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MEASURING: *Drawing the line on drinking and driving*

EM0202: The Globe and Mail, January 5, 2002, page A12

Drawing the line on drinking and driving

Even people who agree about the curse of impaired driving disagree about how best to combat it. Consider the current dogfight between Mothers Against Drunk Driving (MADD) and the Canada Safety Council.

It is illegal under the Criminal Code to drive with a blood-alcohol-concentration level of 0.08 or more – a measure of the proportion of alcohol in the bloodstream. MADD has taken out advertisements saying the level is too high and should be reduced to 0.05 to protect public safety. The Safety Council says it would be "mad" to lower the level because that would place a greater burden on police and the court system and have little practical effect beyond criminalizing the social drinker.

The blood-alcohol limit in Canada is not a monolith. Provinces impose zero tolerance on young and novice drivers and use graduated licensing to ease them into the world of safe driving. Most provinces authorize the police to take away the car keys of a driver who measures between .05 and .08 and suspend his licence for 12 or 24 hours.

The question is whether lowering the general criminal limit would be good public policy. Even a small intake of alcohol may result in some degree of impairment – drowsiness, greater problems with divided attention – that begins before the level reaches .08. A report last April from the U.S. National Highway Traffic Safety Administration, a branch of the Department of Transportation, said: "Widely accepted public health research has identified .05 as the BAC [blood alcohol concentration] level at which driving skills begin to deteriorate. Because of this, some organizations – most notably the American Medical Association – officially support .05 as the safest limit."

But is the degree of impairment between .05 and .08 of sufficient concern to bring the weight of criminal law down on those found driving with that amount of alcohol in their system? The Safety Council says the risk of involvement in a fatal crash within that range is 1.2 or 1.8 driver deaths per 100 million kilometres travelled (the risk without drinking anything is 0.6) and is comparable to driving five kilometres per hour over the speed limit. The U.S. re- port itself added, one sentence after the lines quoted above: "Even those organizations that have adopted such policies [promoting .05] accept .08 as the best reasonable and acceptable compromise that will save lives, prevent injuries and reduce costs to society." (The United States is still trying to persuade some states to lower their limits of .10 to .08.)

What does it take to reach .08? That's hard to say, because so much depends on an individual's weight and metabolism. The U.S. Traffic Safety Administration says the average 170-pound (76-kilogram) male will reach .08 after five drinks in two hours on an empty stomach, and a 120-pound (54-kilogram) woman will reach it after three drinks. Commenting on the belief that one may safely down one standard drink an hour before driving, Transport Canada says the "'one drink per hour' rule works only for the first two or three hours. It does not work for women. Restrict yourself to no more than two drinks. Better yet, don't drink if you are going to drive."

The Ottawa-based Traffic Injury Research Foundation estimates that 5 per cent of drivers account for 84 per cent of trips made while impaired. The Canada Safety Council says lowering the blood-alcohol level would do nothing to catch this hard core. If there are new resources, it argues, let them be devoted to enforcing the law more stringently against these repeat offenders – many of them previously convicted, often driving while under suspension – rather than chasing after less impaired drivers who pose far less of a threat. MADD Canada responds that the Council underestimates the threat posed by those under .08.

It is important to tread carefully. There has been great public support for a law that strikes out against significantly impaired drivers while not making criminals of those who have had a beer, glass of wine or shot of liquor with dinner. Awareness has grown; people are conscious of the dangers, both of harming others and of being stopped by the police. The risk in lowering the level below a point many Canadians might consider reasonable is that it would encourage disdain for the law, which might in turn weaken the resolve of those officers and courts assigned to enforce the law – independent of the increased burden on both.

Driving while impaired is a serious crime. Polls show the great majority of Canadians feel that way. It is heartening to read of technological advances – including an ignition-interlock that prevents a car from starting unless the driver passes a sobriety test – that can stop even unregenerate drinkers from driving. It is important that police officers and the courts more stringently and determinedly enforce the existing criminal law, and be given the resources they need to do it.

But before Canada thinks of lowering the legal limit, and redefining impairment to cover more than it now does, there should be a more comfortable weight of evidence that this is necessary and, being necessary, is politically achievable and desirable.

1. A matter of statistical interest underlying the article EM0202 reprinted above is *measuring* blood alcohol levels, either at the roadside or with a blood test. How are the inaccuracy and the imprecision of such measuring processes relevant to the discussion in the article? Explain briefly.

2. Another matter of statistical interest is the *relationship* between blood alcohol level and degree of driving impairment.
   - What does the article EM0202 reprinted above indicate about this relationship?
   - What does the article indicate about *variation* in this relationship among individuals?
     - Explain briefly how this variation is relevant to the discussion in the article.

3. The article EM0202 reprinted above discusses dfferent values (such as .05 and .08) as a legal threshold for impaired driving. What matters does the article indicate are relevant to choosing an appropriate value?

The article EM0202 reprinted above in this Highlight #37 is also used in Chapter 14 in the STAT 231 Course Materials.

(*continued overleaf*)

MEASURING: ***15,000 census-takers count U.S. homeless***

EM9030: Toronto Star, March 20, 1990, pages A1 and A28

15,000 census-takers count U.S. homeless

By Bob Hepburn
TORONTO STAR

WASHINGTON – In the moonlight tonight, a census-taker will walk up to the heating grates on E Street across from the U.S. state department headquarters and start counting.

He will be checking on how many homeless men and women are asleep under blankets on the grates.

And if any are awake, he's got a few questions he'd like to ask them.

A few blocks away, other census-takers will be counting how many people are asleep on benches in Lafayette Park in front of the White House, under bushes on Capitol Hill, in subway entrances and in hundreds of abandoned buildings in Washington.

It's all part of the first nationwide effort by the U.S. Census Bureau to count as accurately as possible the number of homeless people in the United States.

From 6 p.m. tonight until 8 a.m. tomorow, an army of 15,000 census-takers will check for homeless Americans in state and local shelters, street corners, subway stations, city parks, shelters for abused women, commercial campgrounds, drug and alcohol treatment centres, hospital emergency rooms, train and bus stations, all-night theatres, and farm fields where migrant workers sleep.

From 2 a.m. to 4 a.m., they will check street locations such as subway stations and heating grates.

From 4 a.m. to 8 a.m., they will sit in their cars or stand outside abandoned buildings and count people who leave after waking up in the morning.

When it's over, the number of homeless counted may vary anywhere from 250,000 to more than 3 million.

And that huge difference in estimates of how many people are homeless in America is the reason the census bureau agreed to undertake the $2.7-million survey.

U.S. administration officials claim the number of homeless ranges between 250,000 and 500,000. Advocates for the homeless, such as the National Coalition for the Homeless, claim the real number is 3 million.

They fear the White House will deliberately underestimate the homeless to avoid pumping more federal money into low-cost housing and other programs for the poor.

Former president Ronald Reagan drastically cut federal spending on programs for the poor, claiming the need wasn't as great as advocates suggested.

Cynthia Taueber, the census bureau official responsible for the survey, says the bureau will make its best effort to count the homeless.

The main census of about 250 million Americans will be conducted April 1.

But she admits many "hidden homeless" will not be found because they live doubled-up with friends or relatives, in tunnels or abandoned cars, or in isolated rural areas.

Federal and state governments will use the survey's findings to devise policies, such as low-rent housing, for the homeless. Washington returns billions of tax dollars to state and local governments based in part on population data.

By one estimate, each person is worth about $150 in federal funds to a city or town.

Also, planners will use the census results to determine where to locate facilities such as homeless shelters. As well, they require the data to help assess needs for senior citizens, students and infants in day-care centres.

After the last official census in 1980, there were 37 lawsuits filed against the census bureau charging undercounting.

In the Canadian census next year, Statistics Canada "will very definitely" use new techniques to count the homeless in the country, according to Mike Sheridan, collection manager of the 1991 census.

In fact, Statistics Canada conducted a test last week in Toronto to see whether counting homeless at "soup kitchens" would be effective.

Sheridan said researchers found in a similar test in San Francisco that up to 95 per cent of the homeless in an area came to a "soup kitchen" for a meal over a two-day period.

Statistics Canada has sent observers to several U.S. cities to watch the experiment.

Tonight, U.S. census-takers will ask the homeless simple questions about their age, sex and race.

However, they won't wake anyone who is sleeping on the streets. In those cases, the census people will guess the answers as best they can.

If a sleeping person is completely covered by cardboard or blankets, the person will be merely counted without estimating the age, sex or race.

When the final report is ready, the census bureau will not release a single number of how many homeless there are in the United States.

Instead, it will say how many homeless were found in shelters, on street corners, in abandoned buildings and in other spots where they gather.

1 The number of U.S. homeless, the focus of the article EM9030 reprinted above, is a *size*; briefly describe the (target) population of which this size is an attribute.

2 *We* would classify a population element's *response* variate in the article EM9030 reprinted above as a binary (discrete or categorical) variate with categories of 'homeless' or 'not homeless'. Components of overall error in the count include the difficulty of *finding* every potential population element and then deciding if its category *is* 'homeless'. Describe concisely how these difficulties *differ* from those for elements in the investigations described in Statistical Highlights #15, #35 and #36.

3 Define what is meant by *homeless*. What are the difficulties in formulating a working definition?

- Discuss briefly sources of (measurement) error when using your definition to categorize:
  - a 30-year-old woman with two young children in a shelter for abused women;
  - a 45-year-old man in a tent in a commercial campground;
  - an 18-year-old man in a drug treatment centre;
  - an 80-year-old widow in an old-age home.

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MEASURING: *15,000 census-takers count U.S. homeless* (continued 1)

4 Describe briefly why as many as 15,000 census-takers were used to count the U.S. homeless.
- What source(s) of (measurement) error might arise from using such a large number of 'operators' in the measuring process.
  - How might the U.S. Census Bureau try to overcome these error source(s)?
- Suggest an approximate number of census-takers needed to make a similar count of the homeless in Canada; explain your reasoning briefly.

5 What part(s) of the article EM9030 reprinted on the facingn page HL37.2 are concerned with factor(s) affecting *accuracy* of the counting process? Identify the paragraph of the article in which each factor occurs, and describe briefly the issue(s) involved.
- If an answer were to be given for the number of homeless in the U.S., which categories of error would you expect to impose *severe* limitations on this answer? Explain briefly.

6 The *second* paragraph in the right-hand column of the article EM9030 reprinted on the facing page HL37.2 mentions 37 lawsuits charging *under*counting in the 1980 U.S. census.
- What factor(s) might be responsible for this undercounting?
- Are there factor(s) that might lead to *over*counting? Explain briefly.

7 Describe briefly what you see as the advantage(s) and the *dis*advantage(s) of using the "soup kitchen" method, mentioned in the fifth paragraph (near the middle) of the right-hand column of the article EM9030 reprinted on the facing page HL37.2, to obtain an answer to the Question of the number of homeless people in an area.

8 The last two paragraphs of the article EM9030 reprinted on the facing page HL37.2 states that .... *the census bureau will not release a single number .... . Instead, it will say how many homeless were found in .... spots where they gather.*
- Suggest why the Census Bureau will not release a single number for the U.S. homeless.
- Suggest why the numbers will be released by *type of location.*

9 For the three items of additional information mentioned in the fifth-last paragraph (near the middle) of the right-hand column of the article EM9030 reprinted on the facing page HL37.2, what difficulties might arise in obtaining *correct* information from a homeless person about their age, sex and race? Deal with the three items separately.
- Of all the items of information that could potentially be requested from the homeless, suggest why *these* three were chosen.
- How would a person's age, sex and race in this investigation be described in the terminology of the FDEAC cycle?

The article EM9030 reprinted on the facing HL37.2 in this Highlight #37 is also used in Figure 2.15 in the STAT 220 Course Materials.

(*continued overleaf*)

MEASURING: ***Forget standard deviation – New ways to measure risk***

EM9525: The Globe and Mail, June 10, 1995, page B18

Forget standard deviation – New ways to measure risk

On Mutual Funds

Duff Young

THE mutual fund industry is letting investors down. It's continuing to allow and endorse the use of an antiquated risk measure – one that dupes you by not telling you how risky a fund really is.

The measure is "standard deviation," which shows how widely a fund's monthly returns are dispersed, usually over a three-year trailing period. Standard deviation is the basis of the volatility scale used in *The Globe and Mail's* monthly mutual fund tables and in every other newspaper. It's so widely accepted that nobody questions its validity or usefulness.

But standard deviation is the wrong mathematical model for the job. It fails to distinguish between volatility associated with making money (gains) and volatility associated with losses.

Standard deviation rewards consistent losers and punishes erratic gainers. Academics think using it as a risk measure for investment performance is laughable.

Don't believe me? There are dozens of journal articles with powerful arguments against standard deviation. And of course, as the regulators say, "nobody understands risk."

Understanding risk, in my view, is the most important determinant of your performance as an investor. When you lose money in a fund you didn't figure would go down, you're more likely to sell at the bottom.

Research shows that investors consistently do worse than the funds they own. In a study by Morningstar Inc., a Chicago-based fund-monitoring service, a group of 81 growth funds averaged 12 per cent annually over a five-year period – but investors in the funds lost 2 per cent a year over the same time.

Why? Because, all too often, investors buy at the peak and sell at the first setback. My own studies show that investors in a popular Canadian resource fund underperformed their fund by an amazing 50 per cent over a two-year period because of the mistiming of their purchases.

Should investors take all the blame for buying and selling at the wrong time, or could the industry be more helpful? Here's my suggestion. I recommend that the industry tell investors more about the risk of losing money: how much, how often, how severe, how long.

A quick and dirty way of doing this is to provide some new measures of risk:

- How often did a fund lose money in a calendar year?
- In how many years did a fund earn a lower return than a one-year guaranteed investment certificate?
- How badly did a fund fare in its worst quarter, worst month and worst year?

Cambridge Special Equity Fund, for example, is a Canadian small-cap equity offering for which these new measures of risk would be especially helpful. It has a standard deviation of 8.4, about double that of most similar funds but not the riskiest fund of its type.

Wouldn't it be nice to be warned that this fund lost money in four years of its seven-year history? In three of those years, it lost more than 20 per cent, and in its worst year – 1990 – it lost 35 per cent. In only three of the seven years did it outperform GICs.

Measuring downside risk is the new wave in investment research. Downside risk is a broad term that can describe elaborate measures of a fund's likelihood of underperforming some minimum rate of return. Or it can calculate the average loss.

Over all, downside risk is a framework that often involves a bunch of calculus to explain the potential for investment pain. I've greatly simplified a downside risk framework in my suggestions here, making them easy to understand and calculate.

Being told in advance of the frequent, temporary setbacks even good funds suffer might help people weather those downturns better. Or it might scare the nervous nellies away. Either result is a good thing for both the investor and the industry.

Making new risk measures mandatory won't solve all the industry's problems. And these risk profiles will apply only to mature funds – with a history of four or more years. A disclaimer would have to be drafted for newer funds.

But the fund industry owes it to investors to better disclose past risk, along with those seductive past returns it usually trumpets. And investors should start to demand more useful information about risk when they buy a fund.

Duff Young, a chartered financial analyst, is vice-president of mutual fund research with Equion Group and co-author of Top Funds 1995.

The article EM9525 reprinted above is also used in Chapter 6 of the STAT 231 Course Materials. A broader discussion of risk is given in five other articles in these Materials:

∗ EM9507, *Aluminum in drinking water poses no risk, Canadians told*, used in Figure 15.1 of the STAT 231 Course Materials;
∗ EM9508, *Firemen removed from 15 airports*, used in Figure 7.15 of the STAT 220 Course Materials;
∗ EM9511, *Perils of peanut butter and other risks*, used in Figure 7.15 of the STAT 220 Course Materials;
∗ EM9512, *Risk-free world within reach, Canadians say*, used in Figure 7.15 of the STAT 220 Course Materials and in Figure 2.19d of the STAT 332 Course Materials (1995 curriculum);
∗ EM9513, *A heady analysis of everyday risks*, used in Figure 7.15 of the STAT 220 Course Materials.