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Prepared Statement Before the
Senate Democratic Task Force on Tobacco
Sen. Kent Conrad (D-ND), Chairman

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628 Dirksen Senate Office Building
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Thank you for inviting me to appear today. I am a primary-care physician at the Massachusetts General Hospital in Boston and a tenured member of the economics faculty at the Massachusetts Institute of Technology. Earlier this year, I testified before the Senate Judiciary Committee and the Senate Agriculture Committee on the economics of the tobacco industry and the impact of the proposed global settlement. Recently, I performed an analysis of the impact of smoking-related diseases on the compensation programs of the Department of Veterans Affairs. For your reference, I have attached a bibliography of my recent presentations and publications concerning the tobacco industry.

Summary

- During 1992-1996, the proportion of eighth-to-twelfth-grade students who smoked cigarettes every day rose from 13.1 to 18.2 percent.

- The draft global tobacco industry settlement established specific targets for reducing underage smoking over the next decade. Based upon the procedure described in Appendix V of the Proposed Resolution of June 20, 1997, I calculate that the 5-year goal for the proportion of youths who smoke every day would be 10.6%; the 7-year goal would be 7.6%; and the 10-year target would be 6.1%.

- According to the most recent research findings of economists, every 10-percent rise in the inflation-adjusted price of cigarettes results in a 6-percent decline in the proportion of young people who smoke cigarettes. Based upon this "elasticity" formula, I estimate that the 5-year target could be achieved by a $1.42-per-pack increase in cigarette price after adjustment for inflation. The 7-year target would require a $1.96 increase in the real price per pack, while the 10-year target would require a $2.25 increase in real price.

[1] The opinions expressed here do not necessarily represent those of the Massachusetts General Hospital, Massachusetts Institute of Technology, or any other organization.

- My estimates of the real price increase required to achieve the proposed targets are based on the assumption that no other anti-smoking measures would be effective in reducing teenage cigarette use. However, if restrictions on advertising and sale of cigarettes to minors could by themselves youth smoking from its 1996 level of 18.2% to a 2007 level of 10%, then the real price increase required to reach the 10-year target would be only $1.32 per pack. Whether such restrictions will significantly reduce underage smoking is the subject of ongoing research.

- In any analysis of the impact of cigarette prices on smoking rates, it is important to distinguish between the inflation-corrected (or "real") price and inflation-uncorrected (or "nominal") price. Recently, the Administration proposed to raise cigarette prices by as much as $1.50 per pack over a 10-year period. The proposal did not state explicitly whether the $1.50 increase in price was to be corrected for inflation. While a nominal increase of $1.50 would still have a substantial effect on teenage smoking rates, it might not be sufficient to reach the proposed target rates.

- In a recent submission before this Task Force, four tobacco manufacturers have asserted that "the price of a pack of cigarettes would rise by a minimum of $1.50 over the next ten years as a result of the proposed resolution." The Industry Analysis is not corrected for inflation.

- I used the most recent data from the Economic Research Service of the US Department of Agriculture, as well as company annual reports, to analyze trends in retail cigarette prices and taxes during 1994-1996. Overall, retail cigarette prices rose at about the same rate as the Consumer Price Index. However, manufacturers' receipts per pack and state and local excise taxes rose faster than inflation, while state sales taxes, the Federal excise tax, and wholesale/retail trade margins have not kept pace with inflation. My findings do not support the assumptions made by the tobacco industry in its 10-year projections.

- Based upon my analysis of trends in cigarette prices and taxes, I made 10-year projections of real and nominal cigarette prices under four different policy scenarios: (I) no change in Federal policy; (II) enactment of the Proposed Resolution; (III) a $1.50-per-pack increase in the Federal cigarette excise tax, uncorrected for inflation; and (IV) a $1.50-per-pack increase in the Federal tax that would be adjusted annually for inflation.

- I find that, under the Proposed Resolution, the proportion of youths who smoke every day would fall to about 14% after 10 years (Scenario II). Under a $1.50 Federal excise tax increase unadjusted for inflation, the youth smoking rate would fall to about 12% (Scenario III). If the $1.50 excise tax increase were

adjusted for inflation, the youth smoking rate would fall to about 10% (Scenario IV). In the latter case, youth smoking rates would meet the 5-year target set by the Proposed Resolution, but not the 7- or 10-year targets.

Teenage Smoking and Cigarette Prices

The draft tobacco industry settlement (or "Proposed Resolution") of June 20, 1997 sets specific goals for the reduction of smoking among young people. According to Appendix V of the Proposed Resolution, the proportion of 13- to 17-year-olds who smoke cigarettes every day is targeted to decline by 30% in 5 years, 50% in 7 years, and 60% in 10 years.[2] These percentage reductions in youth smoking rates are to be calculated on the basis of historical averages, rather than current smoking rates.

Table 1 shows the proportions of eighth, tenth, and twelfth graders who smoked cigarettes every day, as reported by the University of Michigan's "Monitoring the Future" Study.[3] The bottom row shows the historical average smoking rates, which I have calculated according to the specifications in the Proposed Resolution. The right-most column shows the corresponding smoking rates for all grades combined. As the right-most column shows, smoking rates among young people have been rising steadily since 1992. While the historical average smoking rate was 15.2%, the proportion who smoke every day was up to 18.2% in 1996.

Based upon the historical average smoking rate of 15.2%, the Proposed Resolution's 5-year goal for the proportion of youths who smoke every day would be 10.6% (that is, $0.7 \times 15.2\%$). Similarly, the 7-year goal would be 7.6% (that is, $0.5 \times 15.2\%$); and the 10-year target would be 6.1% (that is, $0.4 \times 15.2\%$). However, because youth smoking has been on the rise, these targets would require even larger reductions from current smoking rates. Thus, the 5-year goal of 10.6% actually represents a 42% percent decline from the 1996 smoking rate; the 7-year goal of 7.6% actually represents a 58% decline from the 1996 rate; while the 10-year goal of 6.1% actually represents a 67% decline in smoking from current levels. If the recent rising in teen smoking continues through 1997, then even larger reductions from current smoking rates will be required.

Table 1. Percentage of 8th, 10th and 12th Grade Students Who

[2] See Appendix V, Sections A.1-A.3, of "Proposed Resolution: For Settlement Discussion Purposes Only. 6/20/97, 3:00 p.m. DRAFT." (68 pages).

[3] *"Monitoring the Future" Study.* Cigarette Statistics Table 1: Long-Term Trends in Prevalence of Cigarettes for Eighth, Tenth, and Twelfth Graders. Ann Arbor: University of Michigan, 1997. See: http://www.isr.umich.edu/src/mtf/mtfcig1.html .

Reported Smoking Cigarettes Every Day, 1986-1996.[1]

	Daily Smoking Prevalence (%)			
Year	12th Grade	10th Grade	8th Grade	All-Grade Average[2]
1986	18.7			
1987	18.7			
1988	18.1			
1989	18.9			
1990	19.1			
1991	18.5	12.6	7.2	13.8
1992	17.2	12.3	7.0	13.1
1993	19.0	14.2	8.3	14.9
1994	19.4	14.6	8.8	15.3
1995	21.6	16.3	9.3	16.9
1996	22.2	18.3	10.4	18.2
Historical Average[3]	19.2	14.7	8.5	15.2

Notes:

1. *"Monitoring the Future" Study.* Cigarette Statistics Table 1: Long-Term Trends in Prevalence of Cigarettes for Eighth, Tenth, and Twelfth Graders. Ann Arbor: University of Michigan, 1997. See: http://www.isr.umich.edu/src/mtf/mtfcig1.html
2. Weighted average of 12th, 10th, and 8th grade smoking prevalence, where the respective weights were: 0.390, 0.405, and 0.205. These weights represent the respective proportions of persons aged 16-17, 14-15, and 13 years in the U.S. population in 1995. (See: US Census Bureau: Resident Population, Quarterly, by Single Year of Age, Sex, and Hispanic Origin, July 1995. ftp://ftp.census.gov/pub/population/estimates/nation/e90s/e9595rmp.zip
3. For 12th graders, 11-year average; for 10th and 8th grades, 6-year average.

While many researchers continue to study how and why young people smoke, there is good evidence that teenagers' smoking rates are responsive to increases in the price of tobacco. Most recently, Frank Chaloupka and Michael Grossman[4] found that teenagers who lived in states with high cigarette prices were less likely to be smokers than those who lived in low-price states. For every 10-percent increase in retail cigarette price, Chaloupka and Grossman estimated that there would be 6

[4] Chaloupka FJ, Grossman M. "Price, Tobacco Control Policies and Youth Smoking." National Bureau of Economic Research Working Paper No. 5740. Cambridge MA: National Bureau of Economic Research, September 1996. See also: Chaloupka FJ, Grossman M, Tauras JA. "Public Policy and Youth Smokeless Tobacco Use." National Bureau of Economic Research Working Paper No. 5524. Cambridge MA: National Bureau of Economic Research, April 1996.

percent fewer teenage smokers.[5] In economists' jargon, this means that the "participation price elasticity" of teenage smoking was -0.6.[6]

The price-elasticity formula can be used to calculate the amount by which the price of cigarettes must rise in order to reach the youth smoking targets specified in the Proposed Resolution. As noted, the 5-year target of 10.6% underage smokers would require a 42% reduction from 1996 smoking rates. Such a reduction could be achieved by a 70% increase in the real price of cigarettes (that is, 42% ÷ 0.6). With a 1996 average retail price of $2.03 per pack, this would amount to an increase in real price by $1.42 per pack (that is, 70% × $2.03). Similarly, the 7-year target of 7.6% teen smokers would require a 58% decline from 1996 smoking rates. This could be achieved by a 96.7% rise in real cigarette price (that is, 58% ÷ 0.6), which corresponds to an increase in real price of $1.96 per pack (that is, 96.7% × $2.03). By the same method of calculation, the 10-year target of 6.1% teenage smokers could be achieved by a real price increase of $2.25 per pack.

In making the above calculations, I assumed that no other anti-smoking measures would be effective in reducing teenage cigarette use. However, if restrictions on the advertising and sale of cigarettes (e.g., enforcing bans on the sale of cigarettes to minors, regulating print advertising in youth-oriented publications) were effective in reducing teenage smoking, then the required price increase would be smaller. For example, if such restrictions alone could reduce youth smoking from its 1996 level of

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[5] Chaloupka and Grossman, *op. cit.* (Sept. 1996) Table Four, Panel B, on p. 39. This estimate of a price elasticity of -0.6 is based upon the authors' "full model, restricted sample," in which they take account of age, sex, race, education, income and other anti-smoking policies in each youth's state of residence, but exclude any teens who lived near the border of a state with lower cigarette prices. The average estimate of price elasticity for all models considered by Chaloupka and Grossman in their Table Four was -0.675.

[6] Lewit and Coate estimated a participation price elasticity of -0.74 for young adults aged 20-25. (See Lewit EM, Coate D. The potential for using excise taxes to reduce smoking. *Journal of Health Economics* 1982; 1:121-45.) Lewit, Coate and Grossman estimated a participation price elasticity of -1.20 for youths aged 12-17. (See Lewit EM, Coate D, Grossman M. The effects of government regulations on teenage smoking. *Journal of Law and Economics* 1981; 24:545-69.) Chaloupka and Wechsler found a participation price elasticity of -0.53 for college-age students. (See Chaloupka FJ, Wechsler H. Price, tobacco control policies, and smoking among young adults. National Bureau of Economic Research Working Paper No. 5012. Cambridge MA: National Bureau of Economic Research, Feb. 1995.) However, not all published research supports the conclusion that teenagers' and young adults' smoking rates are more sensitive to price than those of older adults. (See, for example, Wasserman J, Manning WG, Newhouse JP, Winkler JD. The effects of excise taxes and regulations on cigarette smoking. *Journal of Health Economics* 1991; 10:43-64.) Although there is less published research on smokeless tobacco use, it appears that young males' use of smokeless tobacco is also responsive to price. (See Chaloupka FJ, Grossman M, Tauras JA. *op.cit.* (April 1996).

18.2% to a 2007 level of 10%, then the real price increase required to reach the Proposed Resolution's 10-year target would be only $1.33 per pack.[7]

Whether restrictions on the advertising and sale of cigarettes to young people will in fact reduce underage smoking rates is the subject of ongoing research. The findings of Chaloupka and Grossman suggest that some policies (such as restrictions on the sale of cigarettes from vending machines) may be effective.[8] However, a very recent study of six Massachusetts communities suggested that vigorous enforcement of youth-sales laws indeed reduced illegal sales to minors, but it did not alter perceived youth access to tobacco or adolescent smoking rates.[9] In Massachusetts, which in late 1993 launched a tax-financed media anti-smoking campaign aimed in part at youths, teenage smoking rates have stayed relatively constant in the face of rising trends nationwide. Only in grades 7 and 8 was a significant decline in smoking observed.[10]

"Real" Versus "Nominal" Cigarette Prices

In any analysis of the impact of cigarette prices on smoking rates, it is important to distinguish between the inflation-corrected (or "real") price and inflation-uncorrected (or "nominal") price. When Chaloupka and Grossman found that the participation price elasticity of teenage smoking was -0.6, they meant that a 10% rise in the *real* price of cigarettes would result in 6% fewer underage smokers.

Thus, I calculated above that a $1.42 increase in the real price of a pack of cigarettes would reduce underage smoking rates to the 5-year target level. If the

[7] From a starting point of 10% teenage smokers, the 10-year target of 6.1% would represent a 39% reduction in the number of teenage smokers. Such a reduction would require a 65% increase in price (that is, 39% ÷ 0.6). This corresponds to an increase in real price of $1.32 per pack (that is, 65% × $2.03).

[8] See also: Jason LA, Ji PY, Anes MD, Birkhead SH. Active enforcement of cigarette control laws in the prevention of cigarette sales to minors. *JAMA* 1991; 266:3159-61; and DiFranza JR, Carlson RR, Caisse RE. Reducing youth access to tobacco. *Tobacco Control* 1992; 1:58.

[9] Rigotti NA, DiFranza JR, Chang Y, et al. The effect of enforcing tobacco-sales laws on adolescents' access to tobacco and smoking behavior. *New England Journal of Medicine* 1997; 337:1044-51.

[10] A significant decline in smokeless tobacco use among males was also observed, but this finding may represent the effect of a large increase in the state excise tax on the smokeless tobacco products. See: Health and Addictions Research. *Tobacco, Alcohol and Other Drug Use: Trends Among Massachusetts Public School Adolescents, 1984-1996*. Boston MA: Health and Addictions Research, May 1997.

average retail price of a pack of cigarettes was $2.03 in 1996, then this means that the price of cigarette prices would rise to $3.45 in 1996 dollars. At a 3% annual inflation rate, the nominal price of cigarettes would be $4.00 per pack five years later, that is, in the year 2001.[11]

There has been much discussion about the Administration's recent proposal to raise cigarette prices by as much as $1.50 per pack over a 10-year period. The discussion, unfortunately, has suffered from an ambiguity as to whether the proposed increase in price is real or nominal. While a $1.50-per-pack increase in the nominal price of cigarettes would still have a substantial effect on teenage smoking rates, it would not by itself be enough to reach the targets set by the Proposed Resolution.

In a recent submission before this Task Force, four tobacco manufacturers have asserted that "the price of a pack of cigarettes would rise by a minimum of $1.50 over the next ten years as a result of the proposed resolution."[12] According to the Industry Analysis, the *nominal* retail price will rise from $1.82 per pack in 1997 to $3.34 per pack in 2007.[13] However, at a 3% inflation rate, this would amount to a 67-cent-per-pack increase in real cigarette prices. At a 2.5% inflation rate, it would mean a 79-cent-per-pack real price increase.[14]

Trends in Cigarette Prices

Table 2 shows my calculations of trends in the retail price of cigarettes during 1994-1996. The Table also shows trends in the components of cigarette prices, including the Federal excise tax, state and local excise taxes, state sales taxes, and wholesale/retail margins on cigarettes. Both nominal and real changes are shown. My calculations rely upon the latest data reported by the Economic Research Service of the US Department of Agriculture, as well as tobacco company annual reports and the Maxwell Reports published in the *Tobacco Reporter*.

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[11] That is $\$3.45 \times 1.03^5 = \$4.00$.

[12] Philip Morris Incorporated, R.J. Reynolds Tobacco Company, Lorillard Tobacco Company, U.S. Tobacco Company. *Impact of the Proposed Resolution on the U.S. Cigarette Industry*. Report to the Senate Democratic Task Force on Tobacco. Washington DC: Bozell Sawyer Miller Group, October 9, 1997. I call this document the "Industry Analysis." The direct quotation is from the accompanying press release.

[13] See Industry Analysis, *idem*, Table 5.

[14] At a 3% inflation rate, the projected $3.34 price per pack would be worth $2.49 in real dollars; at a 2.5% inflation rate, it would be worth $2.61 in real dollars.

From 1994 to 1996, the nominal average retail price of a pack of cigarettes (including state sales taxes) increased from 191.6 to 202.6 cents per pack. This represented an average 2.8% annual increase in price, uncorrected for inflation. However, when prices are corrected for inflation based upon the Consumer Price Index, I find that there was been virtually no change in real cigarette price during the two-year period.

The breakdown of cigarette price into its components shows that manufacturers' receipts per pack and state and local excise taxes have been rising faster than inflation, while state sales taxes, the Federal excise tax, and wholesale/retail trade margins have not kept pace with inflation. Most of the increase in cigarette price has been the result of increases in manufacturers' wholesale prices.

The findings in Table 2 do not support the assumptions made by the Industry Analysis in its 10-year projections of cigarette prices.[15] In particular, the Industry Analysis assumes that manufacturers' wholesale prices, as well as state and local excise taxes, will simply keep pace with inflation. Moreover, the Industry Analysis assumes wholesaler/retailer trade margins will rise proportionately with the retail price, which means that trade margins will rise faster than inflation.

[15] See Industry Analysis, *idem*, Table 5 footnotes.

Table 2. Retail Price, Excise and Sales Taxes, Manufacturers Revenues, and Wholesale/Retail Margins on Cigarettes, 1994-1996

	Calendar Year			Average Annual Change, 1994-1996 (percent)	
	1994	1995	1996	Nominal[14]	Real[15]
1. Expenditures on Cigarettes, Excluding Sales Taxes ($billions)	44,544	45,793	47,233		
2. State Sales Tax Revenues on Cigarettes ($billions)	2,016	2,083	2,101		
3. State Sales Taxes as Percent of Pre-Tax Price	4.53%	4.55%	4.45%		
4. Total Expenditures on Cigarettes ($billions)	46,560	47,876	49,334		
5. State and Local Excise Taxes on Cigarettes ($billions)	7,220	7,717	7,806		
6. Total Cigarette Consumption, USDA Series (billions, cigarettes)	486	487	487		
7. Nominal Retail Price per Pack (cents)	191.6	196.6	202.6	2.8%	-0.1%
8. Nominal State and Local Excise Tax per Pack (cents)	29.7	31.7	32.1	3.9%	1.0%
9. Nominal State Sales Tax per Pack (cents)	8.3	8.6	8.6	2.0%	-0.9%
10. Nominal Manufacturers' Revenues per Pack (cents)	74.1	76.6	80.7	4.3%	1.4%
11. Nominal Federal Excise Tax per Pack (cents)	24.0	24.0	24.0	0.0%	-2.8%
12. Nominal Wholesale/Retail Margin per Pack (cents)	55.5	55.7	57.2	1.6%	-1.3%
13. Consumer Price Index (percent of 1982-1984)	148.2	152.4	156.9	2.9%	

Notes to Table 2:

1. US Department of Agriculture, Tobacco Situation and Outlook Report, TBS-239, Sept. 1997, in press; previewed at http://www.econ.ag.gov/Briefing/tobacco/Table29.htm.
2. USDA, TBS-238, Apr. 1997, Table 32.
3. Line 2 ÷ Line 1.
4. Line 1 + Line 2.
5. USDA, TBS-238, Apr. 1997, Table 32.
6. USDA, TBS-239, Sept. 1997, in press; previewed at http://www.econ.ag.gov/Briefing/tobacco/Table1.htm.
7. 2 × Line 4 ÷ Line 6.
8. 2 × Line 5 ÷ Line 6.

Notes to Table 2, continued:

9. 2 × Line 2 ÷ Line 6.

10. The following calculations were based on domestic sales revenues excluding Federal excise taxes, as reported in company annual reports, and domestic shipments, as reported in the Maxwell Reports, published in *Tobacco Reporter* April 1996 and April 1997.

	1994	1995	1996
4-firm total sales revenue (PM,RJR,Lorillard,Liggett) ($millions)	14,989	15,359	16,376
4-firm total shipments (PM,RJR,Lorillard,Liggett) (billions of units)	397.89	394.36	399.27
4-firm ave. revenue per pack (PM,RJR,Lorillard,Liggett) (cents)	75.3	77.9	82.0
Industry sales revenue (PM,RJR,Lorillard,Liggett,B&W) ($millions)			19,477
Industry shipments (PM,RJR,Lorillard,Liggett,B&W) (billions of units)			482.62
Industry ave. revenue per pack (PM,RJR,Lorillard,Liggett,B&W) (cents)	74.1	76.6	80.7
Ratio of 4-firm to industry-wide ave. revenue per pack			0.984

For 1994 and 1995, the industry-wide average revenue per pack was assumed to equal 98.4% of the 4-firm average revenue per pack.

11. Based on prevailing Federal tax rate of $12 per 1,000 units.

12. Line 7 - Line 8 - Line 9 - Line 10 - Line 11

13. CPI, All Urban Consumers.

14. $(X_{96}/X_{94})^{0.5}$ - 1, where X_{96} and X_{94} are, respectively, the 1996 and 1994 values.

15. $\left((X_{96}/X_{94}) / (C_{96}/C_{94}) \right)^{0.5}$ - 1, where C_{96} and C_{94} are, respectively, the 1996 and 1994 values of the CPI.

Four Policy Scenarios: Impacts on Underage Smoking and Domestic Cigarette Consumption

In Table 3 below, I have projected cigarette prices for the year 2007 based upon four different policy scenarios.

i. the scheduled 15-cent-per-pack increase in the Federal excise tax will remain in effect, but there will otherwise be no new Federal legislation;
ii. the Proposed Resolution will take effect in 1997, but the revenues from the scheduled 15-cent-per-pack Federal excise tax hike will not be credited toward industry payments;
iii. the Federal excise tax will rise by a nominal $1.50 per pack above and beyond the scheduled 15-cent increase; and
iv. the Federal excise tax will rise by $1.50 adjusted for inflation.

To comport with my findings in Table 2, I assume in all scenarios that state and local excise taxes will rise at a real rate of 1% per year; that state sales taxes will remain at an average of 4.45% of the pre-tax price; and that combined manufacturers' prices and trade margins will simply keep pace with inflation. In Scenario II, in particular, I assume that the Proposed Resolution will result in industry payments with a *real* value of 62 cents per pack.[16]

As shown in Table 3, I project that, under Scenario I, with no new Federal legislation, the real price of cigarettes will rise by about 4%, or 8 cents per pack, over the period from 1996 to 2007. Under Scenario II, with the Proposed Resolution in place, the real price of cigarettes will rise by about 35%, or 71 cents per pack. Under Scenario III, with a nominal $1.50-per-pack increase in the Federal excise tax, real price will rise by about 60%, or $1.22 per pack. Under Scenario IV, in which the Federal tax hike is adjusted for inflation, the real price will rise by about 79%, or $1.60 per pack.

Table 4 shows the projected impacts by the year 2007 on teenage smoking and total domestic consumption under each of the four policy scenarios. My projections for teenage smoking are based on a "participation price elasticity" of -0.6, as discussed above. My projections of total domestic consumption are based upon a model in which the overall price elasticity of demand is initially equal to -0.4, and in which there is a background decline of consumption equal

[16] See Harris JE. *Written Testimony Before the Senate Committee on Agriculture, Nutrition, and Forestry Hearings on the Tobacco Settlement and the Future of the Tobacco Industry*, Washington DC, September 11, 1997; Harris JE. *Written Testimony Before the Senate Judiciary Committee Hearings on the "Proposed Global Tobacco Settlement: Who Benefits?"* July 30, 1997; Harris JE. *Prepared Remarks at the American Cancer Society's Press Conference on the Proposed Tobacco Industry-Wide Resolution*, Washington DC, July 24, 1997; Harris JE. *Comments on Proposed Tobacco Industry-Wide Resolution*, Commissioned by the American Cancer Society, June 26, 1997.

Table 3. Projected Nominal and Real Cigarette Prices in 2007 Based on Four Different Policy Scenarios

Scenario I: No New Legislation
State and Local Excise Taxes Rise at a Real Rate of 1% per Year

	Historical 1996	Projected to 2007 Nominal	Real[1]
Retail Price per Pack (cents)	202.6	291.9	210.9
State and Local Excise Tax per Pack (cents)	32.1	49.6	35.8
State Sales Tax per Pack (cents)	8.6	12.4	9.0
Manufacturers' Revenues + Trade Margin per Pack (cents)	137.9	190.9	137.9
Federal Excise Tax per Pack (cents)	24.0	39.0	28.2

Scenario II: Proposed Resolution of 20-Jun-97
State and Local Excise Taxes Rise at a Real Rate of 1% per Year

	Historical 1996	Projected to 2007 Nominal	Real
Retail Price per Pack (cents)	202.6	378.9	273.7
Industry Payments (cents)		83.3	62.0
State and Local Excise Tax per Pack (cents)	32.1	49.6	35.8
State Sales Tax per Pack (cents)	8.6	16.1	11.7
Manufacturers' Revenues + Trade Margin per Pack (cents)	137.9	190.9	137.9
Federal Excise Tax per Pack (cents)	24.0	39.0	28.2

Scenario III: Nominal $1.50-per-pack Increase in Federal Excise Tax
State and Local Excise Taxes Rise at a Real Rate of 1% per Year

	Historical 1996	Projected to 2007 Nominal	Real
Retail Price per Pack (cents)	202.6	448.6	324.1
State and Local Excise Tax per Pack (cents)	32.1	49.6	35.8
State Sales Tax per Pack (cents)	8.6	19.1	13.8
Manufacturers' Revenues + Trade Margin per Pack (cents)	137.9	190.9	137.9
Federal Excise Tax per Pack (cents)	24.0	189.0	136.5

Scenario IV: $1.50-per-pack Increase in Federal Excise Tax, Adjusted for Inflation
State and Local Excise Taxes Rise at a Real Rate of 1% per Year

	Historical 1996	Projected to 2007 Nominal	Real
Retail Price per Pack (cents)	202.6	502.5	363.0
State and Local Excise Tax per Pack (cents)	32.1	49.6	35.8
State Sales Tax per Pack (cents)	8.6	21.4	15.5
Manufacturers' Revenues + Trade Margin per Pack (cents)	137.9	190.9	137.9
Federal Excise Tax per Pack (cents)	24.0	240.6	173.8

1. All real values are in $1996.

to 0.6% annually.[17] By contrast, the Industry Analysis assumes a downward underlying trend in demand of 2.5% per year,[18] an assumption that does not appear to fit with the facts in Table 2 or with 1994-1996 trends in consumption reported by Maxwell.

As shown in Table 4, under the Proposed Resolution, the real price of cigarettes would rise by about 71 cents per pack. The percentage of teens who smoke every day would fall to about 14%, as compared to the Proposed Resolution's 10-year target rate of about 5%. Domestic cigarette consumption would fall by about 18%. By contrast, the Industry Analysis predicted a 10-year decline in overall domestic consumption ranging from 36.9% to 43.5%. While the Industry Analysis uses a higher overall price elasticity of demand, the main reason for the difference in predictions is the industry's assumption of a steep 2.5% per year background decline in consumption, independent of price.

I believe that the industry's assumptions concerning the demand for cigarettes are incorrect.[19] Nonetheless, it needs to be understood that if the Industry Analysis is right, then the value of industry payments under the Proposed Resolution is substantially less than others have estimated. Under the so-called "volume adjustment" provision in the Proposed Resolution, if consumption fell by 43.5% – the industry's high-end estimate of the 10-year impact on cigarette demand – then industry payments would likewise fall by 43.5%. In my testimony before the Senate Agriculture Committee, estimated that, as a result of the volume-adjustment provision, the face value of industry payments would be $304.3 billion over 25 years, while the present discounted value of such payments would $194.5 billion. If the Industry Analysis is correct about the impact on cigarette demand, then the real face

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[17] See Harris JE. *A Working Model for Predicting the Consumption and Revenue Impacts of Large Increases in the U.S. Federal Cigarette Excise Tax.* National Bureau of Economic Research, Cambridge MA, July 1, 1994.

[18] Industry Analysis, page 3.

[19] For support, the Industry Analysis cites a 1994 study by Becker et al. to support its use of a price elasticity of -0.75. (See Becker GS, Grossman M, Murphy KM, An empirical analysis of cigarette addiction. *American Economic Review* 1994;84:396-418.) The Becker et al. model, which was based on an econometric analysis of pre-1985 data on state tax receipts, does not appear to fit national-level data in the post-1985 period. See Harris JE, *idem* (1994) and Harris JE. "American cigarette manufacturers' ability to pay damages: overview and a rough calculation," *Tobacco Control* Winter 1996; 5:292-294. It appears that Becker et al. did not explicitly include a background trend in consumption in their econometric model. As a result, background declines in smoking – which may have actually been the result of increased awareness of health hazards or diminished social acceptability of smoking – were inappropriately attributed to a so-called "long-run" effect of price. The Industry Analysis has it both ways: both a large background trend and a large long-run price effect were assumed.

value of industry payments would be about $218.8 billion, while the present discounted value of industry payments would be $145.8 billion.[20]

As Table 4 shows, I project that a $1.50 increase in the Federal excise tax, unadjusted for inflation, will cause the proportion of 13- to 17-year-olds who smoke every day to fall to 11.7% (Scenario III). If the $1.50 increase were adjusted for inflation, then the teenage smoking rate would fall to 9.6% (Scenario IV). In the latter case, the teenage smoking rate meets the 5-year target of 10.6%, but fails to reach the 7-year and 10-year targets of 7.6% and 6.1%, respectively.

I also computed the 25-year impact of Scenarios III and IV on Federal revenues from cigarettes. In the case of a $1.50 increase in the Federal excise tax, unadjusted for inflation, total additional Federal revenues had a real face value of $444 billion and a real present discounted value of $290 billion. In the case where the $1.50-per-pack tax increase was adjusted for inflation, additional Federal revenues had a real face value of $588 billion and a real present discounted value of $369 billion.

[20] This estimate is based on the model $\exp(3.9348-0.3658p-0.025T)$, where p is the real price of cigarettes and T is the number of years post-settlement. This model appears to fit the projections of demand contained in the bottom line of Table 1 of the Industry Analysis.

Table 4. Projected Impacts on Price and Consumption Under Four Different Policy Scenarios

	Scenario I No New Legislation	Scenario II Proposed Resolution	Scenario III Nominal $1.50 Tax	Scenario IV Real $1.50 Tax
1. Change in Real Price (cents/pack)	8.3	71.1	121.5	160.4
2. Percentage Change in Real Price	4.1%	35.1%	59.9%	79.2%
3. Percent. Change in Number of Teens Who Smoke Daily	-2.4%	-21.1%	-36.0%	-47.5%
4. Projected Percentage of Teens Who Smoke Daily	17.8%	14.4%	11.7%	9.6%
5. Projected Total Domestic Consumption (billions, packs)	22.4	19.8	17.9	16.6
6. Percent. Change in Domestic Consumption from 1996	-7.4%	-18.1%	-25.8%	-31.2%

1. Computed from Table 3.
2. Computed from Table 3.
3. Based upon a participation price elasticity of -0.6. See text.
4. Based upon a 1996 teenage daily smoking rate of 18.2%. (See Table 1.)
5. Computed as *exp*(3.5849-0.006*11-0.1951**P*), where *P* is the real price in dollars per pack. See Harris JE. *Written Testimony Before the Senate Committee on Agriculture, Nutrition, and Forestry*, September 11, 1997, Table 1, note 4.
6. Based upon the Maxwell Report's estimate of 24.165 billion packs in 1996. See *Tobacco Reporter*, April 1997.

(Incorporating corrections, October 22, 1997)

Jeffrey E. Harris: Recent Presentations and Publications Concerning the Tobacco Industry

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