

Your article (# 05-02-50) from the American Economic Review is available for downloading
=====

Dear Corresponding Author:

We are pleased to inform you that the PDF page proofs of your article (# 05-02-50), which is scheduled to appear in the AEA Papers and Proceedings of the AER, are available for downloading from the link below. If the link does not work, try copying the address into your browser window. You will need to have Adobe Acrobat Reader software to read the file. This is free software and is available for use downloading at:

<http://www.adobe.com/products/acrobat/readstep.html>.

To access the proofs, you will also need the following:

Login: your e-mail address

Password: ----

You can download the page proofs from this URL:

<http://rapidproof.cadmus.com/RapidProof/retrieval/index.jsp>

The site contains one file. The file contains:

1. Page proofs of your article
2. A guide to proofreading marks
2. A copyright-transfer agreement
4. A reprint order form

CORRECTING PROOFS:

We encourage you to forward this link to your coauthors (if any), but they should funnel all corrections through you (the corresponding author). We do not wish to receive more than one version of the corrected proofs.

After printing the PDF file, please read the page proofs carefully and:

1. Indicate changes or corrections in the margins
2. Answer all queries on the last page of the PDF proofs
3. Proofread tables and equations very carefully
4. Check that any Greek has translated correctly
5. Check names, dates, and similar data for accuracy. Literature citations require extra care, especially since many "unpublished" articles may have been published since you submitted your manuscript.

Verifying the accuracy of the proofs is the responsibility of the authors.

Within three business days of receipt, and after coordinating with your coauthor(s), please send your corrections to manuscripts@aejournal.org. Ideally, your corrections will be few and simple enough to describe in the text of an e-mail message. Alternatively, the pages with corrections may be scanned and sent as an e-mail attachment to the above address. Please convert the scanned pages to PDF format before attaching the file. **DO NOT USE ANY ADOBE EDITING FEATURE FOR CORRECTING PROOFS.** If you need to return the proofs as marked-up hard copy, please send the corrected proofs via courier (i.e., FedEx or UPS) to the following address:

Ms Liane O'Brien
AEA Papers and Proceedings
c/o CSWEP, School of Industrial and Labor Relations
257 Ives Hall, Cornell University
Ithaca, NY 14853-3901
(phone: 607-255-2438)

COPYRIGHT-TRANSFER AND REPRINT-ORDER FORMS:

The copyright-transfer form must be signed by you and by all coauthors. The signatures need not be all on the same sheet. Similarly, you and your coauthors may send separate orders for reprints. Completed forms should be sent (as hard copy) to:

Jane Voros, Managing Editor
American Economic Review
2403 Sidney Street, Suite 260
Pittsburgh, PA 15203
Phone: 412-432-2311
Fax: 412-431-3014
voros@erjournal.org

SUPPLEMENTS:

Please also note that you are free to post additional materials, including appendices (e.g., additional proofs for a theoretical paper, additional results for an empirical paper, details of experimental design for an experimental paper), data, and code, on the AER Web site. If you wish to do this, please email these materials to jkutz@econlit.org, indicating the journal issue (AEA Papers and Proceedings) and manuscript title. To avoid confusion, please label your e-mail to Jenna as either Empirical Data or Additional Materials. It is preferable to send each set of information as a zip file.

Thank you for your cooperation. Please don't hesitate to contact me if you have any questions or concerns.

Best regards,
J. David Baldwin
Co-Editor, AEA Papers and Proceedings

COPYRIGHT TRANSFER AGREEMENT

From: The American Economic Association
The American Economic Review
2403 Sidney Street, Suite 260
Pittsburgh, PA 15203

To: Author (please print name here) _____

The American Economic Association (hereinafter Association) is pleased to have the opportunity to publish your manuscript in the *American Economic Review*. In order that the Association, as Publisher, may obtain copyright protection for the contents of the Journal, it is necessary for you to execute this formal transfer of your copyrights in this manuscript to the Association. The Association acknowledges the receipt of your manuscript entitled _____, to appear in the May 2005 issue of the Papers and Proceedings.

Consent to Publish

In consideration of the publication by the Association of the above-named manuscript, the undersigned as Author(s) transfer(s) exclusively to the Association all rights, title and interest defined by the Copyright Law of the United States in and to the above-named manuscript in its entirety, including all subsidiary rights. The rights transferred herein shall remain the property of the Association for the full duration of these rights under the Copyright Law of the United States. If it should become necessary, the Author(s) agree(s) to assist the Association in registering and enforcing the Copyright in the name of the Association. The Association shall have the right to publish the above-named manuscript in print, sound or video recordings, magnetic media (i.e., computer disk, CD-Rom, etc...), electronic media (including transmission via the Internet, or any other computerized communication network), or any other technology for publication of this work which may hereinafter be developed.

The Association, in turn, grants to the Author(s) the right to republication in any work in which he or she is the author or editor in any form, including digital repositories in universities and other institutions subject only to giving proper credit of copyright. The Association further grants to the Author(s) the right to distribute the above-noted work in any classroom in which he or she is a teacher, subject only to the Author(s) giving proper credit in any such derivative work and on any copies distributed for classroom use. Proper notice may be given as follows: [Copyright _____, American Economic Association; reproduced with permission of the *American Economic Review*].

Permission to Reprint Policy

The Author(s) may specify the degree of access to which the Association grants others the right to reproduce the Author(s)' material. Check one:

- _____ **Implicit consent:** Grants anyone permission to reprint in all places in all forms provided that the appropriate copyright information is included and the Association is notified that the work is being reprinted.
- _____ **Explicit consent:** Requires direct consent of the Author(s) and the Association before any republication is allowed. The republisher must obtain from the Author(s) permission to reprint all or any major portion of the Author(s)' manuscript. Author(s) may charge a fee for reprint or translation rights.

Rights to translate are retained by the Author(s) and dealt with on a case by case basis.

Warranty of Authorship

The Author(s) warrant(s) that the above-named manuscript is his or her own original work of authorship and has not been published previously. If any material included by the Author(s) in the above-noted manuscript (including tables, charts, or figures) is the work of another author or is otherwise under prior copyright protection by another proprietor, the Author(s) undertake(s) to obtain permission from that copyright proprietor for the inclusion of such material in this manuscript to be published by the Association. The Author(s) further agree(s) to save and hold the Association harmless in any suit for infringement arising from the Author(s)' unauthorized use of copyrighted material. The Author(s) agree(s) to submit to the Editor of the Journal of the Association to whom the manuscript has been submitted, copies of all letters of permission to include copyrighted material of another author included in the subject manuscript by this Author or material written by Author(s) that is under prior copyright protection by another proprietor.

The Author(s) further warrant(s) that this manuscript was not written as part of his or her official duties as an employee(s) of the United States government. Since copyright protection is not available for a work of the United States government, the Author(s) agree(s) to disclose fully to the Association the circumstances of federal employment which might invoke this bar to copyright protection of the manuscript by signing below to confirm the author warranties.

The Author(s) further warrant(s) that this manuscript was not written as an employee so as to constitute a work-for-hire in which the ownership of the copyright is in that employer.

Please sign and date this agreement. *Return one copy to the Editor of the American Economic Review promptly and retain one copy.* A manuscript for which there is no valid Copyright Transfer Agreement cannot be published.

Accepted and approved: _____

Author(s)

Government Employees please sign here: _____ Date: _____

For the American Economic Association and the *American Economic Review*:

Proofreader's Marks

To do this	Mark in text	Mark in margin
Take out character in middle of word	Your pr o of	⤴
Take out character at start or end of word	Your p roof	↵
Insert character in middle of word	Y r proof	⊂ u ⊂
Insert character at beginning of word	p roof	Y ⊂
Insert character at end of word	Your proo x	⊂ f #
Insert word	Your x proof	# new #
Insert space	Your x proof	#
Close up; no space	Your pro o f	⊂
Transpose words and letters	A[proof/gddol]	(tr)
Make lowercase	Your P roof	(lc)
Make capital	y our proof	(caps)
Make italic	Your <u>proof</u>	(ital)
Make bold	Your proof	(bf)
Make roman (not italic or bold)	Your <u>proof</u>	(rom)
Let it stand; OK as is	Your <u>proof</u>	(stet)
Start paragraph	read. Your	¶
No paragraph	Marked.) c Your	no ¶
Align	Three of the dogs	
Insert period	Your proof x	⊙
Insert comma	Your proof x	↵
Insert colon	Your proof x	:
Insert semicolon	Your proof x	;
Insert apostrophe	The man s shoe	↵
Insert quotation marks	Your p roof"	⊂ ⊂
Insert hyphen	A proof x marked page	/=/
Insert bracket	Your [proof x	⊂]
Insert parenthesis	Smith et al. p roof)	(⊂
Insert em-dash (—)	Your proof x	—
Insert en-dash (–)	Your proof x	–
Insert 1-em space	p roof	□
Insert 2-em space	p roof	□□
Make >1 correction to a single line	Your x proof is c o mplete x	# / (tr) / ⊙

AMERICAN ECONOMIC REVIEW

2403 Sidney Street, Suite 260
Pittsburgh, PA 15203
Telephone: (412) 432-2300
Fax: (412) 431-3014

REPRINT ORDER FORM

If you would like to order reprints of your article, fill in the order form below, taking care to describe any special details requiring attention. If covers are desired, add the charges shown in the last column.

The reprint order form must be returned with your page proofs. Reprints cannot be ordered at a later date.

You will receive a bill when the reprints are delivered (approximately four weeks after you receive your issue of the Review). Please do not send checks with your order.

Reprint Price Scale

Table with columns: PAGES: 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, 29-32, Cover. Rows: Minimum Copies 100, (in even hundreds) with prices ranging from \$55.00 to \$100.00.

Additional hundreds in multiples of 100 up to 500 copies:

Table with prices for additional hundreds: \$21.00, \$30.00, \$36.00, \$48.00, \$60.00, \$72.00, \$84.00, \$96.00, \$42.00.

REPRINT ORDER FORM

Detach this part and send to:

American Economic Review
AEA Publications
2403 Sidney Street, Suite 260
Pittsburgh, PA 15203

Author & Title of Article _____

Total Number of reprints: WITHOUT COVERS _____ WITH COVERS _____ (At extra charge)

Ship _____ reprints to _____

Ship _____ reprints to _____

Send invoice to _____

Date _____ Signed _____

Purchase order number, if any _____.

The Net Effect of an Alcohol Tax Increase on Death Rates in Middle Age

By PHILIP J. COOK, JAN OSTERMANN, AND FRANK A. SLOAN*

Alcohol excise taxation increases prices and reduces per capita consumption (Philip J. Cook and George Tauchen, 1982; Christopher J. Ruhm, 1995; Douglas J. Young and Agnieszka Bielinska-Kwapisz, 2003). In principle, a tax-induced reduction in per capita consumption of alcohol may be the result of both a reduction in the prevalence of alcohol abuse and the prevalence of moderate drinking, with opposite effects on mortality rates. The net effect on mortality could be either positive or negative and has not been established empirically.

Some specific mechanisms by which drinking creates health risks and benefits are well documented. For all age groups, episodes of alcohol intoxication cause death from overdose or from injury resulting from accident or intentional violence (Ralph Hingson and Michael Winter, 2003). Chronic heavy drinking may cause death due to organ damage, including liver cirrhosis (Jürgen Rehm et al., 2003). On the other hand, chronic drinking confers some health benefits on middle-aged people, defined here as persons aged 35–69. Alcohol acts as an anti-cholesterol drug, and epidemiological evidence suggests that moderate drinking is associated with reduced mortality from heart disease and stroke (Giovanni Corrao et al., 2000).

Thus an increase in alcohol excise taxes may reduce mortality rates to the extent that it induces a lower incidence of risky drinking and lower prevalence of chronic heavy drinking. But if older people drink *too little* in response to higher prices, then the result may be increased cardiovascular death rates.

In what follows, we combine new estimates of the effect of per capita alcohol consumption on drinking patterns with a summary estimate from the epidemiology literature of relative

risks associated with different levels of drinking. We calculate that a permanent reduction of 1 percent in alcohol consumption per capita, induced by a tax increase or some other mechanism, would have little net effect on mortality in middle age. Our sensitivity experiments suggest that the effect may be positive or negative but is always close to zero. Since there is no health benefit from drinking for younger people, and considerable risks, we conclude that the public-health case for increased alcohol taxation is strong.

I. Drinking and Mortality Rates

Risks and benefits of a drinking career are age-related. A meta-analysis of all-cause mortality found that for men under age 45, death rates increase with alcohol consumption nearly linearly (due to injury risks), but for middle-aged cohorts, the relationship follows a J-shaped curve (Rehm et al., 2001): for those in middle age, mortality rates are lower for those who drink moderately than for abstainers, but at some point the mortality rate increases with alcohol consumption and eventually exceeds the rate for abstainers (Annie Britton and Michael Marmot, 2004). Over the entire age range, typical estimates find a similar number of lives saved and lost from drinking in the United States and Canada, but with an important difference: the victims tend to be quite young, whereas it is older people whose lives are extended by drinking. If the calculation of gains and losses is based on life-years gained and lost, or life years adjusted for disability, then the losses greatly exceed the gains (Christopher J. L. Murray and Alan D. Lopez, 1997; Eric Single et al., 1999).

The implicit thought experiment underlying these estimates is to compare the current mortality rate to a hypothetical mortality rate associated with permanent population-wide abstinence. What is missing from this literature is to consider the effect of a small long-term reduction in per capita

* Cook: Department of Public Policy Studies, Duke University, Durham, NC 27708; Ostermann: Center for Health Policy, Law, and Management, Duke University, Durham, NC 27708; Sloan: Department of Economics, Duke University, Durham, NC 27708.

consumption of the sort that could be accomplished through a modest, but politically feasible, increase in the excise tax rate.

II. Simulation Results

Our empirical approach is to link estimates of the all-cause relative mortality risks from different levels of drinking, using estimates from a meta-analysis of the literature with alternative estimates of how middle-aged drinking patterns are changed by a small change in per capita consumption of the sort associated with a tax increase.

The curve relating all-cause mortality risk to drinking has been estimated in a large number of epidemiological studies utilizing a variety of data sets. A recent meta-analysis of the results for samples of older people (average age of 45 at baseline) documents the J-curve for both males and females (Gerhard Gmel et al., 2003). The summary statistics on relative risks after adjusting for other personal characteristics and behaviors are given in column (i) of Table 1. For females, the lowest relative risk is for drinkers who consume no more than 10 grams of ethanol per day on average (less than that contained in one standard drink, e.g., 12 ounces of beer or 4 ounces of wine). For males the lowest relative risk occurs in the 10–20 gram range, which is the equivalent of about one standard drink per day.

We acknowledge that these results are based on observational data and are subject to a variety of problems of measurement and causal inference. They represent the state of the art, given the impossibility of controlled experiments.

The current distribution of the United States population aged 35–69 across drinking categories is given in column (ii) of Table 1. The estimates come from a recent survey, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), conducted by National Institute on Alcohol Abuse and Alcoholism, fielded in 2001–2002 with a representative sample of 43,093 noninstitutionalized Americans aged 18 and over (National Institute on Alcohol Abuse and Alcoholism, 2003).¹ The

TABLE 1—THE EFFECT OF REDUCED PER CAPITA CONSUMPTION ON RISK EXPOSURE: DRINKERS AGED 35–69

	(i) Relative risk of mortality*	(ii) Population distribution, 2000	(iii) Sim II	(iv) Sim III
<i>A. Females:</i>				
Ex-drinkers	1.44	0.196008	0.196008	0.196008
Lifetime abstainers	1.00	0.447048	0.450072	0.447048
>0–10 g	0.87	0.231526	0.229696	0.232531
>10–30 g	1.01	0.084845	0.083994	0.084083
>30–50 g	1.40	0.022772	0.022829	0.023107
>50 g	1.43	0.017802	0.017402	0.017223
<i>B. Males:</i>				
Ex-drinkers	1.21	0.187786	0.187786	0.187786
Lifetime abstainers	1.00	0.266528	0.268933	0.266528
>0–10 g	0.85	0.249303	0.248972	0.250581
>10–20 g	0.80	0.098276	0.097794	0.09816
>20–30 g	0.91	0.058864	0.058471	0.058803
>30–40 g	0.96	0.037739	0.03773	0.038305
>40–70 g	1.04	0.050816	0.04997	0.049394
>70–110 g	1.27	0.022036	0.021818	0.022112
>110 g	1.46	0.028652	0.028525	0.028331

Sources: Relative risk is taken from Table 2 of Gmel et al. (2003). The population estimate is from NESARC survey data for adults aged 35–69 in 2000–2001. Simulations (“Sim II” and “Sim III”) are described in the text.

remaining columns present the population distributions that would have resulted from a 1-percent reduction in per capita consumption under different assumptions on how the change is distributed. Simulation III in column (iv) assumes that there is no change at the extensive margin, and that the reduction in per capita consumption is accomplished by a uniform downward shift in consumption by drinkers. In effect, each drinker consumes 99 percent as much as in reality. Simulation II adopts the intermediate assumption, generally guided by regression results, that impacts occur at both the extensive and intensive margin.² Simulation I

(authors’ calculations). Note, however, that the epidemiological evidence is also based on self-reported drinking and is subject to the same bias.

² The regression results are presented in the longer version of this paper (Cook et al., 2005). We utilized NESARC data together with state-level per capita sales data to determine how average drinking related to drinking patterns at the extensive and intensive margins.

T1

Fn1

Fn2

¹ Like other such surveys, the NESARC-based estimate of average consumption for the U.S. population has a large negative bias, capturing only about half of per capita sales

TABLE 2—CHANGES RESULTING FROM A 1-PERCENT REDUCTION IN PER CAPITA ALCOHOL CONSUMPTION: DEATHS AND LIFE-YEARS, AGES 35–69

Simulation	Deaths	Life-years lost
Simulation I		
Male	176	4,061
Female	32	813
Simulation II		
Male	13	294
Female	20	520
Simulation III		
Male	–152	–3,514
Female	–64	–1,646

(not shown) assumes that the effect of the tax increase and resulting 1-percent reduction in per capita consumption is accomplished entirely at the extensive margin. One percent of the drinkers become abstainers, and the proportional distribution of drinkers over quantities is unaffected. That is, each category of drinking quantity loses 1 percent of its members.

We assume that the increase in abstainers in Simulations I and II occurs only in the “lifetime” category, and not in the “previous drinker” category—an important assumption because the relative mortality risk is substantially higher in the latter. The “previous drinker” category is likely to include a large group who quit because of health problems (Gmel et al., 2003). Since we simulate the effect of an increase in taxes, the proximate cause of the switch would (by assumption) be higher prices rather than illness.

The first two simulations (for which there is some movement from drinker to abstainer) result in an increase in the population-weighted average in relative risk, while the third results in a decrease.³ Table 2 summarizes the results translated into estimates of deaths in a single year, together with the associated loss of life years. A striking finding is that the numbers are small to the point of triviality in comparison with the 700,000 annual deaths in this age group. Thus a permanent 1-percent reduction in drinking by the population aged 35–69 would have a negligible effect on the death rate. While

it is not possible to be sure whether the effect would be positive or negative, fewer than 200 lives are at stake. Our best estimate (from Simulation II) is that 33 lives would be lost per year in middle age.

III. Concluding Thoughts

How do these results affect the case for higher alcohol excise taxes? The public-health argument (as opposed to the economic argument) for a higher tax rate is that it would reduce morbidity and save lives (Michael Grossman et al., 1993; Cook and Michael J. Moore, 2002). That argument is less obvious than the corresponding argument for tobacco taxes. An increase in tax penalizes healthy as well as unhealthy drinking, whereas smoking in any amount is detrimental to health. Perhaps that distinction is part of the explanation for why tobacco-tax bills have fared so much better in state legislatures in recent years than alcohol-tax bills (Sloan and Justin Trogdon, 2004).

The results presented here strongly suggest that an alcohol tax increase will save lives. We find that the net effect on mortality rates among older people is nil, while the epidemiological evidence suggests that the relative risk increases monotonically with drinking for younger people.

REFERENCES

- Britton, Annie and Marmot, Michael.** “Different Measures of Alcohol Consumption and Risk of Coronary Heart Disease and All-Cause Mortality: 11-Year Follow-up of the Whitehall II Cohort Study.” *Addiction*, 2004, 99(1), pp. 109–16.
- Cook, Philip J. and Moore, Michael J.** “The Economics of Alcohol Abuse and Alcohol-Control Policies.” *Health Affairs*, 2002, 21(2), pp. 120–33.
- Cook, Philip J.; Ostermann, Jan and Sloan, Frank A.** “Are Alcohol Excise Taxes Good for Us? Short- and Long-Term Effects on Mortality Rates.” National Bureau of Economic Research (Cambridge, MA) Working Paper No. ●●●, 2005.
- Cook, Philip J. and Tauchen, George.** “The Effect of Liquor Taxes on Heavy Drinking.” *Bell Journal of Economics*, 1982, 13(2), pp. 379–90.

Fn 3
T2

³ For Simulation 1, the increase is 31 and 74.5 millions for males and females respectively. For Simulation 2 the corresponding numbers are 428.3 and 30.8. For Simulation 3, the decline is 370.6 and 235.7 per million.

- Corrao, Giovanni; Rubbiati, Luca; Bagnardi, Vincenzo; Zambon, Antonella and Poikolainen, Kari.** "Alcohol and Coronary Heart Disease: A Meta-Analysis." *Addiction*, 2000, 95(10), pp. 1505–23.
- Gmel, Gerhard; Gutjahr, Elisabeth and Rehm, Jürgen.** "How Stable Is the Risk Curve Between Alcohol and All-Cause Mortality and What Factors Influence the Shape? A Precision-Weighted Hierarchical Meta-Analysis." *European Journal of Epidemiology*, 2003, 18(7), pp. 631–42.
- Grossman, Michael; Sindelar, Jody L.; Mullahy, John and Anderson, Richard.** "Alcohol and Cigarette Taxes." *Journal of Economic Perspectives*, 1993, 7(4), pp. 211–22.
- Hingson, Ralph and Winter, Michael.** "Epidemiology and Consequences of Drinking and Driving." *Alcohol Research and Health*, 2003, 27(1), pp. 63–78.
- Murray, Christopher J. L. and Lopez, Alan D.** "Global Mortality, Disability, and the Contribution of Risk Factors: Global Burden of Disease Study." *Lancet*, 1997, 349(9063), pp. 1436–42.
- National Institute on Alcohol Abuse and Alcoholism.** *2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions* (NESARC). Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 2003.
- Rehm, Jürgen; Gmel, Gerhard; Sempos, Christopher T. and Trevisan, Maurizio.** "Alcohol-Related Morbidity and Mortality." *Alcohol Research and Health*, 2003, 27(1), pp. 39–51.
- Rehm, Jürgen; Gutjahr, Elisabeth and Gmel, Gerhard.** "Alcohol and All-Cause Mortality: A Pooled Analysis." *Contemporary Drug Problems*, 2001, 28(3), pp. 337–62.
- Ruhm, Christopher J.** "Economic Conditions and Alcohol Problems." *Journal of Health Economics*, 1995, 14(5), pp. 583–603.
- Single, Eric; Robson, Lynda; Rehm, Jürgen and Xie, Xiaodi.** "Morbidity and Mortality Attributable to Alcohol, Tobacco, and Illicit Drug Use in Canada." *American Journal of Public Health*, 1999, 89(3), pp. 385–90.
- Sloan, Frank A. and Trogdon, Justin.** "Litigation and the Political Clout of the Tobacco Companies: Cigarette Taxes, Prices, and the Master Settlement Agreement." Working paper, Duke University, 2004.
- Young, Douglas J. and Bielinska-Kwapisz, Agnieszka.** "Alcohol Consumption, Beverage Prices and Measurement Error." *Journal of Studies on Alcohol*, 2003, 64(2), pp. 235–38.

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

1