Risky Living

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Much joint with Daniel Gottlieb, but not vetted by him.

1. Introduction

Today:

- Talk about "Lori", a loss-averse agent we've been studying for 25 years.
  - (On top of direct utility) Lori dislikes surprise losses—more than she likes surprise gains.
  - This KR "news-utility" model, applied widely.
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  - This KR "news-utility" model, applied widely.
  - Despite preaching, even my own applications feel more like surprise lab lotteries not really role of risk in our lives, focus on static consumer choice and insurance decisions missing the mark.
  - Today: Novel implications for role of risk and insurance in dynamic consumer choice.

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Can highlight results via three themes:

Theme 1: Small risks bother Lori.

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Theme 2: Non-financial risks bother Lori.

- Example (i): **Higher WTP (with or without insurance) for "meliorative" items** (e.g., heating oil, medicine) whose consumption decreases variation in consumption utility than for goods whose periodic consumption *increases* variability.
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- Example (ii): Greater WTP to pay for durables that can be repurchased if break.
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  - Lori prefers the financial risk of repurchases to consumption risk when can't repurchase.

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- Example (ii): Greater WTP to pay for durables that can be repurchased if break.
  - **Even though planning repurchases increases financial uncertainty**,
  - Lori prefers the financial risk of repurchases to consumption risk when can't repurchase.
- Mixed evidence: more LA over non-monetary dimensions than over money.

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Outline of talk:

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Outline of talk:

- Super-quick intro to the Lori-verse.
- Stochastic drug use.
- Durable goods.

2. Background Model

Like models of disappointment aversion, Kahneman and Tversky (1979)emphasize:

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Without getting sidetracked, just noting:

- Treating loss aversion as rational.
- Assumes LA is component of people's experienced well-being (which it is), implemented in error-free way (which it isn't).
- Some of the more welfare-y statements rely on rationality.

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2. The reference point is (recent) expectations—feel losses and gains from surprises.
3. News utility experienced dimension by dimension.
   - Unexpected gains and losses in today's health (say) are separated from surprises in meal quality,
   - **Moreover:** How consumption across time are separate dimensions ... complicated.

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So now, actual environment and results.

3. Stochastic Daily (Drug) Consumption

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- i.i.d., learn each morning that day's state, ω_h or ω_l.
- With probability π, ω_h, drug has consumption value $k > 0$: $m(1|\omega_h) - m(0|\omega_h) = k$,
- With probability $1 - \pi$, ω_l, no benefit, $m(1|\omega_l) = m(0|\omega_l) = 0$.
- Total consumption-u is drug-u minus spending.
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We'll walk through these components, but must note:

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- At end, one example of different initial expectations.
- But most of comparison statics discuss hold for different priors.

Two genres of drugs: Recalling $m(1|\omega_l) = m(0|\omega_l) = 0$

- "Recreational drug": $m(1|\omega_h) = k$ and $m(0|\omega_h) = 0$.
  - Consumption moves you above day-of-no-consumption level.
- "Meliorative drug," $m(1|\omega_h) = 0$ and $m(0|\omega_h) = -k$.
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In both cases value of drug k with probability π, value 0 with probability $1 - \pi$

- Note: Not really "recreational" vs. medical, but whether purchase is unexpected gain or avoiding unexpected loss.
  - So medicine for chronic only rarely available is "recreational".

Four cases:

1. "Recreational" drug, pay-as-you-go price
2. "Recreational drug, per-period insurance, no co-payment
3. "Meliorative" drug, pay-as-you-go price
4. "Meliorative" drug, per-period insurance, no co-payment

Case 1: on proportion π of days, a recreational drug randomly available/enticing at price p.

- Lifetime consumption utility:
  - If buy whenever useful: $T \cdot \pi \cdot (k - p)$.
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- Denote consumption utility by m. Add "news utility".
  - The usual parameters $\lambda > 1$ and $\eta > 0$:
  - positive news utility from belief change $\triangle m > 0$ on a dimension is $\eta \cdot \triangle m$,
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  - $\eta \cdot T\pi \cdot k$ good news about lifetime of fun,
  - $-\lambda\eta T \cdot \pi \cdot p$ bad news lifetime of spending.

Main emphasis is flow of news utility each period once Lori chooses her plan:

- Each of $\approx \pi T$ that she predicts buy, news utility $= [\eta(1-\pi) \cdot k] - [\lambda\eta \cdot (1-\pi)p]$.
  - Consumption is good news relative to $(1-\pi)$ chance of no consumption.
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(If Lori could commit) Doing math for you and *from now on* assume $\lambda = 2$ and $\eta = 1$:

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- Contrast this to classical model, WTP independent of π.
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Cmment:

- Snuck in "commitment" above. Ignoring time inconsistency, but reason matters has to do important fact about Lori's thinking:
  - Lori's optimizing embeds her awareness that consuming drugs when available makes feel worse days not available.

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- That is, Lori can pay insurance premium q, and no copayments or deductibles.
  - Or buy the drug for price p without buying the insurance;
  - Or not buy the drug at all, nor the insurance.
- Then maximum willingness to pay (if $p < \frac{2}{3}k$ and again with $\lambda = 2, \eta = 1$):
  - $q^*(p) = \dfrac{4-\pi}{3}\pi p.$
- Of note: Increasing in π. And since Lori doesn't like uncertain spending, so getting rid of that, fixed fee $q^* > \pi p^*$.

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- Pay as you go still increases spending uncertainty, but gets rid of consumption uncertainty.
- And buying insurance policy for meliorative drug gets rid of both.

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WTP for meliorative drugs with and without insurance:

- $p^{**} = \frac{3-\pi}{4-\pi} \cdot k$ and $q^{**} = \frac{3-\pi}{3} \cdot \pi k$.
- Of note : $p^{**} > p^{*}$ and $q^{**} > q^{*}$.
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- Then we predict $p^{***} = k$.
  - Lori choosing wallop news between loss of \$ over time and loss of health.

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- Most interesting example:

Suppose same day Lori first diagnosed imminent illness also told about effective treatment.

- Then we predict $p^{***} = k$.
  - Lori choosing wallop news between loss of \$ over time and loss of health.
- And $q^{***} > \pi k$, since insurance also eliminates flow news.

4. Durable Goods

Durable Goods

Lori is considering to buy consumer durable future flow of consumption utility (e.g., car, washing machine) that will, at some stochastic future date, break.

- Your car will break down at some random point. Poisson, π breaks each period.
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Cases:

1. WTP for durable good with no chance to purchase replacement.
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Here again results and intuition.

- And here again do case $\lambda = 2$ and $\eta = 1$

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- EU if no purchase $= 0$.
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- *Fixing* V, WTP *increasing* in π. Why?
  - Lower π makes durable newsier: the only day of bad news—the day it breaks—is newsier.

Case 2: Suppose the good is repurchaseable at the same price,

- Reminder: repurchasability does not affect consumption-utility calculus at all.
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- Reminder of theme: Stop focusing on just financial risk.
  - Inability to re-purchase gets rid of all *financial* uncertainty, but feels worse to consumer.

Case 3: Now insurance again. Suppose can pay w each period forever, and get reimbursed price of re-purchase.

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- That is greater per-period WTP than without the insurance.

Final example, favorite theme, additional way insurance gives you peace of mind.

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- The least newsy way your car breaks is if one random day you wake up and your car is dead.
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- If instead, *same price, same durability, same scope for repurchase*, but you might get foreboding before breaks...
- Then item less attractive—and insuring it more attractive.
  - With insurance, foreboding goes away.

Final Example(s):

- For simplicity, assume there are 6 days in a week. (No Tuesdays.)
- Every sunday, a durable breaks with probability $\frac{1}{64}$.
- Consumption utility until breaks is $k = 10$ per week.
- So expected lifetime consumption utility: 640
  - If no foreboding before each Sunday, Lori's WTP if didn't know about the good:
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    - Below 0 if good irreplaceable, and \$213 if replaceable.
  - Note that Lori's utility with fixed insurance (paying \$w per period and never needing to buy again) is same for all these cases.
    - So value of insurance increases in forebodingness.