Discussion of David Laibson’s

“Hyperbolic Discounting and Consumption”

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Overview

• Innovative and exciting work. Takes the hyperbolic model much further than anyone would ever have expected. Transforming it from somewhat of a microtheoretic / psychological curiosum to a “mainstream” tool that can be incorporated into modern macroeconomic analysis.

• Naturally, notions of TI in preferences and of using illiquid assets as commitment devices not new; Strotz (and before). But whole different ball game to actually analyze / solve the problem of “hyperbolic” consumers who simultaneously optimize over consumption, liquid and illiquid assets within a life-cycle context and in the presence of unpredictable income shocks.

• More importantly, makes the key connection to some of the central empirical questions that macroeconomists have been grappling with over the past 2 decades or so. Suggests that hyperbolic-like preferences (more generally, self-control problems) may help provide a simple, unifying, (but of course partial) explanation for some of these puzzles.

• Broadens the debate over relevance of time inconsistency / hyperbolic discounting from (important
and useful) experiments with hypothetical or small-stakes questions over intertemporal tradeoffs to that real-world, large-scale, empirical issues. Should look at both.

- Naturally, there remains work to do to improve certain aspects of the model, both economically and psychologically. But, overall, these quantitative exercises are very carefully conducted, and the results rather convincing—at the very least, thought-provoking.

- Things to criticize also. Will list some possible issues with respect to motivation, implementation or performance of the model. Mostly a list for further research. Potential for much more work here.

1. Self-control and external commitment

2. Main results? Relation to macro puzzles

3. Demand / Supply of savings commitment devices?

4. Liquid and illiquid assets, durables

5. Aggregation and interactions among agents

6. Hyperbolic Euler Equation
Meet Mr. and Mrs. Nichols, from Delavan, Wisc.

He, 34 year old computer specialist for big company; she, 34 year-old assistant bank manager; just had first child.

Combined household income: $109,000 / year (about twice the average).

Both contribute to 401(k) retirement account through employer at rate of 6%. He plans to increase to 10%. Both have IRA’s. Total retirement assets $230,000.

Own home, life insurance; owe $214,000 on mortgage and $20,000 car loan

Also: $700 in directly owned stocks, $600 in bank accounts. Low.

Starting to contribute $25 / month to savings account for daughter’s college fund.
Growing family: Kim and Greg Nichols look over their 2-month-old daughter, Victoria. The Nicholses want to reduce debt and make the most of the money they're socking away money for Victoria's college education.

The couple's retirement assets total about $229,000. Their only other savings: about $600 in bank accounts. Greg also owns two stocks, ADC Telecommunications and Oracle. Both investments have a current value of about $700.

He bought ADC shares about 7 years ago when he belonged to an investment club. "We used to do case studies on different companies," he says. Though the investment club voted against buying ADC, Greg disagreed and bought 120 shares."I thought it was a really good deal. They've split 2-for-1 twice. I'm still making a profit on them even with the market downturn."

Greg eventually quit the club, mostly because he had a different risk tolerance. "A lot of people were older couples, and they tended to be more on the conservative side," he says. Now, some of his friends are talking about starting their own club

Kim and Greg both feel they can afford to take risks. "We don't figure on retiring until probably 60, and that's still 26 years away," Greg says. He has invested nearly 70% of his 401(k) plan assets in a large-company stock fund.

They're taking no risks with Tori's financial future. When she was born, Greg doubled his term life insurance through work to $360,000. And they started putting $25 a month into a savings account for Tori's college fund.

The Nicholses are concerned about reducing debt. They recently refinanced the mortgage on their home to cut the interest rate and combine a first and second mortgage. "We locked in at 6.25% on a 30-year fixed-rate loan," Greg says. "You can't beat that."

The couple owe $214,000 on their home, which they bought last year. They have a $20,000 car loan. Their credit card debt totals about $3,000. Whatever is left from their salaries after paying monthly expenses goes to making extra payments on their credit card bills.

Though Greg and Kim aren't frugal, they aren't extravagant either. They try to be smart shoppers. When the Nicholses recently bought a Kirby vacuum cleaner for $1,100, for example, they were able to finance it with a deal that charges no interest for 6 months.

"We did the same thing with our riding lawn mower," Greg says. "We figured out that if we pay so much a month, in 6 months we'll have saved $218 in interest."

In their spare time, the Nicholses are usually quite active. They enjoy volleyball, softball, golf and going out to dinner. But for now, they are enjoying being at home with their new baby.

By Christine Dugas
Also: $3,000 on credit card bills. Are trying / planning to reduce it.

But not selling stock, also want to increase rather than decrease contributions to 401(k), college fund.

Recent expenses:

– new Kirby vacuum cleaner, $1,100,

– riding lawn mower.

– both financed at 0 interest for 6 months; afterwards...

– perhaps also medical expenses, since daughter born 2 1/2 months early (but may be covered through employers).

Probably pay 17% on credit card, 8% on auto loan. Get after-tax return of 5% on 401(k), IRA, college fund, housing.
Time-inconsistency and self-control

• Agree on the existence of TI / inadequate internalization of futures “selves” preferences.

• But a single $\beta$ applying equally to all goods and situations is a very rough simplification. Intensity of temptation / impulses towards self-gratification varies over goods, states (fatigue, thirst, cues), horizons. Ainslie, Loewenstein.

• Response 1: external commitment mechanisms, contracts. Traditionally emphasized by economists. here: illiquid asset; can think of others.

Response 2: internal self-control mechanisms: emotion/ attention control, mental accounts (Thaler), personal rules (Ainslie).

• Should also note converse puzzles to the one dawod emphasises: miserliness, too low dissaving of the old. Other compulsive behaviors: workaholism, anorexia.
Demand / Supply of savings commitment devices?

- Housing = obvious other role, including considerable tax and other advantages. Its net return is not that precisely calibrated in the model.

- Retirement plans, etc. Yes, but most people do not seem very eager to contribute to them (401k’s and other employer-sponsored pension plans), in spite of substantial tax advantages. Only small fraction of households contribute to IRA’s (10%?) Christmas clubs etc., seem rather marginal.

- Furthermore, most of those who contribute to voluntary retirement plans are households with significant liquid assets as well.

- Could be: a) people have TC preferences (at least for general consumption, perhaps not for procrastination, addictive substances, etc.); b) can achieve self-control through internal commitment mechanisms.

- Could also be that such commitment contracts, if offered by the market, could too easily be circumvented. Can’t prohibit borrowing against them (especially informally: parents, relatives).

- On the other hand:
a) popularity of compulsory social security;

b) usury laws;

c) prohibitions on selling oneself into bondage, indentured servitude.
Main results / relation to macro puzzles

- Excess sensitivity to income: according to PIH + REH, past or predictable $\Delta y$ should have no impact on $\Delta c$. They do.

- Large drop in consumption at retirement

- Varying propensities to consume out of different sources of wealth.

- Specific failures of Euler Equations (stringent tests of standard model)

Key issue: presence of credit-constraints. Here, agents will be endogenously credit-constrained.

Also:

- Low levels of liquid wealth

- Low shares of liquid wealth

- High levels of credit card borrowing, at same time as holds significant accumulated wealth in illiquid assets.
Liquid and illiquid assets

• Here, only totally liquid asset, or very illiquid one ("housing"). In reality, many assets with intermediate degrees of liquidity between credit card and house.

• Particularly important: *durables*. Probably the next big step in this research agenda. May require to make the model more psychologically sophisticated as well. Indeed:

• Suspect that a lot of impulse buying / credit card purchases = durables.

• Problem: most of consumption flow comes from the future (sometimes many years). So requires extremely high degrees of discounting to make it attractive. Temptation, state-dependent discount factors.

• In fact, often don’t even get to consume right away: must order new car months in advance, waiting list, etc. So, for a while at least, must be consuming anticipation. Same for vacation, etc.

• Is it consumption or is it savings? Issue both for economists (national accounts / savings rate) and for individuals (mental account/ rules: may justify to oneself as an investment").
Aggregation and Interaction

A. Aggregation

• “Hyperbolics are of two minds”: behave as if high discount rate for short-run savings decisions (credit cards: $\beta \delta$), but low discount rate for long-run investments (illiquid asset: $\delta$).

Relatedly, hyperbolic model fits data better during early part of life, exponential fits better during later part.

• Question: Is it clear that we can distinguish the hyperbolic model from one where there are simply two types of exponential consumers, with high ($\delta$) and low ($\beta \delta$) degrees of patience? Reports mostly averages (conditional on age),

• May need to better identify puzzles that cannot be explained in that way.
B. Interactions

• No interactions at all among agents in the model. They all live “parallel” lives”. Would like to know about:

• General equilibrium effects: agents lend and borrow to each other \( \implies \) asset prices should be affected, agents in turn will respond. Does \( \beta < 1 \implies \) specific predictions for level and interest rate differentials?

• Interactions between exponentials and hyperbolics. Not just mix of two that still do not interact with each other (laibson et al., BPEA). One issue that has been raised is whether “rational” consumers will exploit / drive out “hyperbolic ones”.

• Basic claim of “Dutch books” neglects that fact that: a) the hyperbolics are sophisticated (won’t be fooled); b) may react with self-control when stakes are high enough; c) exponentials will compete; c) limited arbitrage opportunities. Still, not clear which way will ultimately go; needs to be worked out. fs

• Might even have the reverse, if fear of TI leads some people to be compulsive savers.
Hyperbolic Euler Equation

\[ u'(c_t) = E_t \left[ \left( \frac{\partial c_{t+1}}{\partial x_{t+1}} \right) \beta \delta + \left( 1 - \frac{\partial c_{t+1}}{\partial x_{t+1}} \right) \delta \right] \times Ru'(c_{t+1}) \]

- Elegant, intuitive. Allows to determine sign of bias in estimating standard equation \((\beta \equiv 1)\).

- Can be estimated by simulated method of moments \(\implies \beta = .55, \delta = .96\). Different from simulations. Issue for what moment to calibrate the model on?

- But: Involves highly endogenous MPC. In contrasts to standard EE, which became methodological workhorse of macro work on consumption because:
  
  - can be estimated without solving the intertemporal optimization;
  
  - can be tested (jointly with RE) using orthogonality to all date-\(t\) information. Usually fails, at least on a priori LC households.

- Can one test these overidentifying restrictions here? Pass of fail?

- If not, can one at least test as an inequality, if only for non-currently LC constrained households (easy to determine), i.e. \(u'(c_t) \geq R\delta E_t [u'(c_{t+1})]?\)