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MARKETING BILL AND ITS COST COMPONENTS OF U.S. FOOD FISH PRODUCTS

Washington, D.C. March 1980

> U.S. DEPARTMENT OF COMMERCE

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Erwin Penn

Economic Analysis Staff Office of Policy and Planning Washington, D.C. March 1980



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MARKETING BILL OF U.S. FISH-FOOD PRODUCTS AND ITS COMPONENTS

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ABSTRACT. Based on the cost analyses of price margins of 18 fishery products at four functional levels (harvesting, processing, wholesale, and retail), cost bills are estimated and expanded to include all edible fishery products harvested, imported, distributed, and consumed in the United States during 1972-77. Fishery products reach consumers not only through retail stores but in greater quantities through eating places and other food service institutions. Detailed estimates for 1972-77 are made for the following: a marketing bill at each functional level of every fishery, an outlay for each cost item at six functional levels of each fishery, annual consumer expenditure on each fish product, and per capita consumption of all edible fishery products in dollar value.

PURPOSE OF THE STUDY

This study presents, for the first time, the annual consumption of fishery products in value terms, a more reasonable measurement than that expressed in quantities. Such a measurement readily combines with marketing bills and consumer expenditures for other food products published by the U.S. Department of Agriculture.

Different costs in a marketing bill represent purchases of goods and services by the fishery from other industries or sectors of the economy; such purchases denote the values of the fishery's inputs. Marketing bills are split according to marketing levels from processing, wholesaling, retailing, to food servicing, which are the outlets for each fishery catch. Ultimately the study will form a basis for further inquiry into a detailed input-output analysis of the U.S. fishing industry. In its present form, this study provides adequate information to analyze the economic impact of a fishery on the national economy, and related industries, during production changes under a management or development plan.

INTRODUCTION

Fishery products are of numerous varieties, widely different in form, quality, and price. To acquire a meaningful total consumption figure, the quantity of one product consumed should not be added to that of a dissimilar one, just as one should not add apples and oranges. For comparison purposes between areas and periods, production or consumption of all fish and shellfish products will not be realistic in an economic sense if it is presented in quantity by weight.

When fish consumption is shown in value terms it is interpreted as how much consumers have spent on fishery products. A consumer's dollar paid for fishery products is shared by a cross section of fishermen, processors, wholesalers, retailers, and food service facilities. Each of these functional levels contributes to the fishery by creating either "place," "form," or "time" utility for the fishery product. Such contributions are assessed by services performed, which in turn are measured by the costs of performing such services. For every consumer's dollar spent on fishery products, different amounts go to labor, materials, transportation, capital expenses, taxes, profits, and 10 other costs for different fisheries at different levels. Such an outlay of costs will present another cross section of the distribution of a consumer's food dollar. This study provides such information, with total annual consumer expenditures on domestic and imported food fish computed by product type and costs at different functional levels, and shows how much disposable personal income is spent on fishery products compared with farm food products.

ESTIMATION OF MARKETING BILLS

Cost analysis of each fishery and price margin studies at different marketing levels on a unit weight basis are examples of microanalysis of cost and price for each fishery product. In an aggregate study of consumer expenditures for each fishery product for the entire Nation, prices are elevated to sales values and unit costs are expanded to marketing bills when total volumes of production, distribution, and consumption of each fishery are taken into account.

Based on the price margins of the 18 selected fish and shellfish products, cost outlays of these margins for the six functional levels (Penn, 1980), and the markup rates for all levels of each fishery (appendix tables 1 and 2), marketing bills are estimated and expanded to include all edible fish products harvested, imported, distributed, and consumed in this country during 1972-77. The appendix gives detailed methodology of the calculation. At the consumer level two marketing outlets are added to retail stores to give a detailed estimate of consumer expenditures for fish products: public eating places, and institutions with food services as appended, secondary functions. Their distribution pattern should be taken into consideration in the calculation process. Sales value at any level, except the harvesting level, minus the merchandise (fish) purchased is the marketing bill for that level. At the harvesting level, the harvesting bill is equivalent to the exvessel value of the catch, since the merchandise (fish) is caught and not purchased by fishermen. The marketing bill is, therefore, an estimate of costs and profits of processing, transporting, and distributing fish products purchased by U.S. consumers. It can also be expressed as the difference between consumer expenditures and the total payment to fishermen.

Sixteen costs are estimated separately in the marketing of fish products at each marketing level. The total cost from all levels except the harvesting level is the marketing bill. The total cost at the harvesting level is the harvesting bill, which is equivalent to the total payment to fishermen for their catch or simply the exvessel value of landings. When marketing bills of all levels are added to the exvessel value, the total will represent total consumer expenditures for fishery products.

1. Harvesting Bill

U.S. fishermen received \$1,409 million for edible fish landed in 1977 (excluding industrial fish) (table 1). The largest increase in the harvesting bill in 1977 was in the production of shrimp and salmon (fig. 1). The shrimp fishery had a bad year in 1974, and the salmon fishery fared poorly in 1974 and 1975. American lobster landings in 1977 were higher in value with no increase in catch from a year earlier. The drop in sea scallop prices was compensated by heavier landings. Landing values of tuna and halibut dropped in 1977 after a big increase in 1976.

The total landing value of domestic edible fish in 1973 was about 18 percent higher than in 1972; the amount caught dropped 2 percent in the same period. Although a price freeze was enforced in 1973, it did not apply to industries engaged in primary food production. Fishing was included in the latter category. The increase in total harvesting costs in later years can be attributed to the increase in quantities of landings and pressure from inflation after the price decontrol.

2. Consumer Expenditures for Domestic Fishery Products

In 1977, U.S. consumers spent \$5.19 billion on domestically produced edible fishery products, 67 percent more than in 1975 (\$3.29 billion) and 54 percent more than in 1972 (\$2.88 billion). Included are expenditures for fishery products bought from retail stores; for prepared fish orders spent in restaurants, cafeterias, vending machines, and other away-fromhome eating establishments; and for fish food served in institutions like schools, hospitals, airlines, nursing homes, military stations, prisons, and others whose primary business is not related to food service.

Table 2 shows the distribution pattern for sales of fishery products from wholesalers and processors/wholesalers to different marketing outlets.

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Table

	Har	vesting bil	1	Mar	keting bill		Consumer	s' expendit	ures
	1972	1973	1974	1972	1973	1974	1972	1973	1974
					\$1,000				
Ulandar	28.762	31.268	34.129	1 82.137	98,970	99,341 1	110,899	130,247	133,470
Cod	8.666	9.686	11,969	24,042	29,845	38,010	32,708	39,531	49,979
Haddork	4.291	3.160	3,017	7,602	5,945	5,814	11,893	9,105	8,831
Ocean perch	3.880	4.638	3,567	16,975	18,184	13,616	20,855	22,822	17,183
Salmon steak	3.202	3.373	2.320	9,284	6, 394	4,366	12,485	9,767	6,686
*Salmon canned	11.666	26.129	49,385	41,618	49,506	153,858	32,386	48,822	189,985
*Salmon mise products	47.890	95.611	69.607	192,681	192,546	203,488	217,810	240,444	248,156
Halibur staak	13.153	12.601	9.404	22,790	23,468	19,014	35,943	36,069	28,418
Tuna ranned	89.933	90.105	117,783	163,241	152,378	200,874	253,174	242,483	318,657
Sardines canned	1.836	1.075	2,586	30,063	20,033	37,007	31,899	21,108	38,429
*Other finfish	64.143	113.266	131,101	280,589	303,627	357,267	344,732	380,893	450,364
*Shrimp canned	12.630	13,817	23,118	17,624	16,785	35,058	19,525	16,130	46,347
Shrimp peeled	65,362	74,428	60,257	193,443	205,876	145,315	258,804	280,303	205,572
*Shrimp. other products	115.196	131,175	94,485	219,160	208,554	138,291	302,022	287,257	185,436
Blue crab meat	14,194	17,329	18,259	95,814	105,764	109,978	110,008	123,093	128,237
Sea scallop meat	12,625	10,677	9,922	16,731	15,568	17,282	29,356	26,245	27,204
American lobster live	36.052	41.917	42.352	90,061	97,320	111,365	126,113	139,237	153,717
*Other shellfish	123,441	130,016	148,273	802,123	793,650	803,891	925,552	923,666	946,975
Total	686,922	814,271	828,534	2,305,978	2,344,413	2,493,835	2,876,364	2,977,222	3,183,646

* Consumers' expenditures for these products do not equal to the sums of their harvesting and warketing bills, because of the quantities that have been exported after harvesting and/or processing.

	Har	vesting bill		Mai	rketing bill		Consume	rs' expendi	tures
	1975	1976	1977	1975	1976	1977	1975	1976	1977
					- \$1,000				
Flounder	886 87	52.007	59.477	102.157	145,171	151,175	145,390	197,178	201,652
Cod	14.446	15.877	18.876	41.963	46,752	63,460	56,409	62,629	82,336
Haddock	5.283	5.551	9.270	11,445	9,557	23,831	16,728	15,108	33,101
Ocean perch	4.028	5.114	6.136	13,044	17,292	21,961	17,072	22,406	28,097
Salmon steak	4.738	7.686	3.244	8,775	13,537	6,643	13,513	21,223	9,887
*Salmon. canned	38.944	62.681	89,286	102,542	236,822	207,401	106,934	265,639	262,656
*Salmon. misc.products	72.616	126.129	129,333	138,571	404,650	210,401	167,696	475,337	245,731
Halibut steak	14.549	19.418	17.340	24,518	30,024	27,213	39,067	49,442	44,533
Tuna. canned	108.377	149.765	135,785	218,680	289,746	218,525	327,057	439,511	354,310
Sardines, canned	2.656	1.695	2,038	38,172	33,068	42,592	39,633	34,639	43,775
*Other finfish	113.877	136.404	140,915	356,047	418,543	562,147	466,046	542,329	707,364
*Shrimp. canned	12.692	23.843	36,309	21,448	40,342	52,602	23,876	49,501	70,845
Shrimp, peeled	70.898	103.281	106,450	135,180	230,222	263,935	206,079	333,503	370, 385
*Shrimp, other products	142.650	204.251	212,399	189,338	356,635	424,553	277,907	501,883	576,221
Blue crab meat	18,793	22,966	27,454	111,193	122,206	146,852	129,986	145,172	174,306
Sea scallop meat	18.009	35.061	40.584	28.708	66,678	63,690	46,717	101,737	104,274
American lobster.live	49.090	52.684	57.715	118.638	152,150	152,755	167,728	1 204,834	210,470
*Other shellfish	160,320	247,905	316,639	892, 393	1,221,292	1,558,845	1,047,018	1,450,805	1,770,006
Total	895,199	1,272,418	1,409,250	2,552,812	3,834,687	4,198,581	3,294,856	4,912,876	5,289,949

Table lb.--Cost bills and consumer expenditures by fish product from U.S. domestic production, 1975-77

* Consumers' expenditures for these products do not equal to the sums of their harvesting and marketing bills, because of the quantities that have been exported after harvesting and/or processing.





Product	Retail	Public	Institutions
	Stores	places	institutions
		Percent-	
Fresh finfish products	36	53	11
Frozen finfish products	45	47	8
Canned fish	92	13	5
Shellfish (excluding shrimp)	1	87	3
Shrimp products (fresh and frozen)	38	59	3

Table 2.--Distribution pattern of fish products from wholesalers to the consumer market by product group, 1971 and 1975¹

¹Compiled from the <u>Food Service Industry:</u> <u>Type, Quantity, and Value</u> of Foods Used, 1971, Department of Agriculture; and <u>Florida Shrimp:</u> From the Sea Through Market, 1975, Florida Sea Grant Program.

In 1977, public eating places sold \$3.70 billion worth of domestic fish foods, 9.5 percent higher than in 1976, accounting for 70 percent of consumer expenditures on fish products and 94 percent of the sales of the away-from-home market. Retail store sales of fishery products in 1977 were \$1.35 billion, up 4 percent from a year earlier. The situation in 1974 was just the opposite when retail sales of domestic fishery products were 33 percent higher than in the previous year, and public eating places sold 2.2 percent less fishery products than in 1973. A switch from awayfrom-home eating seems reasonable during the inflation/recession period of 1974 when people ate more often at home than before (table 3).

3. Marketing Bill of Domestic Products

The marketing bill for domestically produced edible fishery products-the difference between consumer expenditures and exvessel values of such products (excluding exports)--reached \$4.20 billion in 1977, an increase of 68 percent from 1974 and 82 percent from 1972 (table 1). The marketing bill in 1973 did not increase markedly as in other years. The price freeze helped to constrain the upward movement of costs at all levels except harvesting. The freeze had some effect on price stability of fishery products at distribution levels.

The sharp increase in the marketing bill in 1974 was traceable to (1) price decontrol that unleashed the inflationary pressure built during the previous period and (2) a bigger volume of edible fish products handled in 1974 that entailed more marketing expenses.

The marketing bill for 1977 did not increase as rapidly as in the previous 2 years. Lower salmon prices and a smaller pack of canned salmon

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	1972	1973	1974	1975	197ó	1977
			\$1,0	00		
Retail food store	1	1	1			
Merchandise purchased Marketing bill	511,265 175,966	553,779 181,845	704,778 275,336	647,272 221,073	1,015,602 283,444	1,037,844 315,838
Total sales	687,231	735,624	980,114	868,345	1,299,046	1,353,682
Markup rate	(0.3441)	(0.3283)	(0.3906)	(0.3415)	(0.2790)	(0.3043)
Public eating places						
Merchandise purchased Marketing bill	889,005 1,165,227	914,905 1,184,580	892,790 1,161,111	1,007,379 1,269,301	1,500,931 1,876,137	1,702,758 1,995,599
Total sales	2,054,232	2,099,485	2,053,901	2,276,680	3,377,068	3,698,357
Markup rate	(1.3107)	(1.2947)	(1.3005)	(1.2600)	(1.2499)	(1.1720)
Institutions						
Merchandise purchased Marketing bill	78,818 56,084	86,792 55,321	88,496 61,131	89,718 60,113	141,720 94,940	144,436 93,473
Total sales	134,902	142,113	149,631	149,831	236,660	237,909
Markup rate	(0.7115)	(0.6374)	(0.6908)	(0.6700)	(0.6699)	(0.6472)
Total consumer expen-	2,876,365	2,977,222	3,183,646	3,294,856	4,912,775	5,289,948

Table 3.--Purchases and sales of domestic edible fish products and weighted average markup rates at three levels of the consumer market, 1972-77

Note: Marketing bills for different marketing levels are shown in tables 7-12; markup rates are calculated and presented in tables 5 and 6.

Since

sales = merchandise purchased + marketing bill, and marketing bill ÷ merchandise purchased = markup rate, then sales value can be solved for each level. brought marketing bills for salmon down from a year earlier, although most other fishery products recorded increases.

The U.S. Department of Agriculture estimated that the average total marketing bill for domestic farm food products was 2.05 times their farm value during 1975-77. In the same period the average total marketing bill for domestic fishery products was 2.96 times their total exvessel value. The costs of marketing fishery products are higher than those for farm food products and could be ascribed to the following reasons:

1. Markup rates are especially high in eating places. They are almost quadruple the retail markup rates, because more labor and materials are used in preparing food orders. A greater percentage of fishery products is consumed away from home. As a result, the marketing bills for public eating places and institutions are more than 6.5 times the bill for retail stores in marketing fishery products in all years since 1972 except 1974.

2. The yield of fishery products is 30 to 40 percent edible for most species. Few fish processing plants are converting their solid wastes to byproducts with the same efficiency as the large-scale meat packing industries do in trying to reduce production costs or increase profit.

4. Components of the Marketing Bill

There are five cost components for materials and supplies, four for services, and six for value added. These 16 cost components plus profit or loss constitute the marketing bill of each of the six functional levels for each of the 18 edible fishery products (table 1). When the marketing bills of the 18 products for each level are added together for each year, and the total of all levels is added to the exvessel value of all edible fishery products harvested for domestic consumption in the same year, the sum represents the consumer expenditures for all domestic edible fishery products for that year. The methodology of such calculations is appended at the end of this report. Tables 4 to 9 show results of marketing bills and consumer expenditures for 1972-77.

Higher costs of marketing services since 1974 were partly caused by inflation. For some products, the cost increase was attributable to the increase in volume produced and marketed.

(a) <u>Labor</u>--Labor costs, which include wages and salaries of employees and wage supplements, represented 26.7 percent of the total bill in 1977 (fig. 2). Labor costs in marketing domestic fishery products increased from \$710.5 million in 1972 to \$1,124.5 million in 1977, a rise of 58 percent. Wage rate indices indicate that from 1972 to 1977 labor costs for food processing increased about 48.8 percent; wholesaling, 51.9 percent; retailing, 47.6 percent; and for eating places, 43.6 percent. These wage rate increases plus the increase in volume of fishery products handled by labor at different marketing levels caused all total labor costs to increase by 58 percent from 1972 to 1977.

Table 4.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1972

	Harves-			Mark	eting bil	1				Total		Domestic co	nsumer
	ting	Proces-	Processing.	- Whole-	Retail	Eating	[nstitu-	Total	Per-	arketing	Exports	expenditu	res
	1110	sing	wholesale	sale	VCLATE	places.	tions	bill	cent	ANTRA		Total	Percent
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		\$1,000					<u>%</u>		\$1,000 -		<u>%</u>
Materials and supplies	107,338	142,303	40,321	28,974	15,759	307,924	19,676	554,957	24.07	662,295	25,788	636,507	22.12
Packaging materials		82,387	26,800	11,588	4,554	ı	1	125,329	5.43	125,329	4,880	120,449	4.19
Fuel oil Electricity	43,363	2,855	1,092	1 1	2,212	27,258	1,094	35,090	1.19	78,453	3,055	26.317	2.62
Other fuel	1	3,360	1,262	I	983	59,758	3,669	69,033	2.99	69,033	2,688	66,345	2.31
Misc. materials Office supplies	63,975 -	48,803	9,319 -	11,012 6,374	4,120 2,169	182,777 20,308	13,240	269,271 28,851	11.68 1.26	333,246 28,851	12,976	320,270 27,728	11.13 .96
Services hired	145,264	76,168	23,262	73,332	22,706	85,738	5,883	287,089	12.45	432,353	16,835	415,518	14.45
Transportation	I	1	3,560	32,985	I	ł	ı	36,545	1.58	36,545	1,423	35,122	1.22
Insurance	27,248	22,851	6,699	15,735	10,243	24,001	2,117	81,646	3.54	108,894	4,240	104,654	3.64
Kepaır and maintenance Misc. services	111,913 6,103	45,/01	9,654 3,349	13,/18	9,063	34,309	2,4/1	LU8,035	2.64	219,948 66,966	8,564	211, 384 64, 359	2.24
Value added	434,320	305,217	93,658	125,467	137,501	771,565	30,525	1,463,932	63.48	1,898,252	73,912	1,824,340	63.43
Wages	293,994	103,869	31,340	27,808	72,808	115,934	4,865	355,878	15.43	649,872	25,304	624,568	21.71
Salaries	1	36,328	10,331	11,626	11,291	273,672	11,351	354,599	15.38	354,599	13,807	340,792	11.85
Interest Denreciation	17,419 63 186	26,245	4,720 18 870	2,670	1,620	2,253	5 301	37,621	L.63	55,040 214 782	2,143 8 363	52,897	7.18
Rent	2,694	16,857	5,020	5,329	4,931	82,973	1,957	117,067	5.08	119,761	4,664	115,098	4.00
Tax	3,651	19,424	6,040	7,980	7,162	76,832	2,155	119,593	5.19	123,244	4,799	118,445	4.12
Profit	53, 376	49,209	17,328	60,122	34,832	161,305	4,783	327,579	14.20	380,954	14,833	366,121	12./3
<u>Profit</u> (costs &	686,922	523,688	157,240	227,773	175,966	1,165,227	56,084	2,305,978	100.0	2,992,900	116,536	2,876,365	100.00
Percent of total marketing value	22.95	17.50	5.25	7.61	5.88	38,93	1.87	77.05		100.00	3.89	96,11	

Table 5.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1973

	Harves-			Marke	ting bil	1				Total		Domestic co	nsumer
	ting bill	Proces- sing	Processing- wholesale	Whole- sale	Retail	Eating	[nstitu- tions	Total bill	Per-	marketing value	Exports	Total	Percent
				\$1,000					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		\$1,000 -		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Materials and supplies	137,321	137,353	44,550	24,716	18,742	314,065	19,369	558,795	23.84	696,116	39,991	656,125	22.04
Packaging materials	ĩ	79,559	29,618	9,886	5,547	1	,	124,610	5,32	124,610	7,159	117,451	3.94
Fuel oil	61,380	2,773	1,205	• 1	2,490	28,048	1,620	36,136	1.54	97,516	5,602	91,914	3.09
Electricity	I	4,693	2,039	1	1,937	18,339	1,059	28,067	1.20	28,067	1,612	26,455	. 89
Other fuel	1	3,200	1,390	1	1,107	61,489	3,551	70,737	3.02	70,737	4,064	66,673	2.24
Misc. materials Office supplies	75,941	47,128	10,298 -	9,392 5,438	5,019 2,642	185,570 20,619	13,139	270,546	11.54	346,487 28,699	19,905	326,582	16.01
Services hired	155.906	73.647	25.701	57,893	23,863	84,608	- 5,464	271,176	11.58	427,082	24,535	402,547	13,53
44 44	•		000 0	107 00				27 262	7 1 7	27 363	1 572	76 701	87
I fanspot carton Tnsurance	29.204	22.095	7.403	13.439	10.739	23.716	1.967	79.359	3.39	108.563	6.237	102.326	3.44
Repair and maintenance	118,584	44,188	10,668	11,716	9,545	27,013	2,295	105,425	4.50	224,009	12,869	211,140	7.09
Misc. services	8,118	7,364	3,701	9,304	3,579	33,879	1,202	59,029	2.52	67,147	3,858	63,289	2.13
Value added	521,044	325,303	103,883	119,621	139,240	795,907	30,488	1,514,442	64.58	2,035,486	116,936	1,918,550	64.43
Heree	330 670	10% 70%	3/, 630	171 50	76 005	120 005	4 870	263 694	15 51	792 202	40.407	662.957	22.27
Salaries		36,503	11,411	10,098	12,357	280,019	11,363	361,811	15.43	361,811	20,786	341,025	11.45
Interest	24,601	25,397	5,215	2,288	1,704	3,078	144	37,826	1.61	62,427	3,586	58,841	1.98
Depreciation	72,279	51,563	20,857	9,153	5,113	57,760	5,161	149,607	6.38	221,886	12,747	209,139	7.02
Rent	3,184	16,302	5,540	4,576	5,085	81,912	1,807	115,222	4.91	118,406	6,802	111,604	C/*C
Tax	5,218	19,812	6,667	6,913	7,270	81,693	2,139	124,494	5.31	129,712	7,452	122,260	13 85
Profit	76,092	70,962	19,554	63,122	31,706	1/1,440	5,004	361, /80	L5.43	43/,880	22,150	4T.7°1.74	CO • CT
<u>Gross earnings</u> (costs &	-814,271	536,303	174,134	202,230	181,845	1,194,580	55,321	2,344,413	100.0	3, 158, 684	181,462	2,977,222	100.00
Protit)													
Percent of total marketing value	25.78	16.78	5.51	6.40	5.76	37.82	1.75	74.22		100.00	5.74	94.26	

Table 6.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1974

	Harves-			Marke	ting bil	1				Total		Domestic co	nsumer
	ting bill	Proces- sing	Processing- wholesale	Whole- sale	Retail	Eating]	[nstitu- tions	Total bill	Per- cent	marketed value	Exports	Total	res Percent
				\$1,000					2		\$1,000 -		6
Materials and supplies	. 158,645	173, 194	45,639	33,888	27,870	339,277	23,469	643, 337	25.79	801,982	33,486	768,496	24.15
Packaging materials Fuel oil	- 78,896	102,733	32,563	13,555	8,494	30,309	1,953	157,345 38,951	6.31	157,345	6,570 4,921	150,775	4,74 3.55
Electricity Other fuel Misc. materials Office supplies	- 79,749 -	4,22/ 2,882 60,854	1,2/1 866 10,189	- - 12,877 7,455	7,685 4,046	19,818 66,448 200,431 22,270	4,282	29,209 76,007 307,992 33,771	3.05 3.05 12.35 1.35	76,007 76,007 387,741 33,771	3,174 3,174 16,190 1,410	72,833 371,551 32,361	2.29 11.67 1.02
Services hired	167,548	82,081	26,323	76,668	32,612	79,187	5,729	302,600	12.14	470,148	19,631	450,517	14.14
Transportation Insurance Repair and maintenance Misc. services	29,472 128,944 9,132	24,587 49,308 8,185	4,014 6,696 13,380 2,233	35,632 16,001 13,966 11,070	14,654 13,068 4,889	22,409 24,267 32,511	2,072 2,421 1,236	39,646 86,419 116,410 60,124	1.59 3.47 4.67 2.41	39,646 115,891 245,354 69,256	1,655 4,839 10,245 2,892	37,991 111,052 235,109 66,364	1.19 3.49 7.38 2.08
Value added	502,341	307,055	141,140	110,264	214,855	742,647	31,936	1,547,897	62.07	2,050,238	85,606	1,964,633	61.71
Wages Salaries Interest Depreciation Rent Tax Profit	341,516 30,790 80,314 3,551 4,568 41,642	142,786 40,143 240,143 24,076 47,808 17,808 19,234 15,994	35,481 11,689 17,880 17,830 54,67 54,67	29,221 12,020 3,053 11,562 5,742 5,742 9,575 39,091	91,263 33,723 2,341 7,038 7,038 9,697 63,756	82,090 287,839 3,484 58,288 73,288 73,288 73,749	4,115 12,5566 165 5,820 1,797 2,243 5,230	384,956 397,988 42,018 148,346 110,331 124,349 339,911	15.44 15.96 5.95 5.95 4.42 4.99 13.63	726,472 397,988 72,808 228,660 113,842 113,842 128,917 381,553	30,333 16,618 3,040 9,548 4,753 5,383 15,931	696,139 381,370 69,768 219,112 109,089 123,534 365,622	21.87 2.19 6.88 3.43 3.43 11.48
<u>Gross earnings</u> (costs & Profit)	828,534	562,330	213,102	220,820	275,336	1,161,111	61,135	2,493,835	10000	3,322,369	138,723	3,183,646	100.00
Percent of total marketing value	24.94	16.93	6.41	6.65	8.29	34.94	1.84	75.06		100.00	4.17	95.83	

Table 7.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1975

	Harves-			Marke	ting bil	1				Total	-)omestic co	nsumer
	tíng bill	Proces-	Processing- wholesale	Whole- sale	Retail	Eating	Institu- tions	Total bill	Per-	marketed value	Exports	Total	Percent
		0		\$1,000					%		\$1,000 -		2
Materials and supplies	157.585	163.559	54.088	36.776	19.799	379.140	23,258	676,620	26.50	834.205	37,055	797,150	24.19
Packaging materials	1	101,197	38,031	14,710	5,326	ı	- 100	159,264	6.24	159,264	7,074	152,190	4.62
Fuel oil	79,307	2,271	987		3,203	38,150	1,432	34,381	1.35	34,381	1,527	32,854	66.
Electricity		3,843	1,6/1	,	1.424	83,637	4,801	93,622	3.67	93,622	4,159	89,463	2.72
Misc. materials Office subplies	78,278	53,627	12,260	13,975	4,8192,536	215,020	-	314,536 28,016	12,32	28,016	1,244	26,772	18.
Services hired	154.089	67.571	25,958	96.221	27,094	86,820	5,614	309,278	12.12	463,367	20,582	442,785	13.44
			731 A	OAT TA	1		1	51,907	2.03	51,907	2,306	49,601	1.51
Transportation Insurance	31,123	20,250	6,535	18,917	12,209	24,498	2,032	109,971	3.31	725,081	5,133 9,998	715.083	3.35
Repair and maintenance Misc. services	7,856	6,791	2,178	16,496	4,065	35,667	1,190	62,959	2.47	70,815	3,146	67,669	2.05
babba autow	583.525	336.616	122,521	90.016	174,180	803,341	31,241	1,566,915	61.38	2,150,440	95,520	2,054,920	62.37
Varue acces	382.126	109.728	34,068	32.359	71,203	85,043	3,823	336,224	13.17	718,350	31,908	686,442	20.83
Salaries	1	31,370	11,229	15,168	26,351	311,360	12,173	40, 704	16.01	64.355	2,859	61.496	1.87
Interest	23,063	22,558	9,860	3,946	6 416	68 415	6,138	161,569	6.33	240,117	10,666	229,451	6.96
Depreciation	78,548	45,184	19, 191	15,055	4,966	76,539	1,701	107,001	4.19	110,075	4,889	105,186	3.19
Rent Tax	5,481	27,057	11,215	7,715	14,394	83,647	2,182	366 968	14 28	151,691	0,/38	144,953	13 29
Profit	91,233	87,616	31,459	18,410	48,726	175,671	000.0	000 000	14.00	1000	(1)	000	0
Gross earnings (costs &	895,199	567,746	202,567	232,013	221,073	1,269,301	Ĝ0,113	2,552,813	100.0	3,448,012	153,056	3,294,856	100.00
Profit)													
Percent of total marketing value	25.96	16.47	5.87	6.73	6.41	36,81	1.74	74.04		100.00	4.44	95.56	

Table 8.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1976

	Harves-			Marke	eting bil	11				Total		Domestic c	nsumer
	ting bill	Proces-	Processing.	- Whole-	Retail	Eating	Institu-	Total	Per-	marketed value	Exports	expendit	ires
		SING	wholesale	sale		places	LLOUS	1110	cent	5		Total	rercen
				\$1,000					200		\$1,000		20
Materials and supplies	219,703	220,849	86,922	48,567	27,368	583,854	38,042	1,005,602	26.23	1,225,305	46,623	1,178,682	23.99
Packaging materials Fuel oil Flactricity	104,076	105,908 4,051 6,856	46,939 1,892 3.201	19,427 -	7,835 3,921 3,050	- 62,633 40.952	- 3,819 2,497	180,108 76,316 56,556	4.70 1.99 1.48	180,108 180,391 56.556	6,853 6,864 2,152	173,255 173,527 54.404	3.53 3.53 1.11
Other fuel Misc. materials Office supplies	115,627	4,675	32,708	18,620 10,520	1,743 7,088 3,731	137,311 308,662 34,296	8,372 23,355	154,283 489,792 48,547	4.02 12.77 1.27	154,283 605,418 48,549	5,871 23,037 1,847	148,412 582,381 46,702	3.02 11.85 .95
Services hired	211,975	89,429	43,971	133,043	35,221	123,637	8,535	433,836	11.31	645,811	24,574	621,237	12,65
Transportation Insurance Repair and maintenance Misc. services	45,156 155,600 11,219	26,829 53,657 8,943	7,315 10,997 21,993 3,666	70,967 24,210 21,105 16,761	15,852 14,083 5,286	35,084 37,898 50,655	- 3,086 3,617 1,832	78,282 116,058 152,353 87,143	2.04 3.03 3.97 2.27	78,282 161,214 307,953 98,362	2,979 6,134 11,718 3,743	75,303 155,080 296,235 94,619	1.53 3.16 6.03 1.93
Value added	840,740	539,317	204,135	213,932	220,855	1,168,646	48,362	2,395,247	62.46	3,235,987	123,131	3,112,856	63.36
Wages Salaries Interest Depreciation Rent Tax Profit	536,122 29,169 118,796 5,035 12,310 139,308	144,492 49,039 33,010 66,021 17,599 48,145 181,010	57,213 18,57 11,140 33,408 33,408 33,408 7,637 57,797	43,077 20,769 7,070 21,209 6,939 6,939 20,462 94,406	89,626 33,275 2,681 8,044 6,263 14,873 66,193	120,823 453,650 3,002 98,497 109,754 123,262 259,658	5,820 18,969 9,485 2,592 3,370 7,984	461,052 594,559 57,045 57,045 236,664 151,749 227,749 666,948	12.02 15.50 1.49 6.17 3.94 5.94 17.39	997,174 594,555 86,2159 355,460 1355,460 1355,460 255,460 255,256 806,255	29,943 22,624 3,281 13,525 5,946 9,134 30,679	959,231 571,933 82,933 341,935 150,319 230,925 775,577	19.53 11.64 1.69 6.96 3.06 4.70 15.79
Gross earnings (costs & Profit)	1,272,418	849,595	335,028	395,542	283,444	1,876,137	94,939	3,834,685	100.0	5,107,103	194,328	4,912,775	100.00
Percent of total marketing value	24.91	16.64	6.56	7.75	5.55	36.74	1.86	75,09		100.00	3.81	96,19	

Table 9.--Components of bill for harvesting and marketing domestic edible fish products at different levels, 1977

	Harves-			Marke	ting bil	1				Total		Domestic co	nsumer
	ting bill	Proces- sing	Processing- wholesale	Whole- sale	Retail	Eating I places	[nstitu- tions	Total bill	Per-	narketed value	Exports	Total	Percent
		D		\$1,000					2		\$1,000 -		2
Materials and supplies	230,973	228,378	84,115	45,911	27,721	640,925	38,280	1,065,330	25.37	1,296,303	73,481	1,222,822	23,12
Packaging materials Fuel oil	116,156	123,671	44,852	18,365	6,792 5,198	78,945	4,410	193,679 94,689	3.71 2.26	193,679 210,845 68 030	10,979	182,700 198,893 65,023	3.45 3.76 1 23
Electricity Other fuel Misc. materials Office supplies	- - 114,818	6,832 4,658 89,180	3,553 2,422 31,189	17,446	4,043 2,310 6,144 3,234	310,3072 310,307 26,983	2,884 9,669 21,317	08,930 192,132 475,583 40,317	4.58	192,132 590,401 40,317	33,467 2,285	181,241 556,934 38,032	3.43 10.53 .72
Services hired	224,701	94,737	38,439	117,474	35,499	138,319	7,660	432,128	10.29	656,829	37,232	619,597	11.71
Transportation Insurance Repair and maintenance Misc. services	47,135 166,316 11,250	28,421 56,842 9,474	7,180 9,378 18,755 3,126	62,638 21,386 18,644 14,806	15,974 14,200 5,325	39,421 42,187 56,711	2,758 3,217 1,685	69,818 117,338 153,845 91,127	1.66 2.78 3.66 2.18	69,818 164,473 320,161 102,377	3,958 9,323 18,148 5,803	65,860 155,150 302,013 96,574	1.25 2.93 5.70 1.83
Mappe auter	953,576	720,291	158,485	305,839	252,618	1,216,355	47,533	2,701,121	64.33	3,654,697	207,167	3,447,530	65.19
Wages Wages Salaries Interest Depreciation Rent Tax	590,915 26,654 101,099 34,326 34,321	160,941 44,757 26,672 53,424 18,034 109,031 307,432	54,033 17,670 11,467 22,936 7,511 11,700 33,168	45,192 18,744 4,624 18,496 7,429 60,801 150,553	95,593 34,297 2,585 7,554 6,435 35,534 70,420	133,881 490,402 2,959 105,033 116,498 133,141 234,441	5,924 18,890 167 8,850 2,546 3,521 7,635	495,564 624,760 48,474 48,474 216,493 158,453 353,728 803,649	11.80 14.88 1.15 5.16 3.77 8.42 8.42 19.14	1,086,479 624,760 75,129 317,592 388,049 388,049 999,909	61,587 35,415 4,259 18,003 9,227 21,997 26,679	1,024,892 589,345 70,870 299,589 153,552 366,052 343,230	19.37 11.14 1.34 5.66 2.90 6.92 17.83
Gross earnings (costs & Profit)	1,409,250	1,043,496	281,039	469,224	315,838	1,995,599	93,473	4,198,580	100.0	5,607,830	317,881	5,289,949	100.00
Percent of total marketing value	25.13	18.60	5.01	8.36	5.63	17.75	1.66	74.86		100.00	5.66	94.34	



Figure 2.--Components of bill for marketing fish products in 1977.

Marketing labor costs are highest at eating places, followed in descending order by processing, retail, wholesale, and institutions. Labor costs as a percentage of the marketing bill went down since 1974, because of moderate increases in wage rates during the last 3 years as compared with the rapid increase of price indices of fuel and packaging materials. But wage rates increased faster than costs of services.

(b) <u>Packaging</u>--Packaging materials include paperboard, wrapping paper, metal containers, plastic board, and insulators. Their wholesale price indices advanced substantially since 1974. During 1972-77 there were 2 years (1974 and 1976) when canned and packaged fish products increased above their respective preceeding years faster than other years. Because of production increases, package material costs in 1974 were 26 percent higher than 1973, and those in 1976 were 13 percent higher than 1975. Although the quantity of packaged and canned products continued to increase and packaging material cost indices climbed higher in 1977, total packaging material costs were only 8 percent higher than 1976. It is possible that the quantity and/or quality of materials used in packaging may have been cut back to streamline costs.

(c) <u>Energy</u>--In fish processing plants, about 65 percent of the energy is derived from electricity, 13 percent from fuel oil, and 22 percent from other fuels (U.S. Department of Commerce, 1975). In retail stores, electricity and gas are consumed for refrigeration. In eating places, gas and fuel oil combined are used more than electricity.

The energy bill for 1977 at the processing level and other marketing levels was \$355.7 million, 170 percent higher than in 1972 and 150 percent higher than in 1974, but only 24 percent higher than in 1976 (tables 4, 6, and 9). Oil prices staged a big upturn since 1974, while electricity and gas prices increased only moderately. Two years later, situations changed so that gas prices increased at a greater rate than oil and electricity. The sudden increase in gas costs affects the marketing bill most at eating places.

(d) <u>Capital Costs</u>--Capital costs, which include depreciation and interest, were \$265 million in 1977, up 28.5 percent from 1975 and 37.8 percent from 1972. As a component of the marketing bill, capital costs account for 6.20 percent of the total bill of \$4.20 billion.

The interest rate on short-term commercial bank loans in 1974 rose 93.8 percent from 1972. The rate dropped to 48.6 percent in 1975 and 29.9 percent in 1976, and stayed almost at the same level in 1977 as in 1976. The wholesale price index for machinery and equipment rose to 123.5 (1972=100) in 1974 and increased gradually to 164.8 in 1977. This index reflects the replacement cost of machines and equipment and, therefore, affects their depreciation costs.

(e) <u>Services Hired</u>--Services hired in the marketing of domestic edible fishery products increased to \$432 million in 1977, up 40 percent from 1975 and only 51 percent from 1972. Because of lower quantities of fish products marketed in 1973 and 1975, service costs in 1974 did not increase

much from 1974, while those in 1973 even dropped, because of a price freeze that year.

Transportation is one of the items in service costs. It includes only the intracity movements of fishery products by the wholesalers. Inter-State transportation services performed by trucking companies, railroads, and airflights are not separated out, but their charges are included in the wholesale prices.

Insurance costs increased substantially in 1976 and 1977 from earlier years, because premium rates were boosted. Wage rate increases caused higher costs of repair and maintenance. Expenses for miscellaneous service did not change much in the last 2 years. They include postage, telephone, telegram, office cleaning, and legal fees.

(f) <u>Marketing profit</u>--Fishery firms at all marketing levels reaped a profit of \$803.6 million in 1977, an increase of 20 percent from 1976. This total profit is about 19 percent of the total marketing bill at six marketing levels, the highest rate reached in the last 6 years. Average profit rates were lean in 1976 and 1976. Many plants cutting haddock fillets lost money in 1974; many others processing salmon steaks, peeled shrimp, and ocean perch fillets did not do well in 1975. A few wholesalers incurred losses in handling blue crab meat in 1974 and ocean perch fillets in 1975. Many retailers suffered the same fate in marketing haddock fillets and blue crab meat in 1974 and salmon steaks, peeled shrimp, and blue crabs in 1975. The overall profit rates for all fisheries in 1974 and 1975 were barely 14 percent of their marketing bills.

Profit as well as cost figures presented in this paper are national averages for each fishery. Individual fishery firms of different sizes and from different areas may not match, but can examine their experiences and compare with the national averages.

5. Marketing Bill at Different Marketing Levels

Marketing firms are grouped by functions--processing (including processors who operate also as wholesalers), wholesaling, and distributing. The distribution of fishery products is performed by three outlets-retailers, public eating places, and institutions that serve food. Tables 7 to 12 show marketing bills with separate cost components for marketing firms at different levels in 1972-77. Public eating places and institutions together at the food service level accounted for the largest share (50.5 percent) of the total marketing bill in 1972. This share declined in 1973 and dropped further to 46.6 percent in 1974. As expected, the share of the total marketing bill for retail jumped from 7.6 percent in 1972 to 11.0 percent in 1974. With economic recovery in 1975, food service bill increased again at the expense of retail store sales, suggesting that people eat away from home more in years of better economic conditions.

Fish processing had the second largest share of the total marketing bill in all years. Its share increased slowly from 29.5 percent in 1972

Table 10.--Consumer expenditures and marketing bills fo imported edible fish products, 1972-77

	Imports	Processing	Retail	Eating	Institu-	Total
	Importo	& wholesale	noouzz	places	tions	
<u>1972</u>			<u>\$1,000</u>			
Sales Distribution pattern Markup rate Marketing bill Total " " Import value Consumer expenditures	1,233,292	1,765,088 - (0.4312) 531,796	983,235 (42%) (0.3263) 241,898	2,066,255 (52%) (1,2512) 1,148,409	177,942 (6%) (0.6802) 72,037	1,994,140 1,233,292 3,227,432
<u>1973</u>						
Sales Distribution pattern Markup rate Marketing bill Total " " Import value Consumer expenditures	1,398,484	2,005,706 - (0.4342) 607,222	1,112,385 (42%) (0.3205) 269,988	2,284,098 (52%) (1.1900) 1,241,131	194,954 (6%) (0.6200) 74,612	2,192,953 1,398,484 3,591,437
<u>1974</u>						
Sales Distribution pattern Markup rate Marketing bill Total " " Import value Consumer expenditures	1,495,380	2,147,814 - (0.4363) 652,434	1,244,061 (42%) (0.3791) 341,979	2,544,996 (52%) (1.2787) 1,428,133	215,211 (6%) (0.6700) 86,342	2,508,888 <u>1,495,380</u> 4,004,268
<u>1975</u>						
Sales Distribution pattern Markup rate Marketing bill Total "" Import value Consumer expenditures	1,367,180	1,868,935 (0.3670) 501,755	1,203,445 (48%) (0.3415) 306,356	1,942,945 (46%) (1.2600) 1,083,235	187,267 (6%) (0.6700) 75,131	1,966,477 1,367,180 3,333,657
1976	-					
Sales Distribution pattern Markup rate Marketing bill Total "" Import value Consumer expenditures	1,916,848	2,591,579 (0.3520) 674,731	1,624,169 (49%) (0.2790) 354,295	2,623,858 (45%) (1.2500) 1,547,647	259,661 (6%) (0.6699) 104,166	2,590,839 1,916,848 4,507,687
1977						
Sales Distribution pattern Markup rate Marketing bill Total "" Import value Consumer expenditures	2,078,492	2,840,675 (0.3657) 762,183	1,815,496 (47%) (0.3043) 423,565	2,776,474 (45%) (1.1720) 1,498,171	280,750 (6%) (0.6472) 110,309	2,794,228 2,078,492 4,872,720

Table 11.--Sales of domestic and imported fishery products at the consumer level, 1972-77

	Domestic	Imported	Domestic	Imported	Domestic	Imported
	19	72	19	73	19	74
			\$mil	lion		
Retail stores Public eating places Institutions	687.2 2,054.2 134.9	983.2 2,066.3 177.9	735.6 2,099.5 142.1	1,112.4 2,284.0 195.0	980.1 2,053.9 149.6	1,244.1 2,545.0 215.2
Subtotal Percent of total Total consumption Resident population	2,876.4 (47.1%) 6,1 208,2	3,227.4 (52.9%) 03.8 34,000	2,977.2 (45.3%) 6,56 209,85	3,591.4 (54.7%) 8.6 9,000	3,183.6 (44.3%) 7,18 211,38	4,004.3 (55.7%) 7.9 4,000
Per capita consumption: Value Quantity	(\$2 12.5	9.31) 1 1b	(\$31 12.9	.30) 1b	(\$34 12.2	.00) 1b
Exports	13	4.1	241	.9	194	.9
e	19	975		1976	19	977
Retail stores Public eating places Institutions	868.3 2,276.7 149.8	1,203.5 1,942.9 187.3	1,299.0 3,377.1 236.7	1,624.2 2,623.9 259.7	1,353.7 3,698.3 237.9	1,815.5 2,776.5 280.8
Subtotal Percent of total Total consumption Resident population Per capita consumption:	3,294.8 (49.7%) 6,6 213,0 (\$3	3,333.7 (50.3%) 528.5 551,000	4,912.8 (52.1%) 9,42 214,66	4,507.8 (47.9%) 20.6 59,000 8.88)	5,289.9 (52.0%) 10,16 216,33 (\$49	4,872.8 (48.0%) 52.7 32,000
Quantity	12.	.1 1b 57.4	13.0) 1b 9.8	473	3.4

Table 12.--Fish consumption compared with total food consumption and disposable personal income in the United States, 1972-77

Year	Fish consump- tion	Total food con- sumption ¹ /	Fish consumption as percent of food consump- tion	Disposable ¹ / personal income(DPI)	Fish consump- tion as per- cent of DPI	Total food consumption as percent of DPI
	<u>\$b</u>	illion	<u>%</u>	\$ billion	<u>%</u>	
1972	6.10	150.40	4.06	801.30	0.76	18.77
1973	6.57	168.10	3.91	901.70	.73	18.64
1974	7.19	189.80	3.79	984.60	.73	19.28
1975	6.63	209.50	3.16	1,084.40	.61	19.32
1976	9.42	225.50	4.21	1,185,80	.79	19.02
1977	10.16	246.30	4.13	1,308.60	.78	18.82

1/ Department of Commerce, Bureau of Economic Analysis.

to 31.5 percent in 1977. Only the big processing plants that function also as wholesalers were able to make more than modest profits in the last 3 years. Smaller processors were less fortunate.

Expenses in fishery product wholesaling were \$469.2 million in 1977 or 11.2 percent of the total marketing bill, the second smallest share after fish retailing. Wholesalers' share in 1977 was higher than in all other years since 1972. Labor costs at this level increased substantially in later years, but the profit margin was badly slashed in 1974 and 1975.

The marketing bill for fish retailing ranks the lowest among all marketing levels. It has been around 7.5 percent of the total bill for most of the last 6 years. However, a large increase in the marketing bill for retail sales was recorded in 1974 (11.0 percent), indicating more fish consumption at home than away from home in a year of economic recession. (See figure 3 for trends of marketing bills at different levels.)

CONSUMER EXPENDITURES ON IMPORTED FISH PRODUCTS

Imports of edible fishery products measured by quantity reached a record high in 1973; 1972 was a close second. From 1974 to 1977, the volume of their annual fish imports was less than that in 1972, while the value of imports was higher for all those years. Two devaluations of the U.S. dollar in 1973 and the continuous high inflation in most foreign countries caused the value of fish imports (in dollars) to rise faster than domestic fish prices.

Imported fishery products are mostly frozen and canned. Table 10 shows their distribution pattern to different outlets in the consumer market. Their markup rates at wholesale and retail levels follow those of frozen and canned products, although those at the eating places and institutions remain the same for all products. (Compare with appendix tables 1 and 2.)

Since processors and wholesalers do not sell directly to consumers, consumers spend their food dollars in retail food stores, public eating places, and/or institutions. The marketing bills of imported fish from the processing/wholesale level down were \$2.79 billion in 1977 (table 8). Adding the sum of marketing expenses to the value of imports yields the total expenditures of \$4.87 billion by consumers on imported fishery products in 1977, compared with \$3.23 billion in 1972, \$3.59 billion in 1973, and \$4.00 billion in 1974. The decline in consumption of imports in 1975 to \$3.33 billion was caused by a sharp drop of imported fresh and frozen tuna and shrimp, canned salmon, and canned sardines.

CONCLUSION

The result of the aggregate analysis of costs for 1 year of a product from production to consumption is the sum of costs and profits at all levels, referred to as annual consumer expenditures for that product. For fishery products, such expenditures are measured either (1) by the



Billion dollars

Figure 3.--Marketing bills of domestic fishery products at different marketing levels, 1972-77

sum of the exvessel values of all edible fishery products harvested minus export values, to which are added costs incurred for processing, transporting, importing, distributing, and serving the products to the consumer; or (2) by the sum of cash that consumers spent for fish food in retail stores, eating places, institutions, and other away-from-home establishments. The results of both estimates are identical.

Findings of this study indicate that the total consumption value of domestic and imported edible fishery products in the United States for 1977 reached a high of \$10.16 billion, or \$49.74 per capita. This was an increase both in total value and in quantity from earlier years, although quantity did not increase on a per capita basis (table 11).

The ratio of disposable personal income (DPI) spent on total food consumption increased from 18.77 percent in 1972 to 19.32 percent in 1975, then dropped to 18.82 percent in 1977. For fishery products, the trend of consumption ratios to DPI is just the reverse in the same years--these ratios dropped from 0.76 percent in 1972 to 0.61 percent in 1975 and increased to 0.78 percent in 1977 (table 12).

Compared to total food consumption, consumer expenditures for fishery products declined in 1975, when only 3.2 percent of total food expenditures was spent on fish items that year. This ratio improved to 4.1 percent in 1977 (table 12).

In 1977, price indices of all fishery products increased 13.47 percent at the harvesting level² and 8.04 percent at the wholesale level from the previous year, whereas those of all foods increased only 0.8 percent at the farm level³ and 4.6 percent for all processed foods at the wholesale level³ during the same period. As a result of more rapid increases in fish prices at all levels coupled with a steady rise in quantity of fish products sold, fish consumption has gained some ground from other foods in competing for the consumer's food dollar in 1976 and 1977 (table 12).

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²Annual reports of Fisheries of the United States, 1976-77, NMFS. ³Bureau of Labor Statistics, U.S. Department of Labor.

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APPENDIX

Methodology in the Calculation of Consumer Expenditures and Marketing Bills

a. Identification of Symbols

i represents individual cost items. There are 16 cost items, i = 1, 2, . . 16 (See table 4 in the text on kinds of costs--detailed data of cost rates for each fishery at all levels are not presented in this paper but in a paper on cost analysis.)

j represents functional levels. There are six levels.

- j = 1: Exvessel level
- j = 2: Processing level
- j = 3: Wholesale level
- j = 4: Retail level
- j = 5: Eating places
- j = 6: Institutions

k represents type of product. There are 18 fish products involved, k = 1, 2, ... 18(See table 1.)

V represents sales value, V_1 = sales value at the exvessel level after deduction

of exports; it is also equal to M_1 as has been explained in the text.

 V_2 = sales value at the processing level, etc.

M represents the marketing bill, or sales value minus purchase value.

 M_2 = marketing bill for the processor = $V_2 - V_1$, and $V_2 = M_2 + V_1$ $M_3 = V_3 - V_2$, etc.

R represents markup rate; R_3 = markup rate for the wholesalers

$$\frac{V_3 - V_2}{V_2}, \text{ or } V_2 \cdot R_3 = M_3, \text{ or } V_3 = V_2 (R_3 + 1)$$

$$= V_2$$

$$R_4 = \frac{V_4 - V_3}{V_3}, \text{ etc.}$$

(See Appendix Tables 1 and 2 for markup rates for different fisheries at different marketing levels, 1972-77.)

Proces- sing Whole- male Retail Proces- sing Whole- sale Retail Proces- sale Whole- male Retail Proces- sale Whole- sing Retail Proces- sale Whole- sale Retail			1972			1973			1974	
Tresh Froducts: Tresh		Proces- sing	Whole- sale	Retail	Proces- sing	Whole- sale	Retail	Proces- sing	Whole- sale	Retail
Flounder filtet 0.4660 0.3955 0.2955 0.5210 0.4680 0.5397 0.2862 0.55 God Haddock	Fresh Products:					Ratio	1/			
Frozen products: I:3440 0.22550 0.4380 1.1330 0.2880 0.4049 1.0730 0.1341 0.9 Halibut steak .2630 .1520 .4520 .4524 .1604 .3 Canned products: .2630 .1520 .4520 .4520 .4524 .1604 .3 Shrimp 0.8840 0.3520 0.3520 0.3520 0.3280 0.4760 0.2 Shrimp 0.8840 0.3520 0.3520 0.3280 0.3280 .2920 .2995 .3 Shalmon Salmon 0.8840 0.3520 0.3720 0.1810 0.1970 0.2992 .3 Shallfish products: 0.8840 0.3720 0.1810 0.1970 0.2992 .3 Shellfish products: 11.1369 0.06671 0.1638 1.2.3030 0.0484 0.2356 1.7797 .4 .3 Shellfish products: 11.1369 0.05660 0.24290 1.4130 .4130 .20966 .2992 .3	Flounder fillet Cod " Haddock " Salmon steak	0.4680 .4986 .3034 .4370	0.3965 .3470 .1370 .4710	0.2955 .2671 .2660 .1950	0.5210 .5500 .3070	0.4680 .4000 .1960 .3965	0.4630 .5050 .4000 .2540	0.5397 .5507 .3109 .1744	0.2862 .3891 .1690 .3451	0.6327 .5318 .2987 .2167
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Frozen products:									
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Ocean perch fillet Halibut steak	1.3440	0.2250	0.4380 .4520	1.1330 .3490	0.2880 .2320	0.4049 .2520	1.0730	0.1341.1604	0.9023
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Canned products:									
SardinesIII.13690.06710.165812.50300.04840.245512.98062992 $.2992$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2932$ $.2609$ $.2450$ $.2932$ $.2932$ $.2639$ $.2450$ $.25609$ $.4430$ $.2932$ $.2932$ $.2639$ $.26790$ $.26790$ $.2932$ $.2932$ $.2634$ 0.3450 0.25600 $.2634$ 0.3450 0.25324 0.3450 0.25324 0.3450 0.25324 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.25340 0.3450 0.3450 0.3450 0.3450 0.3450 0.3450 <th< td=""><td>Shrimp Tuna Salmon</td><td>000</td><td>.8840 .8840 .6290</td><td>0.3520 0.3520 0.3720</td><td>0.0. 1.</td><td>8500 8500 3320</td><td>0.3280 .3280 .2991</td><td>0 1</td><td>.9760 .9756 .7797</td><td>0.2078 .2077 .4650</td></th<>	Shrimp Tuna Salmon	000	.8840 .8840 .6290	0.3520 0.3520 0.3720	0.0. 1.	8500 8500 3320	0.3280 .3280 .2991	0 1	.9760 .9756 .7797	0.2078 .2077 .4650
Shellfish products:O.72530.21510.23600.77600.18100.19700.53240.3Shrimp, peeled0.77500.25600.42901.4130.4030.4430.0572.3Blue crab meats, fresh1.79000.25600.42901.4130.4030.4430.0572.3Blue crab meats, fresh-0.066000.24704030.44302.0830.0572.3American lobster, live-0.066000.2470-0.17200.43502609.4Special products: Salmon smoked, salted, caviar, etc2.19440.47110.19501.00780.39650.25401.26340.34500.2Weighted average0.34410.19501.00780.39650.25401.26340.34500.2Mall fish products100400.68021.19000.62001.26340.34500.2	Sardines	11.1369	0.0671	0.1658	12.5030 	0.0484	cc+2.0	9096.21	7667*	0000.
Shrimp, peeled Blue crab meats, fresh Blue crab meats, fresh - 1.79000.72530.21510.23600.17600.18100.17970.53240.0Blue crab meats, fresh Sea scallop meats, frozen American lobster, live smoked, salted, caviar, etc1.79000.25600.4430.4430.6030.0572.3Special products: Salmon- smoked, salted average-0.066000.24705860.38902609.4Special products: Salmon- smoked, salted, caviar, etc5880.33700.17200.44506780.3Special products: Salmon- smoked, salted, caviar, etc2.19440.47110.19501.00780.39650.25401.26340.34500.2Weighted average0.34410.19501.00780.39650.25401.26340.34500.2Maighted average0.34410.19500.34410.39650.25401.26340.34500.2Meighted average0.34410.19500.34610.39650.32830.34500.2Maighted average1.25120.36801.00780.32830.34500.34500.3450All fish products1.25120.68021.19000.62001.27870.6700	Shellfish products:									
Special products: Salmon- Special products: Salmon- 0.3450 0.3450 0.3450 0.3450 0.3450 0.3450 0.2540 weighted average 2.1944 0.4711 0.1950 1.0078 0.3965 0.2540 1.2634 0.3450 0.2 Weighted average 0.3441 0.3441 0.3441 0.3283 0.3 0.3 Meighted average Eating Institute Eating Institute Eating Institute 0.3 All fish products 1.2512 0.6802 1.1900 0.6200 1.2787 0.6700	Shrimp, peeled Blue crab meats, fresh Sea scallop meats,frozen American lobster, live	0.7253 1.7900 -	0.2151 0.2560 0.0600 .5880	0.2360 0.4290 0.2470 .3370	0.7760 1.4130 -	0.1810 .4030 0.1720 .5860	0.1970 .4430 0.4350 .3890	0.1797 2.0830 -	0.5324 .0572 .2609 .6780	0.3098 .3017 .4938 .3800
Weighted average0.34410.32830.3Weighted average0.34410.32830.3EatingInstituted averageInstituted averageInstituted averageInstituted averageEatingInstituted averageInstituted averageInstituted averageInstituted averageAll fish products1.25120.68021.19000.62001.27870.6700	Special products: Salmon smoked, salted, caviar,etc	2.1944	0.4711	0.1950	1.0078	0.3965	0,2540	1.2634	0.3450	0.2170
Eating placesInstitu- EatingEating Institu- placesInstitu- Eating placesEating Institu- placesInstitu- forsAll fish products1.25120.68021.19000.62001.27870.6700	Weighted average			0,3441			0.3283	-		0.3906
All fish products 1.2512 0.6802 1.1900 0.6200 1.2787 0.670		Eatir place	60 S	Institu- tions	Eatin place	I I	nstítu- tions	Eatiplac	ng I es	nstitu- tions
	All fish products	1.25	12	0.6802	1,190	0	0.6200	1.278	87	0.6700-

Table 1.--Markup rates for different fishery products at five marketing levels, 1972-74

A-2

Products Frésh Products:	1/7	0		1976			1977	
Frésh Products:	roces- Who sing sa	le- Retail le	Proces- sing	Whole- sale	Retail	Proces- sing	Whole- sale	Retail
				- Ratio				
Flounder fillet 0 Cod " Haddock " Salmon steak	.3412 0.257 .4060 .446 .4883 .151 .1620 .369	6 0.7004 7 .4936 0 .2979 0 .1417	0.5064 .5111 .4348 .0645	0.3481 .3668 .0389 .3458	0.3635 .4832 .2510 .0726	0.4263 .6845 .5836 .1481	0.3597 .3837 .2269 .4116	0.3713 .4978 .4055 .2220
Frozen products:								
Ocean perch fillet 0 Halibut steak	.9506 0.114 .3965 .083	9 0.6716 9 .2864	1.0864 .3332	0.1417 .0920	0.4405 .2400	1.1476 0.3138	0.1692 0.1252	0.4921 .3015
Canned products:								
Shrimp Tuna Salmon Sardines	1.1470 1.1469 1.6357 7190 0.095	.2540 .2539 .0554 2 .3471	1.1 1.1 2.2 13.4374	.053 .053 .836 0.0458	0.2414 .2414 .4254 .3227	2 2 14.1149	9726 9726 2730 0.0749	. 1684 .1684 .4515 .2137
Shellfish products:								
Shrimp, peeled 0 Blue crab meats, fresh 1 Sea scallop meats, frozen American lobster, live	.1490 0.401 .9919 .080 202 585	4 0.1114 2 .2423 4 .4181 6 .3800	0.2087 1.7822 -	0.4579 .0624 .3462 .8079	0.1970 .2097 .4799 .4300	0.2979 1.7823 -	.4923 .1072 .2259 .7507	.2251 .2195 .5693 .4400
Special products: Salmon smoked, salted, caviar, etc. 1	.3461 0.369	0 0.1420	1.8350	0,3456	0.0726	1.7802	0.4116	0.2220
Weighted average		0.3415			0.2790			0.3043
	Eating places	Institu- tions	Eating		nstitu- tions	Eati plac	ng es	Instítu- tions
All fish products	1.2600	0.6700	1.2499		0.6699	1.17	20	0.6472

Table 2.--Markup rates for different fishery products at five marketing levels, 1975-77

 $\underline{1}$ See footnote for table 5.

A-3

- K represents percentages of distribution of fish products from the wholesalers. (See table 2 in the text.)
 - K_{L} = percentages of distribution of fish to retailers.
 - K_5 = percentages of distribution of fish to eating places.
 - K_6 = percentages of distribution of fish to institutions.
- $M_2 = V_1 \cdot R_2$ (Processor's marketing bill is the result of exvessel value times processor's markup rate.)
- $M_3 = V_2 \cdot R_3$ $M_4 = V_3 \cdot R_4 \cdot K_4$ (From wholesale level up, each outlet should be adjusted by the K factor.)
- $M_5 = V_3 \cdot R_5 \cdot K_5$ $M_6 = V_3 \cdot R_6 \cdot K_6$
- C represents annual cost value (including profit), C_{ik} = the annual total value spent on <u>i</u>th cost for <u>k</u>th product.
- E represents annual consumer expenditures on fish products.
 - K_k = annual consumer expenditure for <u>k</u>th product.

b. Application of Equations

The end result of the aggregate analysis is the presentation of annual consumer expenditures on domestic fish products. Consumer expenditures of a product are the summation of all costs incurred from production to consumption of that product. For fish products, they can be estimated in two ways -- (1) the sum of the exvessel value of all edible fish products harvested minus export value and add to it costs incurred for processing, transporting, distributing, and serving the products to the consumer, and (2) the sum of cash consumers spent in retail stores, eating places, institutions, and other away-from-home establishments for fish food. The results of the two approaches should be identical.

After fish products are processed, processors sell them at a price higher than that at which they bought them from the fisherman. The processor's sales value (V_2) of the processed products is determined by the processor's markup rate (R_2) of individual products from the exvessel value, or $V_2 = V_1$ ($R_2 + 1$). All the expenses (materials, services, value added, and profit) incurred in moving one kind of fish product from the dockside to the consumer through different processing and distributing channels are called the marketing costs of that product. They are divided into marketing bills according to marketing levels. In the report entitled "Cost Analyses of Fish Price Margins, 1972-74, at Different Functional Levels -- for Management Decisions on Production, Distribution, and Pricing Policies," I discuss in detail the cost analyses in different classifications by product type and by functional level. That report has about 140 cost tables. All cost figures used in this study are derived from the findings of the other report.

The processor's marketing bill (M₂) of a fish product is the difference between the processor's sales value and the exvessel value of that product M₂ = V₂ - V₁. The markup rate is obtained by dividing M₂ by the exvessel value, or R = $\frac{V_2 - V_1}{V_1}$.

Therefore, $M_2 = V_1 \cdot R_2$. By the same token, $M_3 = V_2 \cdot R_3$ for the wholesaler, $M_4 = V_3 \cdot R_4$ for the retailer, if there is no other outlet to reach the consumer.

V₁

Here the marketing bill for retailers has to be adjusted according to the percentage of fish products distributed from wholesalers or processors/ wholesalers because the latter have other distribution outlets besides retailers, such as eating places and institutions for away-from-home food services. Each product has a different distribution pattern for the three outlets according to the percentage of products distributed by the wholesaler (K). For retailers, the distribution rate is K_4 ; for eating places, K_5 ; for all other institutions, K_6 ; and

$$K_4 + K_5 + K_6 = 1 {.} {(1)}$$

The marketing bills for the three outlets at the consumer level are, therefore, adjusted as follows:

$$M_{4} = V_{3} \cdot R_{4} \cdot K_{4}$$
(2)

$$M_5 = V_3 \cdot R_5 \cdot K_5$$
(3)

$$M_6 = V_3 \cdot R_6 \cdot K_6 \tag{4}$$

At any marketing level, its marketing bill for each product is the summation of 16 costs (including profit) involved in marketing that product. The total costs for kth product at jth level is represented as

$$M_{j,k} = \sum_{i=1}^{16} C_{i,j,k}$$
(5)

There are five marketing levels and one harvesting level in the U.S. fishery production and distribution system. The cost bill (16 items) for each marketing level is the sales value minus purchase value. At the harvesting level the cost is represented by the exvessel value since fish are not purchased by the fisherman and there is no purchase cost to deduct. Therefore, $V_1 = M_1$.

The sum of five marketing bills and the harvesting bill (M_1) for all fish products (17 groups) will be the annual consumer expenditure on fish consumption.

$$E = \sum_{k=1}^{17} (M_1 + M_2 + \dots + M_6) = \sum_{k=1}^{17} \sum_{j=1}^{6} M_{j,k}$$
(6)

At jth level, the marketing costs of all products will be

$$M_{j} = \sum_{k=1}^{17} \sum_{i=1}^{16} C_{i,j,k}$$
(7)

When the marketing costs of all six levels are added up for all products, the sum total will, by definition, be the consumer expenditures in a particular year.

$$E = \sum_{j=1}^{6} M_{j} = \sum_{k=1}^{17} \sum_{j=1}^{6} \sum_{i=1}^{16} C_{i,j,k}$$
(8)

The results of the application of the above equation for the years from 1972 to 1977 are shown in the last columns of tables 4-9.

As mentioned before, the total value of consumer expenditures is equal to the value of fish product sales at retail stores, eating places, and other food serving institutions.

$$E = \sum_{j=4}^{6} v_j = v_4 + v_5 + v_6$$

= $(v_3 K_4 + M_4) + (v_3 K_5 + M_5) + (v_4 K_6 + M_6)$ (9)

Table 3 shows results of the application of this equation for the years from 1972 to 1977.

To prove that the results of equations 8 and 9 are equal, let us first figure out the value for <u>k</u>th product charged at the three outlets for consumers:

$$E_{k} = \int_{j=4}^{6} V_{j,k}$$

= $V_{4,k} + V_{5,k} + V_{6,k}$ (10)

 $V_{4,k}$ is the sales value of <u>k</u>th product at the retail which is equal to the purchased value of <u>k</u>th product from its wholesaler plus the retail marketing bill, or

$$V_{4,k} = V_{3,k} \cdot K_4 + M_{4,k}$$
 where $M_{4,k} = \sum_{i=1}^{10} C_{i,4,k}$

The same reasoning applies to $V_{5,k}$ and $V_{6,k}$ to get:

$$E_{k} = V_{3,k} \cdot K_{4} + \sum_{i=1}^{16} C_{i,4,k} + V_{3,k} \cdot K_{5} + \sum_{i=1}^{16} C_{i,5,k} + V_{3,k}, \cdot K_{6} + \sum_{i=1}^{16} C_{i,6,k}$$

$$\cdot = V_{3,k} \cdot (K_{4} + K_{5} + K_{6}) + \sum_{j=4}^{6} \sum_{i=1}^{16} C_{i,j,k}$$

$$= V_{3,k} + \sum_{j=4}^{6} \sum_{i=1}^{16} C_{i,j,k}$$
since $K_{4} + K_{5} + K_{6} = 1$
(11)

Here $V_{3,k}$ is the sales value of <u>k</u>th product at the wholesale level and is equal to the purchase value from the processor plus wholesale marketing bill of kth product.

$$V_{3,k} = V_{2,k} + M_{3,k}$$
where $V_{2,k} = V_{1,k} + \sum_{i=1}^{16} C_{i,2,k}$
and $V_{1,k} = \sum_{i=1}^{16} C_{i,1,k}$

$$V_{3,k} = \sum_{i=1}^{16} C_{i,1,k} + \sum_{i=1}^{16} C_{i,2,k} + \sum_{i=1}^{16} C_{i,3,k}$$

$$= \sum_{j=1}^{3} \sum_{i=1}^{16} C_{i,j,k}$$
(12)

Substituting the above value in equation 11,

$$E_{k} = \sum_{j=1}^{3} \sum_{i=1}^{16} C_{i,j,k} + \sum_{j=4}^{6} \sum_{i=1}^{16} C_{i,j,k}$$
$$= \sum_{j=1}^{6} \sum_{i=1}^{16} C_{i,j,k}$$
(13)

$$E_{\text{total}} = \sum_{k=1}^{17} E_k = \sum_{k=1}^{17} \sum_{j=1}^{6} \sum_{i=1}^{16} C_{i,j,k}$$
(for all products at all levels) (14)

which is identical to equation 8. Consumer expenditures shown in tables 4-9 are comparable to the corresponding annual figures shown in table 3.

Note: Detailed data for prices and costs at different functional levels for the 13 fisheries are voluminous. They are not presented here but are available in the Economic Analysis Group, NMFS. The distribution pattern at consumer market levels and markup rates by level and product types are presented in the report.

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