# Economic Analysis of Proposed Legislation

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This memorandum analyzes the economic impact of a legislative proposal to require U.S. tobacco manufacturers to pay tax-deductible assessments according to the following schedule: a $10 billion lump-sum payment in 1998; a $0.50 per pack assessment in 1999; a $1.00 per pack assessment in 2000; a $1.50 per pack assessment in 2001; and $1.50 per pack indexed for medical inflation after 2001. The analysis focuses on three factors: the effect of the legislation on the retail price of cigarettes; the total amounts paid by cigarette manufacturers; the effect on total U.S. consumption of cigarettes; and the effect on the prevalence of smoking among teenagers. I consider a 25-year horizon, extending from 1998 to 2023. I do not analyze the impact of such a proposal on the price or consumption of smokeless tobacco.

## Assumptions and Economic Model

My analysis is based upon the following assumptions:

- During 1998–2003, the Consumer Price Index will increase at an average annual rate of 3.0%, while the medical care component of the Consumer Price Index will rise at an average annual rate of 5.4%.[2] After 2001, the required payments by tobacco manufacturers will be indexed to the medical care component of the Consumer Price Index.

- The Federal excise tax on cigarettes, currently at $0.24 per pack, will increase to $0.34 per pack in 2000, and to $0.39 per pack in 2002, but remain unchanged thereafter.

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[1] The opinions expressed in this document are the author's sole responsibility. They do not necessarily reflect the opinions of the Massachusetts General Hospital, the Massachusetts Institute of Technology, or any other organization.

[2] During 1990-1997, the annual average CPI for all items increased at an average rate of 3.0% per year, while the annual average CPI for medical increased at an average rate of 5.4% per year (Bureau of Labor Statistics data; Web Page: http://www.bls.gov/ and FTP site: ftp://ftp.bls.gov/pub/time.series/cu/ ). The medical component of the CPI reflects only household expenditures for health insurance premiums and out-of-pocket medical expenses (those not covered by health insurance). The CPI does not include employer-paid health insurance premiums nor government-paid health care such as Medicare (See: *How BLS Measures Price Change for Medical Care Services in the Consumer Price Index.* Web Page: http://stats.bls.gov/cpifact4.htm).

- State and local excise taxes, which amounted to $0.321 per pack in 1996, will increase at a real, inflation-adjusted rate of 1% annually.[3]

- In the absence of new legislation, manufacturers' wholesale prices plus retailer and wholesaler markups, which amounted to $1.397 per pack in 1996, would remain unchanged in real terms, that is, they would continue to rise at the general rate of inflation.[4]

- State sales taxes will remain at 4.45% of the pre-sales tax price.

- Manufacturers will fully pass on the costs of required payments to consumers in the form of price increases. This assumption applies to both the initial lump-sum payment and the subsequent per-pack payments.

- Total cigarette consumption (in billions of packs annually) will follow the model: $\log Q = 3.579 - 0.006T - 0.195P$, where $Q$ is the number of packs, $P$ is the real price of cigarettes in 1998 dollars, $T$ is the number of years since 1998, and *log* represents the natural logarithm.[5]

- Following recent trends, the proportion of students in grades 8 through 12 who smoke cigarettes daily will rise to 19.6% in 1997 and, in the absence of any new interventions, will rise to 21.4%.[6] Thereafter, the prevalence of daily smoking in grades 8 through 12 will follow the model: $\log Y = 3.525 - 0.6 \log P$, where $Y$ is the percentage of daily smokers, $P$ is the real price of a pack of cigarettes in 1998 dollars, and *log* represents the natural logarithm.[7]

## Results

[3] Harris, JE. *Prepared Statement Before the Senate Democratic Task Force on Tobacco Sen. Kent Conrad (D-ND), Chairman*, Washington DC, October 21, 1997; Table 2.

[4] Harris, JE. *Prepared Statement Before the Senate Democratic Task Force on Tobacco*, Table 2.

[5] 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; Appendix Table 2.

[6] Harris JE. *Prepared Statement Before the Senate Democratic Task Force on Tobacco,* Table 1. The proportion of daily smokers, based on "Monitoring the Future Study," was 18.2% in 1996. The projections are based on an estimated 8.6% annual growth rate in the number of teenage smokers.

[7] This is a "constant elasticity" model based on a "participation price elasticity" of -0.6. See Harris JE, *Prepared Statement Before the Senate Democratic Task Force on Tobacco.*

Table 1 shows the projected effect of the proposed legislation on the nominal price of a pack of cigarettes; projected total domestic consumption; real total payments; and the present discounted value of payments based on a 7% nominal interest rate. To finance the initial lump-sum payment of $10 billion, manufacturers will need to raise the nominal price of cigarettes by 47 cents per pack. Over a 25-year period, total undiscounted real payments would be $641 billion; the present discounted value of such payments would be $396 billion. The total undiscounted nominal payments (not shown in Table 1) would be $980 billion.[8]

Table 2 shows the projected impact on the percentage of students in grades 8 through 12 who smoke every day. In 1998, an estimated 18.9% will smoke every day. By 2023, the prevalence will be down to 13.6%.

Sensitivity Analysis

In recent years, both the rate of general inflation and the rate of medical price inflation have slowed. For example, during 1994-1997, the all-item CPI grew at 2.7% annually, while the medical care component of the CPI grew at 3.6%. If these percentages had been used in the projection model, then the 25-year total payments would be: $585 billion in real, undiscounted dollars; $356 billion in present discounted value; and $847 billion in nominal, undiscounted dollars. Total consumption would fall from 21.4 billion packs in 1998 to 14.2 billion packs in 2023. The percentage of students in grades 8 through 12 who smoke every day would fall from 19.0% in 1998 to 14.9% in 2023.

The above analysis assumed that, in the absence of changes in real price, the proportion of students in grades 8 through 12 who smoke every day would rise to 21.4% in 1998, but remain constant thereafter. If a background rate of decline in teenage smoking of 1% per year had been assumed, but the annual growth of the CPI and medical component of the CPI remained at 3.0% and 5.4%, respectively, then the proportion who smoked every day would fall from 18.9% in 1998 to 10.6% in 2023.

[8] This analysis does not employ the so-called “constant GDP” assumption used by the Joint Committee on Taxation and the Congressional Budget Office to analyze the effects of Federal excise tax increases. Under the “constant GDP” assumption, private-sector incomes would fall to offset the increased Federal payments. At a marginal income tax rate of 25%, the resulting fall in private-sector incomes would result in a $245 billion loss of Federal income tax revenues over 25 years. In that case, net undiscounted nominal payments would equal $735 billion over 25 years.

**Table 1. Projected Effect of Proposed Legislation to Impose Tax-Deductible $10 Billion Lump-Sum Payment in 1998, Followed by Tax-Deductible Per-Pack Payments of $0.50 in 1999, $1.00 in 2000, $1.50 in 2001, and $1.50 Indexed for Medical Inflation After 2001**

| Policy Year | Calendar Year | Base Federal Excise Tax (per pack) | Nominal Payments (per pack) | Projected Real Price per Pack (1998 $) | Projected Domestic Consumption (billions packs) | Real Total Payments (1998 $billions) | Real Present Discounted Value (1998 $billions) |
|---|---|---|---|---|---|---|---|
| 0 | 1998 | 0.24 | 0.47 | 2.65 | 21.4 | 10.0 | 10.0 |
| 1 | 1999 | 0.24 | 0.50 | 2.66 | 21.2 | 10.3 | 9.9 |
| 2 | 2000 | 0.34 | 1.00 | 3.24 | 18.8 | 17.8 | 16.5 |
| 3 | 2001 | 0.34 | 1.50 | 3.68 | 17.2 | 23.6 | 21.0 |
| 4 | 2002 | 0.39 | 1.58 | 3.75 | 16.8 | 23.6 | 20.3 |
| 5 | 2003 | 0.39 | 1.67 | 3.78 | 16.6 | 23.9 | 19.8 |
| 6 | 2004 | 0.39 | 1.76 | 3.81 | 16.4 | 24.2 | 19.2 |
| 7 | 2005 | 0.39 | 1.85 | 3.84 | 16.3 | 24.5 | 18.7 |
| 8 | 2006 | 0.39 | 1.95 | 3.87 | 16.1 | 24.7 | 18.2 |
| 9 | 2007 | 0.39 | 2.06 | 3.90 | 15.9 | 25.0 | 17.7 |
| 10 | 2008 | 0.39 | 2.17 | 3.94 | 15.7 | 25.3 | 17.3 |
| 11 | 2009 | 0.39 | 2.28 | 3.97 | 15.5 | 25.5 | 16.8 |
| 12 | 2010 | 0.39 | 2.41 | 4.01 | 15.3 | 25.8 | 16.3 |
| 13 | 2011 | 0.39 | 2.54 | 4.04 | 15.1 | 26.0 | 15.9 |
| 14 | 2012 | 0.39 | 2.68 | 4.08 | 14.9 | 26.3 | 15.4 |
| 15 | 2013 | 0.39 | 2.82 | 4.12 | 14.7 | 26.5 | 15.0 |
| 16 | 2014 | 0.39 | 2.97 | 4.16 | 14.5 | 26.8 | 14.6 |
| 17 | 2015 | 0.39 | 3.13 | 4.20 | 14.3 | 27.0 | 14.1 |
| 18 | 2016 | 0.39 | 3.30 | 4.25 | 14.1 | 27.3 | 13.7 |
| 19 | 2017 | 0.39 | 3.48 | 4.29 | 13.8 | 27.5 | 13.3 |
| 20 | 2018 | 0.39 | 3.67 | 4.34 | 13.6 | 27.7 | 12.9 |
| 21 | 2019 | 0.39 | 3.87 | 4.38 | 13.4 | 27.9 | 12.5 |
| 22 | 2020 | 0.39 | 4.07 | 4.43 | 13.2 | 28.1 | 12.2 |
| 23 | 2021 | 0.39 | 4.29 | 4.48 | 13.0 | 28.3 | 11.8 |
| 24 | 2022 | 0.39 | 4.53 | 4.53 | 12.8 | 28.5 | 11.4 |
| 25 | 2023 | 0.39 | 4.77 | 4.59 | 12.6 | 28.7 | 11.1 |
| Total | | | | | | 641 | 396 |

**Table 2. Projected Impact on the Percentage of Students in Grades 8 Through 12 Who Smoke Cigarettes Every Day**

| Policy Year | Calendar Year | Daily Smoking Prevalence (%) |
|---|---|---|
| 0 | 1998 | 18.9 |
| 1 | 1999 | 18.9 |
| 2 | 2000 | 16.8 |
| 3 | 2001 | 15.5 |
| 4 | 2002 | 15.4 |
| 5 | 2003 | 15.3 |
| 6 | 2004 | 15.2 |
| 7 | 2005 | 15.1 |
| 8 | 2006 | 15.1 |
| 9 | 2007 | 15.0 |
| 10 | 2008 | 14.9 |
| 11 | 2009 | 14.8 |
| 12 | 2010 | 14.8 |
| 13 | 2011 | 14.7 |
| 14 | 2012 | 14.6 |
| 15 | 2013 | 14.5 |
| 16 | 2014 | 14.4 |
| 17 | 2015 | 14.3 |
| 18 | 2016 | 14.3 |
| 19 | 2017 | 14.2 |
| 20 | 2018 | 14.1 |
| 21 | 2019 | 14.0 |
| 22 | 2020 | 13.9 |
| 23 | 2021 | 13.8 |
| 24 | 2022 | 13.7 |
| 25 | 2023 | 13.6 |

## Additional Considerations

The proposed legislation will raise the price of cigarettes, which will cause consumption to fall. The resulting decline in consumption has several indirect consequences. In particular, the decline in consumption will tend to lower Federal and state receipts on conventional cigarette excise taxes. These effects, however, are small in comparison to the magnitudes of the dollar collections from the proposed legislation. In the absence of any new legislation, I estimate the present discounted value of Federal and state excise tax collections during 1998–2023 to equal $100 and $141 billion, respectively. In the presence of the proposed legislation, the corresponding present discounted values would be $74 and $104 billion, respectively. Thus, in terms of present discounted value over 25 years, the

proposed legislation would decrease conventional Federal and state excise tax collections by $63 billion, while total industry payments would equal $396 billion.

The above analyses were based upon the assumption that all Federal payments were deductible from Federal income taxes. The analysis of the non-deductible case is given in an Appendix.

## Appendix: Effect of Imposing a Non-Deductible Fee

Let the non-tax deductible fee equal $F$ dollars per pack, and let $t$ denote the Federal marginal corporate income tax rate. If a manufacturer seeks to pass the full costs of the fee to consumers, it must raise its wholesale price by the amount $\Delta p = F/(1-t)$.

Let $q$ denote the number of packs sold. The total cost of the non-deductible fee is $q\Delta p = qF/(1-t)$. This total cost has two components: (1) the non-deductible fee, that is, $qF$; and (2) the additional income taxes paid when price is raised to finance payment of the fee, that is, $tqF/(1-t)$.

A numerical example illustrates the calculation. In 1999, the proposed legislation imposes a nominal payment of $F$ = $0.50 per pack. If the Federal corporate income tax rate was $t$ = 0.35, then manufacturers would have to raise their wholesale price by $\Delta p = F/(1-t)$ = $0.77 per pack. As a result, the real price of cigarettes will be $2.94 per pack, and project total domestic consumption will fall to q = 20.1 billion packs. Therefore, manufacturers' pre-tax profits will rise by $q\Delta p$ = $15.5 billion. These profits will be used to finance: (1) the non-deductible payments of $qF$ = $10.0 billion; and (2) additional income taxes of $tqF/(1-t)$ = $5.5 billion.

This calculation can be compared to the estimates for the year 1999 in Table 1. If the payment is tax-deductible, then manufacturers will raise price by $0.50, and total consumption will fall to 21.2 billion packs. Total Federal receipts will be $10.3 billion. Thus, the provision of non-tax deductibility will result in higher cigarette prices and lower adult and teenage cigarette consumption, but smaller direct payments. The reduced payments, however, will be quite small in comparison to the increased Federal corporate income tax revenues resulting from the non-deductibility provision.