

## Brief report

# Critique of the Philip Morris study of the cost of smoking in the Czech Republic

**Hana Ross**

[Received 18 November 2002; accepted 20 March 2003]

**This critique analyzes the methodology used in a study of the economic burden imposed on public finances in the Czech Republic by the consumption of cigarettes. The study was prepared by a consulting firm on behalf of the Phillip Morris Company. This critique, by using economic theory and a cost-benefit methodology, refutes the conclusion of the Phillip Morris study that smoking represents an economic benefit to Czech state finances. In fact, the correction of only one among numerous errors in assumptions and calculations in the Phillip Morris study leads to the opposite conclusion: Instead of savings of \$150 million per year, smoking drains at least \$373 million from the state budget annually, nearly .8% of the Czech gross domestic product. The net loss to the society is even greater if all pertinent costs and benefits are calculated properly. The critique demonstrates how to craft a rigorous economic response to common industry attempts to influence public opinion in which the industry employs specious or erroneous assumptions and data.**

**Introduction**

In 2000, Philip Morris CR a.s. commissioned Arthur D. Little International, Inc., to measure the effects of smoking on the public finance balance in the Czech Republic in 1999. Their study (A. D. Little, 2001) found that smoking cost the state budget 15,647 million CZK<sup>1</sup> (\$403 million) per year. The analysis went on to point out that the government collects about 20,270 million CZK (\$522 million) in cigarette taxes and saves an additional 1,192 million CZK (\$31 million) on retirement pensions and other government-provided services for the elderly. These savings occur because smokers die prematurely, thus collecting a disproportionately smaller share of these benefits. The A. D. Little consultants concluded that cigarette consumption is therefore beneficial for the Czech Republic because it saves the state budget every year about 5,815 million CZK (\$150 million), if not more. In short, smokers not only pay high sin taxes but also die before collecting their full pension benefits. This

<sup>1</sup>Exchange rate used throughout the analysis is \$1 = 38.8 Czech Crown (CZK).

Hana Ross, Ph.D., Health Research and Policy Centers, School of Public Health, University of Illinois at Chicago.

Correspondence: Hana Ross, 850 W. Jackson Boulevard, Suite 400, Chicago, IL 60607, USA. Tel: +1 (312)-413-5423; Fax: +1 (312)-355-2801; E-mail: hanaross@uic.edu

conclusion was presented to Czech lawmakers in order to dissuade them from enacting restrictions on smoking or sale of tobacco products.

It is no longer disputed that the use of tobacco leads to a variety of adverse health and economic consequences. Many countries have a strong interest in the economic evaluation of smoking behavior. Estimating the costs and benefits helps to prioritize public health policies and to develop effective programs for reducing the harm associated with tobacco consumption. In this respect, the A. D. Little estimates were the first attempt in the Czech Republic to fill the knowledge gap regarding the economic consequences of smoking. Unfortunately, the study was a flawed, incomplete economic analysis. The budgetary impact of smoking represents only one dimension of the economic impact of cigarette consumption. Thus, the analysis provided a misleading picture of the economic consequences of tobacco use in the country.

The purpose of this paper is to contrast the study's methodology and results with a more rigorous academic approach to the economic analysis of tobacco consumption. It points to obvious and also less obvious flaws in the methods used by the A. D. Little consultants and shows that the results of the study are indefensible. The approach applied in this

analysis can serve as a model for addressing similar economic arguments frequently promoted by the tobacco industry.

### *Theory and literature review*

The appropriate definition of the cost of smoking, and the perspective from which these costs are counted, are dictated by the policy question to be answered. The perspective, for example, could be that of a government department, the health care sector of the economy, or all of society. Consistency in defining costs is particularly important to avoid double counting and identifying transfers of funds in the economy (as opposed to costs) (Lightwood, Collins, Lapsley, & Novotny, 2000).

The method used by the A. D. Little analysts, if applied correctly, would belong to the category of expenditure-based cost analysis studying monetary expenditures and revenues that occur because of tobacco use. This method excludes intangible costs (e.g., the value of lost life) and examines transfers within or between sectors, none of them being real economic costs.

Studies evaluating the economic consequences of smoking usually belong to the category of cost-of-illness analyses, in which the impact of smoking is quantified considering the social costs of treatment, prevention, and law enforcement; plus losses of productivity related to increased morbidity and mortality; plus various measures of the quality of life years lost. These costs are then contrasted with a hypothetical situation in which smoking is completely eliminated from the society. Such studies rely on the notion of opportunity costs—resources that could be used elsewhere if smoking did not exist. However, they are not uniform in what they designate as costs and how they measure them.

Most published studies clearly distinguish between the social (external) and private (internal) costs of smoking. According to value theory, based on the rational economic model, private costs are at least matched by private benefits and have zero economic impact on the rest of society. They are borne by a smoker (or other private parties) and enter into the decision-making process of a rational individual evaluating his or her smoking behavior. Tobacco, unlike most other goods, also imposes social, external costs when consumed. The external costs are either borne by society as a whole or by individuals, including nonsmokers. The existence of social costs (economists call them externalities) justifies government involvement in regulating tobacco consumption and constitutes an economic rationale for the excise tax on tobacco products. An economically efficient excise tax should at least cover smoke-related external

costs. Another important role of the excise tobacco taxes is to discourage present and future smoking behavior.

An alternative approach to measuring the costs of smoking is based on the theory of addiction, which assumes that individuals underestimate their risk of nicotine dependency and costs of reducing or eliminating this addiction. According to this theory, the costs of smoking also include both social costs and private costs incurred by smokers. Recent literature has debated whether such internalities justify government action (Cutler, 2002; Gruber & Mullainathan, 2002).

Several studies have evaluated the economic impact of smoking in the United States. For example, Manning, Keeler, Newhouse, Sloss, and Wasserman (1989, 1991) estimated the lifetime, discounted costs that smokers impose on others. They concluded that the external costs of smoking are modest, ranging from  $-\$0.91$  to  $\$0.24$  per pack with different discount rates. However, Manning et al. considered only medical costs of a smoker over his or her lifetime that are not directly paid for by the smoker or his or her family and failed to include other external costs such as costs of second-hand smoking. When the authors included the value of life years lost, it became evident that smoking imposes an economic burden on society.

Hodgson (1992) estimated the total lifetime medical costs of an American smoker independent of who incurs them. This approach corresponds to the addictive theory of smoking behavior. Hodgson's estimates are larger than those of Manning et al.: They suggest that the lifetime medical costs of a smoker exceed those of a nonsmoker by 32% and 24% for males and females, respectively. However, Hodgson did not account for the different characteristics of smokers and nonsmokers. According to Manning et al., about 13% of the difference in medical costs of smokers and nonsmokers can be explained by characteristics other than smoking. Hodgson also estimated that public funds do not pay for more than 18% of these costs.

Miller, Zhang, and Rice (1998) estimated smoking-attributable fractions among both known smoking-related and other diseases. They adjusted their estimates based on demographic and socioeconomic characteristics, risk attitudes, health status, and health insurance status using U.S. cross-sectional data from 1987. The authors estimated the gross costs of smoking for the United States in 1993 to be  $\$72.7$  billion or 1.15% of the U.S. gross domestic product (GDP).

Several studies based on the addictive theory calculate internal costs of smoking. Under the assumption that smokers die on average about 6 years earlier than nonsmokers, smokers lose about 2 hr per pack of cigarettes. Based on estimates of the value of life agreed upon in the literature (about  $\$100,000$  per year; Cutler & Richardson, 1997; Tolley,

Kenkel, and Fabian, 1994), the cost to a smoker from early mortality alone (ignoring morbidity, out-of-pocket medical expenses, and discounting) is about \$22 per pack, greatly exceeding the external cost estimates.

Viscusi (1995) used 1993 U.S. data to assess both the external and internal costs of smoking, but he focused mostly on the effect on public finances. He proposed that smokers overestimated the risk of smoking; thus, they more than internalized their cost of addiction. Viscusi concluded that cigarette taxes were well above the optimal tax level given the externalities associated with smoking. However, his analysis overlooked important social costs attributable to smoking such as the value of life years lost and production losses. In addition, the author claimed that the current medical costs associated with smoking are overestimated owing to a decreasing level of tar present in cigarettes over time. This assumption is contradicted by recent evidence demonstrating that health damage of smoking may be worse than previously thought, especially given the detrimental effects of components of cigarettes other than tar, and that the medical care costs attributable to cigarette consumption are increasing over time (Centers for Disease Control and Prevention [CDC], 2002; International Agency for Research on Cancer, 2002). Viscusi's recommendation to subsidize tobacco consumption was disregarded by public policy makers in the United States.

The approach used by A. D. Little to evaluate the effect of smoking on the state budget has no precedents in the peer-reviewed economic literature. However, the consultancy firm prepared a similar analysis on behalf of the Philip Morris Company for the Netherlands in 1997. The study, titled "Public expenditure balance of smoking in the Netherlands," was never published.

## Method

The method applied by A. D. Little is grounded neither in value theory nor in addiction theory, and resembles most closely an expenditure-based cost analysis. Therefore, the study considered only the effect of smoking on public finances, not on society as a whole, thus providing a misleading and incomplete picture of costs borne both by individuals and by the society as a whole. It failed to compare the current situation with an alternative (an economy without tobacco) and to distinguish between internal and external costs of smoking. Identifying the two types of costs is essential for evaluating the level of tobacco taxation and for assessing the individual utility of smoking. By evaluating the effect of smoking through a framework of public finances, the study shifted the focus from the issue of net economic loss to the issue of resource distribution (or redistribution).

Table 1 points to the methodological weaknesses of the study by providing an overview of internal and external costs of smoking and by showing which of these costs were taken into account by the A. D. Little analysts when estimating the effect of cigarette consumption on state finances.

It is evident that the study failed to include important costs, some of which are linked directly to the state budget. For example, it did not consider the loss of income tax from smokers on medical leave or from retirees in the labor force, lower productivity among smokers working in the public sector, disability benefits paid for by the public funds, or social security benefits distributed to the dependents of tobacco victims, all items having direct links to the state budget. In this respect, the study failed to accomplish its own goal: It underestimated the effect of tobacco consumption on state finances.

In addition, the A. D. Little analysts failed to include other external costs of smoking such as the value of human capital lost because of smoking-related or environmental tobacco smoke (ETS)-related premature death, the loss of the value of household production from those who died prematurely owing to smoking or ETS, the loss of productivity among smokers, the loss of income and out-of-pocket medical expenditures among ETS victims, the loss of income from retirees in the labor force, the loss of income for those dependent on tobacco victims, and the like.

By neglecting the value of human capital, the Phillip Morris study implied that the value of a retired person's life is zero, and that the value of a person at a productive age is equal only to his income tax contributions to the budget. This approach ignores the productive value of a retired person to society. Even though not in the formal labor market, retirees, through home production, are economically productive. To illustrate, consider the service of baby-sitting often provided by retirees. This service offers benefits not only to individuals (releasing their time for other activities) but also to the whole society by allowing parents to participate in the labor force (thus increasing their income tax contributions to the state budget) and by savings on social benefits otherwise distributed to low-income families, mothers on maternity leave, and those who are unemployed.<sup>2</sup> Many other examples can be found for the productive value added by retirees, such as home food production, which still plays an important role in Central and Eastern Europe.

Even though studies assessing the value of human lives vary considerably in their conclusions, estimates of the value of human life almost never fall under

<sup>2</sup>The assumption is that it is harder for a woman with small children to find a job if her time available for work is dependent on day care facilities with limited hours and on her need to take care of children when they are sick. The use of day care facilities also increases the probability of children getting sick more frequently.

**Table 1.** Costs of smoking.

Internal costs	External costs	Costs in the Phillip Morris study
Costs related to premature mortality <b>Value of smoker's life</b> <b>Value of smoker's human capital for the dependents</b> <b>Grief of relatives</b> <b>Value of forgone smoker's income potential</b> <b>Denied life insurance benefit due to negligence</b>	<b>Value of human capital (smokers &amp; ETS victims)</b> <b>Value of foregone income for ETS victims</b> Foregone income tax and social security contributions (smokers & ETS victims in productive age, and <b>retirees in labor force</b> ) <b>Foregone contributions to private pension and life insurance funds</b> <b>Higher life insurance benefits premium (nonsmokers)</b> <b>Social security benefits paid to dependents of a deceased smoker</b> <i>Uncollected social security benefits for retirees: pensions, nursing homes, medical care, etc.</i> <i>Smoke-related medical care costs covered directly from the state budget</i>	Foregone income tax and social security contributions (smokers & ETS victims in productive age) <i>Uncollected social security benefits for retirees: pensions, nursing homes, medical care, etc.</i>
Costs related to morbidity <b>Pain/suffering (smoker and family)</b> <b>Medical costs (out of pocket)</b> <b>Higher health insurance premium (smokers)</b> <b>Loss of income due to illness or disability</b> <b>Lower productivity among workers in private sectors</b>	<b>Pain/suffering (ETS victims and their family)</b> <b>Medical costs for ETS victims (out of pocket)</b> <b>Higher health insurance premium (nonsmokers)</b> <b>Smoke-related medical care costs covered directly from the state budget</b> Sick leave covered by employer or state (smokers & <b>ETS victims</b> ) <b>Loss of income tax (smokers &amp; ETS victims)</b> <b>Disability and social security benefits paid both from public and private funds</b> <b>Lower productivity among workers in both public and private sectors</b>	Reimbursement of medical costs (smokers & ETS victims) Sick leaves covered by insurance, employer, or state (smokers)
Costs related to fire <b>Out-of-pocket property loss due to fire</b>	<b>Higher costs of property insurance</b>	Value of lost property
Costs related to consumption of tobacco products <b>Expenses on tobacco</b>	<i>Excise tax, valued added tax (VAT), customs duty</i>	<i>Excise tax, VAT, customs duty</i>

Based on Manning et al. (1989) and adjusted by the author.

ETS, environmental tobacco smoke.

Items in boldface were neglected in the Phillip Morris study. Items in italics were savings as identified in the Phillip Morris study.

hundreds of thousand of U.S. dollars. For example, Manning et al. (1989) used the willingness-to-pay method to estimate a value of \$1.66 million per life. Including this cost in the analysis of smoking would begin to capture the enormous economic loss associated with smoking.

The Phillip Morris study did not consider the internal costs borne by smokers themselves and by other private parties (e.g., employers). These costs represent true opportunity costs. Had there been no tobacco in the country, the money spent on tobacco and on medical care related to smoking would have been spent on other products or been saved and invested. Depending on spending patterns of current smokers (or those who quit smoking), this should lead to an improved trade balance (if the new spending pattern is more favorable to domestic products), to more investments (if some released funds are saved), or to higher employment (if the demand shifts to more labor-intensive sectors of the economy).

The internal costs borne by private employers result from lower productivity among smoking employees, since they spend a certain percentage of their working hours pursuing their habit. In addition, smokers have more sick days, which represent additional losses to a company.

The internal costs of smoking are much higher than the external costs. Estimates from the United States suggest that internal costs are more than 100 times larger than external costs (CDC, 2002). In addition, recent economic literature suggests that the existence of some internal costs also may justify government intervention in the private decision on smoking behavior. The rationale is that not all individuals correctly account for the adverse effects of smoking behavior on their own health. Most people start smoking as adolescents (42% of smokers start before age 16 years, and 75% begin before age 19 years; Cutler, 2002), underestimating their ability to deal with nicotine addiction. A study of high school seniors in the United States reported that 56% of respondents said they would not be smoking in 5 years, but only 31% had quit by that time (U.S. Department of Health and Human Services, 1994). Government intervention, such as tax increases, leads to less consumption of an addictive substance and can help individuals to better assess the cost of their addiction. Under these circumstances, the efficient level of cigarette taxation should exceed the smoking-related external costs.

## Results

Ignoring important cost categories is not the only error in the Phillip Morris study. It also incorrectly estimated the costs it considered. For example, smoking-related medical care costs were calculated

based on information from only one health insurance company, the General Health Insurance Company (the VZP). Because this insurance company covers only about 74% of the population, the medical care costs of approximately 26% of smokers were neglected.<sup>3</sup> The rationale of A. D. Little for excluding other insurance companies is the direct link of the VZP to the government budget, which is unique to this insurance group. However, the VZP, in fact, is an independent company with government guarantees. It can, for example, ask the government for a temporary loan, which must be paid back in the following budget cycle. If the goal of the A. D. Little analysts was to evaluate the relationship between smoking and public finances, health care costs reimbursed by any insurance company operating in the Czech Republic should not have been included. Yet a thorough economic analysis of tobacco consumption would count as costs the excess health insurance premium paid by non-smokers (external costs) and smokers (internal costs) because of the presence of smokers in the insurance pool.

The A. D. Little analysis was based on a series of questionable assumptions. It used an old estimate of the number of years lost owing to smoking in the United States (5.23 years lost, estimated by Lippiatt in 1990), which stands in sharp contrast with the most recent CDC estimates of 13.2 years lost for males and 14.5 years lost for females (CDC, 2002). These CDC predictions are considered more reliable because they are based on an improved methodology, and because they correspond to the time period evaluated in the study. Eva Kralikova, a smoking-prevention specialist at Charles University's First Medical Faculty in Prague, argued that smoking shortens smokers' lives in the Czech Republic by an average of 8–10 years (Swoger, 2001).

The Phillip Morris study used outdated estimates of smoking-attributable mortality based on an article by Peto et al. 1994, predicting that 22,000 persons die in the Czech Republic every year related to smoking. Other estimates suggest a higher death toll: Pert Sadilek calculated that 24,897 deaths were attributable to smoking in 1998 (Swoger, 2001); the Minister of Health of the Czech Republic, Bohumil Fiser, reported to the Czech Parliament in summer 2001 (after the release of the Phillip Morris study) that the estimated mortality attributed to smoking is 23,000 persons a year.

Using the up-to-date figures for the number of years lost and smoking-attributable mortality would change the study's estimates for both uncollected social security payments (positive effect on the state budget), and forgone income tax and Social Security contributions (negative effect on the state budget). In

<sup>3</sup>This estimate is based on the assumption that smokers are equality distributed between VZP and other insurance companies.

addition, the overall negative economic impact of smoking would increase owing to higher losses of human capital.

The estimates presented in the study are very sensitive to the share of smokers dying at a pre-retirement age. The study assumed that 33% of smokers die at a productive age (about 7,260 persons per year in 1999) but also admitted that it could be as high as 50%. Unfortunately, no literature was cited to support this wide range of estimates. To its benefit, the Phillip Morris study used the lower estimate, 33%, which led to higher budgetary savings owing to uncollected Social Security and lower losses from forgone income tax and Social Security contributions.

A. D. Little used the average annual health care costs of a retired person to estimate budgetary savings from earlier death among those who smoke. This approach is incorrect if the purpose of the study was to look at the impact on state finances. As explained above, private health insurance companies cover health care costs in the Czech Republic, and the state budget is responsible for the health insurance premium for retirees. The total amount of health care expenses would be considered only under the analytical approach comparing a society with and without tobacco, which was not applied by the Phillip Morris study. Even if premature death among smokers saves medical care resources, these savings need to be offset by higher health care expenditures during smokers' lives in order to determine if a smoker causes a burden to the health care system. Estimates based on the United States from the late 1980s (Hodgson, 1992) indicated that a male smoker's medical bill exceeded that of a male nonsmoker by about 32%.

The study's estimates of medical care expenditures attributable to smoking during a smoker's life were in sharp contrast with similar estimates of Sadilek (2001). The Philip Morris study calculated that total health care costs in the Czech Republic attributable to smoking were 11,422 mil CZK in 1999. Sadilek suggested that inpatient services related to smoking alone reached at least 22,989 mil CZK in that year. According to Sadilek's calculation, the total health care costs of smoking would largely exceed those presented in the Phillip Morris study.

Even though the A. D. Little consultants recognized that health care costs would increase with the rising standard of living in the Czech Republic, they applied this notion selectively, only when they calculated medical care savings from premature smoking-related deaths, not when they estimated losses owing to medical care expenses associated with smoking. Thus, the study demonstrated inconsistency within itself when applying its own assumptions.

The A. D. Little analysts found that the Czech government benefitted from the use of tobacco mostly by way of collecting tobacco excise taxes. These taxes accounted for almost 73% of the benefits of smoking as presented by the study. In an economic framework, the excise taxes offset the external costs associated with tobacco use (and are designed for that purpose), but they represent only a transfer of resources already created in the economy, not new assets. The same transfer of resources can occur if, in a tobacco-free society, taxes are levied on alternative goods and services. Therefore, these taxes cannot be viewed as benefits associated solely with tobacco consumption. The only value of tobacco as a tax base is that it is relatively easy to administer (from the highly concentrated tobacco industry), easy to justify (based on public health arguments and the argument that tobacco has no productive value), and minimizes the dead weight loss of consumer's surplus from low price elasticity of the products (lower consumption induced by higher tax decreases consumer's utility less compared with other goods). Therefore, the only adverse welfare impact from collecting taxes from a different base would be the marginal costs associated with the switch to an alternative taxable product or service, such as alcohol, waste, fuel, or the like. It is true that some of the costs associated with selection of an alternative taxation base would be political, because new taxes on alternative products or services might difficult to sell to the public.

The Philip Morris study also counted the income tax on the above-average profit of the tobacco industry as additional benefit to state finances. However, such profit is only a temporary condition in competitive markets and should disappear in such markets in the long run. It is the government's role to address any kind of market imperfections such as monopoly or oligopoly powers that leads to above-average profit.

In general, the A. D. Little results were presented in a very confusing manner, rendering replication of many results difficult. On the few occasions when the results could be replicated, the A.D. Little estimates did not correspond to results arrived at using generally accepted methodologies. For example, a mistake was made in estimates of the costs associated with smokers missing work owing to smoking-related illness. The study claimed that the Czech Republic has 2,237,000 smokers of productive age. On average, each of them misses 4.5 days of work because of medical conditions related to smoking. Simple multiplication would indicate that the society loses 10,066,500 workdays related to smoking every year. The authors claimed a total of 19,118,553 workdays were lost because of any illness in the country that year (1999). This result implies that more than half of days out of work because of any illness were related to smoking. Such an estimate

does not seem to be realistic and contradicts the study's own assertion that only 10% of sick days are smoking related.<sup>4</sup>

Another obstacle in replicating the results is the unreadable mathematical formulas (e.g., the formula calculating direct health care costs) and formulas with suspected typographical errors (e.g., the formula calculating savings for elderly persons housing). Unexplained abbreviations (e.g., EBT, for earnings before taxes) and nonsystematic rounding of numbers add to the confusion. The study failed to provide important references such as the source of smoking-attributable mortality and morbidity. Such references would be of particular interest, because Czech-specific estimates of this sort do not exist. The authors themselves undermined the credibility of the analysis by disclaiming any responsibility for the presented results and by urging any third party to verify the contents of the report.

At this moment, there are no publishable estimates of the costs of smoking in the Czech Republic using the correct methodology, because data are not available. However, it is possible to predict the direction in which the estimates of the Phillip Morris study would differ if a correct methodology were applied. Table 2 summarizes the results of this analysis.

The table has two parts, one containing the cost and benefit items included in the Phillip Morris study (with the estimates reported by A. D. Little), the other listing items excluded from the Phillip Morris study. The second column indicates how the application of a correct methodology would reduce the estimate of smoking-related costs provided by A. D. Little consultants, and the third column shows what may lower the estimated benefits of smoking.

The study omitted or miscalculated many more items reducing the benefits of smoking compared with those reducing the costs of smoking. Simply excluding collected taxes from the calculation would reduce the A. D. Little estimates of the benefits of smoking to 1,192 million CZK, resulting in total loss of 14,455 million CZK for the state budget. This would completely reverse the results: The budget burden of smoking in the Czech Republic would be about 13 times greater than the budget savings linked to tobacco consumption. The costs would outweigh savings even more if the study corrected its estimates as indicated in Table 2.

## Discussion

To summarize, the Phillip Morris study was not a true economic analysis of the impact of tobacco consumption, and it even failed to correctly assess the financial

consequences of smoking for the state budget of the Czech Republic. The study was flawed and could be dangerous if used as a self-serving rationale for addicted smokers or protobacco advocates. The correct approach to economic evaluation of tobacco consumption would be to compare two alternatives: The Czech economy with tobacco vs. the Czech economy without tobacco. Such an evaluation could be done from different perspectives: From the perspective of public sector finances, from the perspective of an individual or a private employer, or from the perspective of the whole society. The study's results did not inform policy makers about the public health policy choices they face. The study included no evaluation of the impact of increased tobacco taxation, advertising bans, counter-advertising, and information campaigns or cessation programs.

The conclusions of the study reflect the flawed methodology and data deficiencies. Even if the narrow perspective of the Philip Morris study is ignored, the results depend heavily on counting tobacco taxes as benefits of smoking. Correcting the analysis for this inaccuracy alone leads to an opposite conclusion: Smoking imposes a net loss of 14,455 million CZK (or \$373 million) to the state budget, almost .8% of the Czech Republic's GDP. This result is still an underestimation, because many other costs, such as correct estimates of medical care related to smoking, loss of human capital, and slower economic growth owing to worse public health, are not included in this calculation.

The release of the public finance study was not the first attempt by the tobacco industry to misinform the public. The motivation to finance such a study in the Czech Republic became clear when its executive summary was distributed in June 2001 to members of the Czech Parliament during the discussion of two important bills: A bill on protection against tobacco, alcohol, and addictive drugs, which would strengthen the tobacco control measures in the country; and an advertising law proposing tobacco advertising restrictions. At the same time, the Czech Republic was debating the alignment of its tax system, including tobacco taxes, with that of the European Union (EU).<sup>5</sup> These laws and the adjustment to the higher tobacco tax level of the EU would have had direct adverse consequences for Philip Morris, the manufacturer of 80% of cigarettes consumed in the Czech Republic.

The developments surrounding the release of the Philip Morris study<sup>6</sup> point to an urgent need for tobacco control research and advocacy in the Czech Republic. Even though the study generated an immediate uproar in the international public health

<sup>4</sup>According to the study, the total social benefits paid for time out of work due to illness in 1999 reached 16,430 million CZK, out of which 1,667 million CZK were attributed to smoking.

<sup>5</sup>Czech cigarette taxes were 46% of purchase price in 2001, compared with EU recommendations of 59%.

<sup>6</sup>The study was completed in November 2000 and made public in May 2001.

**Table 2.** What would change Phillip Morris estimates of the effect of smoking on the state budget.

Cost/benefit item and amount	What would reduce the Phillip Morris estimate of costs of smoking \$15,647	What would reduce the Phillip Morris estimate of benefits of smoking \$21,462
Cost/benefit items included in the Phillip Morris study		
Lost income tax and social security contributions (smokers & ETS victims in productive age) 1,367 mil CZK=\$ 35.2 mil		More accurate estimate of years of life lost due to smoking Alternative estimates of premature deaths due to smoking Alternative percentage of smokers dying in productive age Alternative percentage of smokers dying in productive age
<i>Uncollected social security benefits: pensions, housing and medical care for elderly, etc.</i> 1,192 mil CZK=\$ 30.7 mil	More accurate estimate of years of life lost due to smoking Alternative estimates of premature deaths due to smoking Inclusion of smoke-related medical care costs covered directly from the state budget	Replacement of saved total medical costs by saved insurance premium for retirees
Health care costs (smokers & ETS victims) and sick leaves (smokers) 14,231 mil CZK=\$ 366.8 mil	Replacement of medical costs reimbursement by insurance premium Omission of sick leave covered by private insurance companies	Use of higher, more realistic estimates of medical costs of smoking Inclusion of smoke-related medical care costs covered directly from the state budget Inclusion of sick leave for ETS victims Exclusion of taxes from the calculation
Fire-induced costs 49 mil CZK=\$ 1.3 mil <i>Excise tax, value added tax (VAT), custom duty, corporate income tax</i> 20,270 mil CZK=\$ 522.4 mil		
Cost/benefit items excluded from the Phillip Morris study		
<b>Foregone income tax and social security contributions (retirees in labor force)</b>		Inclusion of these costs
<b>Social security benefits paid to dependents of a deceased smoker</b>		Inclusion of these costs
<b>Sick leave covered (ETS victims)</b>		Inclusion of these costs
<b>Disability and social security benefits paid from public funds</b>		Inclusion of these costs
<b>Lower productivity among workers in both public and private sectors</b>		Inclusion of these costs

ETS, environmental tobacco smoke.

Items in boldface were neglected in the Phillip Morris study. Items in italics were savings as identified in the Phillip Morris study.



community, it initially eluded the attention of the Czech media. This delayed reaction of the Czech press reflects not only the social acceptability of smoking in the whole Eastern and Central European region but also the absence of local specific research evidence that the local tobacco control community could use for a quick and targeted response to attempts to undermine the public health policy agenda.

In July 2001, after being taken to task by the world press (Pellegrini, 2001; "Smoking is cost-effective, says report," 2001; Swoger, 2001; "Tobacco's death benefits," 2001) and on the Internet (Bates, 2001; "Morris study blasted," 2001), Philip Morris apologized for the study and canceled similar ones planned for Poland, Slovakia, Hungary, and Slovenia.

However, a serious economic analysis of the study is still lacking. This critique fills the gap and analyzes the Phillip Morris study using the economic framework to evaluate critically both the methodology and the results of the study. When the results are scrutinized using an economic framework, additional errors ranging from simple calculation and typographical errors to exclusion of important items from the economic analysis are revealed. This critique can serve as an example of an analytical approach to crafting a rigorous economic response to similar sorts of industry arguments that may appear in the future.

### Acknowledgments

The author thanks her husband, Jonathan Ross, for his help in editing this paper and for his continuous support of her research. Further, the author thanks colleagues David Collins and Helen Lapsley from Australia, recognized experts in the area of costs of smoking, for their helpful comments. Last, but not least, the author thanks Czech and Polish colleagues for inviting her to write this paper.

### References

A. D. Little International Inc. (2001). Public balance of smoking in the Czech Republic. Report to Philip Morris CR a.s. Retrieved February 24, 2003, from <http://www.tobacco.org/Documents/001128pmlittleczech.html>

Bates, C. (2001). Death and taxes: A response to the Philip Morris study of the impact of smoking on public finances in the Czech Republic. Action on smoking and health. Retrieved February 24, 2003, from <http://www.ash.org.uk/html/international/html/czechstudy.html>

Centers for Disease Control Prevention. (2002). Annual smoking-attributable mortality, years of potential life lost, and economic costs – United States, 1995–1999. *Morbidity and Mortality Weekly Report*, 51(14), 300–3003.

Cutler, D. M., & Richardson, E. (1997). *Measuring the health of the U. S. population* (Brookings Papers on Economic Activity: Microeconomics, pp. 217–271). Washington, DC: Brookings Institution Press.

Cutler, D. M. (2002). *Health care and the public sector* (NBER Working Paper 8802). Cambridge, MA: National Bureau of Economic Research.

Gruber, J., & Mullainathan, S. (2002). Do cigarette taxes make smokers happier? (NBER Working Paper 8872). Cambridge, MA: National Bureau of Economic Research.

Hodgson, T. A. (1992). Cigarette smoking and lifetime medical expenditures. *Milbank Quarterly*, 70(1).

International Agency for Research on Cancerpar. (2002, June). *Tobacco smoke and involuntary smoking* (IARC Monograph Volume 83). Retrieved October 3, 2003, from <http://www-cie.iarc.fr/htdocs/monographs/vol83/01-smoking.html>

Lightwood, J., Collins, D., Lapsley, H., & Novotny, T. E. (2000). Estimating the costs of tobacco use. In P. Jha & F. J. Chaloupka (Eds.). *Tobacco control in developing countries* (edited volume, section I, chapter 4). Oxford, U.K.: Oxford University Press.

Lippiatt, B. (1990). Measuring medical costs and life expectancy impacts of changes in cigarette sales. *Preventive Medicine*, 19(5), 515–532.

Manning, G. W., Keeler, B. E., Newhouse, J. P., Sloss, E. M., & Wasserman, J. (1989). The taxes of sin: Do smokers and drinkers pay their way? *The Journal of the American Medical Association*, 261(11), 1604–1609.

Manning, G. W., Keeler, B. E., Newhouse, J. P., Sloss, E. M., & Wasserman, J. (1991). *The costs of poor health habits*. Cambridge, MA: Harvard University Press.

Miller, L., Zhang, X., & Rice, D. P. (1998). State estimates of total medical expenditures attributable to cigarette smoking, 1993. *Public Health Reports*, 113(5), 447–458.

Morris study blasted. CNN. (2001, July). Retrieved February 24, 2003, from

Pellegrini, F. (2001, July 17). From big tobacco, a smoking gun that saves money. *Time*.

Peto, R. L., Boreham, A. D., Thum, J., & Heath, C. J. (1994). *Mortality from smoking in developed countries, 1950–2000*. Oxford, U.K.: Oxford University Press.

Sadilek, P. (2001). *Enumeration of the contribution of smoking to the costs of hospital treatment in 1999* [Czech]. Prague: Medical Information Center.

Smoking is cost-effective says report. (2001, July 17). *BBC News*. Retrieved October 3, 2003, from <http://news.bbc.co.uk/1/hi/world/americas/1442555.stm>

Swoger, K. (2001, June 27). Report says smoking has benefits. *Prague Post*.

Tobacco's death benefits. (2001, July 24). *USA Today*.

Tolley, G., Kenkel, D. S., & Fabian, R. G. (1994). *Valuing health for policy: An economic approach*. Chicago: University of Chicago Press.

U.S Department of Health Human Services. (1994). *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*, Washington, D.C.: Government Printing Office.

Viscusi, W. K. (1995). *Cigarette Taxation and the Social Consequences of Smoking. Tax Policy and the Economy, Vol. 9*. MIT Press.