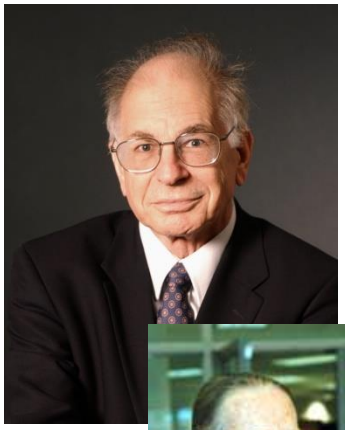
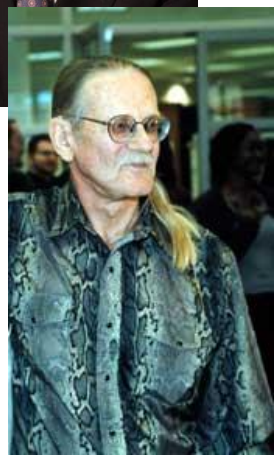
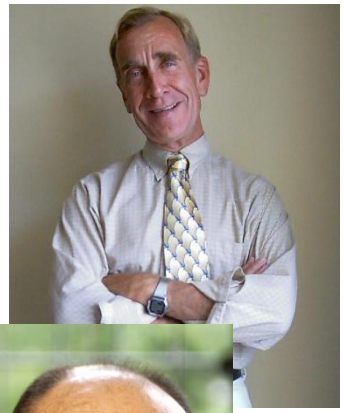
به نام خدا





نگاهی به مالی رفتاری

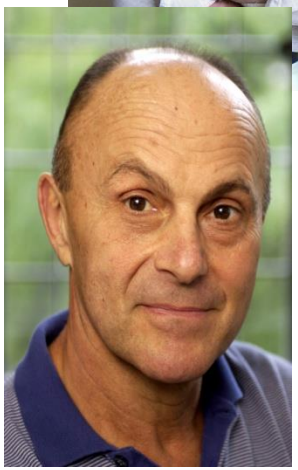


ارائه:

سعید اسلامی بیدگلی (CIIA)

www.eslamibidgoli.com

http://eslamibidgoli.blogfa.com



بهار ۱۳۹۴

سیر دانش مدیریت مالی

- دهه ۱۹۵۰: تحلیل میانگین- واریانس؛
- دهه ۱۹۶۰: ظهور CAPM و مدلهای تعادلی در بازار؛
- دهه ۱۹۷۰: انتظارات عقلایی، APT و کارآیی بازار؛
- دهه ۱۹۸۰: مدلهای اقتصاد سنجی و کمی؛
- دهه ۱۹۹۰: ظهور مدلهای رفتاری؛
- قرن جدید: The New Finance

پارادایم‌های کلاسیک

1. تصمیم گیری بازیگران بازار عقلایی است.
2. بازیگران بازار مانند هم فکر می‌کنند.
3. تصمیم گیری بر اساس بیشینه سازی مطلوبیت(۱) مورد انتظار است.
4. افراد نسبت به آینده جهت دار نیستند.

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1. Utility Maximization

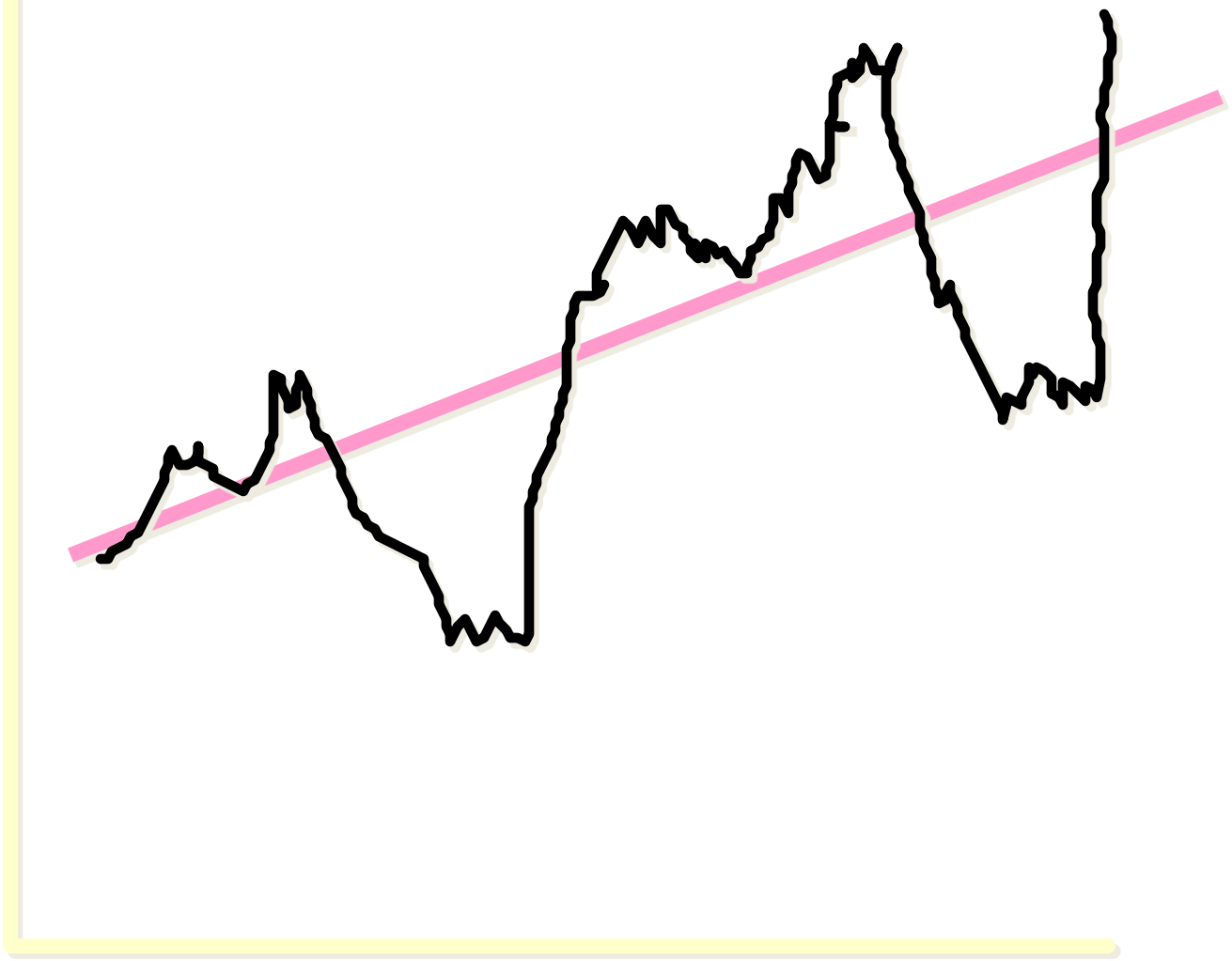
نتایج پارادایم‌های سنتی
گذری بر فرضیه کارآیی بازار (EMH)

- آیا قیمت اوراق بهادار انعکاس کامل و به‌هنگامی از اطلاعات مربوط است؟
  - چه نوعی از اطلاعات؟
    - قیمت‌های تاریخی، حجم معاملات، ... ← کارآیی در سطح ضعیف؛
    - اطلاعات منتشر شده عمومی ← کارآیی نیمه قوی؛
    - اطلاعات محرمانه ← کارآیی قوی.
  - رقابت اطمینان خاطر می‌دهد که قیمت‌ها منعکس کننده اطلاعات هستند. هنگامی که اطلاعات در دسترس قرار می‌گیرند؛ مشارکت‌کنندگان در بازار با تحلیل آن اقدام به معامله می‌کنند.

سوال؟

قیمت اوراق بهادار

آیا در
بازارهای کارآ
قیمت‌ها
می‌توانند روند
داشته باشند؟



زمان

گذری بر فرضیه کارآیی بازار (EMH) (ادامه ...)

- قیمت اوراق بهادار به‌طور کامل و صحیح منعکس کننده اطلاعات عمومی منتشره است.
- مشارکت‌کنندگان در بازار به دفعات اشتباه نمی‌کنند.
- همیشه برای سهام عرضه شده متقاضی و برای سهام تقاضا شده، عرضه کننده وجود دارد.

آیا در یک بازار کارآ به مدیران پرتفوی نیازی هست؟

- حتی در بازارهای کارآ نیز مدیران پرتفوی نقش‌های زیر را ایفا می‌کنند:
  - یافتن پرتفوی بهینه بر روی مرز کارآ؛
  - نگهداری پرتفوی در سطح معین ریسک؛
  - ملاحظات مالیاتی.

آزمون‌های تجربی کارآیی بازار

- کارآیی در سطح ضعیف
  - آزمون مفید بودن قواعد معاملاتی به منظور پی بردن به فایده‌مند بودن اطلاعات تاریخی قیمت و حجم؛
- کارآیی در سطح نیمه قوی
  - انجام تحقیقات رویداد پژوهانه در نزدیکی زمان‌های انتشار عمومی اطلاعات به منظور سنجش واکنش آنی؛
- کارآیی در سطح قوی
  - ارزیابی عملکرد مدیران حرفه‌ای و درون سازمانی به منظور سنجش میزان برتری اطلاعاتی آن‌ها نسبت به سرمایه‌گذاران عادی.

ساختار آزمون‌های کارآیی

- بررسی قیمت و بازدهی طی زمان:
  - همبستگی زمانی؛
  - روندهای فصلی؛
  - پیش بینی پذیری؛
- محاسبه بازده غیر عادی حول و حوش رویداد مشاهده شده:
  - با استفاده از مدل بازار برآوردهای زیر انجام می‌شود:

a. $R_t = a_t + b_t R_{mt} + e_t$

➔ Expected Return = $a_t + b_t R_{mt}$

➔ Excess Return = Actual – Expected return

$= (a_t + b_t R_{mt} + e_t) – (a_t + b_t R_{mt}) = e_t$

b. Cumulate the excess returns over event windows

شالوده مدل‌های مالی

- مدل‌های مالی دو بعد را شامل می‌شوند:
  - انسان عاقل اقتصادی (Homo-economicus)
  - کامل بودن بازار (Completeness)

- اما:
  - آیا بازیگران بازار واقعا عاقل اقتصادی هستند؟
  - آیا بازارها کامل هستند؟
- سوال اساسی این‌جاست که آیا عقلانیت اقتصادی و کامل بودن بازار توضیح دهنده است؟

چند سوال (ورود به بحث مالی رفتاری)

1. میانگین وزن یک نهنگ آبی بزرگسال چند پوند است؟
2. در چه سالی تابلوی مونالیزا کشیده شد؟
3. در پایان سال ۲۰۰۰ چند کشور مستقل وجود داشته است؟
4. فاصله هوایی پاریس و سیدنی چند مایل است؟
5. چه تعداد استخوان در بدن یک انسان هست؟
6. چه تعداد جنگجو در جنگ جهانی اول کشته شد؟
7. چه تعداد کتاب در پایان سال ۲۰۰۰ در کتابخانه کنگره امریکا بوده است؟
8. طول رود آمازون به مایل چقدر است؟
9. سرعت گردش زمین به دور خود بر حسب مایل بر ساعت چقدر است؟
10. در پروسسور کامپیوتر پنتیوم ۳ چند ترانزیستور وجود دارد؟

(۱)۲۵۰۰۰۰ (۲)۱۵۱۳ (۳)۱۹۱ (۴)۱۰۵۴۳ (۵)۲۰۶ (۶)8.3m (۷)18m (۸)۴۰۰۰ (۹)۱۰۴۴ (۱۰)9.5m

یک بازی ساده

- یک عدد بین ۰ تا ۱۰۰ انتخاب کنید (تا یک رقم اعشار)
- برنده کسی است که نزدیکترین عدد را به دو سوم میانگین کل داشته باشد...

- شما چه عددی را انتخاب کردید؟ چرا؟
  - آیا عددی که انتخاب کردید بزرگتر از ۶۷ است؟
  - آیا عددی که انتخاب کردید نزدیک به ۳۳ است؟
  - آیا دیگران را نیز عاقل فرض کردید؟
  - نقطه تعادل این بازی کجاست؟

بازی و کارآیی

- آیا اگر دوباره بازی را انجام دهید صفر را انتخاب می‌کنید؟
- چه انگیزه‌ای برای انتخاب صفر وجود دارد اگر بازار کامل باشد؟

عقلانیت، کامل بودن بازار و پارادیم‌های جدید مالی

		کامل بودن بازارها	
		0	1
عقلانیت بازیگران بازار	0	مالی نوین	مدل‌های رفتاری خرد
	1	مدل‌های گیم	مالی کلاسیک

امور مالی رفتاری(۱)

- مطالعه واکنش انسان‌ها به اطلاعات در جهت تصمیم گیری آگاهانه (Lintner)
- درک و پیش بینی نتایج حاصل از فرآیندهای روانشناختی در تصمیم‌گیری‌های مالی و سرمایه گذاری (Olsen)
- چگونگی تاثیرگذاری روانشناسی(۲) بر مسایل و بازارهای مالی (Shefrin)
- تشریح مسایل غیر عادی در حوزه مالی و اقتصاد از طریق اصول روانشناسی و تصمیم‌گیری (Fuller)
- مالی رفتاری مطالعه تاثیرات روانشناسی بر تصمیم‌گیری مالی، شرکت‌ها و بازارهای مالی است. (Nofsinger)

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1. Behavioral Finance
2. Psychology

امور مالی رفتاری(۲)

- مالی رفتاری موضوع چندان جدیدی هم نیست:
  - سلدن (۱۹۱۲): تفکر افراد در مورد سرمایه گذاری در روند قیمت‌ها اثرگذار است.
  - کینز (1920’s): عوامل روانشناختی در رفتارهای اقتصادی افراد نقشی اساسی ایفا می‌کنند.
  - سایمون (1950’s): محدودیت‌های انسان اجازه نمی‌دهد که او بر اساس مدل‌های کاملا اقتصادی رفتار کند.
  - فاما، تالر، کانمن، تیورسکی و ...

فرصت‌های آربیتراژ و امور مالی رفتاری

- نتایج کارآیی بازار:
  - قیمت‌های واقعی برابر (نزدیک) ارزش ذاتی هستند.
  - منفعتی به طور رایگان به دست نمی‌آید.
  - بازده به دست آمده دقیقا متناسب با ریسک است.

❖ در صورت انحراف از ارزش ذاتی فرصت اربیتراژ آن را اصلاح خواهد کرد.

فرصت‌های آربیتراژ و امور مالی رفتاری (ادامه)

- ریسک‌هایی که باعث غیر جذاب شدن فرصت آربیتراژ می‌شوند:
  1. ریسک بنیادی (۱)
  2. ریسک معامله گران مزاحم (۲)
  3. هزینه های اجرا (۳)
  4. ریسک مدل ارزیابی

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1. Fundamental Risk
2. Noise Trader Risk
3. Implementation Costs

مالی رفتاری در دوسطح

- Micheal M. Pompian در سال ۲۰۰۷ تقسیم‌بندی جالبی از مالی رفتاری ارائه کرد:
  - مالی رفتاری خرد (۱)
    - بررسی رفتارهای افراد و چگونگی عقلایی بودن سرمایه‌گذاران؛
    - مطالعه تورش‌های رفتاری سرمایه‌گذاران.
  - مالی رفتاری کلان (۲)
    - بررسی کارآیی بازارها؛

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1. Micro Behavioral Finance
2. Macro Behavioral Finance

مالی رفتاری در دوسطح (ادامه ۲)

سوال اساسی:

آیا این دو (مالی رفتاری خرد و مالی رفتاری کلان) به هم مربوطند؟

شواهدی بر ناکارایی بازارها

- ✓ اثر اندازه (۱۹۸۱)،
- ✓ اثر P/E و تقویمی (۱۹۸۳)،
- ✓ اثر اهرم (۱۹۸۸)،
- ✓ اثر B/M (۱۹۹۲) و
- ✓ اثر بورس‌های مختلف (۱۹۹۳).

چالش مالی رفتاری در سطح کلان

- بی‌قاعدگی‌های بنیادی؛
- بی‌قاعدگی‌های فنی؛
- بی‌قاعدگی‌های تقویمی.

شواهدی برناکارایی بازار

- اثرات تقویمی در بازار
- برگشت بلندمدت در بازده (۱۹۸۵)،
- ✓برگشت کوتاه مدت در بازده (۱۹۹۳)،
- ✓فراواکنشی و فروواکنشی (۱۹۹۶)،

شواهد ی برغیرعقلایی بودن عامل‌های اقتصادی

- ✓ تصمیمات شهودی (۱۹۷۴)،
- ✓ چارچوب‌های تصمیم گیری (۱۹۷۹)،
- ✓ اثر سرمایه‌گذاران غیرعقلایی در بازار (۱۹۹۰)،
- ✓ محدودیت در آربیتراژ (۱۹۹۷)
- ✓ اریب های خود اسنادی (۱۹۹۸).

چالش مالی رفتاری در سطح خرد

- عقلانیت کامل؛
- منافع شخصی؛
- اطلاعات کامل.

زیرمجموعه‌های تصمیمات شهودی

روانشناسی شناختی	توضیحات
نمایندگی	• قضاوت بر اساس مشابهت‌ها که این باعث چشم پوشی از برخی واقعیتها می‌شود. • تصور تکرار وقایع درآینده.(قانون اعداد کوچک) • استراتژی شتاب حاصل همین تفکر است.(سرمایه‌گذاران به دنبال سهام برنده هستند)
لنگرانداختن(واکنش‌کند)	• نوعی رفتار محافظه کارانه و برعکس نمایندگی است. • افراد در برآوردهای کمی، تحت تأثیر برآوردهای قبلی یا اعداد موجود در مسأله هستند. • افراد به اطلاعات جدید عکس‌العمل کمی نشان می‌دهند.
سفسطه قماربازان	افراد پیش‌بینی می‌کنند که پدیده‌ها یک روند بازگشت به میانگین را دارند، بنابراین پایان یافتن یک بازده خوب یا بد را پیش‌بینی می‌کنند.
اریب در دسترس بودن	افراد وزن بیشتری به اطلاعات در دسترس می‌دهند
حسابداری ذهنی	• در نظر گرفتن مسایل در حسابهای جداگانه و نادیده گرفتن ارتباط مابین وقایع • این اثر، اثر تمایلی را هم تشریح می‌کند
چارچوب‌های تصمیم	• ارزیابی کلی از موضوع مورد مطالعه • ارزیابی متفاوت از پیامدهای مثبت و منفی • عکس‌العمل نسبت به ضرر به مراتب بیشتر از عکس‌العمل نسبت به سود می‌باشد
محافظه کاری	• افراد در مقابل تغییرات مقاومت نشان می‌دهند. • اگر تغییرات بلندمدت باشد خود را تطبیق می‌دهند. • این رویکرد عکس نمایندگی است.
اثر تمایلی	• عقیده به نگهداری اوراق بهاداری که در زیان است به علت شناسایی نکردن زیان موجود در پرتفوی سهام و فروش اوراق بهاداری که در سود است، به علت شناسایی سود حاصل از پرتفوی سهام. • این رویکرد بیشتر خود را در بازارهایی با حجم نقدینگی بالا نشان می‌دهد.
اطمینان بیش ازاندازه	• افراد تمایل دارند مهارت‌ها وتوانایی‌های خود را برای رسیدن به موفقیت بیش از حد تخمین بزنند. • خودفریبی باعث این رویکرد رفتاری می‌شود. • خود اسنادی عامل مهم دیگر این رویکرد است که باعث می‌شود افراد شواهدی را که بیشتر با اعتقاداتشان سازگار است تفسیر کنند. • افراد نسبت به اطلاعات خصوصی خود معمولاً بسیار مطمئن هستند. • آقایان بیشتر از خانمها این رویکرد رفتاری را نشان می‌دهند. • این مسأله در افراد تحصیل کرده به‌طور واضح‌تری قابل مشاهده است.

رویکرد های دیگر تصمیمات شهودی

تورشهای رفتاری	توضیحات
پشیمان‌گریزی و احساس غرور	• افراد به این دلیل که از احساس ناراحتی ناشی از تصمیمات نامطلوب خود پرهیز می‌کنند، سهام ضعیف را نگهداری می‌کنند. • شبیه اثر تمایلی است.
زیان گریزی	این رویکرد شبیه اثر تمایلی است.
برجستگی	افراد اطلاعات جدیدی را که بصورت متفاوت و متمایز از گذشته ارائه می‌شوند، در ذهن خود به خوبی نگه می‌دارند.
اثرهاله‌ای	قضاوت فرد تحت تاثیر یک ویژگی فرد یا موضوع، و تعمیم این ویژگی به سایر جنبه‌های آن.
اثر نگرانی	چگونگی واکنش افراد نسبت به موقعیتها و تصمیماتی که برایشان ایجاد هیجان و نگرانی می‌کند.
توهم‌درموردصحت‌وسقم پدیده‌ها	گرایش افراد به پذیرش صحت وسقم مطالبی که پردازش آن‌ها ساده‌تر است.
آشنایی	• افراد نسبت به موضوعات و موقعیت‌هایی که بیشتر با آن آشنا هستند قدرت تحمل ریسک بیشتری دارند • سرمایه‌گذاری در سهام شرکت‌های محلی، نمونه‌ای از این رویکرد رفتاری است.

منابع خطاهای رفتاری در سرمایه گذاری

- عدم تفکر صحیح
- قواعد احساسی
- عملکرد مغزی
- اینترنت

خطاهای روانشناختی و امور مالی رفتاری
انحرافات شهودی(1)

- برجستگی (۲): اطلاعات متفاوت و متمایز از گذشته یا پدیده هایی که کمتر رخ می دهند؛
- اثر هاله ای (۳): تعمیم یک ویژگی به سایر اطلاعات؛
- توهم واقعیت (۴): ادراک ساده ها، ترک مشکلها؛
- حسابداری ذهنی (۵): پرونده های جداگانه برای هر تصمیم؛
- نمایندگی (۶): تصمیم گیری بر اساس شباهتها یا تداوم رویدادها؛
- کند واکنشی (۷): تاثیر اطلاعات قبلی بر تصمیم گیری.

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1. Heuristic Biases
2. Salience
3. Hallo Effect
4. Illusion of Truth

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5. Mental Accounting
6. Representativeness
7. Anchoring

خطاهای روانشناختی و امور مالی رفتاری
خود فریبی(۱)

- اعتماد بیش از حد(۲)؛
- خود اسنادی انحرافی(۳)؛
- فروش سهام در سود؛
- نگهداری سهام در ضرر.

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1. Self-Deception
2. Over-Confidence
3. Biased Self-Attribution

خود فریبی
اعتماد بیش از حد

"اعتماد بیش از حد اکتسابی است"

- توهم دانش(۱)
- توهم کنترل (۲)

(افراد روی سکه پرتاب نشده بیشتر شرط می بندند.)

- انتخاب داشتن
- نتایج
- آشنایی با فعالیت
- اطلاعات
- درگیری در فعالیت

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1. Illusion of Knowledge
2. Illusion of Control

اعتماد بیش از حد و ریسک

- اعتماد بیش از حد به دو دلیل باعث افزایش ریسک می‌شود:
  1. نگهداری سهام کوچک و پر ریسک
  2. عدم متنوع سازی مناسب(۱).

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1. Under diversifying

وضعیت فعلی (۱)

- تاثیر رجحان مالکیت (۲)
- تعصب روی وضعیت فعلی (۳)
- احساس تعلق خاطر(۴)

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1. Status Quo
2. Endowment Effect
3. Status Quo Bias
4. Attachment Bias

قواعد احساسی

- اثر پول قمار (۱)
- اثر نیش مار (۲)
- اثر سر به سری (۳)

سوال:

1. حباب قیمت‌ها چیست؟
2. آیا حباب یک پدیده رفتاری است؟
3. چه توضیحی برای حباب دارید؟

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1. House Money Effect
2. Snake Bite Effect
3. Break Even Effect

جنبه های اجتماعی سرمایه گذاری

- سهیم شدن دانش سرمایه‌گذاری؛
- حرکت با توده مردم (۱)؛
- سرعت ذاتی است؛
  - Czech Value Fund Vs. Castle Convertible Fund
  - Transcontinental Reality Investor Inc. Vs. Tele-Communications Inc.
- باشگاه‌های سرمایه‌گذاری
- خانم‌های بردستون

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1. Herd
2. Beardstone ladies

Beliefs in Prospect Theory

The Creation of Decision Weights
From Probabilities

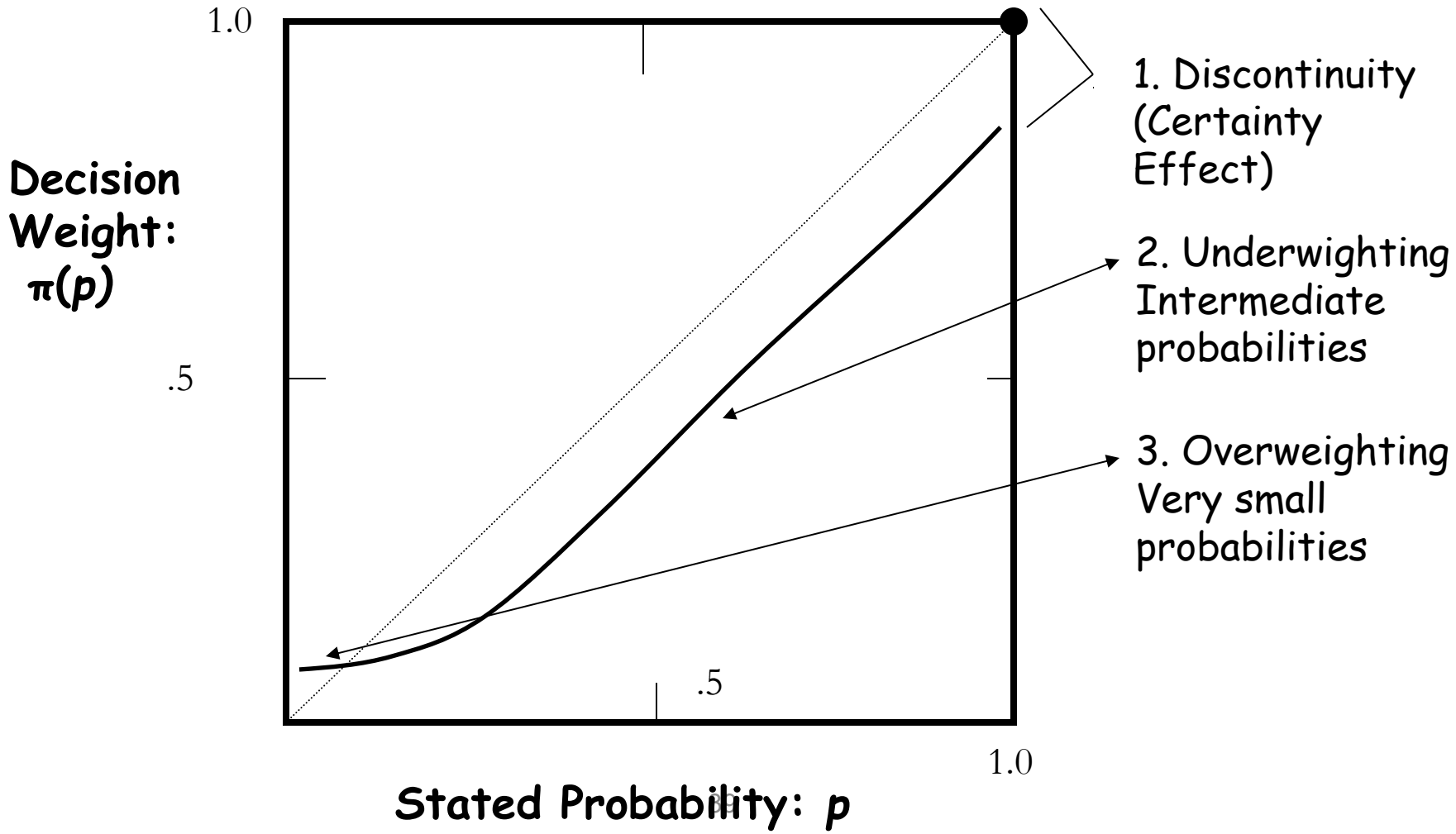
Beliefs in Prospect Theory

- In Decision Theory beliefs are represented as probabilities about the likelihood of states of the world. These beliefs are gradually adjusted through experience.
- In Prospect theory the expressed beliefs or probabilities of a person do not directly weight the outcome of an action. Instead they are unconsciously adjusted to become “decision weights” by means of the π function

Decision Weights

- Decision weights (the π function) are not probabilities – they do not sum to one
- They are not the direct expression of a person's belief – rather mediate between the person's belief and the person's decision
- For example, if you ask a person the probability of getting a head or a tail when tossing a fair coin they will say "50%"
- But when betting on a fair coin the evidence suggests that a decision weight of less than 50% is being used.
- So decision weights represent the impact of events on the desirability of prospects and not merely the perceived likelihood of events

Hypothetical Probability Weighting Function Π



Evidence

- K & T asked many respondents how they would respond to a variety of hypothetical choices
- The respondents were asked to imagine that were actually faced with the choice described and to indicate the choice they would have made in such a case
- The respondents were anonymous and were told that there was no “right” answer to the problems
- In most cases the problems were constructed in several forms with different amounts where money was concerned
- K & T are keenly aware of the difficulties of using hypothetical evidence but suggest that “field” or naturalistic studies would be too crude for their purposes

Non-linear Decision weights

- **[1]** Consider the following choice put to N = 66 people:

  A : R6000 at .45 chance [EV = 2700] (14% – chose)

  B : R3000 at .90 chance [EV = 2700] (86% – chose)

- **[1']** Now consider the following problem put to N = 66 people

A : R6000 at .001 chance [EV = 6] (73% chose) –

B : R3000 at .002 chance [EV = 6] (27% – chose)

Commentary on Problem [1]

- In the first situation (Prob [1]) with larger probabilities most people choose the larger probability, but when the probabilities become so small as to be mere possibilities (Prob [1’]) , most people choose the larger amount
- Clearly the decision weights are not “linear” one-to-one maps of perceived probabilities…

Overvaluing very low probabilities

- **[2]** Consider the following choice put to N = 72 people:

A : 5 000 at .001 chance [EV = 5] (72% chose) –

B : 5 at 1 (certainty) [EV = 5] (28% chose) –

- **[2']** Also consider the following choice put to N = 72 people

A : -5 000 at .001 chance [EV = -5] (17% chose) –

B : -5 at 1 (certainty) [EV = -5] (83% chose) –

Commentary on Problem [2]

- In Problem [2] people prefer what is in effect a lottery ticket over the expected value of that ticket. In terms of the normal "risk aversion" seen in the domain of gains, this amounts to overvaluing low probabilities
- The same conclusion arises from the preference for insurance seen in Problem [2'], where the insurance premium amounts to the same value as the EV of the loss.
- K & T suggest that part of the overweighting of very small probabilities effect comes from the inability of most people to comprehend very small probabilities.

Evidence for Certainty Effect

- **[3]** Zeckhauser asked respondents to imagine that they were forced to play Russian Roulette. However, in this game they were given the opportunity to purchase one bullet from the loaded gun. The respondents were asked
  - [A] How much they would be willing to pay for the chance to – reduce the number of bullets from four to three
  - [B] How much they would be willing to pay for the chance to – reduce the number of bullets from one to zero?
- Most respondents were willing to pay much more for [B] the reduction of the chance of death from 1/6 to zero than for [A] the chance to reduce the probability of death from 4/6 to 3/6

Commentary on Problem [3]

- Standard Economic Theory suggests that one should be willing to pay more for [B] than for [A] because in [B] the value of money is reduced by the probability that one will not live to enjoy it…
- But this economic effect is overwhelmed by the high value placed on certainty in situation [B]

Evidence for Certainty Effect, ctd

- **[4]** Consider the following two stage game put to N = 85 people. In the first stage there is an 75% chance to end the game without winning anything, and a 25% chance to move to the second stage. If you reach the second stage, you have a choice between:

  A : a sure win of $30 [EV = 30] (74% chose) –

  B : 80% chance to win $45 [EV = 36] (26% chose) –

- Your choice must be made before the game starts, i.e., before the outcome of the first stage is known.

Evidence for Certainty Effect, ctd 2

- **[5]** Consider a problem put to N = 81 people. Which of the following options do you prefer?

C : 25% chance to win $30 [EV = 7.5] (42%) –

D : 20% chance to win $45 [EV = 9] (58%) –

Commentary on Problems [4] and [5]

- If you consider both stages of Problem [4] you need to multiply the probabilities in the second stage by .25 (since there is only a 25% chance of making it to stage 2). That means the EV of A: = .25 * $30 = 7.5, and the EV of B: = .25 * .8 * $45 = 9.
- But these are the same EVs as you find in problem [5], where most people chose differently.
- So most people are being over influenced by the "pseudo" certainty found in option A of problem [4]. (They forget the probabilistic nature of the first stage, and then succumb to the "certainty" effect.

Non-monetary evidence of certainty effect

- **[6]** N=72 people asked to choose between
  - A : 50% chance to win a three week tour of England, France and Italy (22% chose)
  - B : A one-week tour of England with certainty (78% chose)
- **[6']** N=72 people asked to choose between
  - C : 5% chance to win a three week tour of England, France and Italy (67% chose)
  - D : A 10% chance of a one-week tour of England (33% chose)

Commentary on Problem 6

- The reward in prospect A is much greater than that in prospect B, but respondents are influenced by the certainty of prospect B
- When certainty is removed as in problem [6'] the greater value of the outcome exerts a more rational influence.

Undervaluing intermediate probabilities

- **[7]** Suppose you are considering buying insurance against flooding, but are hesitating because of the high premiums. Your friendly insurance agent comes with an alternative offer. You can have the insurance at less than half the premium and you will be fully covered if the flood takes place on an even numbered day, but not covered at all if the flood takes place on an odd numbered day. Would you take this revised offer?
- Most people reject this offer of probabilistic insurance

Commentary on Problem 7

This insurance agent's offer is good (a bargain) because for less than half the premium you are covered on half the days.

- However most people undervalue intermediate probabilities (in this case .5 for even days) so they undervalue the offer, tending to turn it down.

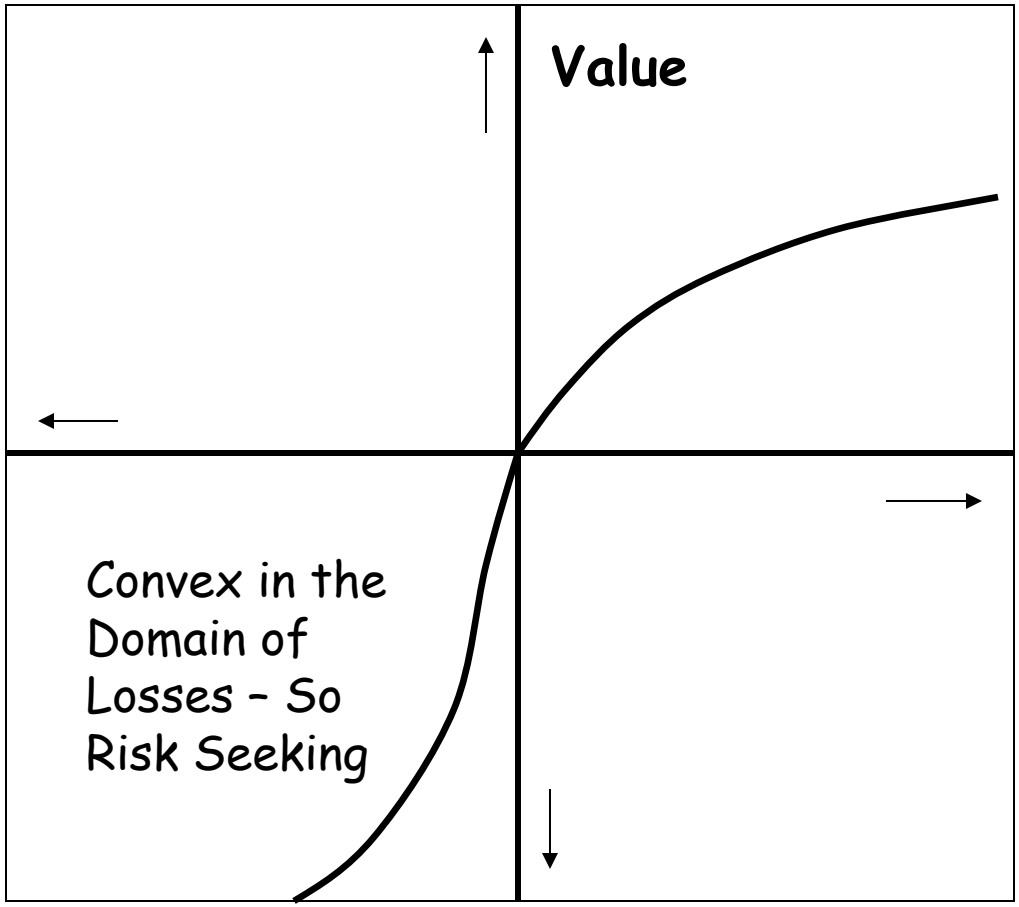
Values in Prospect Theory

Gains, losses, the Status Quo, and Frames

The "S"-curve and Framing effects

- Turning from beliefs to values, Prospect Theory suggests that most people do not evaluate prospects from the "**total wealth**" perspective suggested by Decision Theory.
- Instead they evaluate from the perspective of the "**status quo**" suggested by the way the prospect is stated, and think of each prospect as involving a gain, a neutral outcome, or a loss.
- The influence on decision making of the way in which the problem is stated is called a "**framing**" effect, and can lead to irrational decision making

The Hypothetical Value Function



Concave in the Domain of gains – So Risk Averse

Loss curve is Steeper than Gain curve – So Losses "Loom larger" Than gains

Risk Aversion in the domain of gains

- Knowledge that people are risk averse in the domain of gains dates from the time of Daniel Bernoulli
- Subjectively a gain of R100 when the person possesses R0 is experienced as greater than a gain of R100 when the person possesses R1000

Risk Seeking in the domain of losses

- Similarly knowledge that people become risk seeking in the domain of losses is old
- Subjectively a loss of R100 when the person possesses R200 is experienced as greater than a loss of R100 when the person possesses R1000

Some Evidence

- **[8]** N=68 people were asked to choose between two bets:

  A : $6000 at 25% chance (18% chose) –

  B : $4000 at 25% chance and $2000 at 25% chance (82% chose)

- **[8']** N=64 people were asked to choose between two bets:

  A : -$6000 at 25% chance (70% chose) –

  B : -$4000 at 25% chance and -$2000 at 25% chance (30% chose)

Commentary on Problem [8]

- Working out the expected values for problems [8] we get:
  - $\pi(.25)*v(6000) < \pi(.25)*v(4000) + \pi(.25)*v(2000)$
  - So a chance of a gain of 6000 is experienced as less valuable than a chance of two smaller gains that add up to 6000 – supporting concavity in domain of gains
- Working out the expected values for problems [8'] we get:
  - $\pi(.25)*v(-6000) > \pi(.25)*v(-4000) + \pi(.25)*v(-2000)$
  - So a chance of a loss of 6000 is experienced as better than a chance of two smaller losses that add up to 6000, supporting convexity in domain of losses

Losses loom larger than gains

- The S-curve is considerably steeper for losses than for gains
- This explains why people are reluctant to bet on a fair coin for equal stakes
  - K & T found in a sample of undergraduates that – most refused to stake $10 on a coin toss unless they stood to gain at least $30

What are "Frames"?

- "Frames" refer to the way in which a problem is **formulated.** Cognitively speaking they are mental structures we create to help us interpret meaning
- Consider a story (from Steven Robbins) about two young Catholic priests who were both smokers and who both asked their Bishop for permission to smoke whilst praying
- The first asked, "Would it be permissible for me to smoke whilst praying to the Lord?" and was given a resounding "No" in reply from the Bishop
- The second asked, "During those moments of weakness when I smoke, would it be permissible for me to say a prayer to the Lord?" and he received the reply, "Yes, of course, my son"

The effects of framing prospects as losses or gains

- **[9]** (N = 152). Imagine that the US is preparing for the outbreak of an unusual Asian disease which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:
  - A : If program A is adopted 200 people will be saved (72%)
  - B : If program B is adopted there is a one third probability that 600 people will be saved and a two-thirds probability that no people will be saved. (28%)
- Which of the two programs would you favour?

Commentary on Problem [9]

- The implicit reference point of the problem [9] is that if no program is adopted 600 people will die
- The outcomes of the two programs are stated in gains, and as expected most respondents were risk averse in the domain of gains – respondents tend to prefer to take the certain outcome rather than the gamble

Now consider …

- **[10]** (N = 155). Imagine that the US is preparing for the outbreak of an unusual Asian disease which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

  C : If program C is adopted 400 people will die – (22%)

  D : If program D is adopted there is a one third – probability that nobody will die and a two-thirds probability that 600 people will die. (78%)

- Which of the two programs would you favour?

Commentary on problem [10]

- It is easy to see that options C and D in problem [10] are in real terms the same as options A and B in problem [9]
- However in problem [10] the options are stated in terms of losses, and people become risk seeking in the domain of losses
- This means that respondents will tend to prefer the gamble over the certainty of losses
- Together problems [9] and [10] demonstrate a failure Decision theory's "invariance" assumption – that decisions should depend on the real value of the outcomes, not the way the prospects are worded

Framing Effects are like Illusions

- *“The failure of invariance is both pervasive and robust. It is as common among sophisticated respondents as among naive ones, and it is not eliminated even when the respondents answer both questions within a few minutes. Respondents confronted wit their conflicting answers are typically puzzled. Even after reading the problems, they still wish to be risk averse in the "lives saved" version; they wish to be risk seeking in the "lives lost" version; and they also wish to obey invariance and give consistent answers in the two versions. In their stubborn appeal, framing effects resemble perceptual illusions more than computational errors.” K & T, (2000, p. 5)*

Failure of Dominance

- **[11]** (N = 86). Choose between

A : 25% chance to win $240 and 75% – chance to lose $760 (0%)

B : 25% chance to win $250 and 75% – chance to lose $750 (100%)

- In Problem [11] it is easy to see that option B dominates A, and all respondents chose accordingly.

Failure of Dominance, ctd

- **[12]** (N = 150). Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer:

Decision (i). Choose between: –

- C: A sure gain of $240 (84%)
- D: 25% chance to gain $1000 and 75% chance to gain nothing (16%)

Decision (ii). Choose between: –

- E: A sure loss of $750 (13%)
- F: 75% chance to lose $1000 and 25% chance to lose nothing (87%)

Commentary on Problem [12]

- A majority of respondents make a risk averse choice for the sure gain over the positive gamble in decision (i)
- An even larger majority of Ss make a risk seeking choice for the gamble over the sure loss in decision (ii).
- Effectively the majority of respondents expressed a preference for C and F over D and E
- The same pattern emerged in modified versions of this problem.

Commentary on Problem [12] ctd

- Effectively the majority of respondents expressed a preference for C and F over D and E
- The preferred conjunction, however, is **dominated** by the rejected one
  - Adding the sure gain of $240 (option C) to option F yields a 25% chance to win $240 and 75% chance to lose $760 (= option A in problem [11])
  - Adding the sure loss of $750 (option E) to option D yields a 25% chance to win $250 and 75% chance to lose $750 (= option B in problem [11])
- So the framing effects in Problem [12] cause people to choose the dominated option of Problem [11]

Moral of the story

- Clearly Decision Theory is correct in the idea that choosing in terms of a single measure of overall wealth [a “canonical” representation of the problem] will help avoid failures of invariance and the irrational choosing of dominated options
- But people naturally think in terms of gains and losses and achieving a canonical representation of problems is demanding and psychologically alien.

Mental Accounting

Applying Prospect Theory to Mutiattribute Utility Problems

Organizing the Outcomes of Transactions

- Multiattribute utility theory (part of DT) is concerned with identifying and analyzing multiple variables to provide a common basis for arriving at a decision
- Multiattribute DT is particularly widely used to analyze transactions and trades
- In Prospect Theory Multiattribute DT is replaced with an easier “heuristic” called “mental accounting” – an heuristic that can sometimes lead to irrational decisions

Mental Accounting and Framing

- To evaluate options with many attributes K & T propose that a person sets up a “mental account”.
- This mental account contains an implicit reference standard against which the advantages and disadvantages of the option can be evaluated.
- An option is seen as acceptable if the balance of its advantages exceeds its disadvantages.
- The mental account includes other features of prospect theory such as concavity of gains and loss aversion

Three possible kinds of mental account

- Assessing two transactions that combines some advantages with some advantages could be done using one of three types of mental account:
  - Minimal Accounts: A minimal account includes only the differences between the two options and disregards all the features they share
  - A comprehensive account relates the relative advantages and disadvantages of the options to a person's overall level of wealth, or perhaps a person's monthly expenses
  - A topical account relates the consequences of the possible choices to a reference level that is determined by the context in which the choice arises
- Prospect Theory believes that people actually use topical accounts when assessing transactions and trades

Multiattribute Problem

- **[13]** N=88. Imagine that you are about to purchase a jacket for $125 and a calculator for $15. The calculator salesman informs you that the calculator that you wish to buy is on sale for $10 at another branch of the store, located 20 minutes drive away. Would you make a trip to the other store?
- 68% said "Yes"

Accounting Representation of Problem

- If a minimal account were used in problem [13] the advantage of going to the other store would be represented as a gain of $5. The disadvantage would be represented as a loss of the petrol and time used to get to the store.
- In a topical account the advantage is framed as a reduction in the price of the calculator, from $15 to $10. Because there is no saving on the price of the jacket, the cost of the jacket is not included in the topical account.
- In a comprehensive account the saving on the calculator and the cost of petrol etc would be evaluated in relation to a person's monthly expenses or budget

Testing the Prediction of Topical Accounts

- K & T reason that if people are using topical accounts the willingness to travel to the other store for a saving of $5 in problem [13] should be:
  - Inversely related to the price of the calculator –
  - Independent of the price of the jacket –
- To test this they constructed a problem [13'] in which the prices of the two items were interchanged (calculator given as $125 in the first, and $120 in the second store; the jacket set at $15 in both stores)
- Only 29% of N=93 respondents were willing to drive to the other store to save $5 on as $120 calculator
- This supports "topical" accounting, because [13] and [13'] are identical in both minimal and comprehensive accounts

The Implication of Topical Accounting

- People will exert the same degree of effort to save $15 on a $150 purchase as to save $5 on a $50 purchase. It is not the absolute size of the saving, but the relative proportion saved that matters
- Surveys show that the standard deviation of prices of the same product in different stores in a city are roughly proportional to the average price of the product. This must result from consumer's effort to find the best price, i.e., consumers exert effort in proportion to the average saving, not the absolute saving on a product (Pratt, Wise and Zeckhauser)

Which Account?

- **[14]** N = 200. Imagine that you have decided to see a play and paid the admission price of $10 per ticket. As you enter the theatre, you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered.
- Would you pay $10 for another ticket?
- Yes (46%). No (54%)

Which Account?, ctd

- **[14']** N = 183. Imagine that you have decided to see a play where admission is $10 per ticket. As you enter the theatre, you discover that you have lost a $10 bill.
- Would you still pay $10 for a ticket for the play?
- Yes (88%). No (12%).

Commentary of Problems [14], [14′]

- Why are so many people unwilling to spend $10 on going to the theatre after having lost a $10 ticket if they would readily spend that sum if they had lost an equivalent amount of cash?
- K & T think its is how the two problems are grouped into mental accounts. Losing the ticket gets put into the account of going to the theatre and “doubles” the cost of seeing the play. Losing the $10 bill gets put into a separate account (money used that day/week or month) so making the person feel only slightly less affluent
- These mental accounting choices are also influenced by regret, feelings of frustration and self-satisfaction.

The "Endowment effect"

- K & T propose that the "status quo" serves as the reference level in making choices
- Many choices involve making a decision between retaining the status quo and accepting an alternative to it.
- Because prospects are evaluated in relation to the status quo gains will be evaluated cautiously from a risk averse point of view, and losses will be evaluated in a risk seeking manner
- Because losses tend to loom larger than gains, a decision maker will be biased in favour of retaining the status quo
- This is termed the "endowment effect" – it explains the reluctance of people to part with assets that belong to their "endowment".

A Reluctance to Trade

- [15] One group of respondents was told to imagine that they had been offered and accepted a job in Alaska (Very cold) at a a very good salary (Good Money).
- Another group of respondents was told that they had been offered and accepted a job in Florida (Nice Climate) at a moderate salary (Poor money).
- After being asked to think about these situations for a while both groups were asked if they would like to swap (e.g., cold climate with good money for good climate and poor money, and vice versa).
- K & T observed a marked reluctance in both groups to swap. They suggest that this illustrates the endowment effect in that respondents become biased in favour of the status quo.

Commentary

- The endowment effect will favour stability over change. The fact that people fear losses more than they anticipate gains, gains will have to be substantially greater than losses to induce people to change.
- K & T note "Thus the instability of preferences produces a preference for stability. In addition to favouring stability over change, the combination of adaptation and loss aversion provides limited protection against regret and envy by reducing the attractiveness of foregone alternatives and of others' endowments."

Either a cost or a loss

- **[16]** N = 132. Would you accept a gamble that offers a 10% chance to win $95 and a 90% chance to lose $5?
- <Filler problem>
- **[16']** Would you pay $5 to participate in a lottery that offers a 10% chance to win $100 and a 90% chance to win nothing?
- 55 respondents expressed different preferences, 42 rejected the gamble in [16] but accepted the lottery in [16']

Commentary

- This problem relates to decisions about buying insurance where the premium can be framed either as a cost or a loss.
- Richard Thaler notes the effect of such framing on a bill before congress preventing stores from being compelled to charge the same amount for cash and credit card use:
- "When it appeared likely that some kind of bill would pass, the credit card lobby turned its attention to form rather than substance. Specifically, it preferred that any difference between cash and credit card customers take the form of a cash discount rather than a credit card surcharge. The preference makes sense if consumers would view the cash discount as an opportunity cost of using the credit card but the surcharge as an out-of-pocket cost."

The Dead-Loss Effect

- This effect is also called the “sunk-costs” effect and (by ethologists) the “concorde effect”.
- It concerns the reluctance of people to admit that some of their resources or investments have been lost, with the consequent tendency to throw good money (or resources) after the bad/lost resources.

Tennis-Elbow Example

- Thaler gives the example of a who develops tennis elbow soon after paying the membership fee of a tennis club and who then continues to play in agony rather than admit to wasting his investment.
- Playing in agony helps maintain the frame of the membership fee as a “cost” rather than as a loss. Recognizing that the membership fee was a dead loss is seen as more aversive than enduring the agony of tennis elbow..
- Similarly, the British and French governments didn’t want to admit having wasted the money needed to develop the Concorde, and so through in additional money to complete the project which eventually only sold 13 aircraft.

Some Conclusions

- Prospect Theory can be linked with a great many other psychological and cognitive theories.
- For example, a worker given a raise may be unhappy if his raise is less than that given to others (social comparison theory).
- This suggests that Prospect Theory can be usefully developed by exploring such links to other theories.
- It does not break down the notion of action at all just like decision theory. Essentially, it is an attempt to extend psychophysics in the realm of values and beliefs.
- It has uncovered many intriguing experimental findings and has strong empirical support

سوال؟

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