	8	7	75.4	58.0	16.8	16.9
2,200 under 5,000.....	5	6	95.8	144.3	18.0	19.4
5,000 and over.....	4	8	1,183.4	1,952.5	17.9	18.6
Total, all groups...	32	37	1,387.8	2,194.9	17.9	18.6

Further Observations

For a total of the five major food manufacturing industries (3-digit SIC level), we estimated census value added for the census-equivalent sector fairly well, despite the fact that tax returns did not permit accurate measurement of census value added. But for merchant food wholesaling, our estimates of the figure for the census-equivalent sector was wide of the mark despite use of a more accurate measure. The first finding evidently is due (a) to fairly stable relations between the tax and census ratios of value added to sales, and (b) either to a close comparability between activities covered by census establishment data and corporate tax data for the five-industry sector, or to random factors that result in this "as if" condition. The finding for wholesaling brings into question the comparability of activities that are classified as food wholesaling under two different systems of reporting.

Some insight into industry comparability is given by the Census Bureau's pioneering link

[8] For an informative discussion of the difference encountered see U.S. Bur. Census (10, pp. 14-15).

[9] The individual margin figures in columns 5 and 6 (table 9) weighted by the share of business receipts of corporate food retailer returns that each asset size group exhibited in 1948 and 1954, as revealed by the Source Book.

unavoidable inclusion in company tax returns of receipts from activities that lie outside merchant food wholesaling. And it could reflect other factors.[8]

FOOD RETAILING

Based on the sample of food retailers, the value added per dollar of sales was 17.9 percent in 1948 and 18.9 percent in 1954 (table 9). When the sample was adjusted for undue influence of different asset size groups, the corresponding figures were 18.3 and 18.8 percent, respectively.[9] There are no similar census data with which to compare these findings.

For 1947, Barger estimated food store gross margins to be 17.5, 18.0, and 20.3 percent for grocery chains, independent groceries, and meat stores, respectively (1, p. 81). Although the chains would come closest to representing the corporate population, the population would also include the independents who were incorporated. On the other hand, the tax return figures probably include the value added in central warehouses and tend to bias them upward. Therefore, the 18.3 percent estimate should be shaded downward and compared with 17.5 which should be shaded upward. Yet, while they are reasonably close, differences in years (1948 versus 1947) and differences in the character of the two samples may have made these comparisons somewhat coincidental. Any conclusions based on this comparison are quite provisional.

Table 9.--Sales and value added by food retailing, sample of tax returns, by total and selected size groups, 1948 and 1954

Asset size groups	Number of firms		Sales		Value added as percentage of sales	
	1948	1954	1948	1954	1948	1954
	No.	*No.*	*Mil. dol.*	*Mil. dol.*	*Pct.*	*Pct.*
Under 250.....	8	7	7.5	9.4	18.7	20.2
250 under 1,000.....	7	9	25.7	30.7	17.9	19.2
1,000 under 2,200.....	8	7	75.4	58.0	16.8	16.9
2,200 under 5,000.....	5	6	95.8	144.3	18.0	19.4
5,000 and over.....	4	8	1,183.4	1,952.5	17.9	18.6
Total, all groups...	32	37	1,387.8	2,194.9	17.9	18.6

Further Observations

For a total of the five major food manufacturing industries (3-digit SIC level), we estimated census value added for the census-equivalent sector fairly well, despite the fact that tax returns did not permit accurate measurement of census value added. But for merchant food wholesaling, our estimates of the figure for the census-equivalent sector was wide of the mark despite use of a more accurate measure. The first finding evidently is due (a) to fairly stable relations between the tax and census ratios of value added to sales, and (b) either to a close comparability between activities covered by census establishment data and corporate tax data for the five-industry sector, or to random factors that result in this "as if" condition. The finding for wholesaling brings into question the comparability of activities that are classified as food wholesaling under two different systems of reporting.

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study of the 1958 data (10). While tax and census data derive from different systems of reporting, the link study data show that, in general, the various food industries have fairly high, though nonuniform, industry specialization ratios. The ratio reflects the percentage of a corporation's total employment that is accounted for by its establishments that census classified in the same SIC industry in which the Source Book classified the corporation. It is about as close as one can come, with present data, to determining the degree of industry homogeneity reflected by Source Book data. Differences among industries in the relative contributions of labor (of different skills) and capital to output would, of course, affect the accuracy of this measure.

For food, this specialization ratio ranged from 99.8 percent for soft drinks, carbonated waters, flavoring extracts, and syrups, to 84 percent for grain mill products and cereal preparations. In general, ratios for food and kindred products manufacturing industries, food wholesaling, and food retailing were over the 90-percent level (table 10).

These findings suggest that industry classification differences between the Source Book and census data may not be large enough to spoil comparisons for various purposes. Valid linkages and interpolations might be made between a wide array of economic and financial data for different food industries. For example, in the present study our sample limitations, and not classification difficulties, prevent good

Table 10.--Link of census establishment and IRS corporation data: Industry specialization ratios and percentage of business receipts covered by such ratios, food industries, 1958

Industry	Industry specialization ratio of matched corporations[1]	Business receipts of matched corporation as a percent of all corporations[1]
	Percent	*Percent*
Meat products	91.4	96
Dairy products	92.3	89
Canning, preserving, and freezing fruit, vegetables, and seafoods	93.9	87
Grain mill products and cereal preparations	84.8	90
Bakery products	96.0	88
Sugar (cane and beet)	98.2	92
Confectionery and related products	93.5	88
Vegetables and animal oils and fats, except fatty acids	85.9	97
Other food preparations and kindred products	85.6	99
Soft drinks, carbonated waters, flavoring extracts, and syrups	99.8	92
Malt liquors and malt	97.3	90
Wines, brandy, and distilled spirits	95.0-99.9	73
Distilled, rectified, and blended liquors	81.8	94
Groceries and related products (except meat and meat products) wholesalers	96.4	85
Meat and meat product wholesalers	--	92
Food stores	92.7	86
Eating and drinking places	98.8	84

[1] Percentage of "matched" corporation's total employment that is accounted for by its establishments that Census had classified in the same industry in which the corporation was classified by the Source Book. "Matched" companies include both explicitly matched corporations and single-industry corporations that were implicitly matched. (See 10, pp. 15-27.)

Source: (10, tables 5 and 6).

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Source: (10, tables 5 and 6).

estimates of census value added at the 3-digit level for four of the five food manufacturing industries in the sample. A more representative sample by industry might provide useful results.

The second general matter of concern here is the definition and measurement of value added. As stated earlier, we have used this term in two different senses. In the generic sense, it denotes the value of output of a firm unduplicated by the value of output of some other group of firms. The other meaning is specific. As used in connection with census data, it denotes the precise degree of unduplication in the Census of Manufactures historic series.

It is important to keep this distinction in mind. When Professor Barger used the term "value added" in his study of distribution, he did not mean what the Census of Manufactures means by value added. Barger's specific use, as pointed out before, did not net out the cost of purchased containers, supplies, energy and contract work, whereas the census measure does. While we have freely used the term value added in this paper, we hope that its meaning has been evident from the discussion.

The census study, "Measures of Value Produced In and By Merchant Wholesaling Firms, 1963" (12), neatly lays out the issue of definition and measurement. It gives four measurements of "value produced," each representing a different degree of netness. Thus, gross margin is the value of sales net of the cost of goods purchased; value added is the gross margin net of the cost of containers, other supplies and materials, fuel, electrical energy, water purchased, and contract work on the firm's materials; net income produced (at market prices) is the value added less the cost of services supplied by other businesses and uncompensated bad debts; and net income produced (at factor costs) is net income produced at market prices less depreciation, sales taxes, excise taxes, license fees, and taxes other than income taxes. (The latter measure of value produced includes payroll, employer contributions to FICA, unemployment insurance, interest payments, and profits before income taxes.)

For merchant food wholesalers as a group, gross margins were 7.3 percent higher than value added in 1963. (In turn, value added was 38 and 51 percent higher than net income produced at market prices and at factor costs, respectively.) For general-line grocers this figure was 3.9 percent. While a comparable statistic is not available for food manufacturing, the difference between gross margin and value added would be wider because processing requires more containers, supplies, and electrical energy than food distributing.

The ratio of value added (generic sense) to business receipts computed from tax returns comes closer to the concept of a gross margin than to the census value added ratio. For food wholesalers, our estimate of 11.4 percent lies between the census 11.7 percent gross margin and 10.9 percent that value added is of operating receipts. An improved sample would be needed to pursue this matter. Also, for food retailing our estimate of the value added ratio probably is nearer to a gross margin than to a value added ratio. Evidence from Barger's margin studies indicates this, but better evidence would be needed to give assurance.

Beyond matters of company classification and the definition of value added is the matter of the use of terms by different taxpayers. We assumed that the responses from different food industry firms as to business receipts and costs of merchandise purchased for manufacture or sale were not so heterogeneous as to preclude valid comparisons. The validity of this assumption could be tested with an improved sample. Tax records might yield good estimates of value added by sectors where such basic data are deficient--food retail stores, restaurants, and (on a historical basis) food wholesaling.

Literature Cited

(1) Barger, H. Distribution's place in the American economy since 1869. Nat. Bur. Econ. Res., Inc., Princeton Univ. Press, 1955.

(2) Hoos, S. Relation between agricultural price policy and marketing research. Jour. Farm Econ., Vol. 33, pp. 357-369, August 1951.

(3) Kuznets, S. Commodity flow and capital formation. Nat. Bur. Econ. Res., Inc. New York, 1938.

(4) Ogren, K. E. The farmers' share, three measurements. Agr. Econ. Res., Vol. VIII, No. 2, pp. 43-50, April 1956.

(5) Ogren, K. E. The marketing bill for agricultural products. Agr. Econ. Res., Vol. VII, No. 4, pp. 101-107, October 1955.

(6) Stigler, G. S. Trends in output and employment. Twenty-fifth Anniversary Ser. 4, Nat. Bur. Econ. Res., Inc., New York, 1947.

(7) Waldorf, W. H. Output of factories processing farm food products in the U.S.--1909-1958. U.S. Dept. Agr., Tech. Bul. 1223, 1960.

(8) Waldorf, W. H. Productivity and food processing cost. Agr. Econ. Res., Vol. XIV, No. 1, pp. 30-34, January 1962.

(9) Waugh, F. V., and K. E. Ogren. An interpretation of changes in agricultural marketing costs. Amer. Econ. Rev., Vol. LI, pp. 213-227, May 1961.

(10) U.S. Bureau of the Census. Enterprise statistics, 1958: Part 3--Link of census establishment and IRS corporation data. Series ES3, No. 3, Dept. Commerce, 1964.

(11) U.S. Bureau of the Census. Census of Business: Summary, 1963, and earlier issues. Dept. Commerce, 1965.

(12) U.S. Bureau of the Census. Measures of value produced in and by merchant wholesaling firms, 1963. Dept. Commerce, 1965.

(13) U.S. Internal Revenue Service. Source Book of the statistics of income. Dept. Commerce, annual issues.