Comments on Chaloupka, Emery, and Liang

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Frank Chaloupka has made major contributions to the empirical study of addictive drug use, and he and his colleagues provide a valuable review of the growing economic literature on addiction. Their paper documents recent movement away from the strict "rational addiction" framework of Gary Becker and his colleagues, in the direction of models that correspond more closely to recent psychological theorizing about addiction. This is a shift in orientation as well as content. The newer theories tend to start with the behavior of addicts and try to model it; Becker and colleagues started with a model (rational choice) and tried to make it behave like an addict.

By focusing my brief comments on Becker's rational addiction theory (RAT), I necessarily exaggerate the differences between economics and psychology regarding addiction, because Becker's model is economics' least psychological statement. Elsewhere, Peter Reuter and I described RAT as "an intellectual *tour de force* of unknown relevance to the phenomenon of real-world addiction" (MacCoun & Reuter 2001: 64). Here, writing without my economist co-author, I am inclined to be less equivocal. There are good reasons to believe that RAT is wrong as a model of the addiction process. But at the same time, I think it is a mistake to dismiss its contribution to drug policy analysis.

RAT as a Process Model of Addict Choice

I will not rehearse the cogent points about RAT made in other papers in this volume (or in Skog's (1999a, b) sophisticated and fair-minded assessments). But in brief, there is now a wealth of evidence suggesting that important aspects of RAT are almost certainly wrong. First and foremost, in dozens of direct empirical tests, temporal discounting — by addicts, non-addicted people, and animals — is better described by hyperbolic discounting than by exponential discounting (see, e.g. Ainslie & Monterosso Chapter 1, Rachlin Chapter 4, Skog Chapter 5, Cardinal *et al.* Chapter 6, Bickel and Johnson Chapter 8, Mitchell Chapter 11, this volume).[1] Exponential discounting implies, as Chaloupka and colleagues put it, "that individuals consistently maximize utility over their life cycle." Hyperbolic discounting implies preference reversals over time.

Moreover, it is not at all clear that people — be they pension managers or heroin addicts — have anything like a coherent "lifetime utility function." The notion is contradicted by much theory and evidence in cognitive psychology (see Kahneman & Tversky's 2000 edited collection), behavioral finance (e.g. Benartzi & Thaler 1995), and behavioral economics

(Rabin 2000; Rabin & Thaler 2001) showing a disconnect between our assessments of isolated, moment-by-moment choices and the way we might assess aggregated, lifetime utility — if we actually did so.

For example, Rabin (2000) has shown that the degree of concavity necessary to describe risk attitudes in low stake situations generates preposterous predictions for high stake choices. Rabin & Thaler (2001: 225) argue that "the correct conclusion for economists to draw, both from thought experiments and from actual data, is that people do not display a consistent coefficient of relative risk aversion, so it is a waste of time to try to measure it." In fairness, this body of work does not examine drug addicts, but everything we know about addicts suggest less planning, not more, than recent studies find in college students and financial investors.

Price Matters

If I and others are correct that RAT is wrong as a process model of addict choice, then what are we to make of the moderate empirical success of the theory in econometric tests? RAT's greatest empirical success, and its most important contribution, is the notion that addicts are sensitive to current drug prices. For the rationality debate, this is more molehill than mountain. Responsiveness to price is about as minimal a requirement for rationality as one could ask for. Pigeons are price-sensitive in the psychology laboratory; most animals are price-sensitive in ethological studies of foraging behavior in the wild.

But for policy analysis, addict sensitivity to prices is enormously useful information. For a long time, many of us had unthinkingly accepted the idea that addicts were so chemically enslaved that they'd obtain their daily dose at almost any cost. If addicts are indifferent to price, then any intervention that drives up the price of a drug will have unintended deleterious consequences — addicts will divert more of their income from the support of their household and dependents; they may commit more income-generating crime; and illegal drug traffickers or licit tobacco companies will earn more profits at the expense of public health.

Chaloupka and colleagues cite evidence that smokers engage in compensatory behavioral responses to tax and price increases, which would imply that "the perceived health benefits associated with higher cigarette taxes are likely to be somewhat overstated." (For further evidence, see MacCoun & Reuter 2001, Chapter 15; Stratton *et al.* 2001.) Of course, a corollary is that these compensatory responses imply that estimates of price elasticity of demand probably overstate smokers' willingness to reduce their habit in the face of rising prices. At least initially, smokers can reduce the quantity of tobacco they purchase without reducing the quantity of tars and nicotines they consume, by inhaling deeper, holding the smoke in longer, or switching to brands with more tars or less efficient filters.

The behavioral economics literature suggests that there may be better ways to model addiction than the RAT account, but Becker and his colleagues surely deserve credit for establishing price as an important variable in a literature previously dominated by classical conditioning cues, faulty parenting, peer pressure, and other variables less amenable to aggregate measurement and forecasting.

Back to the Future

Accepting that current prices matter is quite different from accepting that *future* prices matter. Chaloupka, Emery, and Laing review evidence that future prices are associated with current tobacco consumption, and following Becker and colleagues, they interpret this as an indication that users form rational expectations and incorporate those expectations into their current choices. I do not contest the notion that addicts, like non-addicts, sometimes consider the future consequences of their actions. As a father of two young children, I am quite preoccupied with college tuition levels two decades from now. Because it clearly affects my concerns about how to pay for their education, rather than my decision about whether to pay for it, there's a temptation to say, "Well, of course, but that's your child's education, not your cigarette (coffee, cocaine, etc.) habit." But, of course, that response begs the question that we are asking: Just how important is the addict's habit to the addict?

Economists who believe in rational expectations need to shoulder more of the burden of proof here. Our understanding of hyperbolic discounting and temporal myopia, as well as a rich ethnographic literature on addict behavior, make it hard to swallow the idea that future price changes play anything but a trivial role in addicts' current choices.

If addicts aren't considering future prices, why are future prices associated with current use? Future prices might be an econometric proxy for unobserved concurrent rational expectations about the future. But they might also be a proxy for a host of other concurrent factors that are correlated with future prices.[2] Tobacco prices can increase because of rising agricultural and other business costs. But they can also rise because of increases in tobacco taxes.[3] It takes tremendous political mobilization to raise "sin" taxes in the face of powerful industry opposition (see MacCoun & Reuter 2001, Chapter 8). How can we be sure it is the anticipated price rise, rather than the impassioned anti-smoking campaigns, that is producing reductions in current consumption? One could make a similar argument at a smaller scale about price increases due to rising tort litigation expenses.

So if future prices are associated with current consumption, the burden would seem to lie with RAT theorists to do more to show that this indicates a rational expectation effect. On the dependent measure side, one would like to see direct measures of perceived expectations about cigarette prices, and statistical evidence that such expectations mediate the "effect" of future prices on current consumption.[4] On the independent variable side, one might test the differential "effects" of future tax increases vs. non-tax price increases, and the effects of tax initiatives vs. non-tax anti-smoking campaigns. One could operationalize anti-tobacco campaigns using advertising budgets, minutes of radio and TV airtime, newspaper column inches, and so on. Supplementing U.S. data with evidence from other nations might provide more variance in tax levels and price trends.

Tobacco is Different

Chaloupka and his colleagues have published important studies of illicit drug use, but their review indicates that most of the econometric work on addiction has focused on tobacco. From a public health standpoint, this focus makes great sense, as tobacco's health harms

swamp those of the other drugs. And from a methodological standpoint, there's no question that tobacco data are far richer and more reliable than data on illicit drug use. Still, the heavy focus on tobacco does create some inferential problems.

On the demand side, tobacco differs from other addictive drugs in many ways. It is less intoxicating and more easily integrated into daily activities than other drugs (at least outside the U.S.!). Until recently, the costs it imposed on others were not seen as a significant factor, so anti-smoking stigma is far less developed than, say, anti-heroin stigma. And nicotine is probably more dependency-promoting than many drugs, a fact that probably strengthens the case that Becker, Chaloupka and others are making about rationality; if nicotine is more addictive than other drugs and tobacco addicts appear rational, there is an *a fortiori* case that other addicts might be rational too.

On the supply side, the fact that tobacco is legal makes the case for generalization more daunting. Tobacco can be readily purchased in many different locations (no network or dealer contacts needed). Tobacco prices are surely lower than they would be in an illicit market. Tobacco users are far less likely to be criminally active than, say, heroin addicts, who often commit crimes to raise money for their habit, and who by definition are willing to break the law. We know far less about the case for rational addiction involving illegal drugs, and the data (especially on prices) are far noisier (Manski *et al.* 2001).

From a policy perspective, the fact that tobacco is legal means that it can be advertised and promoted, and it can be regulated and taxed. Regulation creates a host of policy levers unavailable to the prohibitionist (MacCoun *et al.* 1996). Because taxes and other price controls are possible, the rational addiction formulation has clear policy relevance. But the policy implications for a prohibition regime are far murkier. If correct, RAT encourages us to drive up drug prices, since that should reduce consumption with little increase in income-generating crime. But our only mechanisms for doing so are the various forms of supply reduction: interdiction, source-country controls, aggressive enforcement against street dealers. And there are serious questions about whether these efforts actually reduce illicit drug supplies to any significant degree, and whether the benefits outweigh the collateral damage (see Caulkins & MacCoun in press; Manski *et al.* 2001; Reuter *et al.* 1988).

Notes

1. In their paper, Chaloupka and colleagues describe Laibson's model as hyperbolic, and Ainslie's model as quasi-hyperbolic. In fact, it is the other way around. Laibson's model comes closer to a step function; it is more tractable but fails to capture some empirical subtleties of discounting behavior.
2. One possibility is that price increases are a response to current prevalence, though I think at least some analyses rule this out.
3. Over the period 1985–2000, average real tobacco prices (excluding tobacco taxes) have risen 100%, while average combined state and federal tobacco taxes have risen 56%. (Rosalie Pacula, Senior Economist at RAND, personal communication on 30 January 2003.)
4. Specifically, current consumption should be correlated more strongly with expected future prices than with actual future prices, because expected prices are the intermediate causal link and because if prices diverge from expectations, it is the expectations that should drive choices. See Baron & Kenny (1986).

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