Tax incidence when individuals are time-inconsistent: the case of cigarette excise taxes

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Abstract

One of the most cogent criticisms of excise taxes is their regressivity, with lower income groups spending a much larger share of their income on goods such as cigarettes than do higher income groups. We argue that traditional quantity-based measures of incidence are only appropriate under a very restrictive "time-consistent" model of consumption of sin goods. A model that is much more consistent with existing evidence on smoking decisions is a time-inconsistent formulation where excise taxes on cigarettes serve a self-control function that is valued by smokers who would like to quit but cannot. This self-control function benefits lower income groups more, since they have a significantly higher price sensitivity of smoking. Calibrations show that, as a result, cigarette taxes are much less regressive than previously assumed, and are even progressive for a wide variety of parameter values.
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1. Introduction

One of the most cogent criticisms of excise taxes is their regressivity. Lower income groups consume the types of "sin" goods to which excise taxes apply at an equal or greater rate than do higher income groups. As a result, there is a strong inverse relationship between income and the income shares devoted to consumption of goods such as cigarettes, alcohol, and gasoline. This relationship is weakened, but not reversed, when more permanent

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measures of resources such as consumption are used to determine incidence (Poterba, 1989).

The presumption behind such regressivity arguments is that they reflect the degree to which each income group is "hurt" by different tax policies. For an economist, the appropriate measure for this analysis is utility. For example, when we say that an increase in the tax on gasoline would be borne most heavily by low-income consumers, we (should) mean that if the tax was instituted, their utility would be most detrimentally affected.

Incidence is traditionally computed in terms of quantities consumed, however, because in neoclassical economics, this is an accurate measure for the utility effect of taxation. For a maximizing consumer, the utility effect of a small price increase is equal to the product of the price increase, the quantity consumed, and the marginal utility of wealth. Thus, we can measure the "harm" of a US$1 tax in direct proportion to the amount of that good consumed by a given income group.

This same analysis can be applied to addictive goods if consumers are "rational addicts", to use the term of Becker and Murphy (1988). Their seminal article codified what had become the standard approach among economists to thinking about regulation of addictive bads. In their model, consumption of addictive bads is governed by the same decision-making process as is consumption of all other goods. Consumers trade off the utility gains from consuming the good against the costs of doing so. As rational forward-looking agents they recognize that those costs include the damage that they are doing to themselves through consumption, as well as the additional future damage to which they are driving themselves by consuming more of an addictive good. In such a model, incidence analysis is effectively the same for addictive as for non-addictive goods.

In this paper, we consider an alternative formulation of consumption of addictive bads. Our model follows that of Becker and Murphy, with one exception: we allow agents to be time-inconsistent in their smoking decisions. Laboratory evidence on preferences uniformly indicates that individuals use lower discount rates in evaluating future intertemporal trade-offs, relative to the discount rate that they use in evaluating similar trade-offs between today and the future. For example, in smoking decisions, the agent might want to enjoy her cigarette today, but would prefer to exercise self-control tomorrow. Since she will have similar preferences for immediate rewards in the future, there is a conflict between the intertemporal selves. This kind of time inconsistency has been modeled as quasi-hyperbolic discounting by Laibson (1997) and O'Donoghue and Rabin (1999a), and it has been applied in the context of savings decisions (Laibson, 1997; Laibson et al., 1998; O'Donoghue and Rabin, 1999b), retirement decisions (Diamond and Kőszegi, 1998), and growth (Barro, 1999).

The goal of this paper is to explore the implications of applying quasi-hyperbolic discounting to incidence analysis. Although our theoretical model is general, we focus in particular on the case of smoking. We do so because the available evidence, reviewed below, suggests that smoking decisions are better modeled in the time-inconsistent framework than in the time-consistent one.

We begin, in Section 1, with some background on smoking, addiction modeling, and time inconsistency, and Section 3 introduces the model. We then turn to the focus of this paper, incidence analysis. Standard incidence analysis, which applies to the Becker–Murphy model, is invalid in our model. Taxation also affects how the agent's self-control