

# More Realistic Preferences

Next 3 lectures: improving assumptions about preferences:  $\Rightarrow$

- Belief-Based Preferences  $\Rightarrow$
- Reference-Dependent Utility, Risk Preferences, News Utility  $\Rightarrow$
- Social Preferences

## Belief-Based Utility

In psychology for very long, and more recently in formal economics, researchers contemplate preferences that depend directly on beliefs.  $\Rightarrow$

- Not  $U(c)$ , where  $c$  is “physical” / “experienced” / outcomes  $\Rightarrow$
- But  $U(c, p)$ , where  $p$  is (current or recent) beliefs about something.  $\Rightarrow$
- Care about beliefs not solely for “instrumental” reasons.  $\Rightarrow$
- Differs from how beliefs enter choice under expected-utility.  $\Rightarrow$ 
  - In EU: Beliefs over utility, not utility over beliefs  $\Rightarrow$
- Linearity of  $p$  matters a lot behaviorally  $\Rightarrow$ 
  - EU is weight assigned to different eventualities  $\Rightarrow$
  - Not description of states of mind  $\Rightarrow$
- Normatively compelling when weighting eventualities

# Belief-Based Utility

- Whether food you just ate is *truly* poisonous or unhealthy, will have an important effect on your well-being down the line.  $\Rightarrow$
- But your *beliefs*, even if not true, affect your well-being *now*.  $\Rightarrow$ 
  - If *think* food poisonous, you'd be in (very unhappy) distress.  $\Rightarrow$
  - If *think* food fattening, guilt or negative anticipatory utility  $\Rightarrow$
  - If *think* food not exploitatively produced, be happier  $\Rightarrow$
- Putting the  $p$  in utility is the next big trend.  $\Rightarrow$ 
  - Making that prediction a while, but now conferences on b-b utility, annual psycho-games conferences, etc.  $\Rightarrow$
- Utility maximization, much like old.  $\Rightarrow$
- But some difference with old-style modeling.  $\Rightarrow$ 
  - E.g., looser connection between correct beliefs and happiness?  $\Rightarrow$
  - Time-consistency issues  $\Rightarrow$  requires researchers cope ...  $\Rightarrow$ 
    - a) emotionally, and  $\Rightarrow$
    - b) technologically.

# Belief-Based Utility

Examples where well-being and choice importantly influenced by beliefs.  $\Rightarrow$

- Ego utility/self-image/identity  $\Rightarrow$
- Anticipation and dread.  $\Rightarrow$
- Disappointment and pleasant surprises  $\Rightarrow$
- Social status and envy etc.  $\Rightarrow$
- Health anxiety (and attitudes towards testing)  $\Rightarrow$
- Social image—what do others think of us?  $\Rightarrow$
- Anger. Grief. Jealousy.  $\Rightarrow$
- Sports, movies, novels, news (before vs. after results known).  $\Rightarrow$

In each: happiness mediated by our (true or false) beliefs about world.  $\Rightarrow$

- My view: **most** preferences are belief-based.  $\Rightarrow$ 
  - Food for (later) thought: includes all choice-set-dependent prefs.  $\Rightarrow$
- Obsession with b-b preferences *not* widespread in BE.  $\Rightarrow$



# Belief-Based Utility

Classical economic issue:  $\Rightarrow$

- Unemployment.  $\Rightarrow$
- Classical assumptions  $\rightarrow$  hard to generate big individual cost of unemployment.  $\Rightarrow$
- Intuition, and (non-decisive) happiness evidence suggests:  $\Rightarrow$ 
  - effect on well-being greater than captured by economic models  $\Rightarrow$

We have not had the formal apparatus to deal with:  $\Rightarrow$

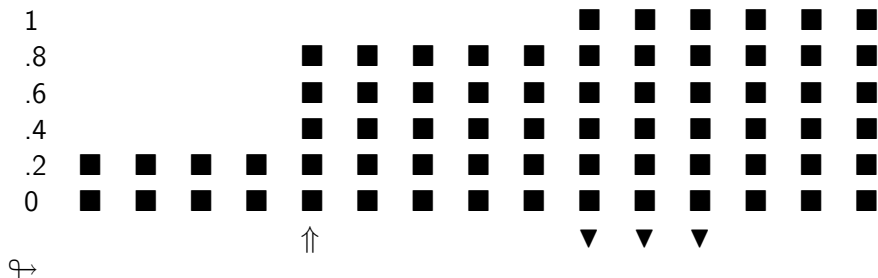
- Self-image consequences of being unemployed.  $\Rightarrow$
- Social-image consequences of being unemployed.  $\Rightarrow$
- Anxiety of becoming unemployed.  $\Rightarrow$ 
  - Not merely behavioral (spend less, no vacations, etc.).



# Belief-Based Utility

Example to frame thinking:  $\Rightarrow$

- For a long time, thought probably no 3-day vacation.  $\Rightarrow$
- Then one day find out that probably will (80%),  $\Rightarrow$
- and then confirmed as 100% likely when it happens.  $\Rightarrow$
- Belief evolution:  $\Rightarrow$



# Belief-Based Utility

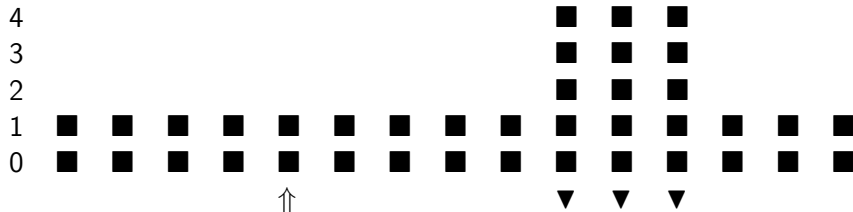
Utility in time?  $\Rightarrow$

- Will talk about real-time “happiness” without choice.  $\Rightarrow$

Stay calm!

- This will have implications for choice.  $\Rightarrow$

Utility if above beliefs?  $\Rightarrow$  Could be:  $\Rightarrow$



# Belief-Based Utility

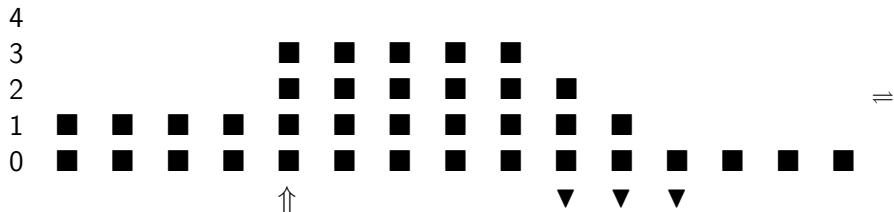
Note: As said earlier, treating beliefs and utility as real.  $\Rightarrow$

- Now we're going to assume ...  $\Rightarrow$  wait for it ...  $\Rightarrow$  time is real!  $\Rightarrow$
- Uncontroversial, and completely standard ... sort of.  $\Rightarrow$ 
  - We don't *quite* say in much formal economics when you experience utility.  $\Rightarrow$
  - So some of our models are going to be not quite PEEMish.  $\Rightarrow$
  - E.g., present bias takes more of a stance about moments of experience.  $\Rightarrow$
  - A central component of doing good is to understand and embrace the “time stamping” of utility.  $\Rightarrow$
  - Here, and in present bias, elsewhere, be careful writing down the consumption profiles  $\Rightarrow$
  - E.g., getting \$ and durable goods is *future* consumption, not current;  $\Rightarrow$ 
    - And having anticipation or anxiety over current consumption is *past* utility.

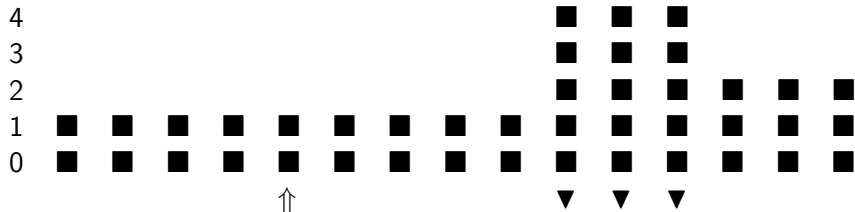


# Belief-Based Utility

Or could be:  $\Rightarrow$

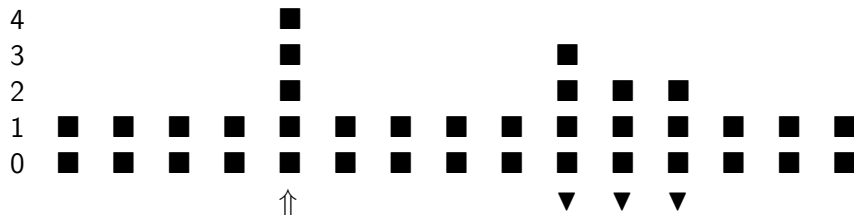


Or could be:  $\Rightarrow$



# Belief-Based Utility

Or could be (my personal vote): $\Rightarrow$



$\rightarrow$

# Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?  $\Rightarrow$
- Often: We don't.  $\Rightarrow$  All captured by *utility(vacation)*.  $\Rightarrow$ 
  - Reduced form probably best for “remembered utility”.  $\Rightarrow$

But can matter for various reasons.  $\Rightarrow$  Three are:  $\Rightarrow$

- Use direct happiness data iff our theories specify timing of utility.  $\Rightarrow$ 
  - (Not topic these lectures).  $\Rightarrow$
- Beliefs/information matter even when behavior is unaffected.  $\Rightarrow$
- Affects choice: including time inconsistency, commitment, etc.

$\Rightarrow$

# Belief-Based Utility

Suppose planning vacation:⇒

- Have anticipatory preferences *for holidaymaking only*.⇒
- \$10,000 Club Medic holiday package, *total* anticipatory utility plus consumption and remembered utility well worth \$10,000. ⇒
- But without anticipatory utility, *not* nearly worth it.⇒
- Can/must buy months in advance.⇒

Situation A: All but \$50 is fully refundable if 24 hours in advance.⇒

- What would a fully rational person (as I define it) do?⇒
- She **would/would not (cross out one)** buy the package, and then she **would/would not (cross out one)** go on the vacation.⇒
  - She **would/would not (cross out one)** buy the package, and then she **would not** go on the vacation.⇒
- And so:⇒
  - She **would not** buy the package, then **would not** go on the vacation.

# Belief-Based Utility

If **fully rational** and have the specified preferences,  $\Rightarrow$

- You won't sign up under Policy A,  $\Rightarrow$ 
  - because you'll cancel,  $\Rightarrow$  *and know you'll cancel*  $\Rightarrow$
- Won't get anticipatory utility after all.  $\Rightarrow$

"Fully rational" defined:  $\Rightarrow$

- Dynamically optimal, anticipating correctly own conduct.  $\Rightarrow$
- But not the beliefs that make you happiest.  $\Rightarrow$
- With b-b preferences, the two are different.  $\Rightarrow$ 
  - Remember: not the same under classical EU  $\Rightarrow$

Situation B: Contract allows no refunds.  $\Rightarrow$

- What would a person do?  $\Rightarrow$
- Buy package? Go on vacation?  $\Rightarrow$ 
  - She **would** buy the package, and then she **would** go on the vacation.

# Belief-Based Utility

Predictions in A vs. B **do/do not (cross out one)** violate classical assumptions about preferences?  $\Rightarrow$

- This **does** violate classical axioms/assumptions about preferences.  $\Rightarrow$ 
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.  $\Rightarrow$
  - "Go" from {No Buy, Go} in Situation B.  $\Rightarrow$
  - (And worse off in Situation A)  $\Rightarrow$
- This **should/should not (cross out one)** freak you out?  $\Rightarrow$ 
  - This **should not** freak you out.  $\Rightarrow$
- Violating such an axiom **should/should not (cross out one)** thrill you?  $\Rightarrow$ 
  - It **should not** thrill you.  $\Rightarrow$
- Be interested in realism, insight, and importance of assumptions.  $\Rightarrow$ 
  - (Not sure of realism, importance this example)  $\Rightarrow$
- "De gustibus" philosophy in its purest and most legitimate form:  $\Rightarrow$ 
  - anticipatory preferences described here are perfectly coherent;  $\Rightarrow$
  - we should not arrogantly dismiss them to satisfy our own axioms  $\Rightarrow$

Lessons from this example:  $\Rightarrow$

- Generates choice-set-dependent preferences.  $\Rightarrow$
- Correct beliefs vs. happiness-inducing beliefs?  $\Rightarrow$ 
  - If believed would go through with it?  $\Rightarrow$
- Welfare effects, choice-set effects, must be handled with care.  $\Rightarrow$
- Making predictions:  $\Rightarrow$ 
  - Köszegi: “personal equilibrium,” KR: PPE related formulations.  $\Rightarrow$
  - The real way to do it ... optimal consistent plans.

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# Belief-Based Utility

Extra slides contain model of consumption & savings with anticipatory preferences... $\Rightarrow$

- A big prediction: without commitment, consumption will be increasing over time  $\Rightarrow$ 
  - Intuition? $\Rightarrow$
- And with commitment ...  $\Rightarrow$ 
  - even more increasing. $\Rightarrow$
- Why from anticipating solely his future consumption utility? $\Rightarrow$ 
  - Why not also from future anticipatory utility? $\Rightarrow$
  - We'll ignore.

$\curvearrowright$

## Consumption & Savings with Anticipatory Preferences

### Setting and Preferences

Yuki will live for 3 periods, has  $y$  to spend over that time (no interest), seeks to maximize his (undiscounted) lifetime utility  $U^1 = u_1 + u_2 + u_3$ . $\Rightarrow$

- In period  $t$ , “consumption utility”  $u_t$  that depends on  $c_t$ . $\Rightarrow$
- Also gets utility from anticipating his future consumption utility. $\Rightarrow$
- Why from anticipating solely his future consumption utility? $\Rightarrow$ 
  - Why not also from future anticipatory utility? $\Rightarrow$
  - We'll ignore.

$\rightarrow$

# Belief-Based Utility

Attempt to model this:  $\Rightarrow$

$$u_1 = m(c_1) + \varphi[m(c_2) + m(c_3)] \Rightarrow$$

$$u_2 = m(c_2) + \varphi[m(c_3)] \Rightarrow$$

$$u_3 = m(c_3) \Rightarrow$$

- where  $\varphi \geq 0$  is relative concern for anticipatory utility.  $\Rightarrow$

Question: what is *incoherent* about such preferences?  $\Rightarrow$

- $u_1$  cannot depend on  $c_2$  or  $c_3$ . Only **beliefs** about  $c_2, c_3$ .

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# Belief-Based Utility

2nd attempt to model:  $\Rightarrow$

- $u_1 = m(c_1) + \varphi E_1\{m(c_2) + m(c_3)\} \Rightarrow$
- $u_2 = m(c_2) + \varphi E_2\{m(c_3)\} \Rightarrow$
- $u_3 = m(c_3) \Rightarrow$

where  $E_t\{m(c_\tau)\}$  is period- $t$  expectations of period- $\tau$  cons. utility.  $\Rightarrow$

- Would want more complete version of this if there is uncertainty.  $\Rightarrow$

When beliefs deterministic, shorthand:  $\Rightarrow$

- $u_1 = m(c_1) + \varphi[m(\tilde{c}_2^1) + m(\tilde{c}_3^1)] \Rightarrow$
- $u_2 = m(c_2) + \varphi[m(\tilde{c}_3^2)] \Rightarrow$
- $u_3 = m(c_3) \Rightarrow$

where  $\tilde{c}_\tau^t$  are Yuki's period- $t$  beliefs about period- $\tau$  consumption.  $\Rightarrow$

- What will Yuki do?



# Belief-Based Utility

**Candidate** solution: Yuki solves $\Rightarrow$

$$\text{Max}_{c_1, c_2} = m(c_1) + (1 + \varphi)m(c_2) + (1 + 2\varphi)m(y - c_1 - c_2).\Rightarrow$$

• E.g., if  $m(x) = \ln(x)$ , then $\Rightarrow$

$$\bullet c_1^{**} = \frac{1}{3+3\varphi}y, \Rightarrow c_2^{**} = \frac{1+\varphi}{3+3\varphi}y, \Rightarrow c_3^{**} = \frac{1+2\varphi}{3+3\varphi}y\Rightarrow$$

• How do these depend on  $\varphi$ ? $\Rightarrow$

- Respectively decreasing, independent of, and increasing in  $\varphi$  $\Rightarrow$
- Intuition? $\Rightarrow$

• If  $\varphi = 1$ , then: $\Rightarrow$

$$\bullet c_1^{**} = \frac{3}{18}y, \Rightarrow c_2^{**} = \frac{6}{18}y, \Rightarrow c_3^{**} = \frac{9}{18}y\Rightarrow$$

• Match for evidence?

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Is this what Yuki will do? $\Rightarrow$

- Claim: we have under-specified features of the environment. $\Rightarrow$ 
  - We need to say when Yuki is making (committed) choices. $\Rightarrow$
- Situation 1: $\Rightarrow$ 
  - Yuki fully rational and can commit, then yes. $\Rightarrow$
- Situation 2: $\Rightarrow$ 
  - Yuki fully rational and *cannot* commit, then only 1 of the 6 is right. $\Rightarrow$

E.g., if  $\varphi = 1$ , then $\Rightarrow$

$\varphi \rightarrow$

# Belief-Based Utility

	Can Commit	Cannot Commit	
$c_1^*$	$\frac{3}{18}y$	$\frac{3}{18}y$	
$c_2^*$	$\frac{6}{18}y$	$\frac{5}{18}y$	$\Rightarrow$
$c_3^*$	$\frac{9}{18}y$	$\frac{10}{18}y$	

What is interesting? $\Rightarrow$

- Consumer more period 2 with commitment than without! $\Rightarrow$
- Why does commitment increase period-2 consumption? $\Rightarrow$ 
  - Because assumed anticipation is over future consumption utility alone (and not future anticipatory utility), happier looking forward to smoothed consumption than back-weighted consumption. $\Rightarrow$
  - But in period 2, this is no longer a consideration.



# Belief-Based Utility

Reasons increased consumption profiles besides anticipatory?⇒

- Precautionary savings⇒
- Backward-looking habit formation⇒

Reasons we may rarely see increasing consumption?⇒

- Present bias... consumption smoothing may be self-control problem.⇒
- Because... anticipatory isn't quite right.⇒
  - It is naturally mis-*ID* for its cousin, news utility.⇒
  - Disappointment and surprise utility⇒
  - must balance anticipation with threat of disappointment.⇒
- Reminder: models should own *all* their implications⇒
  - Anticipatory utility makes some strange ones.

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# Belief-Based Utility

Aside: Different approaches to investigating b-b preferences:  $\Rightarrow$

- Combine assumptions about the psychology, the informational environment, and researchers' methods.  $\Rightarrow$

Some approaches:  $\Rightarrow$

- 1 "Willful" violations of LIE  $\Rightarrow$
- 2 Self-signaling and forgetting  $\Rightarrow$
- 3 Altruistic Revealed Preferences  $\Rightarrow$ 
  - 1 How do we manage the utility of others?  $\Rightarrow$
  - 2 KR (non-RD!), finally starting to use it as a method in experiments.  $\Rightarrow$
- 4 Non-linearity in probabilities, fully-rational/Bayesian  $\Rightarrow$ 
  - Approach 1 has gained some (surprising) traction ...
  - Approaches 2 most common in recent formal models.  $\Rightarrow$
  - Approaches 1-3 are in fact often formally quite similar.  $\Rightarrow$
  - We'll look at Approach 4  $\Rightarrow$ 
    - the least convincing!  $\Rightarrow$
  - But examining Approach 1 ...

# Belief-Based Utility

- Back to anticipatory utility: What if Yuki can fool himself into believing lifetime income  $y$  is something else?  $\Rightarrow$
- What might he tell himself?  $\Rightarrow$ 
  - Choose to be optimistic to consume anticipation.  $\Rightarrow$
  - But trades off against induced under-saving.  $\Rightarrow$
  - Brunnermeier and Parker (2005).  $\Rightarrow$
- How well-being of such "rationally irrational" beliefs compare to stuck-with-rationality utility?  $\Rightarrow$
- But ... what if Yuki can tell himself other stories?  $\Rightarrow$ 
  - Like that he earns lots of interest rate on his savings?  $\Rightarrow$
  - Or wonderful afterlife if maximize true lifetime utility.  $\Rightarrow$
- Fundamental Theorem of Optimal Distortion of Anticipatory Prefs:  $\Rightarrow$ 
  - If no restrictions on distortions, why not choose beliefs to maximize **both** anticipatory preferences and "direct-consumption" utility?  $\Rightarrow$
  - It is no sin to make 'ancillary assumptions'.  $\Rightarrow$  It is a necessity.  $\Rightarrow$  But those are unfamiliar assumptions—*and entirely driving results.*

## Ego Utility $\Rightarrow$

Kőszegi (2006a, 2006b) and others: how one feels about oneself. $\Rightarrow$

- We do so here in the context of ego about skill/talent. $\Rightarrow$
- Nascent research: "social preferences" as self & social image: $\Rightarrow$ 
  - (Related papers: Andreoni on warm glow; Bernheim on conformity; Rabin on moral preferences vs. moral rules; Benabou & Tirole; Grossman; Andreoni & Bernheim; moral wiggle room) $\Rightarrow$
- Status $\Rightarrow$
- We like to think we are:  $\Rightarrow$ 
  - good economists,  $\Rightarrow$
  - good curlers, and  $\Rightarrow$
  - good looking. $\Rightarrow$
- And most of all: $\Rightarrow$ 
  - **good people.**

# Belief-Based Utility

We'll do Approach 4 now.⇒

- Based on Koszegi (2006)⇒
- Person will make choices as to whether acquire information.⇒
  - Certainly the conceptually easier case.⇒
  - Such models of Bayesian self-persuasion pre-date models of Bayesian other-persuasion.⇒

Alternative (won't do):⇒

- "Self-signaling": By actions or information want to convince future self something different about yourself than now know.⇒
  - Reduces to a classical two-person signaling situation, but still a conceptual challenge.⇒

Similar dichotomy in social preferences:⇒

- Rabin (1995) moral-rules approach non-linear⇒
- Recent signaling models.



# Belief-Based Utility

There are two types of people in the world:  $\Rightarrow$

- Those good at widget-making, and those who are not.  $\Rightarrow$

Henrik has utility function  $u = w - e + \varphi\sqrt{p}$ , with parameter  $\varphi \geq 0$ ,  $\Rightarrow$

- where  $w$  is his income,  $\Rightarrow$
- $e$  is his effort costs of widget-making,  $\Rightarrow$
- $p$  is his believed probability that he is good at widget-making.  $\Rightarrow$

Notice the embedding:  $\Rightarrow$

- If  $\varphi = 0$ , “classical”, purely instrumental prefs.  $\Rightarrow$
- If  $\varphi > 0$ , Henrik has “ego utility”  $\Rightarrow$
- (But is it Peemish?  $\Rightarrow$  What do we have ego about?)

# Belief-Based Utility

Notice the non-linearity of  $u = w - e + \varphi\sqrt{p}$ . $\Rightarrow$

- No reason to expect linearity. $\Rightarrow$
- Henrik is “*information-averse*”: concave in  $p \rightarrow$  he prefers to have less information rather than more. $\Rightarrow$ 
  - Henrik prefers beliefs .7 to 50/50 chance of having beliefs .6 or .8. $\Rightarrow$
  - He'd of course prefer beliefs .8 to beliefs .7. $\Rightarrow$
  - But Bayesian approach says cannot choose .8 over .7. $\Rightarrow$
- Classical economics: people weakly prefer more information to less. $\Rightarrow$ 
  - So information aversion is simplest marker of b-b preferences.

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# Belief-Based Utility

Suppose Henrik has priors  $\bar{p} \in [0, 1]$  good at widget-making.  $\Rightarrow$

**If he works,  $e = k > 0$ , and he finds out for sure whether good.**  $\Rightarrow$

- If good,  $w = 1$ ;  $\Rightarrow$
- if bad,  $w = \alpha < 1$ .  $\Rightarrow$

**If no work,  $e = 0$ ,  $w = 0$ , and he learns nothing.**  $\Rightarrow$

Utility from widget-making:  $\Rightarrow u = \bar{p}[1 + \phi\sqrt{1}] + (1 - \bar{p})[\alpha + \phi\sqrt{0}] - k$ .  $\Rightarrow$

Utility from non-widget-making:  $u = \phi\sqrt{\bar{p}}$ .  $\Rightarrow$

- For what values of  $\bar{p}$ ,  $\phi$ ,  $\alpha$ ,  $k$ , will Henrik work?  $\Rightarrow$

If  $\phi = 0$  — classical, non-belief-dependent preferences — then  $\Rightarrow$

- If  $k$  is low, work for sure.  $\Rightarrow$
- more likely to work when  $\bar{p}$  is higher (since  $\alpha < 1$ ).



# Belief-Based Utility

For  $k = .001$ ,  $\alpha = \frac{31}{48}$ , and the combinations of  $\bar{p}$ ,  $\varphi$ , will Henrik work?  $\Rightarrow$

$\bar{p}$ and $\varphi =$	$\varphi = 0$	$\varphi = 3$	$\varphi \rightarrow \infty$	
$\bar{p} = 0$	Yes	Yes	Yes	
$\bar{p} = \frac{1}{9}$	Yes	Yes	No	$\Rightarrow$
$\bar{p} = \frac{1}{4}$	Yes	No	No	
$\bar{p} \rightarrow 1$	Yes	Yes	?	

Fascinating things about this table?  $\Rightarrow$

- Despite  $k \approx 0$ , Henrik sometimes avoids work.  $\Rightarrow$ 
  - “Paying” to avoid information.  $\Rightarrow$
- Fixing any  $\bar{p} \neq 0$ ,  $\bar{p} \neq 1$ , Henrik will not work as  $\varphi \rightarrow \infty$ .  $\Rightarrow$
- Fixing any  $\varphi$ ,  $\bar{p} \rightarrow 1$  or  $0$ , Henrik will work iff  $\exp(\text{wage}) > \text{effort}$ .  $\Rightarrow$
- Non-monotonicity in  $\bar{p}$ .



If  $\varphi > 0$  moderate, can get: when  $\bar{p}$  goes from very low to moderate, Henrik may go from working to not working.  $\Rightarrow$

- Why?  $\Rightarrow$

Lesson emphasized by Koszegi (2006):  $\Rightarrow$  can get negative correlation between confidence about your talent and whether undertake task.  $\Rightarrow$

- Protecting ego, not likely without b-b prefs

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# Belief-Based Utility

And now for a tale of love and widgets ... $\Rightarrow$  Recall:  $\Rightarrow$

- If  $\bar{p} = \frac{1}{4}$ ,  $k = 0$ ,  $\varphi = 10,000$ ,  $\alpha = 0$  Henrik no work. $\Rightarrow$

The twist: Suppose that $\Rightarrow$

- Bjorn loves Henrik and wishes him nothing but the best, $\Rightarrow$
- knows whether Henrik is a good widget-maker or not. $\Rightarrow$
- Henrik knows Bjorn loves him and is aware of Henrik's widget skills. $\Rightarrow$
- Common knowledge that Bjorn could communicate with Henrik $\Rightarrow$
- If and when Bjorn says something, Henrik can take job or not $\Rightarrow$

How does this tale of love and widgets end? $\Rightarrow$

- Quite sadly, on average. $\Rightarrow$ 
  - Henrik will find out whether or not he is a good widget maker. $\Rightarrow$
  - Which makes him feel worse on average. $\Rightarrow$
  - The logic is that of "emotional agency": $\Rightarrow$  credible equilibria in revealing information to people with belief-based preferences. $\Rightarrow$

Forget Bjorn. $\Rightarrow$

- Suppose that Henrik instead has preferences:  $u = w - e + \varphi p^2$ . $\Rightarrow$ 
  - Henrik is information-loving. $\Rightarrow$
- Harder to see over-gathering of information than under-gathering (since value of information always non-negative). $\Rightarrow$
- Henrik may take job as widget maker in situations where wouldn't for "classical" reasons.

$\curvearrowright$

# Belief-Based Utility

Now suppose instead that Henrik has preferences:  $u = w - e + \varphi p$ . $\Rightarrow$

If  $\varphi = 0$ , what would we observe? $\Rightarrow$

- Henrik obtains information for solely for instrumental reasons. $\Rightarrow$

If  $\varphi > 0$ , what would we observe? $\Rightarrow$

- Henrik obtains information solely for instrumental reasons. $\Rightarrow$

If  $\varphi < 0$ , what would we observe? $\Rightarrow$

- Henrik obtains information solely for instrumental reasons. $\Rightarrow$

LIE  $\rightarrow$  Henrik's *observed* taste for information entirely instrumental. $\Rightarrow$

- When linear, belief-based preferences can matter a lot for well-being even when no ID in behavior. $\Rightarrow$

How would Bjorn behave?  $\Rightarrow$

- Emotional agents can reveal b-b preferences even when linear. $\Rightarrow$ 
  - “Altruistic revealed preference”



Conclusion:  $\Rightarrow$

- Recall: similar themes for self-signaling models.  $\Rightarrow$
- Starting (barely) to come on line as improvements to economic models.  $\Rightarrow$

Now turn to Reference Dependence  $\Rightarrow$

- Will come back to b-b preferences with a vengeance.  $\Rightarrow$
- Aside: Ref points everywhere... including ego utility, etc.

$\curvearrowright$

## Reference-Dependent, News-Utility, and Risk Preferences

In virtually all physiological and psychological reactions to (e.g. temperatures), people's reactions tend to reflect adaptation, change, and contrast, rather than solely absolute levels of outcomes.  $\Rightarrow$

- Feelings and choice are reference-dependent:  $\Rightarrow$
- $u(c_t; r_t)$ , not  $u(c_t)$ , where  $r_t$  is some reference level.

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# Prospect-Theoryish Stuff

Kahneman and Tversky (1979, p. 277) stress that salience of changes from reference points is a basic aspect of human nature:⇒

- “Our perceptual apparatus is attuned to the evaluation of changes or differences rather than to the evaluation of absolute magnitudes ... The same principle applies to non-sensory attributes such as health, prestige, and wealth.” ⇒

Not just people, but amoeba and physical systems.⇒

- Role of contrast/comparison poster child for things economists should use to explain things, not something to be explained.⇒

Two features of reference dependence emphasized by Kahneman and Tversky (1979) and others:⇒

- Loss Aversion⇒
- Diminishing Sensitivity



# Prospect-Theoryish Stuff

## 1. Loss Aversion $\Rightarrow$

People dislike losses (2 times?) more than they like comparable-size gains. $\Rightarrow$

- E.g.: Vast majority turn down 50/50 lose \$600, gain \$700 bet $\Rightarrow$ 
  - **Not** because of DMU(W). $\Rightarrow$
  - Strongest such aversion involve mix gains and losses. $\Rightarrow$
  - Many folk, myself included, guilty of sloppy wording, calling all modest-scale risk aversion, even when only gains, “loss aversion” . $\Rightarrow$
- Monetary risk attitudes primary area in which LA explored. $\Rightarrow$
- Other domains where LA important: $\Rightarrow$ 
  - Moral/Fairness, Hippocratic Oath, Wage Cuts $\Rightarrow$
  - [Endowment Effect/SQ Bias in riskless trades] $\Rightarrow$
  - Disposition effects, in investments and houses. $\Rightarrow$
  - Aversion to (nominal) wage and consumption declines. $\Rightarrow$
  - Income-targeting

## 2. Diminishing Sensitivity $\Rightarrow$

- People pay less attention to incremental differences when changes are further away from reference point. $\Rightarrow$
- Prefer \$420 for sure or 50/50 chance at \$900?  $\Rightarrow$
- **Prefer losing \$420 for sure or 50/50 chance to lose \$900?** $\Rightarrow$

Reflects big and general fact about human psychology: $\Rightarrow$

- We think in terms of proportions.

↪

# Prospect-Theoryish Stuff

Change subject: in following pairs, which “feel” like a bigger difference?  $\Rightarrow$

visually 101 ft. away vs. 100 ft. away		1 ft. v. 0 ft. $\Rightarrow$
gaining \$101 v. gaining \$100		gaining \$1 v. gaining \$0 $\Rightarrow$
losing \$101 v. losing \$100	vs.	losing \$1 v. losing \$0 $\Rightarrow$
losing \$101 v. losing \$100		losing \$2 v. losing \$1 $\Rightarrow$
gratification 100 days from now v. 101 days		gratification 0 days v. 1 day $\Rightarrow$
saving \$10 on \$1,000 item		saving \$10 on \$20 item $\Rightarrow$
carrying a suitcase 21 blocks v. 20 blocks		2 blocks v. 1 block $\Rightarrow$
19% chance v. 18% chance		1% chance v. 0% $\Rightarrow$
19% chance v. 18% chance		100% chance v. 99% $\Rightarrow$
17 heads/13 tails v. 16 heads/14 tails		4 heads/0 tails v. 3 h/1 t $\Rightarrow$

$\rightarrow$

# Prospect-Theoryish Stuff

Proportional thinking via diminishing sensitivity in the value function.  $\Rightarrow$

- But DS and proportional thinking the same?  $\Rightarrow$ 
  - The joy of “distinction epiphanies” ...
- Distance vs. Range?  $\Rightarrow$ 
  - DS: with  $r = 0$ , 1 vs. 2 in feels bigger than 91 vs. 92 in  $\{0, 1, 2, 91, 92\}$   $\Rightarrow$
  - RT: 1 vs. 2 in  $\{0, 1, 2, 91, 92\}$  feels smaller than 1 vs. 2 in  $\{0, 1, 2\}$   $\Rightarrow$
- Bushong-Rabin-Schwartzstein think *some* DS really propo-thinking.  $\Rightarrow$ 
  - But some DS really DS  $\Rightarrow$
- Two more issues:  $\Rightarrow$ 
  - Is this really rational “experienced-utility maximization”?  $\Rightarrow$
  - Seriously contradicts some intuitions/popular recent models that people pay too *much* attention to increments over bigger ranges.



## Modeling Reference-Dependent Utility<sub>⇐</sub>

- Fixing  $r$ , rational people will maximize  $u(c|r)$ .<sub>⇐</sub>
  - What is  $r$ ?<sub>⇐</sub>
  - Why is it fixed?<sub>⇐</sub>
  - Moving on...<sub>⇐</sub>
- Reference dependence in  $u(\cdot|\cdot)$  fully rational?<sub>⇐</sub>
  - In principle: yes.<sub>⇐</sub> But in fact ... <sub>⇐</sub> Also yes.<sub>⇐</sub>
  - People feel pleasure and pain from gains and losses.<sub>⇐</sub>
  - But in ensuing lectures return to ways the influence of reference-dependent preferences not fully rational<sub>⇐</sub>
  - Both lead too much attention on gains and losses

↷

# Prospect-Theoryish Stuff

Traditional focus: solely on departures from the reference point.  $\Rightarrow$

- Not how the reference point is formed,  $\Rightarrow$
- **Nor how the reference point affects utility.**  $\Rightarrow$

That is, analyze choice in terms of "value-function".  $\Rightarrow$

- $v(c|r) \equiv u(c|r) - u(r|r)$ .  $\Rightarrow$

**Wildly insufficient** for integrating this into economics.  $\Rightarrow$

- Before returning to the full model  $\Rightarrow$
- Start by framing evidence in terms of that approach  $\Rightarrow$ 
  - Misses how people also care about absolute levels.  $\Rightarrow$
  - But **also** misses, not just what  $r$  is, but  $\partial u(c|r) / \partial r$   $\Rightarrow$
  - Big time crucial for both welfare and dynamic behavior.



# Prospect-Theoryish Stuff

## Reference Dependence and Risk: Round 1: $\Rightarrow$

- Assume people maximize expected value of  $u(c|r)$ .  $\Rightarrow$
- I tend to ignore non-linear probability weights.  $\Rightarrow$ 
  - Mostly simplicity  $\Rightarrow$  Partly skepticism.  $\Rightarrow$
  - Most traumatizing picture in all of economics!  $\Rightarrow$
  - Overweight low probabilities...except when ignore  $\Rightarrow$
- Others also have downplayed.  $\Rightarrow$
- But it's making a comeback...  $\Rightarrow$ 
  - Largely because it should (I was/we were wrong)  $\Rightarrow$
  - Employs 2<sup>nd</sup>-most traumatic picture.  $\Rightarrow$
- Ignoring non-linear probability weights: "reference-dependent Von Neumann-Morgenstern preferences" (RD-VNM prefs):  $\Rightarrow$ 
  - For each  $r$ , people maximize  $\int_c p(c)u(c|r)$ .



# Prospect-Theoryish Stuff

Assumptions A0-A4 (K&T (1979), formalized by BMR (1999)): $\Leftarrow$

- A0.  $v(x)$  continuous, differentiable for all  $x \neq 0$ ,  $v(0) = 0$ . $\Leftarrow$
- A1.  $v(x)$  is strictly increasing. $\Leftarrow$
- A2. If  $y > x > 0$ , then  $v(y) + v(-y) < v(x) + v(-x)$ . $\Leftarrow$
- A3.  $v''(x) < 0$  for  $x > 0$  and  $v''(x) > 0$  for  $x < 0$ . $\Leftarrow$
- A4. From  $x > 0$  direction,  $\lim_{x \rightarrow 0} \frac{v'(-x)}{v'(x)} \equiv L > 1$ . $\Leftarrow$

**Implications for Risk Attitudes?** $\Leftarrow$  (Assume  $r$  = current wealth) $\Leftarrow$

- 1. Person will turn down any 50/50 lose  $\$X$ /gain  $\$X$  bets. $\Leftarrow$ 
  - Implied by A2. $\Leftarrow$
- 2. Is risk averse among bets involving only gains $\Leftarrow$ 
  - Implied directly by A3. $\Leftarrow$
- 3. Is risk-loving among bets involving only losses $\Leftarrow$ 
  - Also implied directly by A3. $\Leftarrow$
- 4. Is "first-order risk-averse." $\Leftarrow$ 
  - Implied by A4.

- Implications 1 & 2 true of EU/DMU(W) model. $\Rightarrow$
- Implication 3 famously inconsistent with EU/DMU(W). $\Rightarrow$ 
  - But generates the question: $\Rightarrow$
  - Huh? Insurance? $\Rightarrow$
- Implication 4: Folk wisdom that first-order risk aversion is  $\Rightarrow$ 
  - *inconsistent with* EU/DMU(W). $\Rightarrow$
  - But hugely important, not just a limit result.

↪

## DMU(W) does not help explain Modest-Scale Risk Aversion $\Rightarrow$

- Virtually none of aversion to risks involving little chance of gaining or losing more than (say) \$10,000 can be explained. $\Rightarrow$

What mean by EU/DMU(W) “does not **help**”? $\Rightarrow$

- Not that it is missing factors. $\Rightarrow$
- Rather: for modest stakes, capturing **very** little. $\Rightarrow$
- **Not** that EU/DMU(W) model wrong ... all models are wrong. $\Rightarrow$ 
  - For **this** question, it has virtually zero explanatory power. $\Rightarrow$
  - It predicts virtual risk neutrality. $\Rightarrow$
  - Just because all useful models are false (because all models are false), doesn't mean that all false models are useful. $\Rightarrow$

EU/DMU(W) *does* help for large stakes... main story.

↪

## Four final comments (for now) on risk prefs: $\Rightarrow$

- 1. People *are* in general averse to modest-scale risks.  $\Rightarrow$ 
  - And sometimes risk-loving.  $\Rightarrow$  Rarely risk-neutral  $\Rightarrow$
- 2. Modest-scale risk aversion is an important topic for economics.  $\Rightarrow$ 
  - Extended warranties, aversion to deductibles, fixed-rate plans, etc. are market-driving, institution-driving behaviors.  $\Rightarrow$
- 3. Risk aversion neither simplifying assumption nor done for generality.  $\Rightarrow$ 
  - It is one of the most results-driving assumptions in all of economics  $\Rightarrow$
  - Ubiquitously added as *necessary* “complication”  $\Rightarrow$
- 4. We don't want to get rid of the  $u''(w) < 0$  assumption.  $\Rightarrow$ 
  - Among most intuitive, compelling, important assumptions we make!



# Prospect-Theoryish Stuff

## Four final comments (for now) on risk prefs: $\Rightarrow$

1. People *are* in general averse to modest-scale risks.  $\Rightarrow$

- And sometimes risk-loving.  $\Rightarrow$
- Rarely risk-neutral  $\Rightarrow$

Example from Sydnor (2010) on housing insurance:  $\Rightarrow$

<u>Deductible</u>	<u>Premium</u>	<u>Choice</u> $\Rightarrow$
\$1000	\$504	
\$500	\$588	
\$250	\$661	X
\$100	\$773	

- With average claim rate (3.7%), paid \$157 for an expected savings of \$28 — very risk-averse!  $\Rightarrow$

# Prospect-Theoryish Stuff

2. Modest-scale risk aversion is an important topic for economics.  $\Rightarrow$ 
  - Extended warranties, aversion to deductibles, fixed-rate plans, etc. are market-driving, institution-driving behaviors.  $\Rightarrow$
  - Dismissal of lab evidence as only involving small stakes has reached a whole new aesthetic height in this area:  $\Rightarrow$ 
    - "...but would they be risk averse for small stakes for *large* stakes?"
3. Risk aversion neither simplifying assumption nor done for generality.  $\Rightarrow$ 
  - It is one of the most results-driving assumptions in all of economics.  $\Rightarrow$
  - Ubiquitously added as *necessary* "complication"  $\Rightarrow$
  - Shortcomings current model are sufficiently severe — and sufficiently solvable — that it is worthwhile for economists to investigate additional determinants of risk attitudes.



4. We don't want to get rid of the  $u''(w) < 0$  assumption.  $\Rightarrow$
- Among most intuitive, compelling, important assumptions we make!  $\Rightarrow$
  - Far more well-being out of the first \$5 million you spend in life than the last \$5 million.

↪

# Prospect-Theoryish Stuff

Aside: there are many measures of risk attitudes.  $\Rightarrow$

- Most common measure of risk aversion used is the coefficient of relative risk aversion,  $\frac{-wu''(w)}{u'(w)}$ , where  $w$  is a measure of “wealth”.  $\Rightarrow$ 
  - Macroeconomists measure CRRA on huge stakes as somewhere in the single digits or low double digits.  $\Rightarrow$
  - Experimentalists measure CRRA on small stakes in single digits.  $\Rightarrow$
- DMU(W) pretty well calibrated after all?  $\Rightarrow$
- Problem: using different measures of wealth.  $\Rightarrow$ 
  - Which is to say, different definitions.  $\Rightarrow$
  - “Wealth” is defined as earnings from the experiment alone.  $\Rightarrow$
  - Other papers use monthly income, lifetime wealth, or current assets.  $\Rightarrow$
- If same definition used  $\Rightarrow$ 
  - 5 orders of magnitude differences.

## Integrating Prospect Theory ... $\Rightarrow$

Kőszegi and Rabin (2006, 2007, 2009) clarifies, modifies, and extends PT with the goal of making the theory of reference-dependent preferences more conducive to general application within economics. $\Rightarrow$

- The theory came out of years of teaching without a satisfying, consistent, and applicable model of reference dependence. $\Rightarrow$

Grand Conceit: Because we (jointly) do two things, $\Rightarrow$  Derive reference point from preferences and environment, and $\Rightarrow$  derive gain-loss utility from reference points and consumption utility, $\Rightarrow$

- aim at universal formula for constructing reference-dependent preferences from existing (non-reference-dependent) models. $\Rightarrow$
- Not quite there, but many contexts close to improved predictions with zero degrees of freedom added to the models:

# Prospect-Theoryish Stuff

First premise: **People don't care solely about gains and losses.**⇒

- People don't just react to the sensation of gaining or losing a mug; they care whether they have a mug to drink from.⇒
- Don't just enjoy sensation of \$-gain: they like more to spend.⇒

**Certainly worse for economics to ignore this classical consumption utility than ignoring gain-loss utility.**⇒

- Integrate “gain-loss utility” component of prospect theory with “consumption utility” studied by economists
  - in fact relate the two strongly.⇒
- Prospect theory best interpreted as silent on consumption utility, rather than saying it doesn't exist.⇒
- But the silence a fundamental barrier in many applications.



# Prospect-Theoryish Stuff

## Combine Absolute & Contrast Utilities. $\Rightarrow$

Imagine breaking down the  $u(c|r)$  function:  $\Rightarrow$

- $u(c|r) \equiv m(c) + n(c - r|r), \Rightarrow$

where

- $m(c)$  is “consumption utility”, and  $\Rightarrow$
- $n(c - r|r)$  is “gain-loss utility”.  $\Rightarrow$

So far, this decomposition is just an interpretation in our heads.  $\Rightarrow$

- Substance to this breakdown given by further structure.  $\Rightarrow$
- Actually, dimension-by-dimension.  $\Rightarrow$ 
  - Will suppress dimension notation

We'll assume that  $n(0|r) = 0$  for all  $r$ , and  $n(c - r|r)$  obeys A0 to A4.  $\Leftarrow$

- Note that  $u(c|c) \equiv m(c)$ .  $\Leftarrow$
- $m(c)$  is how you feel about outcome that matches reference point.  $\Leftarrow$
- Utility matches classical in settings where consume at reference levels!

$\rightarrow$

# Prospect-Theoryish Stuff

What is odd about assuming  $n(\cdot|r)$  meets A0-A4?  $\Leftarrow$

- Behavioral evidence on shape  $u(c|r)$ , not  $n(\cdot|r)$ .  $\Leftarrow$
- What we see is influenced by shape of  $m(c)$   $\Leftarrow$

Claim: Often okay to assume  $m(c)$  is  $\approx$  linear, when  $c - r$  is small.  $\Leftarrow$

- When  $m(c)$  is not linear for even small changes ...  $\Leftarrow$ 
  - we predict in fact prospect theory v-function will not hold.  $\Leftarrow$
  - we are happy with that prediction  $\Leftarrow$
  - And when talking about big changes, we are very happy with that prediction.  $\Leftarrow$

In fact, wrong framing...

$\rightarrow$

# Prospect-Theoryish Stuff

Reflecting common intuition, Köszegi and Rabin (2006) propose:  $\Rightarrow$

- gain-loss utility is proportional to changes in consumption utility.  $\Rightarrow$

Specifies that  $n(\cdot)$  is tightly related to  $m(\cdot)$ :  $\Rightarrow$

- How people feel about gaining or losing the mug is related to how they feel about having the mug to drink from.  $\Rightarrow$

Specifically:  $\Rightarrow$

- $n(c - r|r) \equiv \mu(m(c) - m(r))$ , where  $\mu(x)$  is a “universal gain-loss function” meeting properties A0-A4.  $\Rightarrow$
- $m(\cdot)$  as the argument helps us address the shape-of- $m(\cdot)$ -based exceptions to A0-A4.  $\Rightarrow$
- **Big** prediction of including the model:  $\Rightarrow$ 
  - Attitudes towards uncertainty at different wealth levels proportional to marginal utility at those wealth levels.  $\Rightarrow$

Although limited by the separability assumptions, by a need to specify relevant dimensions, and cardinal interpretation of  $m(\cdot)$ , this comes close to saying: $\Rightarrow$

- Once you specify the reference point, we can propose a zero-degrees-of-freedom alternative prediction to classical reference-free models. $\Rightarrow$
- Include news utility, implications for things like precautionary savings.

$\curvearrowright$

## Stochastic Reference Points $\Rightarrow$

Koszegi & Rabin (2006) also introduce a new issue (and an alternative approach to that taken by others) in modeling reference dependence. $\Rightarrow$

- Clear once we consider beliefs to be the reference point, need to know what happens with a stochastic reference point. $\Rightarrow$
- If a person is endowed with a lottery? What is the reference point? $\Rightarrow$
- If reference point is probability measure  $G$  over  $\mathbb{R}$ , and consumption drawn according to probability measure  $F$ , then utility $\Rightarrow$

$$U(F|G) = \int \int u(c|r) dF(c) dG(r).$$

$\curvearrowright$

# Prospect-Theoryish Stuff

E.g. if endowment is  $\frac{1}{3}/\frac{1}{3}/\frac{1}{3}$  lottery \$0, \$50, or \$100, then getting \$50 assessed as loss relative to \$100, gain relative to \$0, and wash relative to \$50:  $\Rightarrow$

$$U(\$50|lottery) = \frac{1}{3}u(50|0) + \frac{1}{3}u(50|50) + \frac{1}{3}u(50|100).\Rightarrow$$

- This model of “mixed feelings” crucial to some of the risk-preferences stuff, less crucial in other contexts.  $\Rightarrow$
- It matches a strong intuition, and (unbeknownst to me!) massive literature:
  - When endowed with a lottery, selling price  $\approx$  expected value
  - Takes work to see why this supports stochastic reference points.  $\Rightarrow$
  - But it does.

$\curvearrowright$

“Mixed feelings” implicitly contradicts common decision-theoretic cousins to this approach.  $\Rightarrow$

- Those models assume implicitly that the reference point for stochastic outcome is its (recursive) certainty equivalent.  $\Rightarrow$
- Dynamic-consistency, non-cycling, “resulting-property axioms” may force no-mixed-feelings-allowed property.  $\Rightarrow$
- But no psychological logic suggesting must be the case.

$\curvearrowright$

## What is the Reference Point? $\Rightarrow$

- Literature historically fluctuates between imprecision and status quo.  $\Rightarrow$
- Typical approach to this issue is in Tversky and Kahneman (1991):  $\Rightarrow$

*“We assume that the decision maker has a definite reference state  $X$ , and we investigate its impact on the choice between options.  $\Rightarrow$  The question of the origin and the determinants of the reference state lies beyond the scope of the present article.  $\Rightarrow$  Although the reference state usually corresponds to the decision maker’s current position, it can also be influenced by aspirations, expectations, norms, and social comparisons.”*

$\curvearrowright$

## So what is the reference point, already? $\Rightarrow$

- Usually assumed to be status quo,
- or recent consumption  $\Rightarrow$
- but often much vaguer.  $\Rightarrow$

“What is the reference point?” both example of and metaphor for BE battles.  $\Rightarrow$

- Does BE tell you a new reference point in every new situation?  $\Rightarrow$
- Response to **clearly true** but underspecified, underformalized theories is to more carefully specify and formalize, not dismiss.  $\Rightarrow$
- But worry about limited applicability, limited discipline was legit.

↪

So what is the reference point?  $\Leftrightarrow$  Candidates:  $\Leftrightarrow$

- 1 "Status quo ante"  $\Leftrightarrow$
- 2 Recent consumption or endowments  $\Leftrightarrow$
- 3 Aspirations/goals  $\Leftrightarrow$
- 4 Your neighbors  $\Leftrightarrow$
- 5 **Expectations**  $\Leftrightarrow$

Discuss later why 1 and 2 might really be 5.  $\Leftrightarrow$

- But I think 3 is definitely about 5 many cases.  $\Leftrightarrow$ 
  - But see Pope, Simonsohn, etc.  $\Leftrightarrow$
- And 4, comparing ourselves to neighbors, may be very real ...  $\Leftrightarrow$ 
  - but in a lot of data confounded big time with 5.  $\Leftrightarrow$
- And now, lately, "experience", a variant of (2), has made a big comeback in some intellectual neighborhoods ...  $\Leftrightarrow$ 
  - But it's clearly about expectations, except for a disastrous degree of free.

## The Reference Point as Expectations $\Rightarrow$

- Assume reference point is the probabilistic beliefs about outcomes ("expectations" in shorthand) $\Rightarrow$
- Hence the idea of stochastic reference points. $\Rightarrow$
- Close the model by assuming beliefs obey "rational expectations". $\Rightarrow$

Expectations do not determine the reference point completely. $\Rightarrow$

- Example of an exception: sensory experiences, such as changes in brightness and temperature.

$\rightarrow$

But I would argue expectations are predominant.  $\Leftrightarrow$

- Raises all sorts of issues and complications.  $\Leftrightarrow$
- But we argue that some of the 'complications' are exactly right — we can reconcile things that are variously  $\Leftrightarrow$ 
  - inconsistent with classical EU but consistent with classical PT,  $\Leftrightarrow$
  - inconsistent with classical PT but consistent with classical EU, and  $\Leftrightarrow$
  - inconsistent with both.

$\curvearrowright$

# Prospect-Theoryish Stuff

“Disappointment aversion” by Bell, Loomes and Sugden, others, then axiomatized by Gul (1992) and others, pre-cursor of this approach.  $\Rightarrow$

- One theme of B-B approach: timing is crucial.  $\Rightarrow$ 
  - Delays in realizations of choices matter a lot, and would need to be added to language of the choice-set-based theories.  $\Rightarrow$
  - But how long a person expected the choice set before making a committed choice also matters a lot.  $\Rightarrow$
- KR model has degree of freedom, about how quickly reference point adjusts to new expectations.  $\Rightarrow$ 
  - But research exploring ongoing.  $\Rightarrow$
- Central premise: different to choose from  $\{(.5, -\$250; .5, \$0), -\$100\}$  when  $\Rightarrow$ 
  - a moment ago you thought your choice set was probably  $\{\$0\}$  versus  $\Rightarrow$
  - if you’ve known this was your choice set for quite some time.

**Evidence + Intuitions:**  $\Rightarrow$  And great classic experiment, oversimplified:  $\Rightarrow$

- Medvec *et al* (1995): as judged by photos of heads (above the neck), who's happier? Gold medalists? Silver medalists? Bronze medalists?  $\Rightarrow$ 
  - Obvious econometric issues ... hardly exogenous what people expect and what they achieve.  $\Rightarrow$
  - Replication by McGraw, Mellers, and Tetlock (2005)  $\Rightarrow$
- Unexpectedly losing \$50, or a mug you expected to keep, are losses.  $\Rightarrow$
- Gaining \$50 unexpectedly or getting mug unexpectedly are gains.  $\Rightarrow$ 
  - *But* spending \$50 you planned to spend?  $\Rightarrow$
  - Losing a mug you planned to sell?  $\Rightarrow$
  - Getting \$50 allowance you get every week?  $\Rightarrow$
  - Getting delivery of mug long anticipated?



# Prospect-Theoryish Stuff

Given preponderance of theory, interpretations, and evidence saying status quo is reference point, *how can we say not the status quo?*⇒

- Ignoring is **not** an answer!⇒
  - Stop claiming your model fits by ignoring when it doesn't!⇒
- Answer 1: Most evidence on surprises: status quo = expectations.⇒
  - (rationally or psychologically) expect to maintain the status quo.⇒
  - E.g., owning a mug often connotes to us that we will be in possession of it tomorrow.⇒ (this is cheating)⇒
- Answer 2: In fact, often wording obscures things.⇒
  - E.g., wage cuts are not decreases in wealth ... they are (surprise) decreases in the rate of increase of wealth!⇒
  - How does an unexpectedly small wage increase feel?

↪

## Shopping! $\Rightarrow$

- Now: seemingly important (but largely untested) predictions about a pretty core topic in economics, consumer demand.  $\Rightarrow$ 
  - Simple example of KR (2006);  $\Rightarrow$
  - market analysis in HK papers, Rosato.  $\Rightarrow$
- “Reference-price effects” in marketing literature  $\Rightarrow$ 
  - Little emphasized seems among BE-ers studying loss aversion.  $\Rightarrow$
- Two dimensions, shoes and money:  $\Rightarrow$ 
  - $m(c) = 16 \cdot \text{pairshoes} + \$$ .  $\Rightarrow$
  - “Intrinsic” value for shoes is \$16.  $\Rightarrow$
  - $\mu$  is two-piece linear, with  $\mu'_+(0) = 1$ ,  $\mu'_-(0) = \lambda$ .

$\rightarrow$

Analysis with parameter values  $\eta = 1, \lambda = 3$ . $\Rightarrow$

- Buying at price  $p$  when fully expect to face price  $p$  is the optimal consistent plan iff  $p \leq 16$ . $\Rightarrow$
- **When no uncertainty WTP is “intrinsic” value for shoes.**

↪

# Prospect-Theoryish Stuff

Things change dramatically when uncertainty over prices.  $\Leftarrow$

- Suppose beliefs:  $prob(p = p_H) = prob(p = p_L) = .5$ .  $\Leftarrow$

Some examples, with PPE behavior and utility.  $\Leftarrow$

- If  $(p_L, p_H) = (18, 18)$ , Never Buy,  $U = 0$   $\Leftarrow$
- If  $(p_L, p_H) = (14, 14)$ , Always Buy,  $U = 2$   $\Leftarrow$
- If  $(p_L, p_H) = (2, 14)$ , Always Buy,  $U = 2$   $\Leftarrow$
- If  $(p_L, p_H) = (14, 95)$ , Never Buy,  $U = 0$   $\Leftarrow$
- If  $(p_L, p_H) = (4, 18)$ , Always Buy,  $U = -1.5$   $\Leftarrow$
- If  $(p_L, p_H) = (1, 18)$ , Buy iff  $p = p_L$ ,  $U = -1$   $\Leftarrow$
- If  $(p_L, p_H) = (4, 95)$ , Buy iff  $p = p_L$ ,  $U = 1$

↪

# Prospect-Theoryish Stuff

- If  $(p_L, p_H) = (18, 18)$ , Never Buy,  $U = 0$
- If  $(p_L, p_H) = (14, 14)$ , Always Buy,  $U = 2$
- If  $(p_L, p_H) = (2, 14)$ , Always Buy,  $U = 2$
- If  $(p_L, p_H) = (14, 95)$ , Never Buy,  $U = 0$
- If  $(p_L, p_H) = (4, 18)$ , Always Buy,  $U = -1.5$
- If  $(p_L, p_H) = (1, 18)$ , Buy iff  $p = p_L$ ,  $U = -1$
- If  $(p_L, p_H) = (4, 95)$ , Buy iff  $p = p_L$ ,  $U = 1$

Do you buy at \$18? At \$14?

- "environmental-endogeneity" principle:
  - price distribution influences your WTP.
- But theory puts limits on this (as function of  $\lambda, \eta$ )
- No matter price-distribution:
  - Never buy when  $p > 32$ , always buy when  $p < 8$
- Agenda: Replace "context effects" with:
  - more fully specified utility models that endogenize and fully specify how and why a context/environment influences choice

# Prospect-Theoryish Stuff

- If  $(p_L, p_H) = (18, 18)$ , Never Buy,  $U = 0$ ⇐
- If  $(p_L, p_H) = (4, 18)$ , Always Buy,  $U = -1.5$ ⇐
- If  $(p_L, p_H) = (1, 18)$ , Buy iff  $p = p_L$ ,  $U = -1$ ⇐
- If  $(p_L, p_H) = (4, 95)$ , Buy iff  $p = p_L$ ,  $U = 1$ ⇐

*Attachment effect:*⇐

- if likely price is low, think likely you'll return home with the shoes.⇐
- Increases your WTP even when high price, to avoid loss.⇐

*Comparison effect:*⇐

- Lowering the low price decreases WTP at high prices—high price feels like a worse loss.

↪

# Prospect-Theoryish Stuff

- If  $(p_L, p_H) = (18, 18)$ , PPE is Never Buy. $\Rightarrow$
- If  $(p_L, p_H) = (4, 18)$ , PPE is Always Buy. $\Rightarrow$
- If  $(p_L, p_H) = (1, 18)$ , PPE is Buy iff  $p = p_L$ . $\Rightarrow$

Two effects sometimes go opposite directions  $\Rightarrow$

- No apologies; such is the stuff of classical consumer theory .... $\Rightarrow$
- But notice “quasi-violation” of law of demand: $\Rightarrow$ 
  - *known* lowering of prices may decrease quantity demanded. $\Rightarrow$
  - Will never happen fixing expectations
  - possibility comes from “raising expectations” for a good deal. $\Rightarrow$
- Requires stochastic prices,
  - no good sense for empirical/calibrational relevance.



# Prospect-Theoryish Stuff

- If  $(p_L, p_H) = (18, 18)$ , PPE is Never Buy. $\Leftrightarrow$ 
  - $U = 0$  $\Leftrightarrow$
- If  $(p_L, p_H) = (4, 18)$ , PPE is Always Buy. $\Leftrightarrow$ 
  - $U = -1.5$  $\Leftrightarrow$
- Utility can be lower in PPE than never buying. $\Leftrightarrow$ 
  - Sometimes paying more than thought you might, or  $\Leftrightarrow$
  - Sometimes not getting the good you thought you might  $\Leftrightarrow$
  - might outweigh consumption utility of sometimes getting the good at a low price. $\Leftrightarrow$
- PE consistency constraint here is in force: $\Leftrightarrow$ 
  - might want commit not purchase, can't resist low prices.

↷

# Prospect-Theoryish Stuff

Punchlines of this approach:  $\Rightarrow$

- Departures from classical predictions iff surprise or uncertainty.  $\Rightarrow$
- when uncertainty, environment influences (induced) preferences!  $\Rightarrow$
- Some desirable plans not consistent ...  $\Rightarrow$

Reinterpretation of the endowment-effect evidence.  $\Rightarrow$

- The endowment effect is commonly explained by assuming that the reference point of status quo  $\Rightarrow$
- ... sellers keep the mug  $\Rightarrow$  buyers keep their money.  $\Rightarrow$
- Experimental protocol *arguably* induce parties to expect to keep endowment.

$\rightarrow$

More natural expectations reverse endowment effect?  $\Rightarrow$

- In “real world,” buyers expect/hope to part with money, get good. Sellers expect/hope to lose good, get money.  $\Rightarrow$
- One interpretation of Plott and Zeiler (2006) and of List (2006) is that traders there have expectations of trade.  $\Rightarrow$
- More recent experimental evidence:  $\Rightarrow$ 
  - Ericson and Fuster (QJE): supportive that expectations play a role.  $\Rightarrow$
  - Heffetz and List (JEEA), similar experiment, *and others*, reject role of expectations

↪

## Risk Preferences Revisited $\Rightarrow$

- Some in KR (2006), main topic of KR (2007), and see KR (2009), including/especially on-line Appendix. $\Rightarrow$

Main theme: $\Rightarrow$

- Replicates KT's Prospect Theory in some *identified* contexts. $\Rightarrow$
- And replicates classical DMU(W) in other *identified* contexts. $\Rightarrow$
- Often corresponds to neither PT nor DMU(W). $\Rightarrow$ 
  - *Reflects intuitions of PT, but makes very different predictions than status-quo-based PT literally does.*

↪

# Prospect-Theoryish Stuff

Both “foes” *and* “friends” over the years seen demand for insurance as inconsistent with convexity-in-losses feature of prospect theory.  $\Rightarrow$

- KT have explained with probability weighting.  $\Rightarrow$

Certainly an aspect of risk preferences that is important.  $\Rightarrow$

- And some recent papers argue it *is* probability weighting  $\Rightarrow$ 
  - See, e.g., O’Donoghue et al  $\Rightarrow$
- But I also don’t think it can explain some of the taste for insurance, especially if it has to do battle with DS in losses.  $\Rightarrow$
- I doubt some of the identification

↪

# Prospect-Theoryish Stuff

1. Large-stake risks  $\rightarrow$  classical DMU(W) $\Rightarrow$ 
  - Depends on curvature and whether large stakes dominated by DMU(W), depends on severity of both DS and concavity of  $m$ . $\Rightarrow$
2. Surprise, modest-scale risks  $\rightarrow$  KT's Prospect Theory  $\Rightarrow$ 
  - First-order risk aversion to 'mixed risks' $\Rightarrow$
  - Risk averse in gains, risk loving in losses. $\Rightarrow$
3. Expected, modest-scale risks w/o commitment  $\rightarrow$  heavy risk aversion $\Rightarrow$ 
  - With commitment, even possible to reject dominant lotteries. $\Rightarrow$ 
    - But improved approach of KR (2009) no longer predicts it? $\Rightarrow$
  - Not risk-loving in expected "losses" — because in our model sensation of losses arises only from worse-than-expected decreases.



4. In various ways, people become less risk averse when they expect risk.  $\Rightarrow$ 
  - *But:*  $\Rightarrow$
5. Expecting risk makes you very unhappy.  $\Rightarrow$ 
  - “Equilibrium risk” is always bad: the distribution of gains is identical to the distribution of losses.  $\Rightarrow$
  - And when can buy insurance prospectively (which is the only type of insurance...), become very risk averse.  $\Rightarrow$

↪

All this talk of money raises a pretty big conceptual point.  $\Rightarrow$

- KR (2006) follow others in obscuring, cheating, and fudging on:  $\Rightarrow$

Why do people have utility over money at all?  $\Rightarrow$

- In classical model, money only valued for consumption.  $\Rightarrow$
- Legitimate object of analysis as the indirect utility function.  $\Rightarrow$
- But not current consumption, which KR (2006, 2007) treat it as.

↪

# Prospect-Theoryish Stuff

The psychology of disappointment and elation is about news.  $\Rightarrow$

- Not just contemporaneous consumption relative to expectations.  $\Rightarrow$
- But about changes in beliefs about future consumption.  $\Rightarrow$
- Money is ... news about future consumption.  $\Rightarrow$

**News Utility:** KR (2009): reference point is still recent expectations.  $\Rightarrow$

- But:  $\Rightarrow$  Rather than comparing outcomes to beliefs, people compare new beliefs to old beliefs.  $\Rightarrow$
- Although the full implications are far more complicated, the basic intuition for what this says about money is very simple:  $\Rightarrow$
- Money is future consumption so unexpected gains and losses of money are news about future consumption.

$\curvearrowright$

# Prospect-Theoryish Stuff

New parameter:  $\gamma \equiv$  the degree to which you care about “prospective gain-loss utility” compared to “contemporaneous gain-loss utility”. $\Leftarrow$

- Do revisions in beliefs before an outcome occur cause comparable sensations of gain and loss as surprises at time of outcomes? $\Leftarrow$

Prior analysis all implicitly assume  $\gamma = 0$ . $\Leftarrow$

- Depending on the context, analysis may be misleading.

$\rightarrow$

*Not* anticipatory utility a la Caplin-Leahy, Kőszegi, Brunnermeier-Parker.  $\Rightarrow$

- Our prospective gain-loss utility is about utility from *changes* in expectations of future consumption.  $\Rightarrow$

Difference is going to matter *a lot*.  $\Rightarrow$  And further:  $\Rightarrow$

- Because people didn't have news-utility interpretation, obvious confound in evidence with anticipatory utility.  $\Rightarrow$
- Ceteris paribus — fixing this morning's expectations — obvious correlation with how optimistic you are about the future and how much more optimistic you have become about the future.

↪

# Prospect-Theoryish Stuff

Happiness (especially rich people) in September and October 2008?  $\Rightarrow$

- Moments in world history where rich folk less happy than poor?  $\Rightarrow$ 
  - 1789 France,  $\Rightarrow$
  - 1979 Iran?  $\Rightarrow$
  - 2008 "developed world"
- But 2008 rich still had more comfortable future than 2008 poor.  $\Rightarrow$ 
  - And surely knew it!  $\Rightarrow$
  - (1789 rich French folk had different future?)  $\Rightarrow$
  - Not anticipatory utility, but prospective news utility.  $\Rightarrow$
- Final twist:  $\Rightarrow$ 
  - Perhaps rational inference ... crisis even worse *news* for poor???  $\Rightarrow$
  - Utility: changes in beliefs ... not whether those beliefs rational.

↪

Aside:  $\Rightarrow$

- In models of anticipatory utility, anticipated high consumption in a given period enters into the utility in all prior periods.  $\Rightarrow$
- “Multiple-counting” consumption?  $\Rightarrow$ 
  - Intrinsic prediction increasing consumption  $\Rightarrow$
- News utility does not multi-count *when beliefs stable*.

$\curvearrowright$