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**THE IMPACT OF PROPOSED CIGARETTE PRICE INCREASES**

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## EXECUTIVE SUMMARY

All major national tobacco legislative proposals call for significant increases in cigarette prices, up to \$1.50 per pack, to be phased in over two to five years. This paper reviews the theory and evidence concerning the impact of price increases on cigarette smoking, and estimates the likely impact of the proposed increases on youth and adult smoking. It concludes that large cigarette price increases will lead to substantial reductions in cigarette smoking, particularly in the prevalence of cigarette smoking among youth. When combined with other tobacco control activities, including prevention and cessation programs, counteradvertising, and enforcement of youth access limits, even larger reductions in youth and adult smoking could be achieved.

### Economic Theory and Cigarette Price Increases

While it is a fundamental law of economics that as the price of a product rises, demand for the product falls, the demand for tobacco products is different from the demands for most other consumer goods because of the addictive substance - nicotine - they contain. The main implication that addiction has for demand is that current consumption decisions will depend on past choices. For example, to the addicted smoker, one of the benefits of continued smoking is preventing nicotine withdrawal; therefore, past use tends to encourage consumption, while past avoidance does not.

With respect to price, the key prediction of this model is that lower rates of consumption today due to price increases will lead to even greater reductions in the future.

Economic theory also suggests that youth and young adults will be more responsive to changes in the price of cigarettes than adults, for a number of reasons:

- the share of disposable income that a youthful smoker spends on cigarettes is likely to exceed that spent by an adult smoker;
- peer influences are much more important for youth smoking than for adult smoking; reductions in teen smoking due to price will be amplified by additional reductions due to the lower prevalence rates themselves;
- youth smokers are likely to be less addicted than adult smokers are, and those who do not yet smoke are not addicted at all. The reduced significance of addiction among youths makes the impact of price on choosing whether or not to smoke more important;
- young people generally give less weight to future concerns, and may also be more likely to underestimate the health consequences and potential for dependency than adults. Therefore, current factors such as changes in price are likely to have a greater impact on youth than on adults.

## Estimates of the Impact of Cigarette Prices on Adult Cigarette Smoking

The single most consistent finding from numerous econometric studies of the issue is that increases in cigarette prices will lead to significant reductions in cigarette smoking. The consensus estimates imply that a ten-percent increase in cigarette price would reduce overall cigarette consumption by three to five percent.

## Estimates of the Impact of Cigarette Prices on Youth and Young Adult Smoking

While some studies differ about the impact of price on youth and young adult smoking, most studies have supported the prediction that youth and young adults would be more sensitive to price than adults. A 1996 study by Chaloupka and Grossman confirmed findings from earlier studies that youth are about three times more sensitive to price than adult smokers are. This estimate implies that a ten-percent increase in the price of cigarettes would reduce overall youth cigarette smoking by over 13 percent, while reducing youth smoking prevalence by nearly seven percent. Several recent studies generally support this finding.

### Caveats

Several caveats should be considered in evaluating the effects of cigarette price increases on youth and adult cigarette demand:

- For the reductions in youth and adult smoking resulting from a cigarette price increase to be sustained over time, the cigarette price increase must be sustained in real terms, i.e. adjusted for inflation
- Some research implies that large cigarette price increases would lead some smokers to substitute other tobacco products,

including chewing tobacco and snuff, for cigarettes, unless comparable price increases are made for those products.

- The estimates described above are based on experience with excise taxes in the U.S. The price increases currently being discussed are much larger than have been enacted in the past. Anecdotal evidence from Canada, and recent behavioral economic research, suggest that the effects of large price changes are likely to be at least as significant as those estimated based on relatively smaller changes.
- Recent studies find that the long-run effect of a price increase on overall cigarette demand is about double the short-run effect. This implies that the long-run increases in revenues from large tax increases will be smaller than the short-run increases. However, the long-run reductions in cigarette smoking and the associated health benefits will be larger.

## Evaluating the Impact of Different Proposals

The author estimates the impact of several recently-proposed cigarette price increases as follows:

- The estimated 62 cents-per-pack increase under the terms of the June 20, 1997 settlement proposal would reduce overall cigarette demand in the U.S. by approximately 12 percent, while reducing youth smoking prevalence by over 20 percent. Additional price increases imposed by the industry could substantially increase these reductions in overall and youth smoking. Because this price increase would be initiated by cigarette producers, Federal tax revenues would decline by over \$650 million; state tax revenues would also decline.

- Proposals calling for price increases of \$1.50 per pack to be phased in over a relatively short period of time, and then indexed to the rate of inflation, would lead to about a 30 percent reduction in overall cigarette consumption, while cutting the prevalence of youth smoking about in half. In addition, a tax or licensing fee of this magnitude would increase annual federal revenues by about \$22.5 billion.
- The recent Commerce Committee proposal (S. 1415), a \$1.10 increase phased in over five years and then adjusted for inflation, would reduce overall cigarette demand by about 20 percent, while lowering the prevalence of youth smoking by nearly one-third. A tax or licensing fee of this size would lead to a net increase in federal revenues of approximately \$19.5 billion per year.
- Others, including the Institute of Medicine and numerous public health groups have called for price increases of \$2.00 or more per pack. A sustained price increase of this magnitude would produce a 40 percent drop in overall cigarette demand while cutting the prevalence of youth smoking by approximately two-thirds.

### Regressivity and Smuggling

Opponents of large increases in cigarette taxes argue that cigarette and other tobacco taxes are regressive, since they fall most heavily on lower-income groups, and that higher taxes will create an incentive for cross-border smuggling and result in a substantial black market in cigarettes. Each issue is explored below:

**Regressivity:** Evidence from the Congressional Budget Office (CBO) suggests that the regressivity of tobacco and other excise taxes are overstated. A 1990 CBO

report concluded, if annual family expenditures are more reflective of lifetime income than annual family income, then expenditures on tobacco are only slightly regressive over income classes.

The CBO also examined the effect of tax increases and concluded that such increases were approximately proportional rather than regressive, and in fact somewhat progressive. This finding is supported by other recent studies that conclude that people in the lowest income groups, and those with less education (closely correlated with income) were most responsive to price increases, and thus most likely to reduce consumption rather than pay higher prices in response to a price increase. These estimates also imply that the health benefits of the reductions in smoking that would result from large cigarette tax increases would be disproportionately larger in the lowest income populations.

**Smuggling:** Some argue that large cigarette price increases will necessarily lead to rampant smuggling and a large black market in cigarettes. However, the U.S. has one of the lowest average prices and taxes on cigarettes among industrialized countries. Even a \$1.50 increase in the average cigarette price in the U.S. would be insufficient to put the U.S. in the top 15 countries globally in terms of cigarette prices. Moreover, recent research suggests that other factors, such as weak anti-smuggling policies, can be as important as price differences in spawning cigarette smuggling.

Canadian prices would remain higher than American prices under the proposed increases, so smuggling from that country is unlikely. A price increase would increase the incentive to smuggle from Mexico; however, significant price differences already exist, and there is no empirical evidence that this has led to significant cigarette smuggling.

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## INTRODUCTION

All major proposals for national tobacco legislation call for significant increases in cigarette prices. The June 20, 1997 settlement proposed by the tobacco industry and states' Attorneys General called for the costs of the settlement to be passed on to smokers in the form of higher prices. Harris (1997) estimates that this pass-through would lead to a 62-cent per pack increase in cigarette prices. Based on evidence concerning the pass-through of past cigarette tax increases, the Federal Trade Commission (1997) suggests that the pass-through of settlement costs could be even higher if the tobacco industry was to coordinate the price increases to more than cover costs. Recently proposed legislation calls for larger price increases, ranging from \$1.10 per pack to \$1.50 per pack, to be phased in over two to five years. Some of these proposals would achieve these price increases by raising federal cigarette excise taxes while others would impose a licensing fee for each pack of cigarettes produced.

Regardless of how the increase is achieved, the final result will be to significantly reduce cigarette smoking in the United States, with disproportionately large reductions in smoking among youth and young adults. This paper reviews the economic theory and econometric evidence concerning the impact of cigarette price increases on cigarette smoking, and estimates the likely impact of the large cigarette price increases under consideration on youth and adult cigarette smoking.

## ECONOMIC THEORY AND CIGARETTE PRICE INCREASES

One of the fundamental laws of economics is that of the "downward-sloping demand curve," implying that as the price of a product rises, the quantity demanded of that product falls. Economists use the term *price elasticity of demand* to reflect the impact of changes in prices on the use of a product; this is defined as the percentage change in consumption that results from a one-percent increase in price.

The demand for tobacco products, however, is different from the demands for most other consumer goods because of the addictive substance - nicotine - contained in these products. The key implication that addiction has for demand is that current consumption decisions will depend on past choices. For example, to the addicted smoker, one of the benefits of continued smoking is the avoidance of nicotine withdrawal. Not that long ago, many researchers viewed addictive consumption as an irrational behavior not conducive to standard economic analysis (for example, Elster, 1979; Schelling, 1984). This view implied that the demands for tobacco products did not follow the basic laws of economics, including that of the downward sloping demand curve. Numerous econometric studies of cigarette demand and other tobacco use, however, confirm that the basic principles of economics do apply to the demands for these products. The concept of a downward sloping demand curve is actually fairly universal. Laboratory experiments, for

example, that require addicted animals to work to get a dose of a drug (including nicotine) find the same inverse relationship between price (the amount of work required) and consumption of an addictive substance (Bickel and DeGrandpre, 1996).

Many of the most recent studies of cigarette demand explicitly model the addictive nature of cigarette smoking (Mullahy, 1985; Chaloupka, 1991; Keeler, et al., 1993; Becker, Grossman and Murphy, 1994; Sung, et al., 1994). Many of these studies are based on a model applying the standard, rational-utility-maximizing paradigm of economics to the consumption of addictive substances (Becker and Murphy, 1988). While many non-economists and some economists are uncomfortable with some of the assumptions of this model of "rational addiction," it is gaining an increasing number of adherents. This theory emphasizes the links between past, present, and future behavior in the consumption of an addictive substance, capturing the acquired tolerance, reinforcement, and withdrawal associated with addiction. In particular, it highlights the dependence of current smoking decisions on past smoking. With respect to price, the key prediction of the economic models of addiction is that the long-run effects of price on cigarette demand will be larger than the short-run effects. That is, given the addictive nature of cigarette smoking, the effects of permanent changes in cigarette prices will grow over time.

Economic theory suggests several reasons for expecting youth and young adults to be more responsive to changes in the price of cigarettes than adults (Grossman and Chaloupka, 1997). First, the share of disposable income that a youthful smoker spends on cigarettes is likely to exceed the corresponding portion of income spent by an adult smoker. Economic theory implies that the price sensitivity of demand rises with the share of income spent on a good.

A second factor is that peer influences are much more important in the case of youth smoking than they are for adult smoking. Interestingly, peer pressure has a positive multiplying effect when looking at the impact of cigarette price increases on youth smoking. In addition to the reduced smoking that directly results from a price increase, youth smoking is also indirectly reduced through the impact of the price increase on peer consumption; that is, if fewer teens are smoking, then other teens will want to emulate them, thereby increasing the impact of a price increase.

In addition, youth smokers, because they have been smoking for a relatively short time, are likely to be less addicted than adult smokers are. Similarly, among youth, changes in the number of young people who smoke are primarily due to changes in smoking initiation. In contrast, among adults, changes in the number of smokers occur primarily because current smokers quit. Given the addictive nature of smoking, quits will be inversely related to past consumption while starts are independent of past consumption. Thus, the effect of price on choosing whether or not to smoke should be larger for young people than for adults.

Finally, young people tend to discount the future more heavily than older people do. The "full" cost of cigarette smoking includes not only the monetary costs of cigarettes, but also the health and other future consequences of smoking. Given that young people generally give less weight to future concerns and may also be more likely to underestimate the health consequences and potential for dependency than adults, they are likely to place more weight on current factors when making current smoking decisions. Thus, changes in prices are likely to have a greater impact on youth than on adults.

## ESTIMATES OF THE IMPACT OF CIGARETTE PRICES ON ADULT CIGARETTE SMOKING

The single most consistent finding from the numerous econometric studies of the demand for cigarettes is that increases in cigarette prices will lead to significant reductions in cigarette smoking (National Cancer Institute, 1993; U.S. Department of Health and Human Services, 1989, 1994, forthcoming). The consensus estimates from studies of cigarette demand using a wide variety of individual level and aggregate, cross-sectional, and time-series data and a variety of econometric methods is that the price elasticity of demand for cigarettes is in the range from -0.3 to -0.5. This implies that a ten-percent increase in cigarette price would reduce overall cigarette consumption by three to five percent.

The effects of increases in cigarette prices are not limited to reductions in cigarette consumption by continuing smokers, but also include significant reductions in smoking prevalence, reflecting increased smoking cessation among smokers and reduced smoking initiation among young smokers (NCI, 1993). Evans and Farrelly (1996), for example, using data from 13 of the National Health Interview Surveys conducted from 1976 through 1992, estimate that approximately half of the impact of price on adult smoking is on the decision to smoke. Similarly, Douglas (1998) estimates that a permanent ten-percent increase in the price of cigarettes would lead to a reduction in the duration of a smoker's habit of approximately ten-percent.

Several recent econometric studies of cigarette demand in the context of economic models of addictive behavior confirm the predictions of these theories. Chaloupka (1991) using individual level data, Becker, Grossman, and Murphy (1994) using pooled

annual time-series state-level cross-sectional data, and Keeler, et al. (1993) using time-series data from California, among others, confirm that cigarette smoking is an addictive behavior in that past smoking decisions have a significant impact on current choices. In addition, these studies conclude that smoking is not characterized by myopic behavior, implying that increases in the perceived future costs of smoking would lead to reductions in current smoking. Finally, these studies conclude that the long-run effect of price on cigarette demand is about double the short-run effect. Thus, the long-run price elasticity of demand is centered on -0.8; a ten percent price increase, maintained over the long term, should ultimately result in an approximate 8% reduction in smoking.

## ESTIMATES OF THE IMPACT OF CIGARETTE PRICES ON YOUTH AND YOUNG ADULT SMOKING

The earliest studies of cigarette demand by youth and young adults supported the prediction described above that youth and young adults would be more sensitive to price than adults. Lewit, Coate, and Grossman (1981) used data on over 5,300 youth from Cycle III of the Health Examination Survey to examine the impact of cigarette prices and various other factors on cigarette smoking among youth ages 12 through 17 years. They estimated that the price elasticity of overall youth cigarette demand was -1.44, implying that a ten-percent increase in price would reduce youth cigarette smoking by over 14 percent. Moreover, they estimated that most of the impact of a cigarette price increase on youth smoking is on the decision to smoke; they estimate a price elasticity of youth smoking participation of -1.20, implying that a ten-percent price increase would reduce the prevalence of youth smoking by 12 percent.

Finally, they estimated modest reductions in average cigarette consumption among youth that continue to smoke (a price elasticity of conditional cigarette demand of -0.25).

Lewit and Coate (1982) confirmed their finding of an inverse relationship between the price elasticity of cigarette demand and age. Using data on over 19,000 individuals ages 20 through 70 years from the 1976 National Health Interview Survey, Lewit and Coate estimated an overall price elasticity of demand for cigarettes of -0.42 and a price elasticity of smoking participation (prevalence) of -0.26. In addition, they estimated separate demand equations for different age groups, concluding that younger persons were more sensitive to price changes than older person. For example, they estimated a price elasticity of cigarette demand of -0.89 for 20 through 25 year olds, with a comparable estimate for 26 through 35 year olds of -0.47.

Two studies from the early 1990s, however, cast some doubt on the inverse relationship between price elasticity and age. Both studies used data on relatively small samples of youth and young adults taken from the Second National Health and Nutrition Examination Survey conducted in the late 1970s. Wasserman, et al. (1991), concluded that there was no significant difference between the price elasticity of demand for teens and that for adults. Chaloupka (1991) reached a similar conclusion for demand among young adults (persons ages 17 through 24 years).

These mixed findings and the growing interest in using increased cigarette excise taxes to discourage smoking prompted several recent studies of the impact of cigarette prices on youth and young adult cigarette demand. Chaloupka and Grossman (1996) used data on over 110,000 youth taken from the 1992, 1993, and 1994 Monitoring the Future surveys of eighth, tenth, and twelfth grade students. In addition to examining the impact of cigarette prices on youth smoking, they also looked at

the effects of a comprehensive set of tobacco-related policies, including restrictions on smoking in various public places and private worksites, limits on youth access to tobacco products, and others, as well as numerous socioeconomic and demographic factors related to youth cigarette demand. Chaloupka and Grossman confirmed the findings from earlier studies that youth are about three times more sensitive to price than adult smokers are. They estimate an overall price elasticity of cigarette demand of -1.313, with approximately half of the impact of price on the decision to smoke (a price elasticity of smoking participation of -0.675). Their estimates imply that a ten-percent increase in the price of cigarettes would reduce overall youth cigarette smoking by over 13 percent, while reducing youth smoking prevalence by nearly seven percent.

Several recent studies, including those by Evans and Huang (1998), DeCicca, Kenkel, and Mathios (1998), and Lewit, et al. (1997) generally support this finding. Evans and Huang use state level measures of smoking prevalence among high school seniors over the period from 1977 through 1992 aggregated from the data collected in the Monitoring the Future Surveys. Controlling for unmeasured state-specific influences likely to affect youth cigarette demand, as well as a variety of other factors, they estimate a price elasticity for youth smoking participation of -0.20 for the entire time period. However, they conclude that this has increased over time, estimating a price elasticity of youth smoking participation of -0.50 for the 1985 through 1992 period.

Lewit et al. (1997), use data for ninth grade students in 1990 and 1992 taken from surveys conducted in the 22 North American communities in the Community Intervention Trial for Smoking Cessation (COMMIT). In addition to price, they also examine the impact of limits on youth access, restrictions on smoking, exposure to tobacco education, exposure to pro- and counter-cigarette

advertising, and a variety of other factors on both youth decisions to smoke and intentions to smoke. They find that both youth smoking participation and youth intentions to smoke are inversely related to cigarette prices, with estimated price elasticities of -0.87 and -0.95 respectively.

DeCicca, Kenkel, and Mathios use data from the 1988, 1990, and 1992 waves of the National Education Longitudinal Survey to estimate youth cigarette demand. Treating each wave as a separate cross-section, they estimate price elasticities for youth smoking prevalence of -0.68, -0.52, and -0.48 for eighth, tenth, and twelfth grade students, respectively. Taking advantage of the longitudinal data, the authors go on to explore the determinants of changes in youth smoking behavior over time, concluding that price has little effect on smoking initiation among those who had not started by the eighth grade. While this analysis is a useful first step in exploring the determinants of youth smoking initiation, it also has several limitations that recommend substantial caution in accepting and interpreting its findings. For example, the use of state cigarette taxes as a proxy for price ignores much of the significant industry initiated changes in price that occurred during the time period covered by the data. Likewise, dropping youth who were smoking in the eighth grade - many of whom are from low tax and price states and are at an age where price sensitivity is expected to be highest - from the initiation analysis will significantly bias the estimated effects of taxes on smoking initiation towards zero. Similarly, the econometric methods employed to examine initiation do not adequately capture the process of initiation and do not fully exploit the longitudinal nature of the data. Much more research needs to be done with this type of longitudinal data before rejecting the substantial evidence from cross-sectional analyses that concludes that increases in

cigarette prices lead to significant reductions in the prevalence of youth smoking.

Recent studies of young adult smoking conclude that young adults are also more responsive to price than older adults. Chaloupka and Wechsler (1997) estimate an overall price elasticity of demand for cigarettes of -1.11 and a participation elasticity of -0.53 for college students using data taken from the 1993 Harvard College Alcohol Survey. Similarly, Evans and Farrelly (1996), estimate an overall price elasticity of demand for young adults, ages 18 through 24 years, that is 50 percent larger than their estimate for adults ages 25 through 39 years, and nearly 3 times as large as their estimates for their full sample.

Given that nearly all smoking initiation occurs by the time of high school graduation and that smoking habits become firmly established during early adulthood, these estimates suggest that substantial sustained cigarette tax increases are potentially the most effective means of achieving long-run reductions in smoking in all segments of the population.

## CAVEATS

Several caveats should be noted before evaluating the effects of cigarette price increases on youth and adult cigarette demand. First, for the reductions in youth and adult smoking resulting from a cigarette price increase to be sustained over time, the cigarette price increase must be sustained in real terms, i.e. adjusted for inflation. If the price increases are not sustained in inflation-adjusted, terms, then inflation will eventually erode the value of the price increase and smaller reductions in cigarette smoking would be attained. Most of the proposed increases in cigarette prices resulting from cigarette tax increases or licensing fees on cigarette

producers recognize this and call for the price increases to be indexed to the rate of inflation.

Second, recent research by Ohsfeldt, Boyle and Capilouto (1997) implies that large increases in cigarette prices alone would lead at least some smokers to substitute other tobacco products, including chewing tobacco and snuff, for cigarettes. This substitution would at least partially offset the health benefits of the increased prices. The substitution of smokeless and other tobacco products for cigarettes could be discouraged by comparable increases in the prices of these products as well. Again, many recent proposals call for increases in prices for all tobacco products.

Third, the estimated price elasticities described above are based on the relatively small changes in excise taxes over time and the relatively small differences in excise taxes across states and communities observed in the U.S.. The price increases currently being discussed are much larger than what is observed in the data on which these estimates are based. Anecdotal evidence from Canada, however, suggests that the effects of large price changes are likely to be consistent with those estimated based on relatively smaller changes. Moreover, recent behavioral economic research (for example, Bickel and Madden, 1997) suggests that, if anything, the effects of large price increases are likely to be disproportionately larger than what is implied by the estimates described above.

Finally, recent empirical studies that account for the addictive nature of smoking find that the long-run effect of a price increase on overall cigarette demand is about double the short-run effect. This implies that the long-run increases in revenues from large tax increases will be smaller than the short-run increases. However, the long-run reductions in cigarette smoking and the associated health benefits will be larger.

## DISCUSSION

Taken together, these estimates imply that the large increases in cigarette prices contained in recent proposals will lead to large reductions in adult cigarette smoking, resulting from both increased smoking cessation among adults as well as reductions in average cigarette consumption among adults who continue to smoking. Large increases in price resulting from either large increases in federal cigarette taxes or the imposition of large license fees on cigarette manufacturers will generate substantial increases in Federal revenues from cigarette taxes or licenses. In addition, these estimates imply that the large price increases will lead to disproportionately large reductions in youth cigarette smoking, including sizable reductions in the prevalence of youth smoking.

Using the Chaloupka and Grossman (1996) estimate for the price elasticity of youth smoking participation of  $-0.675$ , and assuming an average price per pack for cigarettes of \$2.00 (the average price in the U.S. as of November 1, 1997 [Tobacco Institute, 1998]), the impact of several recently-proposed cigarette price increases on youth cigarette smoking can be estimated. Based on these estimates and recent estimates from the CDC (1996) on future smoking related deaths among current youth, the health benefits of cigarette price increases can be predicted. Based on recent prevalence estimates, the CDC predicted that 16,620,878 youth in the 1995 cohort of 0 through 17 year olds would eventually become smokers. Given their estimate that 32 percent of regular smokers eventually die from a smoking-related disease, CDC estimates that 5,318,681 of these persons will die prematurely from smoking-related illnesses. Similarly, using a price elasticity for overall cigarette demand of  $-0.4$ , the revenue implications of federal cigarette excise tax

increases (or other revenue-generating mechanisms) can be evaluated.

Harris (1997) predicts that real cigarette prices would increase by 62 cents per pack under the terms of the June 20, 1997 settlement proposal. Similarly, the Congressional Budget Office (1998) estimates that this agreement would raise price by 63 cents per pack. These estimated price increases essentially pass through the industry payments called for in the "global settlement" to smokers in the form of higher prices, and depend on estimates of the price elasticity of overall cigarette demand and assumptions about the cigarette industry's response to the settlement. A price increase of this magnitude would reduce overall cigarette demand in the U.S. by approximately 12 percent, while reducing youth smoking prevalence by over 20 percent. Given recent estimates, the price increase would keep nearly 3.5 million youth in the 1995 cohort of 0 through 17 year olds from becoming regular smokers as adults and over 1.1 million fewer of them would die prematurely from smoking related illnesses. Given that this price increase would be initiated by cigarette producers, federal and state cigarette excise tax revenues would decline significantly as a result of the price increase. Federal tax revenues, for example, would decline by over \$650 million (1997 dollars).

The Harris and CBO estimates of the price increase resulting from the settlement also depend on assumptions about the nature of competition in the industry. The FTC (1997), for example, suggested that the settlement could result in more coordinated industry price increases that would exceed the cost of the settlement. Based on evidence concerning the effects of past state and federal cigarette tax increases on price, the FTC suggests that cigarette prices could increase by as much as \$1.20 per pack in five years as a result of the proposed settlement. This prediction is consistent with the cigarette

industry's estimates that prices would increase by at least \$1.50 in ten years as a result of the settlement (Lorillard Tobacco Company, et al., 1997). A price increase of this size would produce nearly double the reductions in overall and youth smoking described above.

Several other proposals, including those of Senators Kennedy (S. 1492), Conrad (S. 1638), Harkin (S. 1889), and Jeffords (S. 1648), call for price increases of \$1.50 per pack to be phased in over a relatively short period of time and then indexed to the rate of inflation. Price increases of this magnitude would lead to about a 30 percent reduction in overall cigarette consumption, while cutting the prevalence of youth smoking about in half. This translates into over 8 million fewer adult smokers in the 1995 cohort of 0 through 17 year olds, and approximately 2.5 million fewer smoking-related premature deaths in this cohort. In addition, a tax or licensing fee of this magnitude would generate an annual net increase in federal revenues of about \$22.5 billion (1997 dollars).

Senator McCain's recent proposal (S. 1415), a \$1.10 increase phased in over five years in 65, 5, 10, 20, and 10 cent increments and then adjusted for inflation would have a somewhat smaller impact, reducing overall cigarette demand by about 20 percent, while lowering the prevalence of youth smoking by nearly one-third. As a result, over 5.3 million fewer persons in the 1995 cohort of 0 through 17 year olds would become regular smokers and over 1.7 million fewer of them would die prematurely from smoking. A tax or licensing fee of this size would lead to a net increase in federal revenues of approximately \$19.5 billion per year (1997 dollars).

Others, including the Institute of Medicine and numerous public health groups have called for price increases of \$2.00 or more per pack. A sustained price increase of this magnitude would produce a 40 percent drop in overall cigarette demand while cutting the prevalence of youth smoking by

approximately two-thirds. This would reduce the number of adult smokers in the 1995 cohort of 0-17 year olds by over 11 million and extend nearly 3.6 million lives that would have been cut short by smoking.

## ADDITIONAL ISSUES

Opponents of large increases in cigarette taxes make two primary arguments: first, that cigarette and other tobacco taxes are regressive, since they fall most heavily on lower-income groups, and second, that higher taxes will create an incentive for cross-border smuggling and result in a substantial black market in cigarettes.

A 1990 report by the Congressional Budget Office, using data from the 1984-1985 Consumer Expenditure Survey, examined the issue of the regressivity of tobacco and other excise taxes. The report noted that expenditures on tobacco products increased with income except for those in the highest income quintile, but that as a percentage of post-tax income, spending on tobacco was highest in the lowest income quintile and fell almost proportionately with increased income. However, when expenditures on tobacco as a percentage of all expenditures were examined, the share of tobacco expenditures fell gradually over the first four income quintiles (from 1.6 to 1.1 percent) and dropped sharply only in the top quintile (to 0.7 percent). Thus, the CBO concluded, if annual family expenditures are more reflective of lifetime income than annual family income, then expenditures on tobacco are only slightly regressive over income classes.

The CBO went on to examine the distributional impact of cigarette tax increases on consumers by simulating the effects of a doubling of the then-16-cent Federal cigarette excise tax. At first glance, the simulated increase appeared to fall most heavily on the

lowest income groups. However, when income tax brackets and transfer payments were indexed to account for the price increases associated with the excise tax increase, the apparent regressivity of the tax was reduced. When looking at the tax increase relative to expenditures rather than income, the CBO concluded that cigarette taxes were approximately proportional rather than regressive. Finally, the CBO noted that the largest share of the simulated tax increase was paid for by families in the third and fourth income quintiles and that the smallest share was paid by families in the lowest income quintiles implying the tax increase would be somewhat progressive.

The possibility that cigarette tax increases could be progressive, in that the burden of the tax increase would fall more heavily on higher income groups, is supported by a few recent studies examining differences in price sensitivity by income. Townsend and her colleagues (1994), using data from the British General Household Survey, concluded that people in the lowest income groups were most responsive to price increases. Similarly, Chaloupka (1991), using U.S. data, found that less-educated persons were more responsive than more educated persons to changes in cigarette prices. Given the high correlation between education and income, this finding also implies that smoking among those in the lowest income groups would be most reduced by substantial increases in cigarette taxes and prices. This is confirmed by Farrelly, et al.'s (1998) recent analysis of data on cigarette smoking taken from 13 of the National Health Interview Surveys conducted since 1976. They estimate a price elasticity of cigarette demand for persons with incomes below the median that is roughly 50 percent higher than their estimate for the full sample. Together, these estimates imply that the health benefits of the reductions in smoking that would result from large cigarette tax increases would be

disproportionately larger in the lowest income populations.

To the extent that racial and ethnic minorities fall disproportionately into lower income groups, recent studies by Chaloupka and Pacula (1998), Farrelly, et al. (1998) and Evans and Huang (1998) also imply that the regressivity of large cigarette tax increases is overstated. Chaloupka and Pacula, for example, find that smoking prevalence among African American youth is about twice as sensitive to price as smoking prevalence among white youth. Similar findings are obtained by Evans and Huang for white and non-white youth and Farrelly, et al., for white, African American, and Hispanic adults.

Finally, as the CBO report pointed out, the U.S. system contains a mix of many different taxes and transfer programs that could be altered to offset any potential regressivity of an increase in cigarette and other tobacco taxes. To the extent that a significant portion of revenues generated by large cigarette tax increases would be spent on programs targeting low-income populations (as suggested in many recent proposals), the possible regressivity of the tax increases would be mitigated.

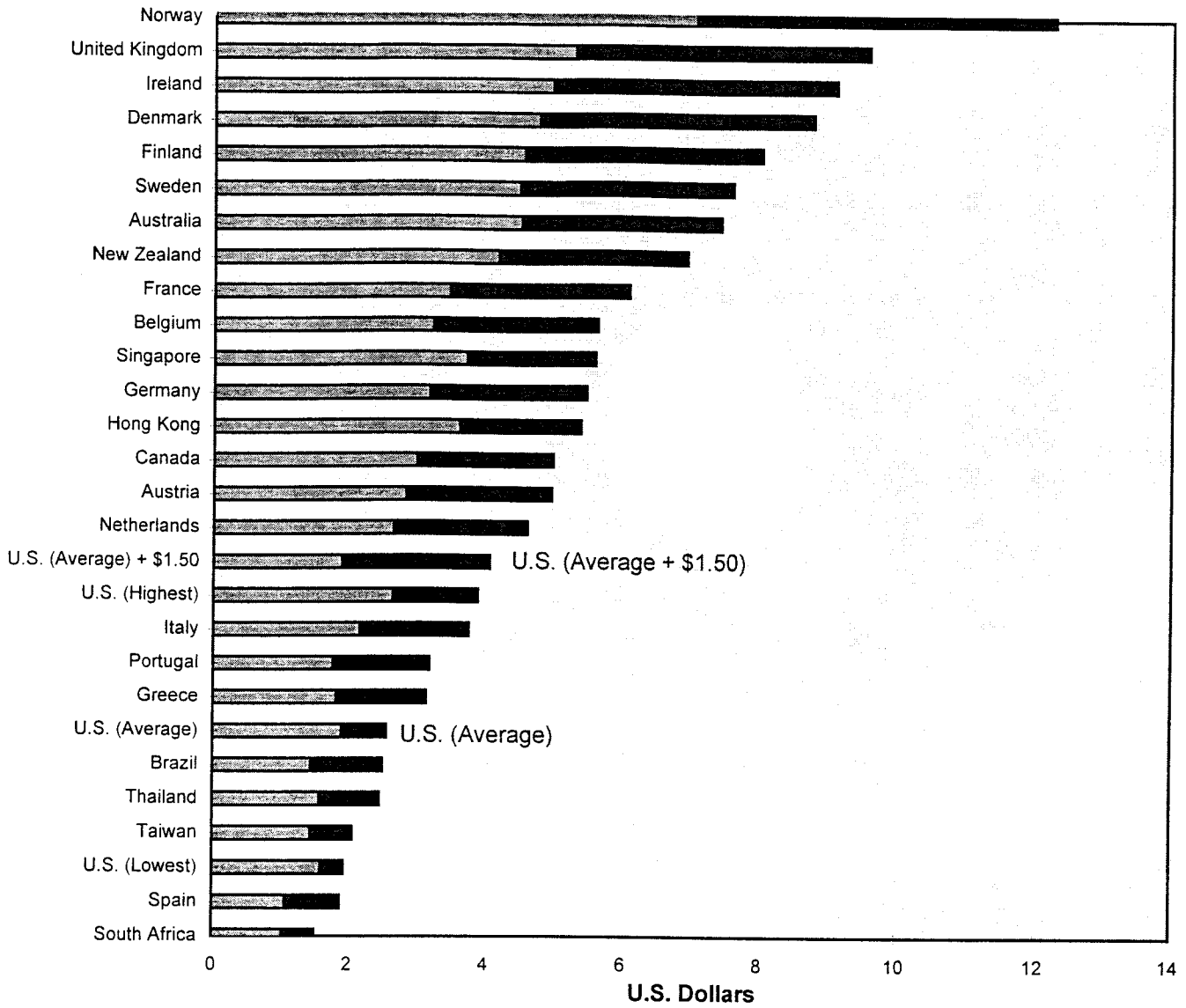
The second argument, that large cigarette price increases will necessarily lead to rampant cigarette smuggling and a large black market in cigarettes in the U.S., is the focus of a recent industry-sponsored advertising campaign. This argument is based on the hypothesis that large tax increases will produce large differences in cigarette prices between the U.S. and other countries that will create opportunities for profit from illicit trade in cigarettes. However, among industrialized countries around the world (as shown in Figure 1, page 10), the U.S. has one of the lowest average prices and taxes on cigarettes. Even a \$1.50 increase in the average cigarette price in the U.S. would be insufficient to put the U.S. in the top 15 countries globally in terms of cigarette prices.

Moreover, recent research by Joossens and his colleagues on the European experience (Joossens and van der Merwe, 1997; Joossens and Raw, 1995) suggests that the presence of an informal distribution network, nonexistent or weak policies concerning cigarette smuggling and their lack of enforcement, and other factors can be as important as price differences in spawning cigarette smuggling. They note, for example, that there is little evidence of cigarette smuggling in some high-priced European countries (including France and the U.K.), while there is extensive evidence of smuggling in those with relatively low cigarette prices (including Spain and Italy). Joossens and his colleagues suggest that much of the cigarette smuggling that does occur in Europe and globally is actually encouraged by the large, multinational tobacco companies.

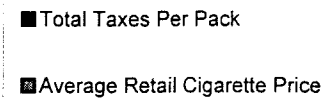
The Canadian experience during the 1980s and early 1990s is used as evidence that widespread cigarette smuggling would result from large increases in U.S. cigarette taxes. As a result of significant increases in Canadian cigarette taxes beginning with the adoption of an *ad valorem* cigarette tax in 1980 and culminating with Federal tax increases of 2 cents per cigarette in 1989 and another 3 cents per cigarette in 1991, the average tax per pack of cigarettes in Canada at the start 1994 was more than five times the average U.S. tax. This large disparity in taxes and, consequently, prices led to substantial smuggling of cigarettes from the U.S. to Canada. This problem was exacerbated by the long stretches of unmonitored border between Canada and the U.S., relatively weak border controls, and the high concentration of the Canadian population living near the U.S. (Sweanor and Martial, 1994).

Moreover, there is evidence that Canadian tobacco companies encouraged and participated in this cigarette smuggling. Much of the black market trade was in Canadian-produced cigarettes that had been exported to the U.S. and then smuggled back into Canada;

### Global Cigarette Taxes and Prices (U.S. Dollars)



Average retail cigarette price and total taxes per pack (U.S. Dollars/Pack), Selected Countries, December 31, 1996. U.S. average = state average + 24 cent federal tax. Source: David Swenor, Smoking and Health Action Foundation, April 30, 1997.



relatively little involved cigarettes produced in the U.S., since these cigarettes contain a different blend of tobacco that is less desired by Canadian smokers (Sweanor and Martial, 1994).

At least partially in response to an aggressive industry-sponsored advertising campaign, the federal tax on cigarettes in Canada was sharply reduced in 1994 and the government agreed to additional reductions to match provincial reductions in cigarette taxes. These cuts led to sizable reductions in Canadian cigarette prices and to a sharp decline in cigarette smuggling into Canada.

Nevertheless, average Canadian cigarette prices are still well above average prices in the U.S., and would remain higher even if any of the proposals for large increases in U.S. taxes was adopted (see Figure 1). Given this, it is very unlikely that there would be widespread smuggling of cigarettes from Canada into the U.S. in response to sizable increases in U.S. cigarette prices. Indeed, given the support for tobacco control in Canada and the past increases in taxes, it is likely that an increase in U.S. taxes would be followed by an increase in Canadian taxes.

Cigarette prices in Mexico, however, are well below those in the U.S., and large increases in U.S. prices might make this a lucrative avenue for illicit trade in cigarettes. To date, however, there is no empirical evidence that supports the contention that there is significant cigarette smuggling from Mexico into the U.S. in response to existing price differences. Furthermore, unlike the Canadian-U.S. border, the border between the U.S. and Mexico is relatively short and heavily guarded, making it much more difficult to smuggle large quantities of a bulky product like cigarettes.

Finally, several relatively easy to implement policies could be adopted that would make it much more difficult to smuggle cigarettes (Joossens and van der Merwe, 1997). These include requiring prominently displayed

tax-paid markings on all tobacco products and sizable increases in the penalties for tobacco smuggling. The Advisory Commission on Intergovernmental Relations (1985), for example, concluded that the Trafficking in Contraband Cigarettes Act of 1978 (PL 95-575) which prohibited the transportation, receipt, shipment, possession, distribution, or purchase of large quantities of cigarettes that did not bear the tax indicia of the state in which the cigarettes are found, led to a significant reduction in interstate cigarette smuggling resulting from interstate differences in cigarette taxes and prices. A comparable, well-enforced policy dealing with cigarettes originating outside the U.S. could be adopted.

## CONCLUSIONS

A large literature from economics clearly indicates that large cigarette price increases will lead to substantial reductions in cigarette smoking, particularly in the prevalence of cigarette smoking among youth. When combined with other tobacco control activities, including prevention and cessation programs, counter-advertising, comprehensive and aggressive enforcement of limits on youth access, and more, even larger reductions in youth and adult smoking could be achieved.

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