

THE DISTRIBUTIONAL EFFECTS OF AN INCREASE IN  
SELECTED FEDERAL EXCISE TAXES

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## INTRODUCTION

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In fiscal year 1985 revenues from all federal excise taxes were \$36 billion, approximately five percent of total federal revenues in that year. Continuing pressures to reduce federal deficits have caused some to consider possible increases in excise taxes. In this paper we analyze the distributional effects by income class of separately considered increases in selected excise taxes. For each of the taxes, the simulated increase in the tax rate is designed to generate an additional \$1 billion in gross excise tax revenues before inclusion of the associated reduction in income taxes. The set of taxes for which increases are simulated include alcoholic beverage taxes on beer, wine and distilled spirits, tobacco taxes, the gasoline tax, the air passenger ticket tax and the communications (telephone) excise tax. These taxes accounted for approximately 65 percent of total federal excise tax liabilities (almost 80 percent of excise tax liabilities excluding the windfall profit tax) in 1985.

In the first section of the paper we present data on the distribution of consumer expenditures by income class on the seven different types of items. In the next section we analyze the distribution of excise tax payments on those expenditures. In the third section we simulate the distributional effects of a \$1 billion increase in gross revenues from each of the separate taxes considered in turn. In the fourth section we analyze the full incidence of these excise tax increases, including their effects on relative prices, and on consumer incomes and income tax payments. The final section concludes with a summary of the results.



Distribution of Consumer Expenditures

Table 1 shows the distribution of average family expenditures on the seven taxed commodities by income class. The income and expenditure data in the table were taken from the 1982/1983 Consumer Expenditure Survey (CES) Interview Survey, and have been aged to 1985 using the growth rate in per capita expenditures and per capita income between 1982/1983 and 1985.<sup>1</sup> Families are defined as one or more members of the same household who either are related or who make joint expenditure decisions.

Expenditures as a percent of income fall as income rises for each type of expenditure except for airfare (see the second row for each type of expenditure in table 1). Airfare expenditures rise slightly as a percent of income for families with incomes of \$40,000 or more. Expenditures for gasoline and telephone service show the largest decline in expenditures as a percent of income between the lowest and highest income classes. Families with incomes of \$5,000 or less spend 17 percent of their income on gasoline, while expenditures for families with incomes of \$50,000 or more

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1. The 1982/1983 Consumer Expenditure Survey consists of two parts: (1) the Interview survey in which consumer units are interviewed every three months and (2) the Diary survey in which consumer units record their purchases over a one week period. The Interview survey is designed to obtain information on the types of expenditures that consumers can be expected to recall over a long period of time. The Interview survey reports only combined expenditures for beer and wine consumed at home, and combined expenditures for all alcoholic beverages consumed away from home. Factors derived from the Diary survey, in which separate expenditures for beer, wine and distilled spirits are reported both for consumption at home and away, are used to allocate the combined alcoholic beverage expenditures reported in the Interview survey. For more information on the complete 1982/1983 Consumer Expenditure Survey see: U.S Department of Labor, Bureau of Labor Statistics. Consumer Expenditure Survey: Interview Survey, 1982-1983. Bulletin 2246 and U.S Department of Labor, Bureau of Labor Statistics. Consumer Expenditure Survey: Diary Survey, 1982-1983, Bulletin 2245.



TABLE 1. AVERAGE INCOME, AVERAGE TOTAL EXPENDITURES, AND AVERAGE EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
Average Income (\$)	26,502	2,311	7,401	14,764	24,750	34,630	44,539	72,016
Share of Total Income	100.0	0.8	4.1	13.3	17.1	17.5	14.1	33.0
Average Total Expenditures	22,828	9,690	10,838	16,195	22,514	27,892	34,007	47,382
Share of Total Expenditures	100.0	3.8	7.0	17.0	18.0	16.4	12.5	25.2
Average Gasoline Expenditures	995	394	453	801	1,111	1,309	1,459	1,639
As a % of Income	3.75	17.04	6.12	5.42	4.94	3.78	3.28	2.28
As a % of all expenditures	4.36	4.06	4.18	4.94	4.93	4.69	4.29	3.46
Share of Gasoline Expenditures	100.0	3.6	6.7	19.2	20.4	17.7	12.3	20.0
Average Beer Expenditures	310	159	157	265	341	414	399	472
As a % of Income	1.17	6.89	2.12	1.80	1.38	1.19	0.90	0.66
As a % of all expenditures	1.36	1.64	1.44	1.64	1.51	1.48	1.17	1.00
Share of Beer Expenditures	100.0	4.7	7.5	20.5	20.1	17.9	10.8	18.5
Average Wine Expenditures	72	32	30	53	70	89	108	154
As a % of Income	0.27	1.38	0.40	0.36	0.28	0.26	0.24	0.21
As a % of all expenditures	0.32	0.33	0.27	0.33	0.31	0.32	0.32	0.32
Share of Wine Expenditures	100.0	4.1	6.1	17.4	17.7	16.5	12.5	25.8
Average Liquor Expenditures	197	88	88	150	203	254	267	381
As a % of income	0.74	3.81	1.19	1.02	0.82	0.73	0.60	0.53
As a % of all expenditures	0.86	0.91	0.81	0.93	0.90	0.91	0.79	0.80
Share of Liquor Expenditures	100.0	4.1	6.6	18.2	18.9	17.3	11.4	23.5
Average Tobacco Expenditures	344	182	247	318	394	441	435	390
As a % of Income	1.30	7.89	3.33	2.15	1.59	1.27	0.98	0.54
As a % of all expenditures	1.51	1.88	2.27	1.96	1.75	1.58	1.28	0.82
Share of Tobacco Expenditures	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Average Telephone Expenditures	432	284	305	384	435	500	532	641
As a % of Income	1.63	12.30	4.12	2.60	1.76	1.44	1.20	0.89
As a % of all expenditures	1.89	2.93	2.82	2.37	1.93	1.79	1.57	1.35
Share of Telephone Expenditures	100.0	6.0	10.4	21.3	18.4	15.5	10.4	18.0
Average Airfare Expenditures	201	67	64	134	174	204	299	573
As a % of Income	0.76	2.91	0.87	0.90	0.70	0.59	0.67	0.80
As a % of all expenditures	0.88	0.69	0.59	0.82	0.77	0.73	0.88	1.21
Share of Airfare Expenditures	100.0	3.0	4.7	15.9	15.8	13.6	12.5	34.5

SOURCE: CBO tabulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures.



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are only a little over two percent of their income. Families in the lowest income class spend about 12 percent of their income on telephone service while families in the highest income class spend just under one percent.

Expenditures are shown as a percentage of total expenditures as well as a percentage of income. Because income is measured over a single year, expenditures expressed as a percent of income may overstate the fraction of permanent income spent on that good. Families whose income may have fallen temporarily are likely to maintain their previous level of consumption in the expectation that their income will return to normal levels.<sup>2/</sup> Because total expenditures are generally thought to reflect long-term incomes, total expenditures may be a better measure of permanent income than income from a single year. Expenditures on each item expressed as a percentage of total expenditures may better approximate the fraction of income spent on each good over a longer time period.

Expenditures for all seven items are much more constant across income class when measured as a percentage of total expenditures rather than as a percentage of total income. There is almost no variation for liquor and wine, while gasoline, beer and airfare expenditures are almost constant except for the highest income class, airfare differing from the other two

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2. Because 1982 and 1983 were years of high unemployment, this may be particularly true for the data presented in the table. The comparison of expenditures and income is further complicated by the survey design. Families were interviewed every three months over a twelve month period about their expenditures over the past three months. Each interview is treated as a separate observation in the table. Income information was collected at the beginning and the end of the twelve month cycle about income received in the previous twelve months. Thus, for many observations, reported expenditures may have occurred just after the period during which reported income was received.



in that the percentage of total expenditures increases rather than decreases for families with incomes of \$50,000 or more. Tobacco and telephone expenditures measured as a percentage of total expenditures retain the pattern observed when measured as a percentage of income, declining as income rises. However, the differences between the highest and lowest income groups are much less when measured relative to total expenditures rather than when measured relative to income.

The difference between the distribution of taxable expenditures measured as a percentage of income and as a percentage of total expenditures is best illustrated by the distribution of gasoline expenditures. Gasoline expenditures as a fraction of income fall sharply as income rises. However, when measured as a fraction of total expenditures, gasoline expenditures mostly are constant across income classes, falling slightly in both the highest and lowest income class. Thus a tax on gasoline will impose a heavy one year burden on any particular family whose income is low in a certain year, but the long-term burden will be more nearly the same for most families, to the extent that total expenditures reflect long-term family incomes.

To facilitate comparison across expenditures for the different items, expenditures for the separate items listed in the table were adjusted for underreporting. The proportion of total consumer expenditures reported on the survey varies by the type of expenditure. For example, after adjusting the data to reflect the growth in per capita expenditures for each of the separate types of expenditures between 1982/1983 and 1985, expenditures



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reported on the survey for wine, gasoline and telephone services were consistent with 1985 total consumer expenditures on those items by the percent of the population that the survey sample represents. However, beer expenditures were less than one-third the amount that should have been reported. If the data were not adjusted for underreporting, taxes on beer expenditures would appear to be much smaller as a percent of income and total expenditures than taxes on expenditures for which there was more complete reporting. To correct for this, all expenditures amounts were adjusted to reflect 1985 total consumer expenditures for those items as reported in the Survey of Current Business.<sup>3/</sup>

Total expenditures are measured as the sum of all expenditures reported on the survey including employee contributions for pensions and Social Security. Total expenditures were not adjusted for underreporting but include the adjustments made to the separate expenditures listed in the table. Total income is measured as the sum of wages and salaries, self-employment income, rents, interest, dividends, pensions, Social Security benefits, and other social insurance payments.<sup>4/</sup>

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3. U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business, Vol. 66 No. 7, July 1986. The Survey of Current Business does not report separate expenditures for beer, wine and distilled spirits. The total expenditure for alcoholic beverages, including purchases for on and off premise consumption, was divided among the three types of expenditures using factors of 53.4% for beer, 12.5% for wine and 34.1% for distilled spirits. These factors were derived from estimates by the Distilled Spirits Council of the U.S., Inc. of total expenditures in 1985 on beer, wine and distilled spirits.
  4. Income in the highest income category was adjusted for topcoding. To maintain confidentiality, reported amounts of income of any type in excess of \$75,000 for data collected in 1982 or \$100,000 for data collected in 1983 were replaced with those amounts. Total income is the sum of those components and may include topcoded amounts. Total income for units in which some component of income was topcoded was adjusted using



Neither the aging of the data to 1985 nor the adjustments for underreporting change the distribution of expenditures by income class. The distribution retains the same characteristics as in the original data from 1982/1983. Thus shifts in the distribution of expenditures since that time, or a pattern of underreporting of expenditures that differs by income class would not be captured in the tables.

Another way to compare the distribution of different expenditures by income class is to look at the share of expenditures of that type in each income class (see the fourth row for each type of expenditure in table 1). Because the sizes of the classes are not equal there would not be an equal division of expenditure shares across classes even if all families spend the same amount. However, one can compare the share of expenditures of a particular type for an income class with the share of total expenditures for that class. By this measure, families with incomes under \$10,000 account for a much larger share of tobacco and telephone expenditure and a slightly larger share of beer expenditures than their share of total expenditures. Conversely, for most items in the table except for wine and airfare, the share of expenditures for families with incomes of \$40,000 or more are less than their share of total expenditures.

The distribution of average expenditures across income classes hides important differences within each income class. First, not all families within a particular income class make expenditures on all of the items. The percent of families that do make expenditures is likely to be different at

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aggregate tax return data for high income families for those years.



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different income levels. Second, even for families that do make expenditures, the amount of expenditures may vary as much within each class as between classes.

Table 2 shows the distribution by income of the percent of families with expenditures, average expenditures for families with expenditures and the percent of families with expenditures who spend within 50 percent of the average for that income class.<sup>5/</sup>

The data illustrate the discretionary nature of some of the expenditures. On average, almost all families make expenditures on gasoline and telephone service, between two-thirds and three-fourths of families make expenditures on various alcoholic beverages, about one-half purchase tobacco products and less than one-quarter have expenditures on airfare. The percentage of families with expenditures varies by income. The greatest differences in the percentage of families with expenditures are for alcoholic beverages while the least difference is for telephone service.

There are also differences among types of expenditures in the variation of expenditures around the mean. Almost two-thirds of gasoline and telephone expenditures fall within 50 percent of the average expenditure (between \$572 and \$1,716 for gasoline and between \$224 and \$671 for telephone). However, less than 40 percent of alcoholic beverage expenditures are within 50 percent of the average.

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5. In order to eliminate variations caused by quarter-to-quarter fluctuations in spending, only families with four consecutive quarters of expenditure information were used in constructing table 2.



TABLE 2. AVERAGE EXCISE TAX FOR FAMILIES WITH EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
<u>Families with Gasoline Expenditures</u>								
Percent of all families	91.6	52.0	71.4	93.0	98.7	99.6	99.4	100.0
Average gasoline expenditures	1,144	667	578	821	1,215	1,304	1,481	1,709
Percent within 50% of the average	65.1	43.6	43.8	64.5	70.7	69.7	72.2	67.2
<u>Families with Beer Expenditures</u>								
Percent of all families	72.0	34.3	44.6	68.3	80.3	79.8	84.9	91.6
Average beer expenditures	414	255	323	358	432	548	370	436
Percent within 50% of the average	38.0	24.2	31.4	33.0	36.5	36.5	42.4	51.7
<u>Families with Wine Expenditures</u>								
Percent of all families	72.0	34.3	44.6	68.3	80.3	79.8	84.9	91.6
Average wine expenditures	103	44	55	64	85	117	117	197
Percent within 50% of the average	38.1	21.1	32.5	33.2	36.4	37.2	41.4	51.6
<u>Families with Liquor Expenditures</u>								
Percent of all families	66.1	25.6	38.4	59.8	74.0	73.9	82.7	89.8
Average liquor expenditures	299	213	196	212	295	379	266	423
Percent within 50% of the average	36.1	25.6	28.6	32.8	37.2	32.0	36.1	47.9
<u>Families with Tobacco Expenditures</u>								
Percent of all families	50.1	37.0	40.2	51.5	54.2	55.1	50.8	50.3
Average tobacco expenditures	657	480	536	589	690	760	719	716
Percent within 50% of the average	58.8	57.7	57.7	56.1	65.0	61.0	56.8	53.5
<u>Families with Telephone Expenditures</u>								
Percent of all families	98.4	90.9	96.3	98.6	99.1	99.8	99.8	99.3
Average telephone expenditures	447	311	308	389	446	486	526	650
Percent within 50% of the average	65.6	59.0	66.0	60.6	62.2	72.8	71.3	70.1
<u>Families with Airfare Expenditures</u>								
Percent of all families	24.4	9.5	7.4	17.8	22.3	29.2	31.1	54.4
Average airfare expenditures	829	434	463	700	790	787	990	976
Percent within 50% of the average	48.9	51.9	57.7	53.5	54.1	52.7	40.6	42.2

SOURCE: CBO tabulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures.



These results suggest that the incidence of excise taxes within income classes will vary a great deal. This may be appropriate for some excise taxes where the objective is to penalize or discourage the purchase of certain commodities. It is also consistent with excise taxes that are designed primarily as user fees. For example, revenues from the gasoline excise tax go into the highway trust fund which is used to finance the construction and repair of federal highways. However, differences in the amount of expenditures for certain items result in a tax burden from selective excise taxes that is less horizontally equitable than a tax on more broadly based consumption. With selective excise taxes, families in nearly identical economic circumstances can pay very different amounts of tax.

#### Distribution of Excise Tax Liabilities

Table 3 shows the distribution of excise tax liabilities by income class. As shown in the second row for each type of tax in the table, taxes as a percent of income are highest in the lowest income class for all types of expenditures in the table. Taxes as a percent of income fall by about one-half for most types of expenditures between families with incomes of \$10,000 to \$20,000 and families with incomes of \$50,000 or over. However, tobacco taxes as a percent of income are less than one-fourth as large for families in the highest income class compared to families with incomes of \$10,000 to \$20,000.



TABLE 3. AVERAGE EXCISE TAX FOR EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
Average Combined Excise Tax	252	113	129	201	267	317	353	439
As a % of income	0.95	4.89	1.74	1.36	1.08	0.92	0.79	0.61
As a % of all expenditures	1.10	1.17	1.19	1.24	1.18	1.14	1.04	0.93
Share of Combined Excise Tax	100.0	4.1	7.6	19.1	19.4	16.9	11.8	21.2
Average Gasoline Excise Tax	93	37	43	73	102	121	137	161
As a % of income	0.35	1.62	0.58	0.50	0.41	0.35	0.31	0.22
As a % of all expenditures	0.41	0.39	0.39	0.45	0.45	0.43	0.40	0.34
Share of Gasoline Excise Tax	100.0	3.6	6.8	18.8	20.0	17.4	12.4	21.0
Average Beer Excise Tax	17	9	9	14	19	23	23	28
As a % of income	0.06	0.37	0.12	0.10	0.07	0.07	0.05	0.04
As a % of all expenditures	0.08	0.09	0.08	0.09	0.08	0.08	0.07	0.06
Share of Beer Excise Tax	100.0	4.5	7.4	19.8	19.7	17.6	11.2	19.9
Average Wine Excise Tax	4	2	2	3	4	5	6	8
As a % of income	0.01	0.07	0.02	0.02	0.02	0.01	0.01	0.01
As a % of all expenditures	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Share of Wine Excise Tax	100.0	4.0	6.3	17.3	17.8	16.5	12.5	25.7
Average Liquor Excise Tax	39	17	18	29	40	50	54	76
As a % of income	0.15	0.75	0.24	0.20	0.16	0.14	0.12	0.11
As a % of all expenditures	0.17	0.18	0.16	0.18	0.18	0.18	0.16	0.16
Share of Liquor Excise Tax	100.0	4.0	6.7	18.0	18.7	17.1	11.6	23.9
Average Tobacco Excise Tax	46	24	33	42	52	58	58	52
As a % of income	0.17	1.05	0.44	0.29	0.21	0.17	0.13	0.07
As a % of all expenditures	0.20	0.25	0.30	0.26	0.23	0.21	0.17	0.11
Share of Tobacco Excise Tax	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Average Telephone Excise Tax	26	14	15	21	26	32	36	47
As a % of income	0.10	0.61	0.21	0.14	0.11	0.09	0.08	0.07
As a % of all expenditures	0.12	0.15	0.14	0.13	0.12	0.11	0.11	0.10
Share of Telephone Excise Tax	100.0	4.8	8.6	19.0	18.2	16.0	11.5	21.8
Average Airfare Excise Tax	27	10	10	18	24	29	39	67
As a % of income	0.10	0.43	0.14	0.12	0.10	0.08	0.09	0.09
As a % of all expenditures	0.12	0.10	0.09	0.11	0.11	0.10	0.12	0.14
Share of Airfare Excise Tax	100.0	3.4	5.7	16.3	16.8	14.8	12.5	30.5

SOURCE: CBO tabulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.



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Taxes as a percent of expenditures are more nearly constant across all income classes than taxes as a percent of income (see the third row for each type of tax in table 3). However, when measured as a percent of total expenditures, tobacco taxes still fall by more than one-half between families with incomes of \$10,000 to \$20,000 and families with incomes of \$50,000 or more. Telephone taxes measured as a percent of total expenditures decline gradually as income rises.

Excise taxes for gasoline, beer, wine, distilled spirits and tobacco are levied on a per unit basis where the tax rate is a fixed amount per unit of sale. For example, gasoline is taxed at a rate of \$.09 per gallon, cigarettes at a rate of \$.16 per pack of 20 cigarettes, beer at a rate of \$.29 per gallon, distilled spirits at a rate of \$12.50 per gallon and wine at rates ranging from \$.17 to \$3.40 per gallon.

The data used for this study do not identify the quantity of each item purchased. Rather, they indicate only how much was spent on a particular commodity. Thus it was necessary to convert unit tax rates to ad valorem tax rates in which the tax is expressed as a constant fraction of the price of the commodity. Because of the lack of reliable price data for beer, wine and distilled spirits, and because of the varying unit tax rates on different types of wine and, to a lesser degree, on different types of tobacco purchases, it was not possible to convert the unit tax rate for these items directly to an ad valorem rate. Rather, the tax rate for these commodities as a percent of the total price was computed as the ratio of total excise tax revenue to total expenditures. For gasoline, the



ad valorem tax rate was computed as the ratio of the tax rate of \$.09 per gallon of gasoline divided by an average price per gallon of \$1.18.

Excise taxes on airline tickets and telephone service are levied on an ad valorem basis. The tax rate for local and long-distance telephone service is 3 percent of the amount paid, while the air passenger ticket tax rate is 8 percent of the air fare.<sup>6/</sup>

Using these ad valorem tax rates, the amount of excise tax payments was calculated for each type of taxable expenditure. Purchasers of taxed goods were assumed to pay the full amount of the excise tax through higher prices.

The major drawback in using a single ad valorem rate for goods with a unit tax is that it implicitly assumes that all families pay the same price for purchases of the taxed items. This is most troublesome for those expenditures in which there may be large differences in the quality of the item purchased. For example, all wine purchases are assumed to be taxed at the same rate whether the wine sells for two or twenty dollars a bottle. A single ad valorem tax rate for all wine expenditures will overstate the taxes paid by those who purchase wine at prices greater than the average and understate taxes for those who purchase wine that is less expensive than average. If higher income households generally purchase higher quality goods, the assumption that an excise tax is proportional to

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6. The tax rate for air passenger tickets is 8 percent of the air fare for domestic travel but \$3.00 per person for international departures. The data were treated as if all expenditures for air travel were for domestic flights.



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expenditures on those goods will cause the tax to appear less regressive than it actually is.

Some portion of the total expenditure for certain commodities is made by business purchasers. It was assumed that the ultimate incidence of the excise taxes for these purchases was born by consumers. Thus, for example gasoline taxes that were paid in the course of transporting other commodities were assumed to be reflected in the price that consumers paid for those goods. The share of excise taxes paid by businesses was distributed to consumers in proportion to the total expenditures of each family.<sup>7/</sup>

In general, the distribution of the share of taxes paid by each income class should look similar to the distribution of the share of family expenditures for each item. However, for those commodities where a larger percentage of the purchases are made by businesses, the distribution of the share of excise taxes paid will look more like the distribution of total family expenditures rather than the distribution of family expenditures on that item alone.

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7. In making these computations, business expenditures were assumed to be approximately 20% of total expenditures, excluding purchases made by the government, for beer, wine, distilled spirits and gasoline, 50% for telephone service and 45% percent for airfare. All tobacco expenditures were assumed to have been made by consumers. The business shares of total expenditures on beer, wine and distilled spirits were based on estimates by the Distilled Spirits Council of the U.S., Inc. of the business share of total alcoholic beverage expenditures in 1984. The business shares of total expenditures on gasoline, telephone service and airfare were based on the implied level of total expenditures in calendar year 1985 calculated by dividing excise tax revenues by the excise tax rate.



The fourth row for each type of expenditure in table 3 shows the share of taxes paid by each income class. These shares reflect both the share of expenditures on the particular item as well as the share of total expenditures. Thus, although families with income of less than \$10,000 accounted for 16.4 percent of direct telephone expenditures, when telephone expenditures by businesses are factored in, the share of the telephone excise tax paid by these families was 13.4 percent.

Families with incomes of less than \$10,000 pay at least 10 to 12 percent of excise taxes on gasoline and alcoholic beverages. These families pay about 13 percent of the telephone excise tax and about 15 percent of the tax on tobacco. Families in the highest income class pay 20 to 25 percent of most excise taxes. However, these families pay about 31 percent of the tax on airline tickets but only about 14 percent of the tax on tobacco.

#### Distribution of Excise Tax Increases

In this section we trace through the distributional effects of a \$1 billion increase in excise tax revenues generated through alternative increases in each of the separate excise taxes. The distributional results for a change in excise taxes will reflect the distribution of expenditures and taxes previously presented.



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We assume that the full tax increase initially is passed forward to consumers through an increase in prices.<sup>8/</sup> With no change in the quantity purchased, expenditures on the taxed commodities increase by the full amount of the tax increase. Because we assume that the quantity purchased of most items declines when taxes on those items increase, expenditures increase by less than the full amount of the tax increase for goods with price elasticities other than zero.<sup>9/</sup> The percentage increase in tax rates for these goods, therefore, must exceed the percentage increase in tax revenues to generate the additional \$1 billion in gross revenues.

Although different elasticities were used for the different tax increases, for any single tax increase the same elasticity value was used for all families. Thus, the distributional results are unaffected by the introduction of price elasticities. Using a constant price elasticity for

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8. An alternative assumption is that the tax increase is fully or partially shifted to factor incomes through reduced wages and dividends and that, consequently, there is no change or only a partial increase in prices. Because producers of the taxed commodities operate in generally competitive labor and capital markets, it is unlikely that the tax increase can be shifted to factor incomes. Others have suggested that an excise tax increase will cause prices to rise by more than the amount of the tax increase because the tax is treated as a cost of production and producers follow a strategy of setting prices at some mark-up over costs. Such a price increase would not be stable, however, unless prices were below their optimal level before the imposition of the tax increase.
9. A price elasticity of -1.00 was used for airfare, -0.80 for distilled spirits, -0.40 for beer, wine and tobacco products, -0.20 for gasoline and 0.00 for telephone service. Lewit, Eugene M. and Douglas Coate (1982). "The Potential For Using Excise Taxes To Reduce Smoking." Journal of Health Economics, no. 1, 121-145, report a price elasticity for cigarettes of -0.42. Ornstein, Stanley I. and David Levy (1983) "Price and Income Elasticities and the Demand for Alcoholic Beverages," in Recent Developments in Alcoholism, Vol. I, ed. Marc Galanter, New York: Plenum Press, 303-345, report an average price elasticity for beer of between -0.30 and -0.40 and an average price elasticity for distilled spirits of between -1.0 and -2.0. However, the Department of Treasury estimates a price elasticity for distilled spirits of about -0.80. The price elasticity for distilled spirits as well as the remaining price elasticities were chosen to reflect estimates used by the Department of Treasury.



each of the tax increases only affects the percentage increase in tax rates necessary to generate an additional \$1 billion in gross excise tax revenue. Actual distributional outcomes will differ from the simulated results if the response to an increase in excise taxes varies among families in relation to their income.

Table 4 shows excise tax liabilities in calendar year 1985 for the seven types of taxes and the percentage increase in tax rates necessary to produce an additional \$1 billion in gross excise tax revenues from each of the taxes considered separately. The percentage increase in tax rates is shown with and without adjustments for a decrease in the quantity of the item purchased.

Table 4

Tax Revenues and Tax Increases Necessary To Generate an Additional  
\$1 Billion in Gross Excise Tax Revenues, 1985

	Calendar Year 1985 Excise Tax Liabilities (Billions of \$)	Percentage Increase in Tax Rate Necessary to Produce an Additional \$1 Billion in Gross Tax Revenues	
		Without Quantity Response	With Quantity Response
Gasoline	8.60	11.6	11.8
Beer	1.59	62.9	64.8
Wine	0.36	280.5	301.0
Distilled Spirits	3.60	27.8	33.4
Tobacco	4.22	23.7	25.4
Telephone	2.45	40.9	40.9
Airfare	2.45	40.9	45.8



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Table 5 shows the increase in average excise tax liabilities with an alternative \$1 billion increase in gross revenues from each of the seven excise taxes. The increase in taxes paid by businesses that purchase the taxed goods have been distributed to consumers in proportion to their total expenditures. Thus all taxes generate the same average increase in tax payments.

With a simulated \$1 billion increase in gross excise tax revenues, the average tax increases would be small, approximately \$11 per family. This would represent about .04 percent of total income and .05 percent of total expenditures.

For the lowest income class, the tax increase from any of the taxes considered would be between 0.2 and 0.3 percent of income, and less than 0.1 percent of total expenditures. Using a measure of the tax increase as a percent of total expenditures, the results suggest that, except for an increase in the tobacco tax, there would not be strong reasons to prefer one tax increase over another on distributional grounds. An increase in the tax on telephone service would increase the tax burden on low income families by slightly more than increases in the tax on gasoline or alcoholic beverages, while an increase in the tax on airline tickets would increase the tax burden on high income families by slightly more than increases in all other taxes. An increase in the tax on tobacco would increase taxes as a percent of expenditures by more than twice as much for families with incomes of less than \$10,000 compared to families with incomes of \$50,000 or more.



TABLE 5. CHANGE IN AVERAGE EXCISE TAX, BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
Increase in Gasoline Excise								
Tax	11	4	5	9	12	14	16	19
As a % of Income	0.04	0.19	0.07	0.06	0.05	0.04	0.04	0.03
As a % of all expenditures	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.04
Share of Gasoline Tax Increase	100.0	3.6	6.8	18.8	20.0	17.4	12.4	21.0
Increase in Beer Excise Tax								
Tax	11	5	5	9	12	14	14	18
As a % of income	0.04	0.23	0.07	0.06	0.05	0.04	0.03	0.02
As a % of all expenditures	0.05	0.06	0.05	0.06	0.05	0.05	0.04	0.04
Share of Beer Tax Increase	100.0	4.5	7.4	19.8	19.7	17.6	11.2	19.9
Increase in Wine Excise Tax								
Tax	11	5	5	8	11	13	16	23
As a % of income	0.04	0.20	0.06	0.05	0.04	0.04	0.04	0.03
As a % of all expenditures	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05
Share of Wine Tax Increase	100.0	4.0	6.3	17.3	17.8	16.5	12.5	25.7
Increase in Liquor Excise Tax								
Tax	11	5	5	8	11	14	15	21
As a % of income	0.04	0.21	0.07	0.06	0.04	0.04	0.03	0.03
As a % of all expenditures	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
Share of Liquor Tax Increase	100.0	4.0	6.7	18.0	18.7	17.1	11.6	23.9
Increase in Tobacco Excise Tax								
Tax	11	6	8	10	12	14	14	12
As a % of income	0.04	0.25	0.10	0.07	0.05	0.04	0.03	0.02
As a % of all expenditures	0.05	0.06	0.07	0.06	0.05	0.05	0.04	0.03
Share of Tobacco Tax Increase	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Increase in Telephone Excise								
Tax	11	6	6	9	11	13	15	19
As a % of income	0.04	0.25	0.09	0.06	0.04	0.04	0.03	0.03
As a % of all expenditures	0.05	0.06	0.06	0.05	0.05	0.05	0.04	0.04
Share of Telephone Tax Increase	100.0	4.8	8.6	19.0	18.2	16.0	11.5	21.8
Increase in Airfare Excise Tax								
Tax	11	4	4	7	10	12	16	27
As a % of income	0.04	0.18	0.06	0.05	0.04	0.03	0.04	0.04
As a % of all expenditures	0.05	0.04	0.04	0.05	0.04	0.04	0.05	0.06
Share of Airfare Tax Increase	100.0	3.4	5.7	16.3	16.8	14.8	12.5	30.5

SOURCE: CBO simulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.



Table 5 measures the increase in excise taxes averaged over all families and not just over those families with expenditures of a particular type. Within each income class most of the burden of the tax increase will fall on those families with expenditures on the taxed items. Thus, tax increases on expenditures such as telephone services will be distributed across almost all low income families, while tax increases on alcoholic beverages or tobacco will be distributed to only about one-third to two-fifths of families with incomes below \$10,000.

There are some differences in the share of the tax increase that would be paid by families in different income classes. Families with incomes of less than \$10,000 would pay the largest share of the tax increase in the case of tobacco taxes and the smallest share of the tax increase in the case of airfare taxes. Families with incomes between \$10,000 and \$30,000 would also fare the worst under a tobacco tax increase and fare the best under an airfare tax.

#### Overall Incidence of an Increase in Excise Taxes

An increase in any given excise tax will increase the price of the taxed item relative to the price of other goods and services.<sup>10/</sup> Consumers who do not purchase those items on which the excise tax is increased, or who purchase less than the average amount, will be relatively better off.

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10. This change in relative price will occur whether or not absolute prices are allowed to rise by the amount of the tax increase or held constant, for example, by an appropriate monetary policy.



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The result extends to entire income classes in which the share of expenditures on a taxed item is less than that income class's share of total expenditures. Table 6 illustrates the distribution of the increase in excise taxes offset by the decrease in the price of other goods and services. The gains from this price decrease are distributed to families in proportion to their total expenditures. Because the increase in the price of the item against which the increased excise tax is levied is offset by the relative decline in other prices, the average effect over all families would be zero. There would be an average gain in those income class that spend relative less on the taxed item and an average loss in those income classes that spend relatively more. However, because of the relatively small changes in average taxes associated with a \$1 billion increase in gross excise tax revenues, the absolute size of the gains and losses would be small.

As the table shows, families in the highest income class either would be unaffected or would gain on average because of the change in relative prices resulting from an increase in any of the excise taxes except the airline ticket tax. This result occurs because families in this income class have a larger share of total expenditures than their share of expenditures for any of the taxed items except airfare. Families in the lowest income class would lose on average because of the change in relative price resulting from an increase in the tax on tobacco or telephone service, because their share of these expenditures is larger than their share of total expenditures.



TABLE 6. CHANGE IN AVERAGE EXCISE TAX WITH OFFSETTING PRICE CHANGES, BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
Increase in Gasoline Excise Tax	0	0	0	1	1	1	0	-3
As a % of income	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	-0.01
As a % of all expenditures	0.00	0.00	0.00	0.01	0.01	0.00	0.00	-0.01
Increase in Beer Excise Tax	0	1	0	1	1	1	-1	-4
As a % of income	0.00	0.03	0.00	0.01	0.00	0.00	0.00	-0.01
As a % of all expenditures	0.00	0.01	0.00	0.00	0.00	0.00	-0.01	-0.01
Increase in Wine Excise Tax	0	0	0	0	0	0	0	0
As a % of income	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Increase in Liquor Excise Tax	0	0	0	0	0	1	0	0
As a % of income	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Increase in Tobacco Excise Tax	0	1	3	2	2	1	-1	-9
As a % of income	0.00	0.05	0.04	0.02	0.01	0.00	-0.01	-0.01
As a % of all expenditures	0.00	0.01	0.02	0.01	0.01	0.00	-0.01	-0.02
Increase in Telephone Excise Tax	0	1	1	1	0	0	0	-2
As a % of income	0.00	0.05	0.02	0.01	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.01	0.01	0.01	0.00	0.00	0.00	-0.01
Increase in Airfare Excise Tax	0	0	0	0	0	0	0	5
As a % of income	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.01
As a % of all expenditures	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01

SOURCE: CBO simulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.



An increase in an excise tax not only would affect relative prices but would reduce consumer incomes as well. It is assumed here that there is no change in gross national product associated with a tax increase. In this case, an increase in excise tax payments will reduce the amount of business receipts that can be paid out in wages and returns to shareholder investments by the amount of the tax increase. With a reduction in factor payments, the aggregate income of workers and investors in the economy will fall by the amount of the tax. This decline in personal income will have certain distributional implications. First, personal income from indexed transfer payments, such as Social Security or Supplemental Security Income (SSI) benefits, will not be affected. Second, a reduction in income will reduce income tax revenues, offsetting some of the excise tax revenue increase.

Table 7 shows the distribution of the reduction in income and the income tax offsets produced by a \$1 billion increase in gross excise tax revenues. The reductions in income have been allocated in proportion to family income excluding Social Security and SSI benefits. Income tax offsets have been computed at the average marginal income tax rate for each income class.<sup>11/</sup>

Families in the highest income class would have the greatest share of the reduction in income, about 37 percent, but also the greatest share of

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11. This reduction in income is balanced by the increase in government revenues from the increase in excise taxes. It is difficult to attribute distributional effects to the revenue increase, however, particularly if, as is likely, the money is used to reduce the federal deficit.



TABLE 7. AVERAGE INCOME REDUCTION AND AVERAGE INCOME TAX OFFSET BY INCOME: 1985

	All Incomes	Less Than \$5,000	\$5,000- \$9,999	\$10,000- \$19,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	\$50,000 Or More
Average Reduction in Income	11	1	2	5	10	15	20	32
As a % of total income	0.04	0.03	0.02	0.03	0.04	0.04	0.04	0.05
As a % of total expenditures	0.05	0.01	0.02	0.03	0.04	0.05	0.06	0.07
Share of Reduction in Income	100.0	0.6	2.2	10.4	16.4	18.4	15.3	36.6
Average Income Tax Offset	3	0	0	1	2	4	6	12
As a % of total income	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02
As a % of total expenditures	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.03
Share of Income Tax Offset	100.0	0.1	1.1	6.3	12.0	16.3	15.9	48.3

SOURCE: CBO simulations based on data from the 1982-1983 Consumer Expenditure Survey Interview Survey. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures.



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the reduction in income taxes, about 48 percent. Although the income of low income families would fall slightly, they would receive little benefit from the income tax reduction.

Thus the overall incidence of an increase in excise taxes will consist of two elements -- (1) a redistribution from consumers who purchase the item against which the tax increase is levied to other consumers as the price of the taxed item rises relative to the prices of other goods and services and (2) a net decline in personal income from employment and investment.

The combination of these effects can be illustrated for families in two different income classes using the results for an increase in the tax on tobacco. With an increase in tobacco taxes, families in the \$10,000 to \$20,000 income class would pay an average of \$10 more in tobacco taxes. However, the decline in prices of other goods and services would save families in that income class \$8 on average, resulting in a net loss of \$2 because of relative price changes. Because of the decline in after-tax business receipts, the average income of families in that income class would decline by \$5. This would be offset by an average reduction in income taxes of \$1, resulting in a net reduction in income of \$4. Thus, the increase in excise taxes would cost families in this income range an average of \$6.

Compare this with families in the \$40,000 to \$50,000 income range. The average increase in tobacco taxes for these families would be \$14.



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After accounting for the decline in other prices, the net result would be an average gain of \$1. However, the average loss in income for these families would be \$20. After allowing for a \$6 decline in income taxes the net reduction in income would be \$14. Thus the average cost of an increase in tobacco taxes for these families would be \$13.

Because we have simulated a \$1 billion increase in gross excise tax revenues, the absolute amount of these changes are small. A larger increase in excise taxes would produce proportionately larger average gains and losses.

These simulated distributional results for the overall incidence of the excise tax increases should not be taken too literally. A number of assumptions used in the analysis, for example that the reduction in incomes is distributed proportionally to all factor income, or that the total gross national product remains constant, simply may not hold. As previously mentioned, the distributional results do not include the gains attributable to individual families from the way in which the government disposes of the additional tax revenues. However, the results do illustrate that the overall distributional effects of the tax increase will depend not only on the distribution of expenditures on the taxed item, but also on the distribution of total expenditures and the distribution of total incomes.



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Summary

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We can summarize the simulated results for separate increases in each of the selected excise taxes as follows. When measuring the distributional effects relative to total expenditures, an increase in the airline ticket tax would be slightly progressive across income classes -- the average increase in taxes as a percentage of total expenditures would be higher for families in higher income classes. Increases in the tax on wine or, for all but the highest and lowest income classes, the tax on gasoline would have the same effect on all income classes when measured as a percent of total expenditures. Increases in all other excise taxes would be at least marginally regressive -- the average increase in taxes as a percentage of total expenditures would be less for families in higher income classes. An increase in the excise tax on tobacco would be the most regressive of all the tax increases considered.

When measuring the distributional effects relative to family income, an increase in any of the taxes except the airline ticket tax would be noticeably regressive. The average increase in taxes as a percentage of total income would be about twice as large (more than three times as large in the case of the tax on beer or tobacco) for families with incomes between \$10,000 and \$20,000 compared to families with incomes of \$50,000 or more.

Because not all families with similar incomes spend the same amount on each of the taxed items, the incidence of an increase in excise taxes



would vary a great deal within income classes. For expenditures other than on airfare, both the proportion of families with expenditures and the percent of expenditures within 50 percent of the average generally is smallest for families with incomes of less than \$10,000. Thus, the incidence of tax increases would vary the most within the lowest income classes.

There would be less variation in the incidence of a tax increase among families in similar economic circumstances resulting from increases in the tax on gasoline or telephone services than from increases in any of the other excise taxes. More than 90 percent of families in all income classes have expenditures on telephone services, while more than ninety percent of families in all income classes, except for families with incomes of less than \$10,000, have expenditures on gasoline. About two-thirds of gasoline and telephone service expenditures are within 50 percent of the average expenditure within each income class (except, again, for gasoline expenditures in the lowest income classes).

A more complete analysis of the incidence of an increase in excise taxes includes the effect on relative prices and the effect on personal income. When the effects of an excise tax increase on the prices of other goods and services are considered, an increase in the tax on wine or distilled spirits would have no net effect on average for families in most income classes. Families in the highest income class would gain on average from an increase in the tax on gasoline, beer, tobacco or telephone services. When the effects on relative prices are considered, families in



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the lowest income classes still would lose on average from an increase in the tax on tobacco or telephone services, although the amount of loss, whether measured as a percentage of income or as a percentage of total expenditures, would be reduced.

If the reduction in personal income because of an excise tax increase is distributed proportionally across all wage and investment income, the distributional effects of each excise tax increase would be more progressive. Measured relative to total expenditures, the burden of any of the tax increases except for an increase in the tax on tobacco, would be the smallest for families with incomes of \$10,000 or less.

Distributing the reduction in personal income proportionally across all wage and investment income does not change the relative ranking among the alternative tax increases according to their distributional effects. If the reduction in income were distributed differently for each separate tax increase, for example with a larger share going to workers and investors in the industry that produced the good or service that was being taxed, the relative ranking according to distributional effects could change when the full incidence of the tax was included.

