The Economics of tobacco and other addictive goods
Folland et al Chapter 24

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Economics 317

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Figure 1.1: Smoking prevalence* in Canada, adults aged 15+, 1965-2010

*Includes daily and non-daily smokers

Figure 2. Smoking participation by selected characteristics. Source: These figures are based on Table 1.
Figure 2. Cont.

4.1. Estimation Results

The smoking participation estimates are presented in Table A2. For brevity, we present results for the full model only for the overall sample and for relevant variables. However, the full model is available upon request.

The results confirm the standard socioeconomic (SES) gradient in cigarette smoking with respect to the income variables. The higher and middle income groups are less likely to be smokers than the low income group. The education variables show some SES gradient. In particular, individuals with post secondary education are less likely to smoke than those with less than secondary education.

The effect of marital status on smoking prevalence is negative just as the unconditional data in Table 3 suggest. The size of the household negatively affects smoking prevalence. Marriage and household size effects affirm the relevance of family setting on the smoking decision. The positive sign of the gender variable confirms the standard results that males are more likely to be smokers. Age has a significant and negative impact on smoking participation.

Some of the provincial dummies are significant. This shows that it is important to control for unobserved provincial factors that affect cigarette smoking.

4.2. Cigarette Tax Results

Since a large part of the cigarette tax is determined at the provincial level, we suspect there may be an identification issue with cigarette taxes when province dummy variables and year trend are included in the model. As a simple way of assessing the within-province variation in cigarette taxes over the data period, a variance inflation factor (VIF) of 6 ($R^2 = 0.8334$) is obtained when cigarette tax is regressed on provincial dummies and trend. The VIF implies there is sufficient within-province variation in cigarette taxes over the sample period.

The key policy variable, real cigarette tax, has a negative and significant impact on smoking participation. Since the estimated coefficients from the probit model provide no quantitative value, the average partial effect and tax elasticity are also reported. Here and in what follows, our interpretation will focus on the elasticity estimates. The tax elasticity estimate for the whole population is $-0.227$. 

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Economics of addictive goods

Background: smoking in Canada.

Standard models and addictive goods.

Economic definition of “addiction.”

Rational addiction.

Evidence.

Criticism.

Information.

Social costs.

The first tax increase was applied in April 2001, raising the federal excise tax to $10.65 per carton. In May 2001, the federal excise tax was further increased to $10.99 per carton, and by July 2002 it reached $15.85 per carton. Since 2002, there has been a steady small increase in the nominal excise tax to offset the impact of inflation on the real federal excise tax. The increase in the federal tax was accompanied by increases at the provincial level, but with different magnitudes.

Table 1 shows the average real cigarettes tax (in 2000 dollars) per carton for each Canadian province.

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Source: Provincial Department of Finance and authors' calculations.

Figure 1. Average real cigarettes tax in Canada by province.

Graph showing the average real cigarettes tax by province for the years 1998 and 2008.
Addiction.

- Can we use standard microeconomic models to study addictive goods?
- How can we modify standard models to capture aspects of addictive behavior?
- How should governments respond to addictive goods?
Standard models.

- For many purposes it is reasonable to use “off the shelf” models even when the good is addictive.
- e.g. The government intends to raise the tax on cigarettes by $1 per pack. What effect will this have on tax revenues? Standard analysis is ok for a rough answer.
- Some people might object that addicts are not rational. Recall: (1) “rational” is jargon. (2) We might view a model as being ok for positive but not for normative purposes in this sort of circumstance.
Models of addictive behavior.

- Standard models do capture aspects of addiction we might think are important.
- Addiction is inherently a *dynamic* process, but standard models are static.
- Difficult to capture differences in behavior between addicts and non-addicts in standard models.
Defining “addiction.”

- There are many different concepts of addiction across various disciplines, none are right or wrong.
- In social sciences we tend to take a behavioral, as opposed to physiological, stance on addiction.
- The modern economic definition is: A good or activity is addictive to a given person if there is a positive causal effect of today’s consumption on future consumption.
- Notice that activities like going to church or watching TV can be addictive under this definition, that addictions are not necessarily harmful (e.g., exercise), and that a given activity can be addictive for one person but not for another.
Rational Addiction.

- An influential paper by Gary Becker and Kevin Murphy in 1988 presented a model of “rational addiction.”
- One way to view this model is as an extension of an older model called a “habit formation” (or “myopic addiction”) model.
- In habit formation models the marginal utility of, say, cigarettes today depends on how much you’ve smoked in the past, but you choose how much to smoke today ignoring the fact that you will be more addicted tomorrow if you smoke more today.
- (graph: cig/other goods tradeoff for light and heavy smokers)
Rational addiction differs from habit formation in that people in the world imagined in the model are fully aware that they will be more addicted in the future if they smoke more today.

A rational addict considering smoking one more cigarette reasons:

- If I smoke one more, that will cost me a bit of money today and I will get some pleasure today.
- But I will wake up tomorrow a bit more addicted, and that will change my behavior tomorrow, and the next day, and the day after that....
- I should add up all the costs and benefits over the remainder of life that will result from smoking one more cigarette today.
Does smoking more today induce the person to smoke more tomorrow?

Smoking more today increases the pleasure of smoking tomorrow, but also increases the present value of the costs (health, money, etc) of smoking more in the future.

If the net effect is positive, then smoking more today causes smoking more tomorrow and the good is by definition addictive for this person.

Notice that under this definition of “addictive” an increase in price, or the realization that smoking is more dangerous than previously thought, can turn a good from addictive to non-addictive.
Modeling the “stock” of addiction.

- We want to capture the notion that how addicted you are today depends on your past consumption.
- Consumptions farther away in the past has less effect than consumption in the immediate past.
Stock of addiction.

Law of motion for addiction:

\[ S_t = S_{t-1} - \delta S_{t-1} + c_t \]  \hspace{1cm} (1)

In steady state, level of addiction does not change,

\[ S = S - \delta S + c \]  \hspace{1cm} (2)

\[ \rightarrow c = \delta S \]  \hspace{1cm} (3)
Predictions of the model.

- (graph)
- “Cold turkey” quitting, short v long run demand curves, temporary shocks have long effects.
- Addiction is more likely for people with high discount rates: they don’t place much weight on the future costs of smoking more today.
- Major empirical implication: an anticipated increase in the future price of the addictive good should reduce consumption immediately.
Statistical evidence on cigarette demand.

Many studies from different countries and different times, using various types of data and various statistical methods, overwhelmingly find that demand for cigarettes slopes down.

The elasticity of cigarette consumption to price is thought to be around -0.5, more elastic in long run than short run.

Policy implication: taxes reduce smoking.

A major prediction of the rational addiction model holds: anticipated future price increases reduce consumption immediately.
Criticism of the Rational Addiction model.

- No uncertainty and rational forward-looking behavior imply no regret, but we observe people who regret their decisions.
- The model is inconsistent with the fact that people sometimes try to restrain their future behavior, e.g., project CARES—deposit money in a bank account, only get it back if a nicotine blood test comes back clean in six months.
- Model is unrealistic—treat normative prescriptions cautiously.
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Extending the Rational Addiction model.

- Many of the restrictive assumptions of the basic model have been relaxed by subsequent research.
- E.g. add uncertainty over how addictive tobacco is to you, consider more than one addictive good, allow for certain types of irrational behavior.
- These models fit the data better.
Information and smoking.

- We expect to see people smoke less, quit, or fail to start in the first place if they learn new information which tells them smoking is more harmful to health than previously thought.

- Cascade of information in the 1960s about smoking and cancer and other risks estimated to have caused large reductions in smoking rates.

- Individuals who think smoking is more harmful are less likely to start.

- However, currently people probably OVERestimate the health risks of smoking—more accurate information unlikely to further reduce smoking.
If people understood the lung cancer risk accurately as opposed to overestimating it, the societal smoking rate would increase by 6.5 to 7.5%.

Social costs of smoking.

- We are concerned with the external costs of smoking, not the private costs.
- The external costs are surprisingly small.
- Some external costs include: effects of smoking on neonatal health and risk of fire.
- A related but distinct argument is that we need to regulate smoking to prevent children from becoming addicted.
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Won't someone please think of the CHILDREN?!
Health costs.

- We all die someday, smoking brings that date closer.
- The effect of smoking on health care costs are:

\[
\text{Costs if smoker} - \text{Costs if non-smoker} \quad (4)
\]

ie, the net cost.
- Many estimates in the popular media are instead gross costs.
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Health care costs cont.

- Suppose a person quits smoking today. Does that increase or decrease her lifetime demand on the health care system?
- Data suggest: costs first fall because the person is now healthier, but in the long run costs are higher because the person lives longer and tends to need more care over longer periods.
- Whether the present value of lifetime costs goes up or down depends on the discount rate.
- In any case, the health care costs of smoking are very small, and probably negative, ie, smokers subsidize non-smokers through the health care system.