Outline

Mental Accounting

Aspects of Mental Accounting

Prospect Theory & Mental Accounting

Multiple Gains Are Segregated

Multiple Losses Are Integrated

Mixed Net Gains Are Integrated

Mixed Net Losses & The Silver Lining Principle

Behavioural Economics

PSYC3310: Specialist Topics In Psychology

Mark Hurlstone
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Seminar 6: Mental Accounting

Today

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- Fungibility in the standard economic model (**4**)

(1) **(2)** **(3)** **(4)**

$$\max_{x_i^t \in X_i} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} p(s_t) U(x_i^t \mid s_t)$$

1. Individuals maximize expected utility **(1)**, **(3)**, and **(4)**
2. An individual's utility is governed by entirely selfish concerns **(4)**
3. Individuals are Bayesian probability estimators **(3)**
4. Individuals have consistent time preferences **(2)**
5. All income and assets are completely fungible **(4)**

- Mental Accounting
  - Violations of fungibility

Today

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A foreword by Dan Ariely

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https://www.youtube.com/watch?v=plvmigGxUZA

What is Metal Accounting?

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*Mental accounting is the set of **cognitive operations** used by individuals and households to **code**, **categorize** and **evaluate** financial activities*

Thaler (1999, p.183)

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- The main component of mental accounting is that people have different "mental accounts" for different things
  - e.g. one might have mental accounts for "entertainment", "food", and "loose change"
- Any spending or income gets assigned to the mental account it is perceived to belong to
- Outcomes are perceived and experienced relative to the particular account that is brought to mind

Why Does It Matter?

- Spending money from one account should not affect the others:
  - Losing a $10 bill brings to mind the “loose change account”, whereas losing a $10 theatre ticket brings to mind the “entertainment account”
  - Losing the $10 bill should have no implications for the “entertainment account”
  - Losing the theatre ticket does have implications for the “entertainment account”
- Thus, mental accounting should influence spending choices—hence it matters

Why Does It Matter?

- To the extent that people do engage in mental accounting, this violates the notion of **fungibility** that is central to the standard economic model
- Fungibility states that money in one account will spend just as well in another
- The standard economic model assumes you have a global financial account that aggregates all individual accounts using the assumption of perfect fungibility of money
- This makes the individual accounts redundant

Why Does It Matter?

- Mental accounting implies that:
  1. Money in one account is not a perfect substitute for money in another account—money is not fungible across accounts
  2. The individual does not exclusively focus on maximising overall financial wealth. The objective might also be to limit the size of losses in individual accounts

Aspects of Mental Accounting

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Thaler (1999) identifies three components of mental accounting:

1. The assignment of spending or income to specific mental accounts (Speaker 1)
2. The perception of outcomes, and how decisions are subsequently made and evaluated (Speaker 2)
3. The coding of losses and gains over time (Speaker 3)

Prospect theory & Mental Accounting

- Prospect Theory is a convenient vehicle for modelling several aspects of mental accounting (Thaler, 1985)
- Central concepts in prospect theory:
  1. reference points
  2. loss aversion
  3. different attitudes to risk in the domain of gains and losses
- Helps explain several mental accounting phenomenon

Prospect Theory & Mental Accounting

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Consider the following well known experiment:

> *(Tversky & Kahneman, 1981, p.457): Imagine that you are about to purchase a jacket for ($125)[$15] and a calculator for ($15)[$125]. The calculator salesman informs you that the calculator you wish to buy is on sale for ($10)[$120] at the other branch of the store, located 20 minutes drive away. Would you make the trip to the other store? Two versions of the problem are given—in one version the figure in parentheses are given ($125 for the jacket, $15 for the calculator, and $10 for the calculator in the sale) while in the other version, figures in square brackets are given ($15 for the jacket, $125 for the calculator, and $120 for the calculator in the sale). At a price of $15($125), 68%(29%) of subjects are willing to travel.*

Prospect Theory & Mental Accounting

We can explain this result, as well as other findings using prospect theory.

$$u(x) = \begin{cases} x^{\beta} & \text{if } x \geq 0 \\ -\lambda(-x)^{\beta} & \text{if } x < 0 \end{cases}$$

Let us use the experimentally observed values of the parameters of the value function: β = 0.88 andλ = 2.25 (Tversky & Kahneman, 1992)

Multiple Gains Are Segregated

- The utility function for gains under prospect theory is strictly concave
- Hence if there are several positive gains, they should not be combined (because the marginal utility from a larger amount is smaller)
- Instead *gains should be segregated* where possible
- As an example, if $x = 100$, then one prefers to split it up into two equal gains of 50 each; using the earlier formula we get:

$$(100)^{0.88} < (50)^{0.88} + (50)^{0.88} = 57.544 < 62.535$$

Multiple Losses Are Integrated

- The utility function under prospect theory is strictly convex for losses
- Hence, using the converse argument to the previous case, *losses should be integrated*
- For instance, if $x = -100$, then the decision maker will prefer to integrate two equal losses of 50; using the earlier formula we get:

$$-2.25(100)^{0.88} > -2.25(50)^{0.88} - 2.25(50)^{0.88}$$

$$= -129.47 > -140.7$$

Mixed Net Gains Are Integrated

- Individuals using prospect theory exhibit *loss aversion*
- So the absolute value of the disutility arising from a small loss is equivalent to the utility arising from a larger gain
- In so far as individuals do not like their mental accounts to go into the red, they should *integrate small losses with larger gains*
- Thus, using the earlier formula, a loss of \$5 can be offset against a gain of \$12.565 because:

$$-2.25(5)^{0.88} + (12.565)^{0.88} = 0$$

Mixed Net Losses & The Silver Lining Principle

- Consider any outcome pair $(b, -a)$, where each outcome is expressed relative to a reference point such that $0 < b < a$, so $b - a < 0$
- If b is small relative to a, for instance, the pair (40, –6000), then we have large net losses $b - a$
- In this case we are likely to have $v(b) > v(b - a) - v(-a)$
- Suppose $\beta = 0.75$, then for the pair (40, –6000), the condition $v(40) > (40 - 6000) - v(-6000)$ requires that:

$$(40)^{0.75} > -2.25(5960)^{0.75} - (-2.25(6000)^{0.75}),$$

$$\text{or } 15.9 > 7.7, \text{ which is true}$$

Mixed Net Losses & The Silver Lining Principle

- In this case, one should *segregate large losses from small gains*
- This is known as the *silver lining principle*
- At the other extreme, when b is not too different from a, as in the pair (40, –50), then integration may be optimal
- Applying the prospect theory utility function with β = 0.75 we get:

$$(40)^{0.75} - 2.25(50)^{0.75} < -2.25(10)^{0.75}$$

$$\text{or } -26.4 < 12.7, \text{ which is true}$$

Jacket and Calculator Problem Revisited

- Consider the outcome pair $(b - a) = (5, -125)$; the item is expensive and costs \$125, and one can save \$5 by travelling to the other store
- So $0 < b < a$, but b is small
- From the silver lining effect, one segregates the large loss from the small gain, so one does not travel to get the extra discount

$$(5)^{0.75} > -2.25(120)^{0.75} - (-2.25(125)^{0.75}),$$

$$\text{or } 3.3437 > 2.5362, \text{ which is true}$$

Jacket and Calculator Problem Revisited

- In the case of the cheaper product that costs \$15, we have $(b, -a) = 5, -15)$
- The converse arguments show that integration is optimal, and one undertakes the trip to the store to save \$5
- The usual calculation in this case is

$$(5)^{0.75} - 2.25(15)^{0.75} < -2.25(10)^{0.75},$$

$$\text{or } -13.806 < 12.653, \text{ which is true}$$