# Course notes on applied consumer financial decision making

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# Overview

In this online book, I examine the drivers of financial decisions made by individuals and households. I look at the economic foundations of financial decision making, the characteristics of consumers making decisions, how we make financial decisions and how to improve consumer financial wellbeing. The material is designed to be useful in applied settings.

The book is based on a subject I teach in as part of UTS's Graduate Certificate and Masters of Behavioural Economics. (The subject is called Behavioural Approach to Investment and Insurance Decisions, but the material is broader than that). It is a half-size subject taught through a mix on online-self guided learning, online seminars and in-person weekend workshops.

The Graduate Certificate and Masters is for post-graduates with no assumed prior knowledge of economics or behavioural economics. The subject on which this book is based is taken after introductory economics and behavioural economics units.

This book covers the following areas:

- **Foundations**: What financial decisions do we need to make? What are the classical economic explanations for why we obtain banking, insurance and investment products?
- **Financial Decision Maker Characteristics**: What are some of our characteristics that affect our financial decisions?
- **Financial behaviours**: How do we actually make financial decisions? What are the explanations behind our patterns of behaviour?
- **Improving financial wellbeing**: How can financial products be designed and distributed to improve customer decision making? What other external tools can improve financial decisions?

# Part I

# Foundations

In this part I examine the types of financial decisions that we make and the classical economic explanations for our behaviour.

I examine what money is, and the classical economics foundations of saving, borrowing, investment and insurance.

# 1 What is money?

Money comprises bank notes, bank deposits or anything else that can be used to buy goods and services, and that is accepted as payment because others can use it for the same purpose.

Money can be thought of as having three functions.

1. Money is a medium of exchange: We exchange money for goods and services, avoiding the limitations of barter.
2. Money is a measure of value, or unit of account: The value of things tend to be measured in specific currencies, enabling us to compare them against each other.
3. Money is a store of value: Money can be saved, retrieved and later exchanged. If performing this function well, it will retain its purchasing power into the future.

Currencies are the most typical way that these functions are performed in modern times. As a result, we often think of money and currency as interchangeable terms. But money could also be a precious metal or any other easily exchangeable item that can perform the these three functions.

The three functions enable us to use money to:

1. **Save** and **borrow** to rearrange our consumption over time
2. **Invest** money in expectation of some benefit in the future
3. **Insure** ourselves against risk

Over the following sections I examine each of these activities.

# 2 Consumption, saving and borrowing

## 2.1 Consumption

Consumption is a term in economics that refers to expenditure on consumer goods.

In economic models, consumption is often the primary driver of utility. People choose consumption at each point in time through their life to maximise a utility function that depends on both current consumption and future consumption.

The starting point for economists thinking about consumption over time is that people and households save and borrow to smooth consumption over the lifecycle. This is most famously captured in Milton Friedman's (( 1957a)) permanent income hypothesis, which in a simplified form states that it is only changes in "permanent income" - the combination of current and all future income - that leads to changes in consumption. Permanent income might also be thought of as someone's long-term income.

Suppose an agent has a two period life. Utility depends on consumption today and in the future, so we might write her utility function as follows:

$$U = u(C_0) + \beta u(C_1)$$

where $U$ is utility, and $C_0$ and $C_1$ are consumption in the first and second periods respectively. $\beta$ is a discount factor (typically less than but close to one) reflecting how much the agent weights consumption in the future relative to today. If the utility function $u(C_t)$ is concave, meaning that there is diminishing marginal utility for each additional increment of consumption, the agent would prefer to spread their consumption across the two periods, but with a tendency for slightly more consumption today.

## 2.2 Saving

Saving is deferred consumption. We can save by putting money in a bank deposit account, a savings account, or stashing cash under our mattress. In economics, savings is often defined as income minus consumption.

Suppose an agent receives $100 in salary today, but does not expect any income in the second period. The agent could save some of this $100, possibly receiving interest payments on her savings. This will then allow her to smooth her consumption across the two periods, giving her higher total utility.

Savings can also take the form of the purchase of a financial asset such as shares. This is known as investing, and is discussed in Chapter 3.

## 2.3 Borrowing

Borrowing is consumption brought forward. We borrow through avenues as diverse as personal loans, mortgages, credit cards, buy-now pay-later, overdrafts, and payday loans.

Suppose an agent has no money today but will receive $100 in salary in the next period. She can borrow at a 10% interest rate between the two periods. This means that the agent could, if she wished, borrow to consume $91 today, and then pay the $91 plus $9 interest when she receives her salary in the next period. However, due to the agent's utility function and her desire to smooth consumption, she would likely borrow around half her income, with the precise amount depending on the agent's particular discount rate, the interest rate and the form of the utility function.

Click here to open an external resource. Look at Figures 10.2 and 10.3a

# 3 Investment

Investing is the allocation of money in the expectation of a return. People invest because investing can help to smooth consumption, or it can increase their consumption relative to other options such as saving.

If you have studied economics, you will likely have come across the term "investment". In macroeconomics, investment is taken to mean the purchase of fixed investments such as structures and equipment by firms, new residential investment by households and landlords, and changes in business inventories. Investment builds the capital stock. This macroeconomic definition does not include the exchange of residences or financial transactions such as purchasing stocks or placing income in a mutual fund.

In this course, I will be using a broader definition of investment. I will take investing to mean any allocation of money in expectation of a return.

## 3.1 Risk-return trade-off

Investing typically involves risk. When a person invests, they often do not know the exact return they will receive. They might know the mean and variance of the returns, and in economic analysis this is often assumed to be the case. But they might not even know those.

As for most economic actors, investors are typically assumed to be risk averse. As a result, they require compensation in the form of higher returns for taking on risk. The greater the risk, the greater the return required.

Before investing in an asset, the investor will want to know the expected future return and future variance in returns. This is, of course, not observable. As a result, it is typical to estimate them from historical data. This can give the investor data points, such as the mean return and sample variance or standard deviation, which enables them to assess the risk-return trade-off (at least in an idealised world).

## 3.2 Portfolios and diversification

People often hold portfolios comprising many assets. In this case, the risk of the portfolio is not a simple average of the portfolio assets. The act of placing assets in a portfolio has the effect

of eliminating some of the variability. This holding of multiple assets to reduce variability is known as **diversification**.

Malkiel (2020) provides an example of how this works in *A Random Walk Down Wall Street*, which I have summarised as follows:

> An investor in an island economy has two options: a resort and an umbrella manufacturer. In sunny weather the resort earns a 50% return while the umbrella manufacturer loses 25%. In wet weather, the umbrella manufacturer delivers a 50% return, while the resort loses 25%. There is a 50:50 chance that each season will be sunny or rainy.

> An investor in the resort would make 50% half the time and lose 25% half the time, giving an average return of 12.5%. Similarly, the umbrella manufacturer will deliver an average return of 12.5%, but with considerable volatility between the 50% gains and 25% losses. However, if the investor puts half their money in the resort and half in the umbrella manufacturer, they will earn 12.5% every season with no volatility. They have effectively eliminated risk while maintaining the same return.

This is an extreme example of the benefits of diversification, with the fortunes of the two business negatively correlated. However, to the extent there is any lack of parallelism in the fortunes of investment options, diversification can reduce risk.

This concept underlies **modern portfolio theory**, which tells investors how to achieve optimal diversification by determining the portfolio that can provide the desired return with the least risk possible. As Harry Markowitz, the founder of modern portfolio theory, is claimed to have said (although I cannot find a source), diversification is "the only free lunch in finance".

# 4 Insurance

Insurance is a method by which an individual or entity can protect themselves against financial loss.

There are many different types of insurance: home and contents, health, life, auto, credit, and income protection, among others. In Australia, these are regulated in three main categories: general insurance, which includes the major forms of property insurance; life insurance, which includes income protection and permanent disability; and health insurance.

There are other ways of insuring, such as private risk pooling and annuities. We will touch on these later in the book.

There are two equivalent ways to think about why people purchase insurance under the classical economic model:

- People use insurance to smooth consumption across different states of the world, maximising their expected utility of consumption. If they were to suffer a major loss when they are not insured, this could result in a sharp change in consumption. As you would have noticed, smoothing is a common theme across consumer savings, borrowing, investing and insurance behaviour.

- Risk averse consumers are willing to buy insurance with a negative expected value as the consumer prefers the certainty of the premium payment to the risk of suffering an uninsured loss.

The equivalence between the two comes from the diminishing marginal utility of consumption. People smooth consumption over time as extra consumption in one period delivers less utility than spreading consumption evenly. Diminishing marginal utility also leads to risk aversion.

Insurance is typically provided as a financial product by an insurer. The insured person or entity buys an insurance policy from the insurer. The insured pay a premium that entitles them to a promise from insurer to be compensated in the event of a loss that is covered by the insurance policy. The insurer collects premiums from the policy holders to cover the losses of those who experience a loss.

Insurance benefits both the insured and the insurer. As the insured are risk averse, they are willing to pay a premium that exceeds their expected loss (the size of the loss multiplied by its probability). Insurers pool risks by insuring many people or entities. If the loss by each individual is statistically independent of the others, by the law of large numbers the average

loss experienced by the insurer will be close or equal to the expected loss. The amount that the insured are willing to pay to avoid the risk thus becomes the insurer's return on their investment.

Insurance is only feasible in the presence of risk or uncertainty. If the insured knew they definitely would not incur the loss, they would not purchase insurance. If insurer knew the insured would definitely incur the loss, they would not insure them.

## 4.1 A numerical example

The following example illustrates why a risk neutral agent (or expected value maximiser) will not purchase insurance, but a risk averse agent might.

An agent is considering insurance against bushfire for its $1,000,000 house. The house has a 1 in 1000 chance of burning down. An insurer is willing to offer full coverage for $1100. (Note: $1000 is the actuarially fair price, the additional $100 might represent profit or administrative costs.)

Would an expected value maximiser or risk neutral person purchase the insurance?

$$E[\text{purchase}] = -\text{premium} = -\$1,100$$

The expected value of purchasing insurance is the guaranteed loss of the premium.

$$
\begin{aligned}
E[\text{don't}] &= P_{\text{burn}} * -value_{\text{house}} \\
&= -0.001 * 1000000 \\
&= -\$1000
\end{aligned}
$$

The expected value of purchasing insurance is $100 less than the expected value of risking the house burning down. A risk neutral agent (who maximises expected value) would not purchase this insurance.

Would a risk averse agent purchase the insurance? Suppose they have a logarithmic utility function $(U(x) = ln(x))$ and they have $10,000 in cash in addition to their house, giving them wealth $(W)$ of $1,010,000.

$$
\begin{aligned}
E[U(\text{purchase})] &= ln(W - premium) \\
&= ln(1,008,900) \\
&= 13.8244
\end{aligned}
$$

$$E[U(\text{don't})] = 0.999 * ln(W) + 0.001 * ln(W - value_{\text{house}})$$
$$= 0.999 * ln(1,010,000) + 0.001 * ln(10,000)$$
$$= 13.8208$$

The expected utility of purchasing insurance is greater than the expected utility from not purchasing insurance. This agent will insure against the fire despite it being actuarially unfair.

## 4.2 Adverse selection

A problem emerges when the insured and insurer have different information.

Suppose there is a population comprising two types of person, high risk and low risk. These two types are found in equal proportions across the population. The high risk people have a 30% chance of experiencing a loss each year, while the low risk have a 10% probability of a loss. In either case, if they experience a loss event, the loss will be $100. Since there are equal numbers of each type, the expected loss of a random person in the population is $20.

What if an insurer offered to insure anyone who wants insurance for $20? If no-one knew which type was which, this insurance would be attractive to both low and high-risk types and the insurer's expected losses would equal the premiums it collects.

But what if the people in the population know which type they are, but the insurer doesn't? Unless they are extremely risk averse, a $20 insurance premium is unattractive to the low risk types, who have an expected loss of only $10. They don't buy insurance. Only the high-risk types get insured, getting a great bargain of a $20 premium to insure against their expected loss of $30. The insurer would then suffer a loss, unless it boosted premiums to $30.

This phenomena where only the high-risk types buy coverage, called **adverse selection**, was highlighted in a classic paper by Rothschild and Stiglitz (1976). The problem can be pervasive. How does an insurer set life premiums for smokers and non-smokers if it can't differentiate the two? Or good and bad drivers?

## 4.3 Moral hazard

Whereas adverse selection involves an information asymmetry about type, **moral hazard** emerges when the asymmetry involves information about the insured's intention to take on risk. (Sometimes the distinction is described as hidden information in the first case, and hidden action in the second).

Moral hazard is the idea that when someone is insured, they may take on greater risks because they know that they will not pay the costs. The insurer will. If their behaviour is not observable or contractable, there are constraints as to what the insurer can do about this.

Moral hazard might be seen in risky driving, not wearing a seatbelt, taking less care on a black diamond ski run, or failing to prepare properly for the bushfire season.

# Part II

# Financial decision maker characteristics

We can now see the challenge facing the human decision maker. To achieve their consumption goals, they need to decide how to save, borrow, invest and insure. They need to do this in an environment of uncertainty, over time, facing a complex sea of products.

This way we approach this challenge is profoundly affected by the way we make decisions. In this chapter, we will examine the human characteristics that affect our financial decisions.

You have covered some of these concepts in other units in your course. In those cases, I will provide a recap and discuss how this concept might apply in the context of financial decision making by individuals and households. Those that are new, we will explore in more depth.

# 5 Financial literacy

Financial literacy is a term with many definitions in the literature. One definition is offered by Remund (2010):

> Financial literacy is a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions.

Although this definition relates to domains such as confidence and planning, most tests of financial literacy are narrower tests of financial knowledge (Fernandes et al. (2014)).

The following questions are classic questions to test financial literacy.

1. Suppose you put $100 into a no-fee savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made?
2. Imagine now that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, would you be able to buy more than today, exactly the same as today, or less than today with the money in this account?" [More, Same, Less]
3. Buying shares in a single company usually provides a safer return than buying shares in a number of different companies. [True, False]
4. An investment with a high return is likely to be high risk. [True, False]
5. Suppose that by the year 2020 your income has doubled, but the prices of all of the things you buy have also doubled. In 2020, will you be able to buy more than today, exactly the same as today, or less than today with your income? [More, Same, Less]

The first three questions are used in many surveys globally. Those three questions plus the latter two are currently asked as part of the Household, Income and Labour Dynamics in Australia (HILDA) Survey (Wilkins and Lass (2018)), a household-based panel study conducted annually in Australia. The questions cover:

- numeracy, via the ability to do simple calculation involving compounding of interest rates
- understanding of inflation

- knowledge of diversification
- understanding of the risk-return trade-off
- the money illusion.

Many people have low financial literacy.

In the 2018 HILDA survey, 42.5% of participants got all five of the above financial literacy questions correct. The proportion of correct responses for each question was:

- Numeracy: 85.5%
- Inflation: 69.8%
- Diversification: 74.9%
- Risk-return: 83.5%
- Money illusion: 77.0%

Remember that all except the numeracy question were multiple choice.

The *Australian Financial Attitudes and Behaviours Tracker*, a periodic survey run by the Australian Securities and Investments Commission (ASIC), consistently finds that only one-third of respondents have heard of and understand the risk-return trade-off (Australian Securities and Investments Commission and EY Sweeney (2018)). Only 40% have heard of and understand the concept of diversification.

You can see how misunderstanding of these concepts could affect borrowing, savings, investment and insurance decisions. To determine the benefits of savings or costs of borrowing, you need base numeracy and need to understand inflation. Diversification is a core principle to achieving investment returns at lower risk.

There is considerable research demonstrating a correlation between financial literacy and financial wellbeing, as well as other financial outcomes. Financial literacy is correlated with day-to-day financial management skills, financial market participation and investment, the holding of precautionary savings, planning for retirement, cheaper mortgages, more regular refinancing of debt, and lower transaction costs, among other things.

However, the evidence of a **causal** relationship between the financial literacy and financial outcomes is debated. We will discuss this debate in Chapter 23.

# 6 Time preference

Saving, borrowing, investment and insurance decisions all involve intertemporal choice. Decisions are made at one point in time, with effects at another. The timing of the costs and benefits do not align.

People discount future costs and benefits. They prefer to receive benefits earlier, rather than later, and prefer to incur costs later rather than earlier.

We have already encountered discounting in Section 2.1, where an agent had the utility function:

$$U = u(C_0) + \beta u(C_1)$$

$$0 \leq \beta \leq 0$$

where $U$ is utility, and $C_0$ and $C_1$ are consumption in the first and second periods respectively. $\beta$ is a discount factor reflecting how much the agent weights consumption in the future relative to today.

A recap of some core concepts is below.

## 6.1 Exponential discounting

Exponential discounting occurs where future costs and benefits are discounted at a consistent rate through time. The following equation is an example of exponential discounting.

$$U = \sum_{t=0}^{t=T} \delta^t u(C_t)$$

$$0 < \delta \leq 1$$

The degree of discounting in this equation evolves over time as 1, $\delta$, $\delta^2$, $\delta^3$, $\delta^4$ and so on. This results in a smooth decline in present value over time. Decisions made with exponential discounting are consistent over time.

## 6.2 Present bias

Present bias occurs when we place additional weight on costs and benefits at the present time. One simple model of present bias is the quasi-hyperbolic discounting model (it is a discrete time version of hyperbolic discounting).

$$U = u(C_0) + \sum_{t=1}^{t=T} \beta \delta^t u(C_t)$$

The degree of discounting in this equation evolves over time as $1$, $\beta\delta$, $\beta\delta^2$, $\beta\delta^3$, $\beta\delta^4$ and so on. This progression results in a larger discount for the first period of delay ($\beta\delta$) than the degree of discount for each subsequent period of delay ($\delta$). There is a relative weighting toward the present.

Present bias of this nature can result in time inconsistency, with decisions at one point reversed at another if given the opportunity.

## 6.3 A numerical example

The following numerical example explores how an exponential discounter and a present-biased agent will each consider two choices:

Choice 1: Would this agent prefer \$100 today ($t = 0$) or \$110 next week ($t = 1$)?

Choice 2: Would this agent prefer \$100 next week ($t = 1$) or \$110 in two weeks ($t = 2$)?

I show that the exponential discounter will be consistent in their decisions through time, whereas the present-biased agent can be time inconsistent.

In this example I represent a stream of payoffs over time in the form $S = (t_1, x_1; t_2, x_2; ...; t_n, x_n)$. For example, $(0, \$100)$ represents a payment of \$100 at $t = 0$, whereas $(0, \$100)$ represents a payment of \$107 at $t = 1$.

### 6.3.1 The exponential discounter

Suppose we have an exponential discounter with $\delta = 0.95$ and utility each period of $u(x_n) = x_n$.

Choice 1: Would this agent prefer \$100 today ($t = 0$) or \$110 next week ($t = 1$)?

$$U_0(0, \$100) = u(\$100)$$
$$= 100$$

$$U_0(1, \$110) = \delta u(\$110)$$
$$= 0.95 * 110$$
$$= 104.50$$

The exponential discounter will prefer to receive $110 next week.

Choice 2: Would this agent prefer $100 next week ($t = 1$) or $110 in two weeks ($t = 2$)?

$$U_1(1, \$100) = \delta u(\$110)$$
$$= 0.95 * 100$$
$$= 95$$

$$U_1(2, \$110) = \delta^2 u(\$110)$$
$$= 0.95^2 * 110$$
$$= 99.275$$

The exponential discounter will prefer to receive $110 in two weeks. The set of decisions across Choice 1 and Choice 2 are time consistent. If the agent selected $110 in two weeks for Choice 2 and was given a chance to change their choice after one week (which is effectively Choice 1), they would not change.

### 6.3.2 The present-biased agent

Suppose we have a present biased agent with $\delta = 0.95$, $\beta = 0.95$ and utility each period of $U(x_n) = x_n$.

Choice 1: Would this agent prefer $100 today ($t = 0$) or $110 next week ($t = 1$)?

$$U_0(0, \$100) = u(\$100)$$
$$= 100$$

$$U_0(1, \$110) = \beta\delta u(\$110)$$
$$= 0.95 * 0.95 * 110$$
$$= 99.275$$

As $U_0(0, \$100) > U_0(1, \$110)$, the present-biased agent will prefer to receive $100 this week.

Choice 2: Would this agent prefer $100 next week ($t = 1$) or $110 in two weeks ($t = 2$)?

$$U_0(1, \$100) = \beta\delta u(\$100)$$
$$= 0.95 * 0.95 * 100$$
$$= 90.25$$

$$U_0(2, \$110) = \beta\delta^2 u(\$110)$$
$$= 0.95 * 0.95^2 * 110$$
$$= 94.31$$

As $U_0(1, \$100) < U_0(2, \$110)$, the present-biased agent will prefer to receive $110 in two weeks.

Putting those two choices together:

Choice 1: The present-biased agent will prefer $100 now to $110 in one week. Their preference for benefits now ($\beta$) leads them to prefer the immediate payoff.

Choice 2: The present-biased agent will prefer $110 in two weeks to $100 in one week. They are willing to wait longer for a larger reward, with both outcomes in the future and subject to the short-term discount ($\beta$).

Consider what would happen if they selected the $110 in two weeks in Choice 2, but after one week were asked if they would like to reconsider their choice. They are effectively being offered Choice 1. This would then lead them to change their mind and take the immediate $100.

This combination of decisions is time inconsistent. The agent's actions are not consistent with their own initial plan.

# 7 Prospect theory

Prospect theory (Kahneman and Tversky (1979)) is a descriptive theory of the decisions people make when faced with a gamble. It is not a theory of *how* people make decisions, nor a theory of how they should make decisions.

You have covered prospect theory and its components in earlier units. Here is a recap.

## 7.1 Reference dependence

1. You have not checked your share portfolio in a while. You expect it is worth around $40,000. Today when you check, it is worth $30,000. Do you feel rich or poor?
2. You have not checked your share portfolio in a while. You expect it is worth around $20,000. Today when you check, it is worth $30,000. Do you feel rich or poor?

People assess choices based on their reference point - where they currently are - as opposed to an overarching assessment of their position. Potential outcomes are coded as losses and gains relative to that reference point.

Reference points can be thought of a state to which you have become adapted.

Under expected utility theory, utility is typically thought of as being the product of your entire wealth ($W$). For example, if you gain $100, your utility increases from $u(W)$ to $u(W+\$100)$.

In contrast, under prospect theory, the value function (what the utility function is typically called in prospect theory) applies to changes relative to the reference point. If their initial reference point is their wealth before receiving the $100, the value of that change is $v(\$100)$. The importance of that distinction becomes apparent when we consider how people consider losses and gains.

## 7.2 Loss aversion

You are offered a gamble on the toss of a coin. If you flip a heads, you lose $100. If you flip a tails, you win $150. Do you accept the gamble?

Loss aversion is the concept that losses loom larger than gains. People feel a loss more strongly about a loss than they do an equivalent gain, so are often willing to reject gambles with a materially positive expected value.

Rejection of bets of this nature cannot easily be explained by risk aversion. As shown by Rabin (2000), rejection of bets over moderate stakes requires absurd rates of risk aversion. For instance, if a person who acts consistent with expected utility theory always turns down a 50:50 bet to win $110 or lose $100 whatever their initial level of wealth, they will also turn down a 50:50 bet to win $1 billion, lose $1,000. (See Rabin and Thaler (2001) for a readable presentation of Rabin's calibration theorem.)

The following is an example of a value function with reference dependence and loss aversion:

$$v(x) = \begin{cases} x & \text{where} \quad x \geq 0 \\ 2x & \text{where} \quad x < 0 \end{cases}$$

Where $x$ is the outcome relative to the reference point.

For example, suppose someone is given $100. If their initial reference point is their wealth before receiving the $100, $x$ will be $100. Therefore their utility is $+100$. If the same person instead loses $100, their utility would be -200.

## 7.3 Reflection effect

Kahneman and Tversky (1984) reported the following experiment:

> Imagine that the U.S. 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 pro-grams are as follows:

> If Program A is adopted, 200 people will be saved.

> 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.

> Which of the two programs would you favor?

In the initial experiment, 72% of participants chose option A.

But what if the experimental participants were presented with the following options?

> If Program C is adopted, 400 people will die.

> 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.

Only 22% chose option C, despite it being equivalent to option A.

This phenomena is the reflection effect. When people make a risky choice related to gains, they are risk averse. They prefer a certain option with lower expected utility than the expected utility of the risky choice. When making a choice in the loss domain, they become risk seeking.

This phenomena might also be thought of as diminishing sensitivity to gains or losses in either direction. This contrasts with expected utility theory where the pain of losses increases as they grow in size.

The following value function is an example of a function where there is diminishing sensitivity to both gains and losses.

$$v(x) = \begin{cases} x^{\frac{1}{2}} & \text{where} \quad x \geq 0 \\ -2(-x)^{\frac{1}{2}} & \text{where} \quad x < 0 \end{cases}$$

The combination of loss aversion and the reflection effect results in the famous value function as in the following diagram:

## 7.4 Probability weighting

1. You are granted entry into a prize draw that that gives you a 5% probability of gaining $10,000. How do you feel?
2. You are granted an additional entry into a prize draw for $10,000 that increases your probability of winning from 5% to 10%. How do you feel?
3. You are granted an additional entry into a prize draw for $10,000 that increases your probability of winning from 50% to 55%. How do you feel?
4. You are granted an additional entry into a prize draw for $10,000 that increases your probability of winning from 95% to 100%. How do you feel?

From the perspective of expected utility theory, each of these four scenarios results in the same expected gain of $500. But they often feel markedly different.

People overweight small probabilities, giving them disproportionately more weight than they deserve. They also underweight large probabilities that fall short of certainty, giving them less weight than is justified. This results in the shifts in scenarios 1 and 4 above generally being received more gratefully than that in scenarios 2 and 3.

Kahneman (2011) calls the large psychological value of the change from 0 to 5% (or some other small probability) the *possibility effect*. Very unlikely but possibles outcomes are given more weight than similar increases in probability for events that are already possible. He calls the

**Figure 1**
*A Hypothetical Value Function*
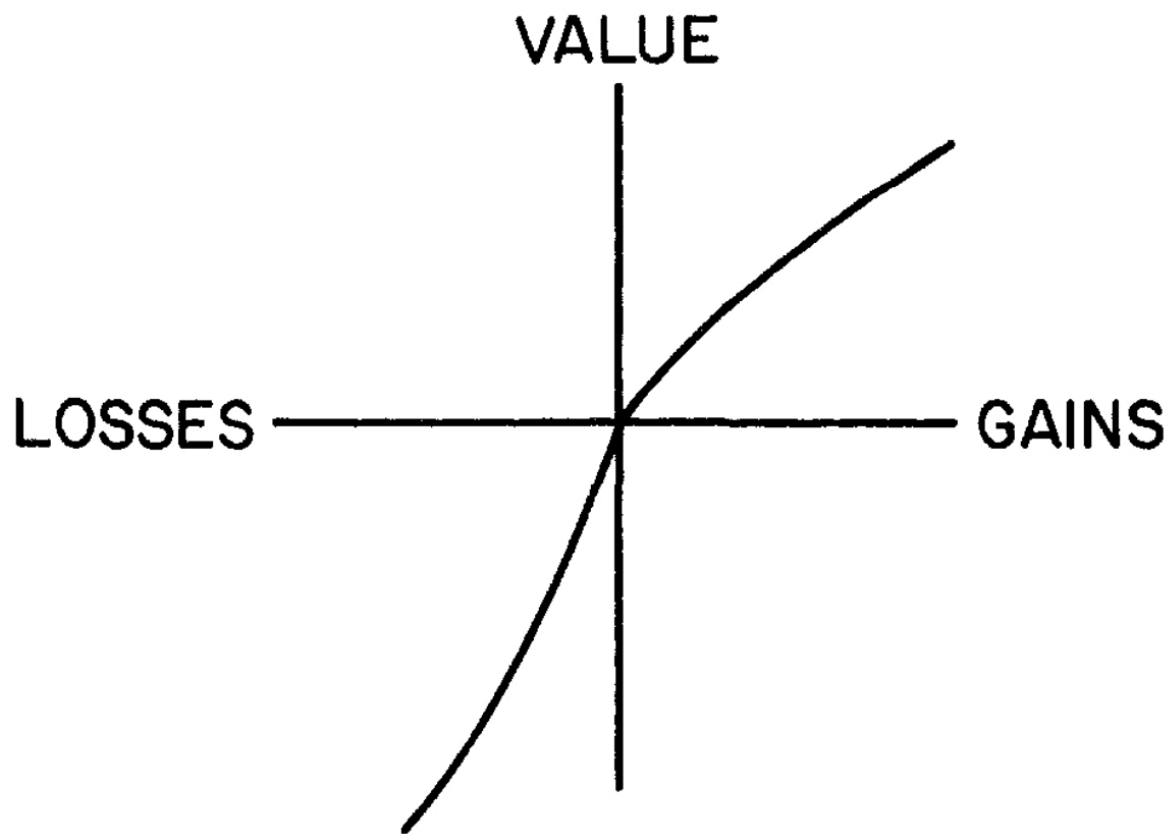


Figure 7.1: Figure 1 from Kahneman and Tversky (1984)

large psychological value of the change to 100% the *certainty effect.* We will pay a lot more for certainty than near certainty.

Combining this with the other components of prospect theory, the value of a prospect can be said to be:

$$V = \sum_{i=1}^{n} \pi_i v(x_i)$$

$$= \pi_1 v(x_1) + \pi_2 v(x_2) + ... + \pi_n v(x_n)$$

Where $\pi_i$ is the subjective probability of realising prospect $x_i$.

This pattern of probability weighting can be seen in the following diagram, where the probability $p$ on the x axis is mapped to a new probability weight on the y axis.

## 7.5 Fourfold pattern of risk attitudes

Prospect theory results in a four-fold pattern of risk attitudes, as shown in this table. For moderate to high probability gambles, the reflection effect dominates and people are risk averse in the domain of gains and risk seeking in the domain of losses.

But for low probability gambles, the probability weighting shifts the decision calculus. The possibility of a gain is overweighted, making the gamble attractive and inducing risk seeking behaviour. A similar effect occurs for a low probability of loss, with the overweighted probability making the potential loss less attractive, inducing risk averse behaviour.

|  | Gains | Losses |
| --- | --- | --- |
| **Medium to high probability** | Risk aversion | Risk seeking |
| **Low probability** (possibility effect) | Rick seeking | Risk aversion |
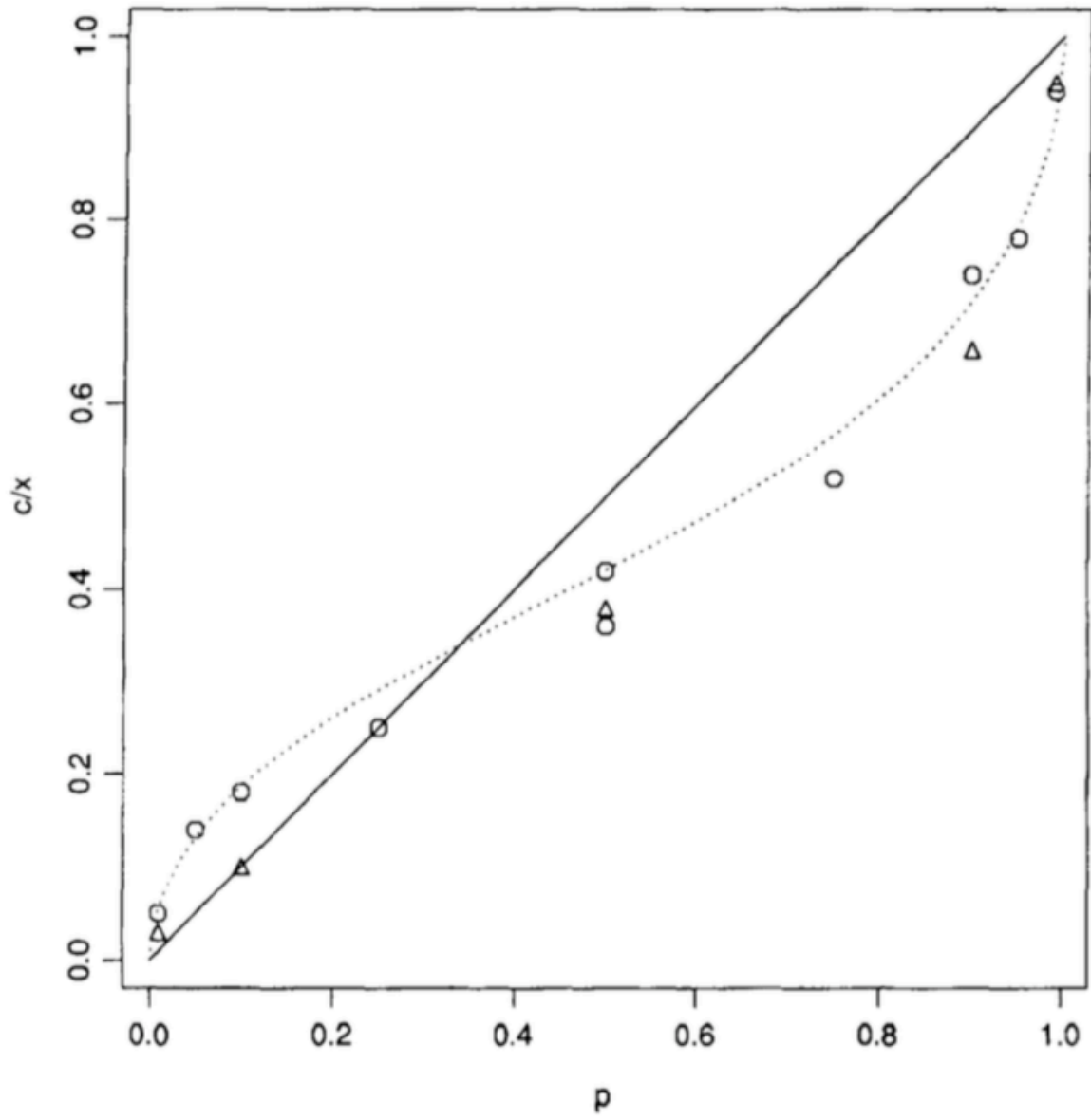
Figure 7.2: Figure 1, Tversky and Kahneman (1992)

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# 8 Mental accounting

Imagine that you have decided to see a play and paid the admission price of $10 per ticket. As you enter the theater, 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?

———————————————

Imagine that you have decided to see a play where admission is $10 per ticket. As you enter the theater, you discover that you have lost a $10 bill.

Would you still pay $10 for a ticket for the play?

When Kahneman and Tversky (1984) asked experimental participants these questions, 46% said they would pay for another ticket in the first instance, and 88% said they would pay for a ticket in the second.

The behaviour of those who will not buy a replacement ticket in the first instance, but will in the second, involves **mental accounting**. Mental accounting was named by Richard Thaler (2008), who described several different ways that we form mental accounts. These include putting labels on different pots of money, and creating mental accounts that are linked to a topic or temporary occasion.

In the case of the first potential theatre attendees, $10 has already been spent in the entertainment account. They are not willing to increase their expenditure to $20.

In the second, nothing has yet been spent on the entertainment account. The loss of the $10 note does not change that, so they are willing to increase their expenditure in that account to $10.

## 8.1 Coding gains and losses

Mental accounting provides a hook for the application of prospect theory. Gains and losses are assessed within mental accounts. The reference point is shaped by the mental account, not their entire financial position.

Thaler (2008) asks what happens when an agent experiences two outcomes. For example, what of the following scenario:

> Mr. A bought his first New York State lottery ticket and won \$100. Also, in a freak accident, he damaged the rug in his apartment and had to pay the landlord \$80.

> Mr. B bought his first New York State lottery ticket and won \$20.

> Who was happier?

Suppose an agent realises a joint outcome (x, y), such as Mr. A's outcomes of (\$100, -\$80). Through the lens of prospect theory, we have four scenarios to consider:

1. Multiple gains: If $x > 0$ and $y > 0$, then $v(x) + v(y) > v(x + y)$ due to diminishing sensitivity to gains. An agent will be happier experiencing separate gains of $x$ and $y$ than a single gain of $x + y$. They will be happier with the gains segregated.

2. Multiple losses: If $x < 0$ and $y < 0$, then $v(x) + v(y) < v(x + y)$ due to diminishing sensitivity to losses. An agent will be happier experiencing a single loss of $x + y$ than separate losses of $x$ and $y$. They will be happier with the losses integrated.

3. Mixed gain: If $x > 0$ and $y < 0$ and $x + y > 0$, then $v(x) + v(y) < v(x + y)$. An agent will be happier experiencing a single gain of $x + y$ than a gain of $x$ and a loss of $y$. They will be happier with the loss integrated with the gain so that they do not feel the pain of the loss.

4. Mixed loss: If $x > 0$ and $y < 0$ and $x + y < 0$, we cannot determine whether $v(x) + v(y)$ is less than or greater than $v(x + y)$. With a large loss $y$ and a small gain $x$, segregation might be preferred due to the diminishing sensitivity of losses. For a loss $y$ marginally greater than the gain $x$, integration is likely preferred due to the effect of loss aversion.

In the scenario above involving the lottery ticket, we have Mr. A experiencing a mixed gain. Integration is preferred to segregation: hence most people believe Mr B. will be happier.

# 9 Attention and memory

[I]n an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.

Herbert Simon (1971) *Designing Organizations for an Information-Rich World*

Most economic analysis contains the implicit assumption that we make decisions using all information that is freely available to us. But think about the last purchase you made. What did you pay attention to? The price? Its quality? Any other features of the product? How this purchase could inform future choices? Your future income? The interest rate or potential gain from investing the money?

We have **limited attention**. This is likely to reflect the cognitive costs of applying greater attention, cognitive constraints on our ability to process the information, or in some cases a strategy for making better decisions (more on that below).

As our attention is limited, the task is often to attract it. Simon noted that many designers build systems as through the problem is information scarcity, rather than attention scarcity. Instead, we need systems that excel at filtering information and providing the most important information at the right time.

Related to our limited attention, we also have **limited memory**.

**Short-term memory** is that capacity for holding information in mind in a readily available state. If someone gave you a phone number that you were to immediately dial, this would involve short-term memory. Short-term memory is constrained. It is often measured through memory span tests, such as asking someone to recall a sequence of digits they have just heard. By that measure, short-term memory can typically hold around $4\pm1$ digits or "chunks".

Related to (and often considered part of) short-term memory is **working memory**. Working memory involves the manipulation of stored information. Like short-term memory, it is constrained.

**Long-term memory** involves the indefinite storage of knowledge. Our long-term memory is incomplete, is highly selective, and fades with time. Further, it changes over time, and can be changed through the act of recall.

Constrained long-term memory and recall is a foundation of the availability heuristic. People tend to weight their judgements toward more recent terms or concepts that are readily available in memory. In determining the probability or frequency of an event, the more available events will be assessed as more probable. For example, when asked about the relative frequency of words starting with the letter K compared to those with K as the third letter, people assume relatively more of the former as words starting with K are easier to recall.

Our lack of attention and memory are a factor behind the success of techniques such as **reminders** to change people's decisions or behaviour. Simple strategies such as text message have been found to improve outcomes such as increasing attendance at appointments, reducing missed credit card payments and reducing re-offending.

## 9.1 Less is more

While limited attention and memory is typically thought of as a constraint and source of error, in some instances it might support better decision making. Often, "less is more", in that there is a beneficial degree of ignorance, or benefits to excluding information from consideration. For example, incomplete memory might lead to better learning of language (Elman (1993)).

Similarly, most machine learning techniques try to reduce the scope of the variables to which the algorithm pays attention to avoid overfitting. Overfitting is an over-sensitivity to the observed data in developing a model. The inclusion of every detail helps the model match the observed data, but prevents generalisation to new situations. Complex strategies can explain too much in hindsight. In an uncertain world where only part of the information is useful for the future, a simple rule that focuses on only the best or a limited subset of information has a good chance of hitting that useful information and less chance of incorporating irrelevant information.

The most common explanation for less-is-more effects is the bias-variance trade-off. Bias is the degree to which there are erroneous assumptions in your model. The classic case of bias is when you have failed to include a relevant predictor. If you exclude relevant predictors, you introduce bias as your predictive model will not include relevant relations between the predictors and the target output you are trying to predict. However, inclusion of too many predictors can lead to what is called variance, which is an error that arises because of the sensitivity of the model to fluctuations in the data you use to develop the model. It ultimately involves giving too much weight to irrelevant or marginally relevant information.

## 9.2 Selective attention test

You may have done this test from Simons and Chabris (1999) before. If not, give it a go.

Not everyone succeeds at this task. What do you consider to be the costs and benefits of the phenomena you just observed?

# 10 Scarcity

## 10.1 What is scarcity?

Mani et al. (2013a) report an experiment in which people in a New Jersey mall were presented with hypothetical scenarios such as the following:

> Imagine that your car has some trouble, which requires a $300 service. Your auto insurance will cover half the cost. You need to decide whether to go ahead and get the car fixed, or take a chance and hope that it lasts for a while longer. How would you go about making such a decision? Financially, would it be an easy or a difficult decision for you to make?

After the scenario, they were given series of Raven's Matrices problems, a test of fluid intelligence. When the results were analysed by whether the experimental subjects were rich or poor, there was no difference in performance on the Raven's Matrices problems.

However, when the scenario was tweaked such that the car trouble "requires an expensive $3,000 service", a gap between the rich and poor emerges. The rich subjects did just as well on the Raven's Matrices after being told they would require an expensive service as for the $300 service. But the poor scored lower, an effect equivalent to as decline of between 13 and 14 IQ points. This is larger than the effect that would be expected from missing a full night's sleep.

Mani et al found a similar effect in a field study involving sugarcane farmers in India. The farmers were given cognitive tests before harvest, when they face considerable financial pressure, and post-harvest. Those farmers showed diminished cognitive performance before harvest compared to after harvest.

This effect has been branded **scarcity**. People have limited cognitive capacity. The poor must manage sporadic income and expenses that they may not be able to meet. Even when they are not making a financial decision, these issues may preoccupy their minds. These preoccupations consume cognitive resources, leaving less "bandwidth" available for decision making.

## 10.2 The consequences of scarcity

Shah et al. (2012) examined the consequences of scarcity across a set of lab experiments. When participants were "poor", in that they were given a lower endowment of shots in a computer game, they tended to use the shots well and score more points per shot than the "rich". However, when given the opportunity to "borrow" shots from later rounds, they tended to overborrow and degrade their overall performance. Similar effects were found when they could borrow time in a trivia game. The poor overborrowed.

Shah et al argued that scarcity elicits greater engagement, which can be a good thing, as evidenced by the better usage of shots by poor participants in the computer game. However, focus on some problems leads to neglect of others, such as neglect of the future costs of borrowing.

## 10.3 Robustness and replication

The concept of scarcity has been subject to considerable debate. Wicherts and Scholten (2013) argued that the Mani et al. (2013a) results were only achieved because income was bifurcated into "rich" and "poor" rather than treated as a continuous variable. Mani et al. (2013b) resurrected their effect by pooling three experiments, although this does raise questions about the robustness.

Camerer et al. (2018) reported a replication of experiment 1 in Shah et al. (2012), and found no effect. This led Shah et al. (2019) to conduct a replication across all of the experiments in their original paper, confirming the failure to replicate the first experiment, but finding most of the others did replicate.

Carvalho et al. (2016) examined cognitive function, risk preferences and time preferences in low-income households before and after payday. They found an effect on time preference when considering monetary rewards, but no effect on cognitive function, risk taking or the quality of decision making.

Finally, in a replication of scarcity papers by O'Donnell et al. (2021): "Of the 20 studies that were significant in the original, four of our replication efforts yielded significant results."

## 10.4 Watch

# Part III

# Financial behaviours

In this part I examine a series of facts about how people consume, save, borrow, pay, invest and insure. For each I will examine where that behaviour is inconsistent with traditional economic explanations, and examine possible explanations that can account for the observed behaviour.

This part draws heavily from Beshears et al. (2018).

# 11 Why are financial decisions so hard?

Before commencing our analysis of consumer financial decisions, we should note that financial decision making is particularly hard. Some of the reasons for this follow (Erta et al. (2013)).

Financial decisions involve **trade-offs between the present and the future**. This delay requires us to solve conflicts between present and future selves, and to determine how to trade-off consumption today with the investment returns that could increase consumption in the future.

Financial decisions involve **risk and uncertainty**. We often do now know what will happen in the future, nor even the spectrum of possible outcomes from which that future could be drawn.

Financial products are inherently **complex**. Financial products in the marketplace have many more features that the basic elements required to save, borrow, invest or insure. Their precise form has often emerged over decades of competition in imperfect markets between financial institutions. For example, savings accounts may not just pay interest, but may also have conditions to achieve that interest, tiered interest rates based on your balance, interest rate caps, and honeymoon interest rates on opening an account. A bank is more likely to offer nine credit cards than one.

Financial decisions can involve **emotions**, such as fear of loss, or regret. We know that financial decisions can have major effects on our life outcomes, so we fear making the wrong one. The wellbeing of of family and loved ones can hinge on these decisions.

Many financial decisions provide little chance to **learn**. Many of our most important decisions are one-off decisions with outcomes only known or experienced after a long delay, such as a decision about how to invest for retirement, or whether to purchase a house. If we make a poor decision, we often do not know until it is too late (assuming we ever realise).

# 12 Consumption and savings

In this chapter we will look at a series of facts about individual or household financial consumption and savings behaviour, examine where that behaviour is inconsistent with traditional economic explanations, and examine possible explanations that can account for the observed behaviour.

> Last New Year's day, after a long evening of rooting the right team to victory in the Orange Bowl, I was lucky enough to win $300 in a college football betting pool. I then turned to the important matter of splurging the proceeds wisely. Would a case of champagne be better than dinner and a play in New York? At this point my son Greg came in and congratulated me. He said, "Gee Dad, you should be pretty happy. With that win you can increase your lifetime consumption by $20 a year!" Greg, it seems, had studied the life-cycle theory of savings.

> *Richard Thaler (1990)*

## 12.1 Observed low levels of smoothing

Despite the economic theory suggesting that people will smooth their incomes over their life-cycle, the observed level of smoothing is low. Consumption responds strongly to both unexpected and predictable changes in income. For example, Broda and Parker (2014) found that the marginal propensity to consume an economic stimulus payment within a quarter is 50-75%. That is, if someone has an unexpected windfall, they will tend to consume 50% to 75% of that windfall within that quarter, rather than saving it.

Suppose a patient person anticipates a regular fixed income of $10 a month during their one year of life. In this world there is no inflation or interest paid on borrowing or savings. Further imagine that they received a surprise windfall in August. Someone who perfectly smoothed consumption would spread that surprise over the remaining months of their life.

What we tend to see instead is this - a large spike in consumption at the time of the surprise, with only some of the windfall smoothed over coming months. (In this chart I have assumed that they consume 75% of any income shock when it occurs.)

This lack of smoothing is observed in relation to many major life events. For example, one US study found that when households reach end of unemployment benefits, which in the US have
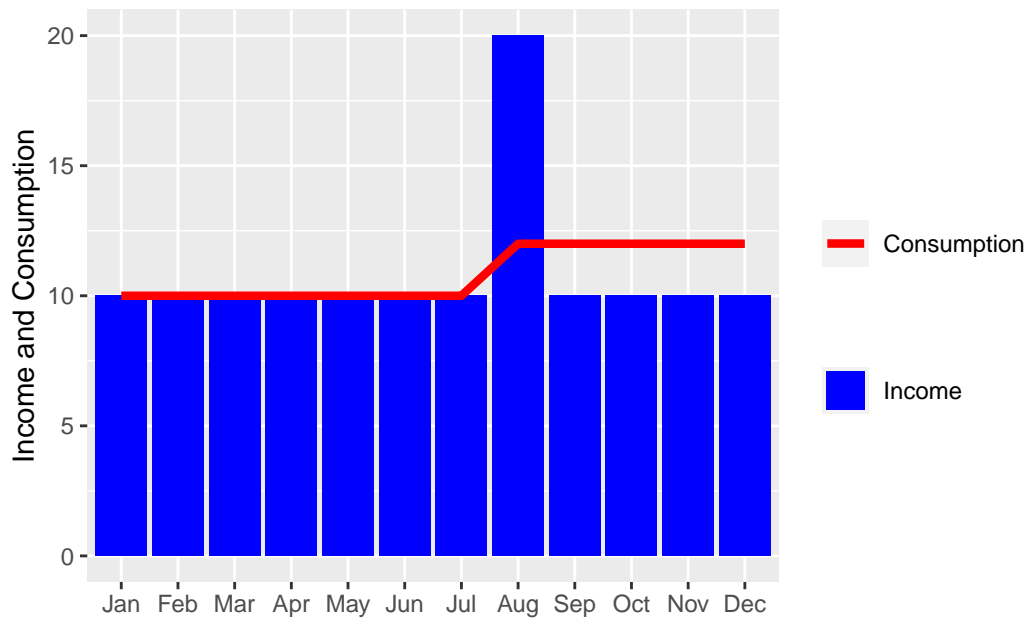
Figure 12.1: Smoothed consumption after windfall
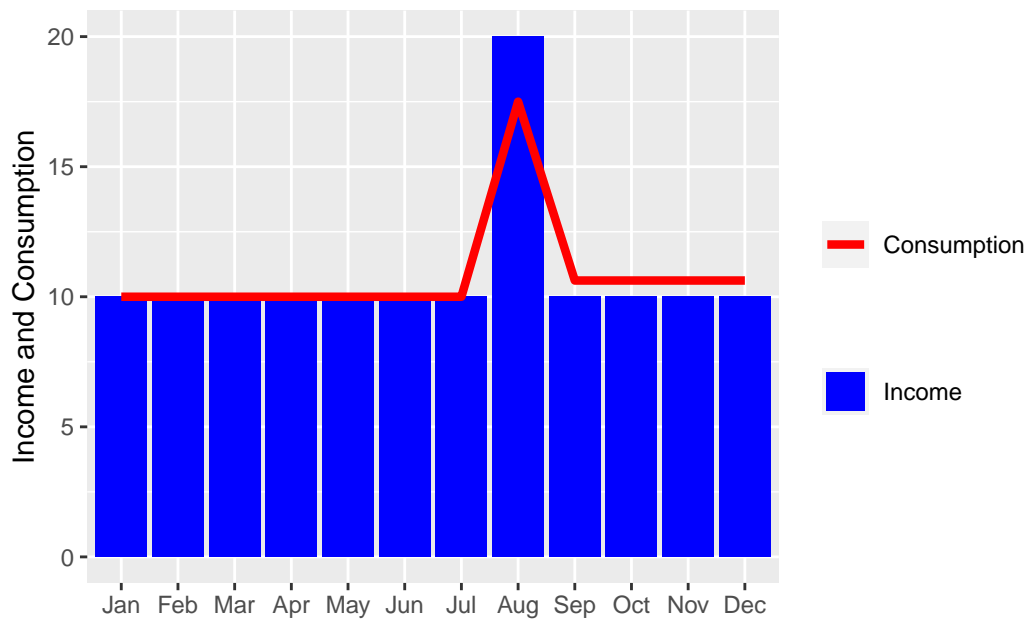


Figure 12.2: Typical consumption after windfall

a predictable end date, consumption falls by 13% at that end. Consumption also tends to fall with income at retirement.

The effect of windfalls on our consumption path depends heavily on whether they relate to liquid assets or not. (A liquid asset is one that can readily be converted to cash. Cash is, of course, highly liquid. A house is illiquid as it takes considerable time and effort to convert.) We blow windfall gains of cash, but not windfalls of less liquid assets. For instance, if there is a large increase in share value, we tend not to spend it. But if a company takeover delivers a cash payment, we will tend to spend it rather than smooth consumption of that payment over our lifetime.

## 12.2 Lifetime savings

In conjunction with this lack of consumption smoothing, households do not tend to accumulate substantial liquid assets over their lifetime. However, they do accumulate substantial illiquid assets.

In Australia, two of the most prominent illiquid assets are housing and superannuation account balances. Liquid assets comprise only around 15% of total household wealth, with less than 2% of that liquid wealth held by the least wealthy half of households (Adams et al. (2020)).

## 12.3 Rational explanations

There are a number of rational explanations for the lack of observed consumption smoothing. Below are three.

### 12.3.1 Liquidity constraints

The first relates to liquidity, in that people are unable to sell claims to their future labour income or borrow substantial sums in expectation of its receipt. They cannot simply access the net present value of their lifetime earnings and consume smoothly through time. They have access to less liquidity than the net present value of future earnings.

Consider the increase in lifetime income you could obtain by completing this course. Could you now go to a bank, tell them about this great course you are completing and how it will affect your future income, and then borrow on the basis of that expectation?

As they cannot access future income growth, people increase their consumption as their income grows.

This explanation, however, does not adequately explain the size of the co-movement between income and consumption unless they are highly impatient. But that level of impatience would

not accord how much we do accumulate assets. People often accumulate substantial illiquid assets over their life. The explanation does not cover the full range of behaviour that we see.

### 12.3.2 Dependants

The cost of child rearing often peaks at the same time as earnings (think private school fees). Further, there is little evidence of changes in household consumption as children leave the house, implying that per person consumption increases. This suggests the alignment of child rearing and the peak of earnings may just be coincidence.

### 12.3.3 Durables

People purchase many "durables" during their lives. These are lumpy purchases that do not quickly wear out and provide utility over time. They are not "consumed" in one use.

Cars and houses are durables. Household goods such as furniture are also durables.

Economists often use expenditure as a proxy for consumption. Durables can make expenditure lumpy (not smoothed) even though the durable good's consumption occurs over time (is smooth).

There is evidence to support this argument at the micro-level, in that payments such as rent often occur in alignment to pay cycles. On, say, a fortnightly or monthly basis, expenditure does not appear smoothed, whereas consumption is.

However, when we examine the empirical data, durable purchases also do a poor job of explaining the lack of consumption smoothing over a person's full lifetime.

## 12.4 Psychological explanations

There are also many explanations for the lack of consumption smoothing based on consumer psychology. Below are three.

### 12.4.1 Present bias

A prominent explanation of the lack of consumption smoothing is present bias.

Recall from Chapter 6 that present bias (in a quasi-hyperbolic model) involves an immediate discount for any delay at all ($\beta$) on top of the regular exponential discount function.

The immediate discount of $\beta$ generates a distinction between the treatment of liquid and illiquid assets. An illiquid asset is impossible or costly to access for immediate consumption,

so any consumption of the illiquid asset is always subject to a delay and a minimum discount of $\beta$, making is less attractive. Liquid assets such as cash are on hand for consumption now.

Someone with high present bias (i.e. $\beta$ substantially below one) will have trouble holding any liquid assets, but could accumulate substantial illiquid assets if they do not have a high rate of exponential discounting (i.e. $\delta$ is close to one).

A related concept is myopia, whereby people consider their income over a limited horizon. This was a feature of Milton Friedman's (1957b) original model of consumption smoothing. If people only think about their income for, say, the next three years, you will see some smoothing. But that smoothing will be limited compared to changes in income and consumption over the complete lifecycle.

### 12.4.2 Mental accounting

Mental accounting provides a potential explanation for the differences in consumption based on where income came from and what bucket it is currently in. For instance, windfall gains may be in a different mental account to a pay rise, and consumed differently.

One mental account may be for wealth saved for retirement. US data suggests that the medium-term (6-month) marginal propensity to consume out of retirement accounts is effectively zero. The medium marginal propensity to consume out of a transaction account is close to one.

Mental accounts can also be defined around categories of expenditure. For example, money in form of shopping coupons increases shopping more than would be predicted by consumption smoothing. The value of the coupon is not spread over all expenditures.

Mental accounting has some similarity to the liquidity explanation, but in the case of mental accounting it is a self-imposed category or rule. Liquidity constraints are external or natural features of the asset.

### 12.4.3 Reference point models

Under prospect theory, utility is measured from a reference point. This reference point might be expectations for current consumption, which means that changes in consumption relative to expectations could generate (or cause the loss of) utility.

Suppose today I get to consume five pieces of chocolate. If I had previously expected to consume four pieces, this could generate extra utility. However, if I had previously expected to consume six, this would be painful. In fact, due to loss aversion, it would be more painful than the equivalent pleasant surprise.

This concept can lead to over-consumption, under-savings and high levels of co-movement between income and consumption (if you calibrate the model with certain parameters). For instance, a windfall in income today could be used to markedly increase consumption above

expectations, giving a person utility both from the consumption itself and the pleasant surprise. Any consumption shifted into the future would not generate a pleasant surprise on the day of consumption, as by that time it would be expected.

A person's reference point may also be the consumption of others. Bertrand and Morse (2016) argued that consumption among rich households had induced those at lower income to consume a larger share of their income.

# 13 Borrowing

In this chapter I look at a series of facts about individual or household financial borrowing behaviour, examine where that behaviour is inconsistent with traditional economic explanations, and examine possible explanations that can account for the observed behaviour.

Under the economic framework we examined earlier, people borrow to smooth consumption. If income is very lumpy and a person has no liquid savings, it is possible to rationalise borrowing at any interest rate, provided there is no alternative product available with a superior rate.

We have already seen that people do not smooth their consumption over their lifetime. So what role does borrowing play?

Below I examine three lending products (credit cards, payday loans and mortgages), the role that these might play in customers' lives, and some possible rationalisations for the pattern of use that we see.

## 13.1 Credit cards

Credit cards present three puzzles that a traditional economic framework has difficulty resolving.

- People borrow far more on credit cards that you would expect than if they were exponentially discounters
- People fail to choose credit cards with the lowest borrowing costs
- People hold both high-cost credit card debt and liquid assets that earn low rates of return.

I then consider a simple example of how intertemporal discounting might affect credit card debt.

### 13.1.1 Excessive borrowing

Although it is possible to justify borrowing at any interest rate if income is sufficiently lumpy, the levels of observed credit card debt are hard to justify. In particular, the impatience required to justify the high levels of credit card debt does not reconcile with the patience required to justify the savings in illiquid assets such as housing and retirement accounts.

Present bias provides one possible explanation. As noted in the discussion in Section 12.3.1, illiquid savings are hard to access immediately, so the potential consumption of illiquid savings is substantially discounted by someone with high present bias. This enables the saving of illiquid assets. However, consumption using a credit card suffers no such discount. It can occur immediately. Meier and Sprenger (2010) found that more present biased individuals were more likely to have credit card debt and had higher levels of debt.

### 13.1.2 Poor card choices

The explanation of present bias is, however, incomplete, as demonstrated by another puzzle. People don't choose the credit card with the lowest borrowing costs.

At least a part of this relates to customers being attracted by teaser rates, which they pay more attention to than the long-term rates they will end up paying.

Customers also exhibit poor understanding of exponential growth and how a credit card debt can compound over time. (Recall the compounding question that formed part of the financial literacy test.) Poor understanding of compounding can lead to an underestimation of the cost of high interest rates.

### 13.1.3 Co-holding debt and savings

People often hold both high-cost credit card debt and *liquid* assets that provide low rates of return. In one UK survey, 12% of households in the sample held an average of £3800 in revolving credit on which they incurred interest charges, while at the same time holding liquid assets that they could use to clear all of this debt (Gathergood and Weber (2014)).

One rational explanation for co-holding is that that some expenses must be paid by cash or direct debit, not credit card. This requirement means that funds must be available in these forms.

An alternative explanation is that co-holding is a self-control strategy. By reducing the amount of unused credit capacity, it may reduce future spending. (Note the use of mental accounts here.)

One shortfall with these explanations is that people who hold multiple cards do not minimise costs when using the cards they have. They pay little attention to relative interest rates when choosing which card to use. They don't repay the card with highest interest rate first.

### 13.1.4 An example of intertemporal discounting and credit card debt

The following example illustrates how an exponential discounting agent and present-biased agent will consider payment of a credit card debt. Will they pay sooner and avoid interest, or will they delay the payment and incur extra costs? And will their decisions through time be consistent?

Consider an agent with utility function $u(x_n) = x_n$ who receives income $I$ in each of three periods, $t = 0, 1, 2$. They have a credit card with an interest free period and are considering whether to:

1. Not use the credit card, which leads to stream of consumption equalling their income in each period: $C_1 = (0, I; 1, I; 2, I)$.

2. Borrow to increase consumption by \$$X$ at $t = 0$ and pay the debt \$$X$ with no interest at $t = 1$, which leads to stream of consumption: $C_2 = (0, I + X; 1, I - X; 2, I)$.

3. Borrow to increase consumption at $t = 0$ and pay the debt \$$X$ with 20% interest at $t = 2$, which leads to stream of consumption: $C_3 = (0, I + X; 1, I; 2, I - 1.2X)$.

**Exponential discounter**

Suppose the agent is an exponential discounter who discounts each period by $\delta$, with $0 < \delta < 1$. Their utility in each period under each choice are as follows:

|       | $t = 0$ | $t = 1$        | $t = 2$            |
|-------|---------|----------------|--------------------|
| $C_1$ | $I$     | $\delta I$     | $\delta^2 I$       |
| $C_2$ | $I + X$ | $\delta(I - X)$| $\delta^2 I$       |
| $C_3$ | $I + X$ | $\delta I$     | $\delta^2(I - 1.2X)$|

An expected utility maximiser will maximise the sum of the utilities across the three periods.

For any $\delta$ less than one it can be seen that borrowing and paying at $t = 1$ gives higher utility than not borrowing:

$$U_0(C_1) = I + \delta I + \delta^2 I$$

$$U_0(C_2) = I + X + \delta(I - X) + \delta^2 I$$

$$U_0(C_1) < U_0(C_2) \text{ as } X - \delta X > 0$$

The agent prefers to borrow as they get the consumption today as opposed to equivalent consumption in the future when it is discounted.

The question then becomes which period they intend to pay for their borrowing. They will prefer to pay in $t = 1$ if:

$$U_0(C_1) > U_0(C_2)$$

$$I + X + \delta(I - X) + \delta^2 I > I + X + \delta I + \delta^2(I - 1.2X)$$

$$\delta(-X) > \delta^2(-1.2X)$$

$$1 < 1.2\delta$$

$$\delta > \frac{1}{1.2}$$

If $\delta > \frac{1}{1.2}$ the agent will pay at $t = 1$. Higher $\delta$ means the future has more weight than for low $\delta$. The less discount that is applied, the more the interest payment degrades the utility of the agent.

What happens when the exponential discounter reaches $t = 1$ and reconsiders when they should pay? They will prefer to defer payment to $t = 2$ if:

$$U_1(C_1) > U_1(C_2)$$

$$I - X + \delta I > I + \delta(I - 1.2X)$$

$$(-X) > \delta(-1.2X)$$

$$1 < 1.2\delta$$

$$\delta > \frac{1}{1.2}$$

The condition is the same. The exponential discounting agent will not change their mind. They are time consistent. This is because the comparison between $t = 1$ and $t = 2$ always involve a single discount by a factor of $\delta$ regardless of when they make this comparison.

**Present-biased agent**

Suppose the agent is a present-biased agent who discounts any delay by $\beta$ and each period of delay by $\delta$, with $0 < \beta < 1$ and $0 < \delta < 1$. Their utility in each period under each choice are as follows:

|       | $t = 0$ | $t = 1$ | $t = 2$ |
|-------|---------|---------|---------|
| $C_1$ | $I$     | $\beta\delta I$        | $\beta\delta^2 I$          |
| $C_2$ | $I + X$ | $\beta\delta(I - X)$   | $\beta\delta^2 I$          |
| $C_3$ | $I + X$ | $\beta\delta I$        | $\beta\delta^2(I - 1.2X)$  |

As for the exponential discounter, for any $\beta$ or $\delta$ less than one it can be seen that borrowing and paying at $t = 1$ gives higher utility than not borrowing:

$$U_0(C_1) = I + \beta\delta I + \beta\delta^2 I$$

$$U_0(C_2) = I + X + \beta\delta(I - X) + \beta\delta^2 I$$

$$U_0(C_1) < U_0(C_2) \text{ as } X - \beta\delta X > 0$$

The agent prefers to borrow as they get the consumption today as opposed to equivalent consumption in the future when it is discounted.

The question then becomes which period they intend to pay for their borrowing. They will prefer to pay in $t = 1$ if:

$$U_0(C_1) > U_0(C_2)$$

$$I + X + \beta\delta(I - X) + \beta\delta^2 I > I + X + \beta\delta I + \beta\delta^2(I - 1.2X)$$

$$\beta\delta(-X) > \beta\delta^2(-1.2X)$$

$$1 < 1.2\delta$$

$$\delta > \frac{1}{1.2}$$

If $\delta > \frac{1}{1.2}$ the agent will pay at $t = 1$. Higher $\delta$ means the future has more weight than for low $\delta$. The less discount that is applied, the more than interest payment degrades the utility of the agent.

You will note that this is the same condition as for the exponential discounter. This is because the agent is comparing costs in two future times. As both are in the future, the discount for the first period of delay ($\beta$) is not relevant. It is only the discount of $\delta$ between them that affects the decision.

What happens when the present-biased agent reaches $t = 1$ and can decide whether to stick with their intention to pay at $t = 1$ or leave the payment to $t = 2$? They will prefer to defer payment to $t = 2$ if:

$$U_1(C_1) > U_1(C_2)$$

$$I - X + \beta\delta I > I + \beta\delta(I - 1.2X)$$

$$(-X) > \beta\delta(-1.2X)$$

$$1 < 1.2\beta\delta$$

$$\beta\delta > \frac{1}{1.2}$$

As both $\beta$ and $\delta$ are less than zero, this condition is less likely to be met than the original condition of $\delta > \frac{1}{1.2}$. The present-biased agent is more likely to defer their payment to $t = 2$ if they reconsider their decision at $t = 1$. They may change their mind from their original decision at $t = 0$, which means that they are not time consistent.

The intuition is that when first considering when they will pay, both potential payment dates are in the future and subject to the discount $\beta$ for the first period of delay. It is then only the long-term discount rate $\delta$ that affects the time of their payment. When re-considering at $t = 1$, payment today is not discounted by $\beta$, whereas the future payment is. Therefore, delaying becomes relatively more attractive.

This example points to the role of intertemporal discounting in the accumulation of credit card debt. Both exponential discounting and present bias can lead to borrowing and interested being incurred. It also suggest that someone with present bias may be more likely to defer payment (even if they did not initially intend to), accumulating debt and interest.

## 13.2 Payday loans

Relative to credit cards, payday loans charge a higher rate of interest, with short-term charges implying huge annual costs.

Payday lending has been subject to much regulatory and legislative action in Australia in recent years. Since 2012, payday loan interest and fees have been legislatively capped. The caps are:

- Establishment fee of 20% of the amount borrowed
- Maximum monthly fee of 4% of the amount borrowed
- Default fees up to a maximum of double the amount you borrowed
- Can also pass on government fees and charge missed payment fees and enforcement expenses

Even though capped, this structure can lead to very high interest rates, particularly when considered on an annual basis. Consider a one month loan with the establishment and monthly fee. That is effectively 24% interest for one month!

### 13.2.1 Harm to consumers

There is an active academic debate on whether payday loans are helpful or harmful.

On the evidence of harm, people tend to use payday loans even though less expensive options are available. Bertrand and Morse (2011) showed that better disclosure marginally reduces take-up, suggesting payday loan use is at least partly due to misunderstanding the terms or consequences of the loan. (We will tackle disclosure in more detail in chapters on production distribution and regulation.) Further, the debt burden created by payday loans can lead to a debt spiral that harms the ability to cover basic financial needs.

An important consideration, however, is the counterfactual of whether the harm would occur in the absence of the payday loans. Bhutta et al. (2016) found evidence that, when payday lending is banned, people shift to other forms of high-interest credit rather than shifting back to traditional credit instruments. This may suggest that constraints to payday lending are addressing the symptom rather than the cause.

### 13.2.2 Who uses payday lenders?

Payday loan use is linked to low self control and low financial literacy.

Gathergood (2012) examined payday loan use in a survey sample where self control was measured by self-reported agreement with statements such as "I am impulsive and tend to buy things even when I can't really afford them." He found a that those with low self-control were more likely to use payday loans, although there were various mechanisms by which this occurred. Low self-control people had more income shocks. They were more likely to have other sources of credit withdrawn. They had more unforeseen durable expenses. All of these could trigger a need for high-cost short-term credit.

You can think about the low self-control in terms of present bias. Payday lending attractive is presence of high $\beta$; that is, a large discount for any delay. However, the variety of mechanisms by which payday loans are required suggests we require a richer story than high present bias.

As for credit cards, financial literacy may also play a role. Payday lender users score poorly on tests of financial literacy. Lusardi and Bassa Scheresberg (2013) found that those with high financial literacy (measured by answering each of the numeracy, inflation and diversification questions) were around 5 percentage points less likely to use a payday lender (20% compared to 25% across the full sample).

### 13.2.3 Watch

To research payday lenders and understand why people use them, Lisa Servon worked as a cashier. She described her experience in *The Unbanking of America* (2017). Here, she talks about her research.

## 13.3 Mortgages

The major source of household credit in Australia is the mortgage. Mortgages comprise over 90% of household credit!

Below we examine two features of the Australian mortgage market: the difficulty in comparing loans, and the "loyalty tax" paid by those who stay with their home loan lender.

### 13.3.1 Comparing loans

Australian banks tend to advertise a headline variable interest rate for their mortgage products. Yet almost 90% of customers of the big four banks receive a discount from that rate (Australian Competition and Consumer Commission (2020)). This can include advertised discounts that they receive when obtaining the loan, and discretionary discounts that are given during the application process or after disbursement of the loan. The ACCC found that, as at 31 October 2019, the average discount on the headline variable rate for standard owner-occupier loans was between 1.23% and 1.31% for each of the four major banks.

The advertisement of rates that are not the rate paid means that interest rate comparison is weakly informative when shopping for a loan. And people tend not to do much shopping around. For instance, ASIC research found that 38% of mortgage customers visited only one mortgage provider (be that a lender or broker, but typically their existing financial institution), with another 26% visiting only two (typically their existing financial provider plus on other).

Research in the United States has highlighted the costs of failing to search for the best rate. Gurun et al. (2016) found the difference between the 5th and 95th percentile adjustable rate mortgage interest rate within a geographic region was 3.1 percentage points, and that was after accounting for borrower and loan characteristics.

### 13.3.2 Punishing loyalty

The ACCC found that existing borrowers pay around 0.26% interest more for their loan than new customers (as at 30 September 2019). If the existing loan is more than five years old, they are paying 0.40% more than what big four bank new customers are paying. As an estimate of the associated costs, those customers of more than 5 years had loans averaging $200,000. If

they refinanced, they could save around $850 in the first year. Given these customers typically have lower loan balances and the lender knows the reliability of their repayment history, this difference in rate is hard to justify on basis of pricing for risk.

### 13.3.3 Explaining these phenomena

Both rational and psychological arguments can be constructed for the failure of customers to shop around.

On the rational, search takes time and has a cost. The benefits of any improvement in interest rates need to outweigh those costs.

However, the scale of the differences in interest rates makes it hard to justify the failure to search without assuming an unreasonably high cost of search or value of the borrowers time. In particular, most long-term borrowers could likely receive some further discount by sending an email or making a phone call requesting a discount (possibly accompanied by a threat to leave). A minimal cost action can achieve large long-term gain, but is not taken.

Present bias provides one explanation as the costs of search are today, whereas the benefits are distant. The benefits of the search receive unduly low weight to a hyperbolic discounter. This is still somewhat an incomplete explanation, as some of the steps to gain lower rates are of such low cost it requires unrealistic levels of present bias.

Another explanation relates to attention and knowledge. A customer with a long-term mortgage may not have given any attention to their current rate relative to the rates they could achieve in the market. The opacity of advertised rates would further cloud their comparison even if they were to focus attention. They do not take the steps to seek a reduced rate because they do not realise it is an option, not because they have calculated the costs and benefits of their action.

# 14 Payments

A fundamental choice when making a payment is whether to pay in cash or via a more abstract method. Besides cash, we can pay via cheque, bank transfers, BPay, credit card, "tap and go", PayPal and so on.

In 2007, almost three-quarters of in-person payments in Australia involved cash. As larger transactions were more likely to be via other means, a bit less than half of these transactions by value were cash. By 2019 cash had reduced to 32% of transactions by number and 19% by value (Delaney et al. (2020)). The use of cash has plunged further during the pandemic.

This change has consequences not just for the practicality of how we purchase goods and services. It also changes how we think about those purchases.

In this chapter we will look at a series of facts about individual or household financial payment behaviour, examine where that behaviour is inconsistent with traditional economic explanations, and examine possible explanations that can account for the observed behaviour.

## 14.1 Abstract payments

Prelec and Simester (2001) ran an experiment in which they sought bids from college students for tickets to see the Boston Celtics and Boston Red Sox. Some students were told that they had to pay in cash. Others were told they had to pay by credit card. In both cases, payment was to be made the next day. Those who bid by credit card bid around twice as much as those who were asked to pay by cash.

Knutson et al. (2007) suggested phenomena such as this may be because excessive prices trigger a pain-like response. The abstract nature of a non-cash method of paying (together with the delay that may occur with credit) might "anaesthetize" consumers against the pain of paying.

## 14.2 Rewards

Many of our financial transactions don't just involve an exchange of money for a good or service. Often our choice of transaction method can involve other costs, such as fees, or benefits, such as rewards points.

Rewards points increase the proportion of transactions that occur via the reward-attracting purchase method. However, we are often poor at assessing the value of rewards.

A reward point in itself is essentially valueless. The reward point only has value in that it can be exchanged for something else of value. As a result, when someone is considering whether they want to use a particular payment method that accrues rewards, they should ask what is the cost of the method relative to other options, and what is the value of the goods or services they could obtain through the reward points. The particular "number" of the reward points is irrelevant.

Despite this, people do not just try to maximise the value of what they can receive by earning reward points. They also seek to maximise the reward points themselves. Hsee et al. (2003) call this "medium maximisation".

Medium maximisation implies that people can be induced to take a more costly action through an offer of more of the medium, even if that additional medium can be used to obtain the same ultimate good or service. For instance, double rewards points for each purchase will attract more purchases through that method even when the value of those reward points, in terms of the goods and services they can be exchanged for, is halved.

## 14.3 The pain of paying

Under the standard economic approach, the utility cost of a purchase is felt through the reduction in other consumption due to that purchase. If I pay $10,000 for a car, there is no loss in utility due to the payment of $10,000 itself, but instead a loss of utility from other consumption I could have possibly bought with that $10,000. If my next best alternative to a car was a holiday, the utility cost of buying the car comes in the form of no holiday. There is no pain from the payment itself.

Prelec and Loewenstein (1998) argued that this does match our experience. Rather, we experience an immediate "pain of paying" that can undermine the pleasure of consumption. They give an example of a ticking taxi meter reducing the pleasure from the ride.

To capture this phenomena, they proposed a "double entry" mental accounting model that captures how the pleasure of consumption and the pain of paying interact. The model has the following features:

- "Prospective accounting": Consumption that has already been paid for can be enjoyed as though it is free. The pain of a payment that is made before consumption is mitigated by the thought of the benefits that the payment will bring.
- "Coupling": Coupling is the degree to which the payment or consumption brings to mind the other. Cash payments lead to tight coupling. Credit card payments have weaker coupling.

The theory leads to a prediction of "debt aversion", whereby people prefer to pay before consumption. This allows people to reduce the pain of paying as they can think about the future consumption. They can then enjoy the consumption without having to think about paying for it. For example, people will tend to prefer flat-rate pay-in-advance pricing schemes to pay-as-you-go.

The presence of debt aversion provides a countervailing force to time discounting. Prepayment may be attractive to increase the experiential benefits of future consumption, whereas time discounting can lead to a preference to delay the payments. Which dominates would depend on factors such as the discount rate and the difference in consumption utility if they pay in advance or not.

One prediction of the theory is that the pain of paying is not constant across different types of consumption. For a brief, high-utility experience (e.g. a vacation), the use of credit will result in a painful payment when one no longer has the vacation to look forward to. The purchaser will have a large mental debt. For a durable (e.g. a washer-dryer), the use of credit will not be as painful as at the time of payment there will still be future utility to come from its use. The contrast between the experience and durable would lead to a further prediction that people would be more likely to prepay or clear debt for experiences. There is a desire to keep the mental account "in the black".

Quispe-Torreblanca et al. (2019) examined this prediction using credit card transaction data. They found that repayment of debt for non-durable goods was 10% percentage points more likely that for debt incurred purchasing durables.

# 15 Investment

Basic economic theory suggests that people invest to earn returns to maximise and smooth consumption. Given this basic objective, there are numerous "puzzles" present in the way that people actually behave.

In this chapter we will look at these "puzzles" where behaviour is inconsistent with traditional economic explanations, and examine possible explanations that can account for the observed behaviour.

## 15.1 Low rates of stock market participation

Australia has one of the highest rates of share market participation in the world. In 2020, 35% of Australian adults held on-exchange investments (ASX (2020)). This level is a drop from 44% in the early to mid-2000s, but above the 10% participation in many countries in Europe. Part of the reason for the high levels of Australian ownership is the large public offerings associated with the sale of public assets, including the Commonwealth Bank in 1991, Qantas in 1993 and Telstra in 1997.

Despite the relatively high level of Australian ownership, there is still a question why barely more than a third of Australians own shares. If the stock market is not correlated with other income sources, there is a benefit of diversification by owning some shares.

One rational explanation for low participation are costs such as acquiring information or opening a trading account. Even though these costs are small, the small financial wealth of most households means that their level of participation would also be small. However, these costs cannot be the only explanation, as many at the top of the wealth distribution also do not participate.

There are many behavioural explanations for non-participation. One is disappointment aversion, which is the tendency to make choices in a way that reduces the potential for future expected disappointment. (Disappointment is closely tied to and often an alternative name for "regret" in the behavioural literature.) Disappointment occurs when an outcome falls short of the person's reference point, such as the expected utility of the lottery or the certainty equivalent. Someone who is disappointment averse will be less attracted to a gamble that an expected utility maximiser due to that potential disappointment. Stock market participation, obviously, provides an opportunity for disappointment (Ang et al. (2005)).
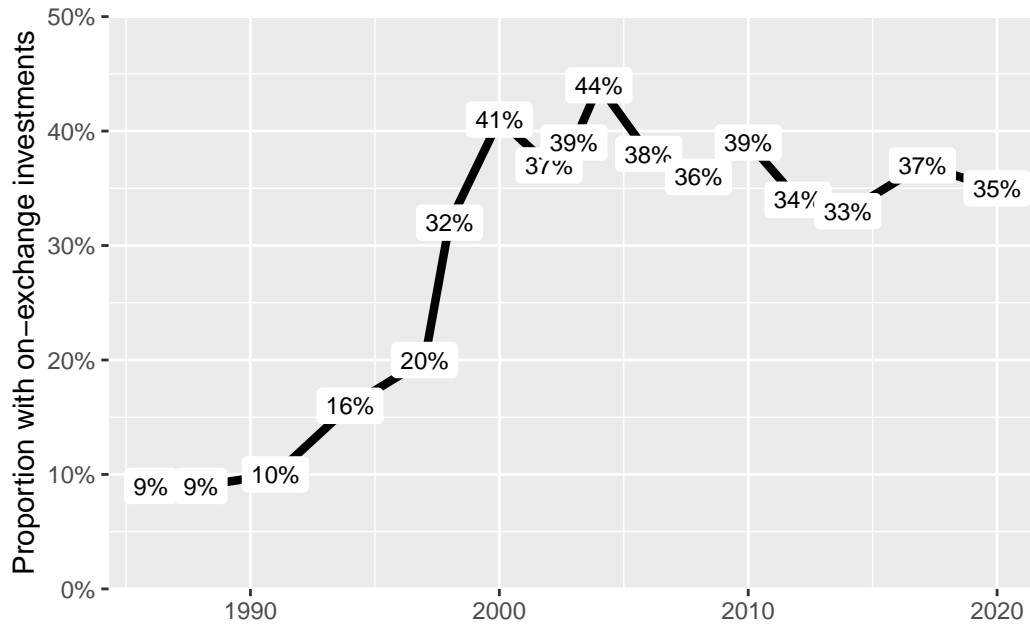
Figure 15.1: Proportion of Australians on-exchange investments (ASX (2020))

Loss aversion could provide another potential behavioural explanation, but it is inadequate to explain the rejection of small, favourable stock market investments. However, it may provide an explanation when combined with narrow framing (Barberis et al. (2006)). Narrow framing occurs where people evaluate gambles in isolation. They do not place the gamble in the context of other gambles they are taking. But combined with a narrow frame, whereby they don't consider their full basket of risks, the potential for loss becomes clear.

There is also a link between stock market participation and knowledge. Those with more schooling, higher IQ or higher financial literacy are more likely to participate in the stock market (Cole et al. (2014), Grinblatt et al. (2011), Rooij et al. (2011)).

Finally, an assessment that more people should participate in the stock market has an implicit assumption that people will participate optimally, such as by buying a diversified portfolio. However, there is a risk that if they did invest in the stock market, they would exhibit many of the problems identified on this page, including a lack of diversification and overtrading. In practice, it might be better if some households stayed out. That is the topic of the next tab.

## 15.2 Under-diversification

Those who invest in shares often hold an undiversified portfolio. The median US household holds around two stocks directly (Kelly (1995), Barber and Odean (2000)). Households also disproportionately hold stocks from their own country, with only 15% of Australians directly holding foreign shares (ASX (2020)).

There is some evidence that those with undiversified portfolios earn outsize returns, due to factors such an information advantage. (For example, see Ivković et al. (2008). In contrast, Seasholes and Zhu (2010) finds no advantage.). However, even if this is the case, outsize return comes with increased risk. It is not clear that the higher return compensates for the greater risk.

As you will recall, one of the questions in the basic financial literacy questionnaire concerns diversification. Lower financial literacy is linked to lower diversification (Abreu and Mendes (2010), Gaudecker (2015)).

Even when we do diversify, we often use crude metrics such as the 1/n rule, in which investments are simply spread across options in equal proportions (for example, Benartzi and Thaler (2001)). This means that if more shares are offered in a menu of options, we will end up with a great proportion of shares in our portfolio.

But is this irrational? The following story from Bower (2011) about a pioneer of modern portfolio theory raises some questions.

> Harry Markowitz won a 1990 Nobel Prize in economics for efficiently passing the buck — make that bucks. He was honored for developing a mathematical formula that helps investors maximize profit and minimize loss in their portfolios. After an exhaustive analysis of financial information, Markowitz's procedure allocates a per- son's stash of cash to an array of assets, with more money going to better bets.

> Many banks rely on this or similar investment approaches, warning customers to avoid picking investments intuitively. Yet Markowitz, now at the University of California, San Diego, followed a hunch in 1952 when he split paycheck contributions to his retirement account equally between stocks and bonds.

> Economists call this simple approach "1 over N," distributing money evenly among the number of available investment options, the Ns. The 1/N strategy is also called "naïve diversification," a presumably second-rate alternative to crunching the numbers and calculating gain and loss probabilities for each potential investment. Nonetheless, many people with stock-and-bond retirement accounts opt for an even split.

> As a young economist, Markowitz just wanted to avoid future regrets about fouling up his nest egg. "I thought, 'You know, if the stock market goes way up and I'm

not in it, I'll feel stupid. And if it goes way down and I'm in it, I'll feel stupid,'" he recalls. "So I went 50–50."

Markowitz did not follow the optimal behaviour as defined by himself. Was Markowitz erring?

Brighton and Gigerenzer (2015) argue that optimisation is not always the best solution. Where a problem is computationally intractable or the optimisation solution lacks robustness due to estimation errors, heuristics may outperform. For example, DeMiguel et al. (2009) compared the performance of the 1/N rule with 14 other asset allocation models, including Markowitz's portfolio allocation model. Across 7 empirical datasets, none of the 14 models outperformed the 1/N rule on out-of-sample tests. There is now a substantial literature in support of and contesting this finding (for example, Kritzman et al. (2010) and Hsu et al. (2018)).

## 15.3 Poor trading performance

**D**

DAY-TRADER, n. See IDIOT

**I**

IDIOT, n. See DAY_TRADER

*Zweig (2017), The Devil's Financial Dictionary*

On average, the more people trade, the worse they perform (Barber and Odean (2000)). This is driven largely, but not solely, by transaction costs.

Overconfidence is regularly proposed as an explanation for excessive trading behaviour (for example, Odean (1998)). Those who believe they are better than others (overplace) trade more (for example, Grinblatt and Keloharju (2009)). There is mixed evidence in support of a link between overprecision and over-trading (for example, Deaves et al. (2009) and Glaser and Weber (2007)).

There is also a difference by gender. Men trade more than women, and suffer a larger trading penalty as a result (Barber and Odean (2001)).
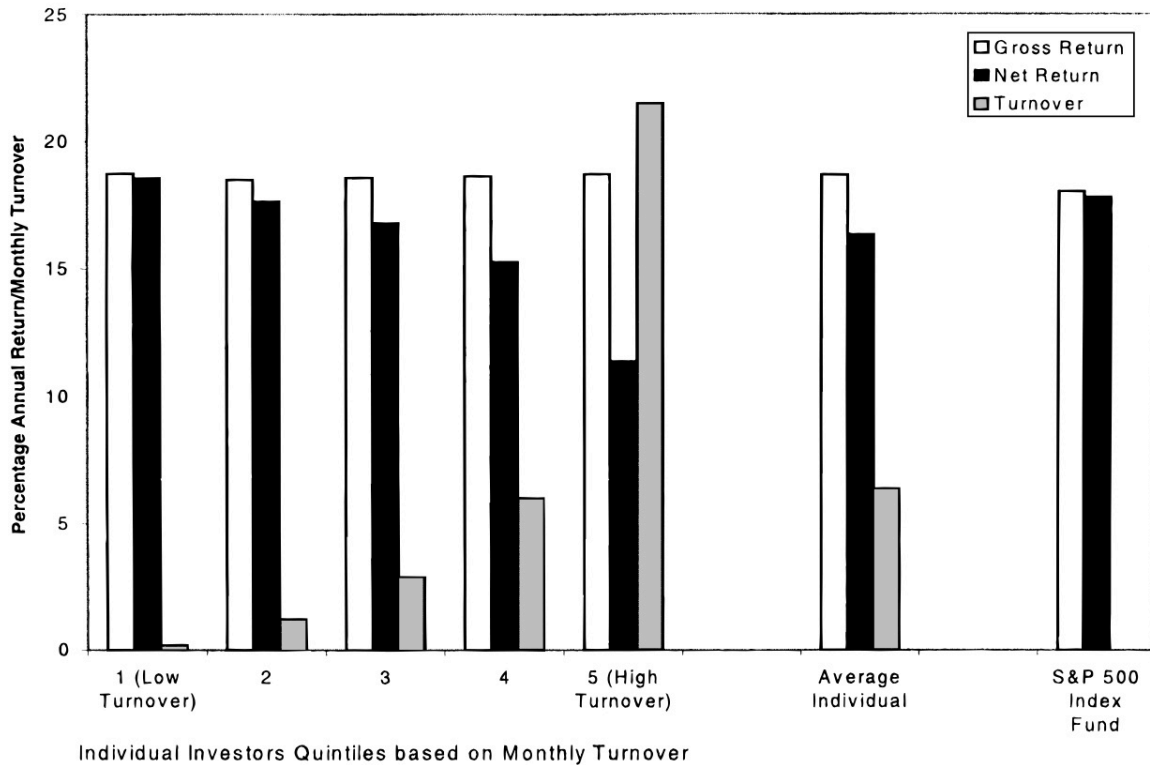
**Figure 1. Monthly turnover and annual performance of individual investors.** The white bar (black bar) represents the gross (net) annualized geometric mean return for February 1991 through January 1997 for individual investor quintiles based on monthly turnover, the average individual investor, and the S&P 500. The net return on the S&P 500 Index Fund is that earned by the Vanguard Index 500. The gray bar represents the monthly turnover.

Figure 15.2: Monthly turnover and annual performance of individual investor (Figure 1 in Barber and Odean (2000))

## 15.4 Poor investment options

One cheap, easy option to achieve stock market diversification is a low-cost managed fund. However, people hold individual stocks more often than you would expect given the diversification benefits of a fund. Then when they choose funds, they often choose actively managed funds,which typically underperform passively managed funds. And of those they choose, they pay high fees.

One rational explanation involves the broker or adviser. Funds tend to flow to funds with higher commissions (Christoffersen et al. (2013)), suggesting the broker is acting in their own interest. Conflicted remuneration has been severely curtailed in Australia in recent years, and low-cost index funds have become increasingly available. This change may influence the proportion of funds in high-fee funds in the future.

There is some evidence that financial illiteracy is a cause of poor fund choice. High-IQ investors choose cheaper funds (Grinblatt et al. (2016)). But even when clear fee information is given to an ostensibly bright group (Harvard and Wharton students and staff) with which to choose between four index funds, many fail to minimise fees (Choi et al. (2010)). This failure suggests a lack of financial sophistication even among that group.

## 15.5 The disposition effect

The disposition effect is the tendency for investors to sell stocks that are in the gain domain relative to the purchase price and to hold stocks that are in the loss domain (Shefrin and Statman (1985)).

While tax implications or portfolio rebalancing are both potential explanations for asymmetric behaviour relating to the sale of stocks, these factors have been shown to be insufficient to explain the observed behaviour.

Most behavioural explanations have turned to prospect theory.

For example, Shefrin and Statman (1985) argued that the disposition effect is driven by the reflection effect, whereby investors are risk seeking in the loss domain and risk averse in the gain domain. To demonstrate how it works, they present the following scenario:

> [C]onsider an investor who purchased a stock one month ago for $50 and who finds that the stock is now selling at $40. The investor must now decide whether to realize the loss or hold the stock for one more period. To simplify the discussion, assume that there are no taxes or transaction costs. In addition, suppose that one of two equiprobable outcomes will emerge during the coming period: either the stock will increase in price by $10 or decrease in price by $10. According to prospect theory, our investor frames his choice as a choice between the following two lotteries:

A. Sell the stock now, thereby realizing what had been a $10 "paper loss".

B. Hold the stock for one more period, given 50-50 odds between losing an additional $10 or "breaking even."

For an investor who is risk seeking in the loss domain, option B would be attractive.

If we craft an alternative scenario where the stock is now selling at $60, selling would realise a $10 gain, while holding the stock would be a risky prospect with the same expected value. An investor who is risk averse in the gain domain will sell.

# 16 Insurance

As you will recall, under the classical economic model, households purchase insurance to maximise the utility of their consumption. This maximisation largely occurs by smoothing consumption through external shocks.

Information asymmetries such as adverse selection and moral hazard can lead to consumers not being able to insure some risks at an actuarially fair price. These often provide explanations for the failure of a consumer to smooth their consumption. However, explanations for many behaviours requires other tools.

## 16.1 Prospect theory

The classical economic explanation for the purchase of insurance is based on the risk aversion of consumers. Consumers are willing to buy insurance with a negative expected value as the consumer prefers the certainty of the premium payment to the risk of suffering an uninsured loss. (The negative expected value is due to the insurer's profit and administrative costs.)

Prospect theory provides an alternative explanation. The purchase of insurance involves a certain loss (the premium) or a gamble involving the possibility of either a large loss or the status quo. As prospect theory has people as risk seeking in the loss domain, we would not expect them to purchase insurance.

However, under prospect theory people also overweight small probabilities. This overweighting of small probabilities can make the purchase of insurance attractive even though it is in the loss domain. This combination of the loss domain but small probabilities is the bottom-right quadrant of the fourfold pattern to risk attitudes generated by prospect theory.

The following numerical example is an illustration.

An agent is considering insurance against bushfire for its $1,000,000 house. The house has a 1 in 1000 chance of burning down. An insurer is willing to offer full coverage for $1100. (Note: $1000 is the actuarially fair price, the additional $100 might represent profit or administrative costs.)

Consider an agent who is risk seeking in the domain of losses but weights probability linearly. Their value function is:

$$v(x) = \begin{cases} x^{0.8} & \text{where} \quad x \geq 0 \\ -2(-x)^{0.8} & \text{where} \quad x < 0 \end{cases}$$

Where $x$ is the realised outcome relative to the reference point.

Determination of the reference point can be arbitrary. What if you pay insurance every year? Could the reference point then be wealth minus the insurance payment (meaning the insurance payment is in the gain domain)?

Taking the reference point as current wealth, would this agent purchase the insurance?

$$\begin{aligned} V(purchase) &= v(-1,100) \\ &= -(1,100)^{0.8} \\ &= -271.1 \end{aligned}$$

$$\begin{aligned} V(don't) &= 0.999 * (0) + 0.001 * v(-1,000,000) \\ &= 0.999 * 0 - 0.001 * (1,000,000)^{0.8} \\ &= -63.1 \end{aligned}$$

As $V(purchase) < V(don't)$, the agent does not purchase insurance. The diminishing feeling of loss leads to them weigh the certain loss of the premium relatively more heavily than the chance of losing the value of their house.

Including loss aversion in the value function does not change the decision as all possible outcomes are in the loss domain.

Would a person who is risk seeking in the domain of losses (i.e. the value function with reflection effect above) and applies the decision weights described below purchase the insurance?

They apply decision weights as per the following table:

| Probability | 0.001 | 0.01 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.99 | 0.999 |
|---|---|---|---|---|---|---|---|---|---|
| Weight | 0.01 | 0.05 | 0.15 | 0.3 | 0.5 | 0.7 | 0.85 | 0.95 | 0.99 |

$$V(purchase) = v(-1,100)$$
$$= -(1,100)^{0.8}$$
$$= -271$$

$$V(don't) = \sum_{i=1}^{n} \pi(p_i)v(x_i)$$
$$= \pi(0.999) * v(0) + \pi(0.001) * v(-1,000,000)$$
$$= 0.99 * 0 - 0.01 * (1,000,000)^{0.8}$$
$$= -631$$

Although the diminishing feeling of loss leads to them weigh the certain loss of the premium relatively more heavily than the chance of losing the value of their house, the overweighting of the probability of fire leads them to purchase insurance. Again, if we had included loss aversion it would not have changed the decision as all possible outcomes are in the loss domain.

## 16.2 Life insurance and annuities

At the household level, the standard economic model predicts a household will purchase insurance to protect against the death of household members, particularly those that are the highest earning. This is not, however, the pattern that is observed. Households often insure spouses when they would suffer no decline in living standard were their spouse to die. They also often fail to insure when they would suffer a substantial decline (Bernheim et al. (2003)).

A similar puzzle exists around life annuities. A life annuity is a product that a consumer purchases through payment of a lump sum in return for a stream of income that lasts until they or the beneficiaries in the household dies. Life annuities protect against the risk of living too long and running out of assets. The fact that only 1% of US households over the age of 65 hold life annuities is often called the "annuity puzzle".

### 16.2.1 Rational explanations

There are some rational explanations for this puzzle. Life annuities are often priced poorly and offer low yields relative to alternative investments. Public pensions already provide protection against longevity risk. There are also arguments that many people have bequest motives, which life annuities cannot satisfy as they only have value while the annuity holder is alive. Finally, annuities are a poor option if there are other uninsurable risks in the future, such as medical costs, which will require access to lump sums rather than an income stream.

All of these are likely factors, although the evidence that people are responsive to prices is weak.

### 16.2.2 Psychological explanations

The link between financial literacy and insurance through annuities is complex and debated. The decision to annuitise is complex, although the decisions required through alternative options such as maintaining assets and determining drawdown requirements each period are possibly more difficult. The result is that in different contexts low financial literacy has been linked to both lower and higher rates of annuitision.

The choice of annuities is sensitive to the frame. When consumers were told about the potential returns from purchasing an annuity (an investment frame), they were far less likely to annuitise than if they were told about the potential future consumption from the annuity (Brown et al. (2016)).

Loss aversion can also make annuities unattractive, as the possibility of an early death might be seen as a potential loss. The future income stream is "lost" in the event of death.

## 16.3 Under-insurance

Households often fail to insure against catastrophic risks to their property, and when they do, they often under-insure against the full extent of the catastrophe. For example, Quantum Market Research (2014) found that 81% of homeowners and renters do not have insurance that enables them to resume the same standard of living in the event of a crisis.

While some of this failure to fully insure is rational, due to the small maximum possible loss, the main explanation for this under-insurance is simply that households underestimate the probability of a large loss. They also do little to understand the extent of the risk.

## 16.4 Low excess

Once households do insure they often over-insure against small losses. They do this by choosing low levels of deductibles, also called "excess". Excess is the amount the policy holder must contribute in the event of a claim. Excess is designed to reduced moral hazard through sharing risk, and administration costs by reducing the number of claims.

The increased premium required to be paid for a low excess means that those who choose it must be very risk averse; in fact, an implausible level of risk aversion under standard economic models.

Loss aversion is one possible alternative explanation, as the potential for loss, even if small, is strongly felt. The difficulty with this explanation, however, is that the premium itself should also be felt as a loss. Prospect theory also provides another challenge to explaining this phenomena in that people tend to be risk seeking in the domain of losses, making the certain loss of the insurance premium unattractive when they have a chance of going uninsured but not suffering the negative event.

Another element of prospect theory, however, can increase the attractiveness of insurance. This is probability weighting, which can lead to small probability events being given greater weight. This exaggeration of the probability could be sufficient to overcome the risk seeking behaviour in the loss domain.

If you remember the four-fold pattern of risk attitudes generated by Prospect Theory, insurance is a combination of low probability and potentially large loss. In that schema, a person will be on net risk averse and seek to insure.

## 16.5  Junk insurance

People regularly buy insurance with limited value.

The prototypical junk insurance in the Australian market is consumer credit insurance. Consumer credit insurance is sold to consumers to cover them in the event that they cannot meet the minimum payments of a loan due to unemployment, injury or illness, or to pay the balance in the event that they die.

Australian Securities and Investments Commission (2019) found that for consumer credit insurance, only around 19 cents in the dollar was paid out. For insurance associated with credit cards, that payout rate was only 11 cents in the dollar.

Most major consumer credit providers have ceased selling many, if not all, of the forms of consumer credit insurance since ASIC's report. But this still leaves open the question of why consumers were purchasing this insurance in the first place.

A major issue was understanding the products. Many people were ineligible to ever claim as they were not meeting work requirements such as a working a minimum number of days or having permanency, or having a pre-existing condition excluded by the policy. They simply did not know (and were not told) this.

Another factor is the attention of the customers. They are primarily engaged in obtaining a credit card or loan at the time of purchasing the insurance. The add-on insurance is an immaterial part of the overall purchase, so receives little attention or scrutiny. There is also little opportunity for the consumer to shop around or compare prices.

## 16.6 Evidence of adverse selection and moral hazard

Adverse selection emerges where there is an information asymmetry between the insurer and potential customer about what type of customer is seeking insurance. Only high-risk customers buy coverage, whereas low-risk customers find the pricing unattractive.

The evidence for adverse selection actually occurring is ambiguous (Kunreuther et al. (2013)). In support of the concept, some studies have found that drivers who choose a lower excess tend to be higher risk drivers.

Other evidence provides little support. For example, people with lower life expectancy are not more likely to purchase life insurance than those likely to live longer.

There is even some evidence of an opposing trend, whereby low-risk customers are more likely to seek coverage (Fang et al. (2008)). "Advantageous risk selection" occurs where risk averse people attach a high value to insurance due to their risk aversion, but are also lower risks due to this risk aversion. There is also evidence that higher risks are less capable of making insurance decisions involving comparison of costs and benefits than those who are lower risk, affecting their insurance purchase decisions.

Evidence for moral hazard is more robust, although not always consistent (Kunreuther et al. (2013)). It is also difficult to disentangle moral hazard from adverse selection. Moral hazard has been found in health, medical and automobile insurance markets.

# 17 Exercises

## 17.1 A case study: Flexible pay

Most employees are paid in arrears. They accrue pay while they work, which is paid on a regular cyclical basis after its accrual.

For example, suppose you are paid fortnightly, with your next pay on Thursday August 27. On that day, you are paid for your labour since the last payday on 13 August; that is, you are paid for your labour from August 13 to August 26.

Some fintechs and financial services providers are developing technology that integrates into employer payroll systems to enable employees to see what they have earned at any point during their pay period and access a proportion of that accrued income in advance of their payday. This enables them to smooth their consumption and meet any unexpected expenses, a major source of financial stress.

Consider this offering from the perspective of what we have discussed in this subject to date. How might employees use the service? How might it affect savings and consumption? Why?

# Part IV

# Improving financial wellbeing

In this part I consider examine what financial wellbeing is and how it can be improved.

I examine how firms can improve financial wellbeing through the way they design and distribute their products, and interact with customers post sale. I then examine financial wellbeing interventions that could be generated by regulators, NGOs and the decision-makers themselves.

# 18 Financial wellbeing

At the beginning of this book I examined the classical economic foundations to some financial activities. There I assumed the consumer's objective was maximisation of their expected utility.

Expected utility maximisation is typically not a practicable framework for assessing whether someone is achieving their financial objectives. The dominant approach in assessing financial outcomes in applied settings is **financial wellbeing**. How can we improve our customers' or the population's financial wellbeing?

In attempting to improve financial wellbeing, financial services providers, regulators and NGOs target a number of intermediate objectives, such as financial literacy and financial capability. I will define each of these below, together with financial wellbeing. These definitions are often debated - you don't need to get into the semantics - but you should be able to distinguish between them.

## 18.1 Financial literacy

I discussed financial literacy in Chapter 5.

There is a high correlation between financial literacy and financial outcomes. But this does not mean that measures intended to target financial literacy are valuable. One study by Fernandes et al. (2014) found that interventions to improve financial literacy explain 0.1% of the variance in behaviours studied, although some recent arguments are more positive (e.g. Kaiser et al. (2021)). We will discuss this in further detail in Chapter 23.

## 18.2 Financial capability

Like financial literacy, financial capability has many definitions.

The Australian Government the Treasury (2022) defines financial capability as:

> Financial capability refers not only to the knowledge needed to make sound financial decisions, but to a combination of financial knowledge, skills, attitudes, and confidence that leads to positive financial behaviours and money management decisions that fit the circumstances of one's life.

Muir et al. (2017) define financial capability as:

> the combination of knowledge, skills, attitudes and behaviours necessary to make sound financial decisions, based on personal circumstances, to improve financial wellbeing.

Financial capability includes financial literacy, but extends to capture attitudes and behaviours.

Many organisations with a historic remit to improve financial literacy have broadened their scope to financial capability. This was in part a recognition that literacy was an overly narrow approach to improving financial wellbeing.

## 18.3 Financial wellbeing

Muir et al. (2017) define financial wellbeing as when a person is able to meet expenses and has some money left over, is in control of their finances and feels financially secure, now and in the future. Financial wellbeing is an outcome metric. It is what interventions relating to the other concepts are trying to achieve.

The Consumer Financial Protection Bureau (2015) defines financial wellbeing as:

> "a state of being wherein you:
>
> - Have control over day-to-day, month-to-month finances;
> - Have the capacity to absorb a financial shock;
> - Are on track to meet your financial goals; and
> - Have the financial freedom to make the choices that allow you to enjoy life."

Financial wellbeing is also essentially a subjective measure (once basic needs are met), but objective outcomes are major determinants of subjective wellbeing. It is generally wise to consider both.

As an example of the types of questions in a financial wellbeing survey, the following are drawn from the Consumer Financial Protection Bureau (2017) Financial Wellbeing Scale:

> This statement describes me (completely, very well, somewhat, very little, not at all):
>
> 1. I could handle a major unexpected expense
> 2. I am securing my financial future

3. Because of my money situation, I feel like I will never have the things I want in life

4. I can enjoy life because of the way I'm managing my money

5. I am just getting by financially

6. I am concerned that the money I have or will save won't last

# 19 Industry interventions

In this part I examine how firms can improve financial wellbeing through the way they design and distribute their products, and interact with customers post sale. We will do this by examining each stage of the product lifecycle.

## 19.1 The financial product lifecycle

A financial product's lifecycle can be roughly broken down into four stages: design of the financial product, distribution or sales of that product to customers, the post-sale period where the customer uses the product, and the product close. This is a simplification, but will provide a framework for us to discuss how financial services firms can better serve their customers.

**Product design**: The bank develops the product in light of the customer's and its own needs. Product design includes the basic function of the product and any additional features. For example, credit cards provide a payment card to the customer and access to a capped line of credit. Interest is charged on outstanding debt. Additional features might include interest free periods on purchases, access to cash advances, differential interest between cash advances and purchases, access to discounts for balance transfers, cashback offers, rewards points, purchase insurance, access to concierge services, and so on.

**Product distribution**: Distribution is the process by which the financial product or service is sold to the customer. There are multiple ways that products are distributed in Australia. Increasingly, distribution is by digital channels such as websites and apps, although with more complex products the initial digital process is often shifted to a human at some point. Distribution can also be in branches, via advisers, through sales representatives on phone, or through other agents. An example of another agent is a car salesperson who sells add-on car insurance during the purchase of a motor vehicle.

**Post-sale**: The interaction between the financial services firm and customer can have varying degrees of intensity through the life of the product. Some products are used and interacted with daily, such as transaction accounts and their associated cards. Others involve a one-off purchase, with interaction only occurring if a set event occurs (e.g. insurance). In either case, however, the design of the system by which the financial services firm interacts with the customer post-sale can have a marked effect on the way that the customer uses the product and their outcomes.

**Product close**: In the simplest case, product close involves the customer choosing to close their product. Although we will not be covering the produce close process in this book, it can have marked effect on financial wellbeing. For instance, how easy is it to close a credit card? Product close can also involve more complex processes with material effects on customer outcomes, such as complaints, dispute resolution and remediation.

# 20 Product design

Product design is the first lever available to improve financial wellbeing. Good design can make distribution easier, and engagement after sale easier.

Similarly, behavioural interventions during distribution and after-sale engagement can be used to reduce the impact of poor design, but this often has lower efficacy than addressing the problem at source.

Many of the problems we have explored in this book come through poor product design. The simple act of removing the problematic design features can solve the problem. The following are some examples:

1. The ability to give discretionary discounts to mortgagees reduces transparency and can lead to less-sophisticated customers paying higher interest. Common rates across customers advertised up-front would reduce that harm.

2. Savers and borrowers are more attentive to initial rates (e.g. honeymoon rates) than to rates they will ultimately pay. A design with a lower initial rate will tend to lead consumers to underestimate the future costs of borrowing and to overborrow. Fixed flat interest rates can reduce that problem.

3. Balance transfer discounts on credit cards can lead to some customers paying substantial interest when their discount period ends, having either miscalculated the likelihood of clearing their debt in advance, or through simple lapse and failing to take an action such as moving to another card. Replacing balance transfer discounts with a lower flat interest rate through time can reduce that problem.

These remedies are not, however, without cost. There are typically trade-offs between customers (and obviously for the firm itself). For instance, the removal of discretionary mortgage discounts may result in some borrowers paying more, and may even result in less credit availability for high-risk borrowers.

Similarly, balance transfer policies help credit card holders on net. The amount of credit card debt in Australia accruing interest has not increased in the last 15 years despite a more than 50% increase in credit card debt. The distribution of those payments, however, has changed markedly.

## 20.1 Save More Tomorrow

The classic example of successful design of a financial product is Thaler and Benartzi's (2004) Save More Tomorrow Program. Under Save More Tomorrow, customers are asked to commit in advance to allocating a fraction of their future salary increases toward their retirement savings accounts.

Save More Tomorrow is designed to reduce loss aversion as a factor in deciding contribution amounts. A commitment of a proportion of pay rises means that the contribution can increase over time, but pay never decreases. The program capitalises on their propensity to stick with the status quo, as people are unlikely to unwind their future commitments despite being able to opt out at any time. That ability opt out also reduces regret/disappointment aversion.

The first tests of the Save More Tomorrow program resulted in 78 per cent of those offered the plan joining, 80% of those remaining in the plan through the fourth pay rise, and average savings rates increasing from 3.5% to 13.6% over 40 months. (Note the savings rate is higher than the default rate in Australia. Could the default in Australia create a low anchor for some people?)

# 21 Product distribution

The process of product distribution often results in the wrong customers being in the wrong products.

## 21.1 Defaults

Defaults are a powerful distribution feature.

Automatic enrolment of employees into retirement savings plans has been one of the most successful behavioural interventions to shift employee behaviour. Madrian and Shea (2001) examined automatic enrolment in 401(k) plans. They found that participation was materially increased. Among those with 3 to 15 months tenure, the increase due to default enrolment was an increase from around 37% to 86% participation.

In the case of retirement savings in Australia, we have a mandatory default requirement to contribute a portion of our salary. Obviously, it is successful in achieving higher participation in retirement savings.

The Australian superannuation system also has voluntary defaults in the form of the particular superannuation provider (an employer selected default) and the investment options within that provider. The stickiness of those defaults and the high fees (poor outcomes) led to the "MySuper" legislation with default low-fee low-frill accounts. Around two out of three members stick with their fund's default option, so defaulting into the best designed option could deliver substantial benefits (Kingston and Thorp (2019)).

Defaults are also set for death, total permanent disability and income insurance within superannuation. As for default funds, these are sticky. The question then becomes what default is better for customers. Recent government reforms mean that account holders are not defaulted into insurance if they are under 25 or have a balance of less than $6000.

## 21.2 Advice

One major method of financial product distribution is the advice channel. People see an adviser who can recommend products and provide ongoing advice as what steps they should take to meet their financial goals.

Given the psychological factors affecting financial decision making, advice could be seen as a way to enlist an expert less subject to those weaknesses. However, there is considerable evidence that advisors do a poor job for their customers. For instance, Australian Securities and Investments Commission (2012) assessment of advice obtained through a shadow shopping exercise rated 3% of the advice as good quality. In contrast, 86% of participants in the study felt they had received good advice. This matches evidence from around the world.

### 21.2.1 Adviser incentives and competence

The rational explanations for this poor advice primarily rest on the incentive structure experienced by the advisors. For example, Mullainathan et al. (2012) showed that advisers tend to either support the mistaken beliefs of their clients or argue against their correct beliefs whenever it was in the adviser's interests to do so. There is also empirical evidence that consumers largely naive about this conflict.

An alternative explanation for poor advice is that advisors lack competence. Linnainmaa et al. (2021) found that advisers tend to invest in accordance with the advice given to their clients. They trade too frequently, chase past returns, and invest in expensive actively managed funds. The result is that their returns are similar to their clients' net returns.

### 21.2.2 Accepting advice

Many adviser clients follow poor advice or fail to follow good advice. Often base this on trust, but trust can be formed on factors such as credentials and first impressions (including confirming the client's own views) (Agnew et al. (2018)).

Part of the advice task is to create advice that is compatible with the client's psychology. Advice that is sub-optimal but that is followed may be superior to optimal advice that the client does not accept. Determining a framework to manage anxiety and emotional comfort over time can be as important as the initial advice.

As an example, consider the equity premium puzzle and Bernartzi and Thaler's (1995) explanation.

Suppose an investor has a choice between risky stocks, with an expected annual return of 7% and standard deviation of 20%, and a sure return of 1%. The attractiveness of stocks to a loss averse investor will depend on both the time horizon of the investor and the frequency with which they evaluate the returns. If they monitor their portfolio frequently, they will often observe losses from stocks, which they feel with greater force than gains.

Suppose that one loss averse investor examines their portfolio every day. Since on a daily basis stocks go down almost as often as they go up, this investor will experience a lot of pain, making the stocks unattractive. Another loss averse investor only checks in on their portfolio

once a decade. At that horizon, stocks have only a small probability of losing money, so will be much more attractive to someone who is loss averse.

It is a combination of loss aversion and a short evaluation period that will drive an investor to require a large premium for holding the risky option. Benartzi and Thaler call this *myopic loss aversion.*

An adviser that can set up a framework where their client only periodically checks their portfolio may be more likely to have that client adhere to their ongoing advice.

## 21.3 Marketing and advertising

The way in which information is provided through the distribution and sales process can markedly change customer outcomes.

The most salient way in which this occurs is marketing and advertising. As one example, research by Hastings et al. (2017) into the privatised Mexican social security system found that marketing raises demand for financial products, and lowers the price elasticity of demand (low elasticity means price goes up, but demand doesn't go down). This enabled the system to have fees so high that the average fee would reduce a 100 peso deposit to 95 pesos five years later even when the investments earned a 5% annual return.

Similarly, research by Gurun et al. (2016) into the US mortgage market found that lenders sell more expensive mortgages in regions where they advertise more.

Part of the way in which these negative effects occur is that firms make appealing attributes salient, and shroud fee and quality problems. Customers don't seem to infer that what is hidden is bad news. For instance, UK research by Armstrong and Vickers (2012) found that a small cohort of bank customers often suffer repeated "unexpected" overdraft charges. These fees were easily found after a few clicks on the bank's website, but were effectively hidden relative to other features of the accounts.

This leads to an obvious intervention of ensuring advertising covers more than just the positive attributes of a product, possibly enabling a better decision. Are the long-term interest rates advertised with the same salience as the honeymoon rate? However, if a product is poorly designed (e.g. excessive fees), there is no way to fix this through marketing.

## 21.4 Voluntary disclosure

Bertrand and Morse (2011) trialled information disclosure in a field experiment in payday lending stores in the United States. They included one of the following three designs on the loan documentation envelopes.

**Dollar information**

One treatment provided the customer with dollar information on accumulated fees over time, compared with same amount on credit card.

| How much it will cost in fees or interest if you borrow $300 | | | |
|---|---|---|---|
| **PAYDAY LENDER** (assuming fee is $15 per $100 loan) | | **CREDIT CARD** (assuming a 20% APR) | |
| If you repay in: | | If you repay in: | |
| 2 weeks | $45 | 2 weeks | $2.50 |
| 1 month | $90 | 1 month | $5 |
| 2 months | $180 | 2 months | $10 |
| 3 months | $270 | 3 months | $15 |

Customers who received this treatment were 5.9 percentage points less likely to borrow in the pay cycle following the intervention (an 11% decline relative to the control group). They also reduced the amount borrowed if they did return by 23%. The success of this intervention suggests an initial lack of understanding of the power of compounding (financial literacy).

**Comparison of annual percentage rates**

Although regulation already required lenders to provide an annualised percentage rate to customers, this treatment involved comparison of the annualised percentage rate of the payday loan with other financial instruments that the customers are likely familiar with.
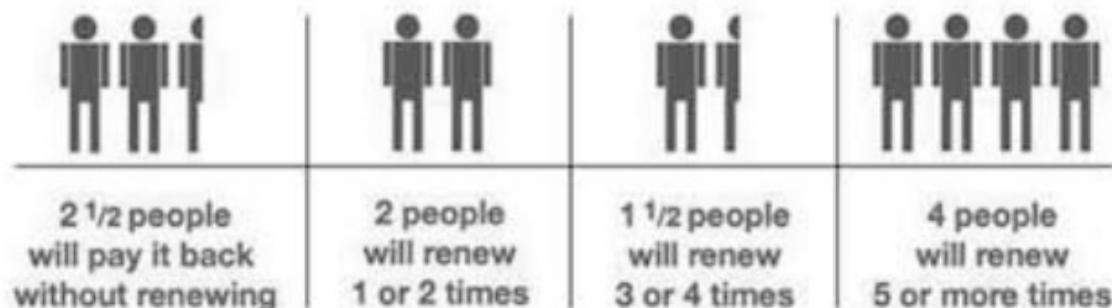
**Annual interest rates on different types of loans**

| | Median Annual Interest % (from government surveys) |
|---|---|
| Payday Loan | 443% |
| Installment Car Loans | 18% |
| Credit Card | 16% |
| Subprime Mortgages | 10% |

Customers who were provided with the annual percentage rate comparisons reduced the amount borrowed for future loans by 16%. (There was no effect on likelihood of taking out a loan.)

**Typical repayment profile**

The third treatment provided information on the typical repayment profile for a customer.

**Out of 10 typical people taking out a new payday loan...**

| 2 ½ people will pay it back without renewing | 2 people will renew 1 or 2 times | 1 ½ people will renew 3 or 4 times | 4 people will renew 5 or more times |
|---|---|---|---|

Customers provided with the typical repayment profile reduced future sums borrowed by 12%. (There was no effect on likelihood of taking out a loan.) This change might be because the information reduced the overoptimism of the borrower as to their future actions and financial situation .

## 21.5 Credit card transparency

Buell and Choi (2019) examined a large nationwide retail bank showed the trade-offs associated with credit cards at the beginning of the sale process. Monthly spending by those who saw the trade-offs was 10% higher, with 20% lower cancellation rates and 10% fewer late payments.



It is not clear exactly how the transparency measure worked, but may be due to both selection effects (people got cards more suited to their needs) or an education effect (they used the card better).

# 22 Post-sales

While post-sales interactions with customers are often an inferior way of addressing poor product design and distribution practices, the long-term nature of many financial products, the ongoing decisions required of customers, and customers' often changing financial positions necessitates that those interactions are well designed.

## 22.1 Text messages and credit card payments

The classic post-sale interaction is a behaviourally designed prompt to trigger an action at a critical time.

As one example, Behavioural Economics Team Australia (2019) partnered with Treasury and Westpac to see if reminders could encourage consumers to pay credit card debt earlier. They sent emails and text messages with various content such as a basic message ("Hello Name, Payment on your Westpac credit card is due next week."), a loss frame ("To avoid paying more interest, think about lowering or even clearing your full debt") or social norm ("Many people choose to pay the full debt on time.")

SMS reminders resulted in an increase in payments of \$134 the following month (a 28 per cent increase). There was no difference between the different types of messages, including the basic message. This suggests the effect of the response was not due to the amelioration of any "bias", but rather by gaining attention.

## 22.2 A text message backfire (at least for the bank)

Alan et al. (2018) reported on a Turkish bank that sent text messages highlighting a discount on overdraft fees. The messages reduced overdraft usage, which suggested that people were not aware that there was a price on overdrafts. The discount was an increase from their reference point.

Conversely, text messages simply mentioning to customers that they had an overdraft available increased usage.

## 22.3 Lemonade

For insurance products, a critical interaction occurs when a consumer makes a claim. Often these claims are fraudulent. For instance, claims for damaged or lost iPhones typically surge just before release of the next model.

The insurance company Lemonade has introduced several features to their claims process to increase honesty. For example, policy holders sign a digital pledge of honesty at the beginning of the claim process, rather than the usual certification after entering the claim. Another measure by Lemonade involves the claimant recording a video of themselves describing the loss. Given the desire people often have to maintain a positive self-image of themselves, this may reduce the amount of blatant cheating.

The used of digital pledges is based on experiments by Dan Ariely and colleagues on honesty. In Mazar et al. (2008), students were induced to reduce cheating by citing honour codes before completing a test. In Shu et al. (2012), drivers gave more accurate mileage information when seeking insurance by signing at the beginning of the form.

Unfortunately (for this approach at least), these experiments have not replicated in large-scale multi-lab replications or additional fieldwork was based, in part, on fraudulent data (Verschuere et al. (2018), Kristal et al. (2020), Anonymous (2021)). It is not clear that this measure has any effect.

# 23 Education

Through this book we have seen substantial evidence that those with higher financial literacy have higher financial wellbeing and better outcomes for many financial decisions.

However, that link in itself does not mean that: - there is a causal relationship between financial literacy and wellbeing - interventions to increase financial literacy will do so - any increase in financial literacy will translate into higher financial wellbeing.

These points are the subject of a substantial debate.

## 23.1 The case against financial education

The case against financial education is laid out by Fernandes et al. (2014) who examined 201 previous studies and found that financial education explained only 0.1% of variation in the financial behaviours studied. Further, the minor effect of the financial education decayed with time, having negligible effects 20 months after the intervention.

Fernandes et al. also found that when they controlled for other psychological traits of consumers (such as propensity to plan, willingness to take financial risks, and numeracy), the effect of financial literacy diminish dramatically. As a result it may be other traits that are driving the observed effects

Finally, they noted that few studies explicitly seek a causal effect, rather than just correlational. Financial literacy effects are far smaller when manipulated rather than measured.

## 23.2 The case for financial education

A more recent paper by Kaiser et al. (2021) pushes back at this interpretation of the evidence.

Their paper had the benefit of more recent studies, with the number of randomised controlled trials that they could draw on having grown from 13 to 76 since Fernandes and colleagues' meta-analysis. Adding that new work increased the effect three to five times (depending on methodology) from that found by Fernandes.

Kaiser et al. were also critical of the use of "variance explained" measure to describe the effect of financial literacy, arguing that it can hide materials effects. Using alternative measures more common in the meta-analysis literature, they find that financial literacy interventions have an average 0.1 standard deviation effect on financial behaviours and 0.2 standard deviation effect on financial knowledge. This is similar to many math and reading interventions (although it should be noted there is a similar debate playing out across the broader education field).

Ultimately, Kaiser et al. argue that it is actually a comparison of the economic costs and benefits that are required. This was seldom done in the papers that they examined, but they did argue that they could be meaningful.

They also suggest that there are not enough long-term studies investigating decay to make any definitive statements about whether it occurs. If we were to draw evidence from the broader education literature, however, we would expect to see large decay.

## 23.3 Just-in-time financial education

One area where there is substantial evidence in favour of financial education involves interventions that are provided "just-in-time". These are interventions designed to affect a decision or behaviour at an important moment. By their nature, they are less subject to decay and do not require the consumer to retrieve and apply financial knowledge from much earlier education.

We have covered one such example with Bertrand and Morse's interventions to decrease payday lending use. By providing simple information at a critical moment, they were able to shift behaviours in the short-term, with potential longer-term benefits.

# 24 Regulation

One direct means of improving financial decision making is through regulatory obligations placed upon financial service providers.

Examples of regulatory interventions include:

- Cooling off periods: This prevents people making purchases made when they were in an emotional state (or enables them to unwind them), and provides an opportunity for reflection and price comparison.
- Restricting the use of certain defaults: As defaults are sticky, legislating the better default may improve outcomes. For example, financial advisers in Australia are now required to periodically renew the client agreement for ongoing fees, a change from the previous default arrangement of ongoing fees.
- Price caps: If competition in a market is for naive, price-insensitive customers, price caps can limit the damage. As noted earlier in this course, payday lending fees in Australia are capped. Price caps can, however, reduce supply if poorly targeted.

Three case studies are provided below.

## 24.1 Deferred sales for add-on insurance

Customer outcomes can often be improved simply by ceasing poor distribution practices. Add-on insurance provides an illustration of this.

Add-on insurance is an insurance product sold to accompany another financial transaction, such as purchase of a motor vehicle or a credit product. The add-on insurance then covers events associated with that other transaction, such as a motor vehicle accident. Consumer credit insurance, which we covered previously in Section 16.5, is typically sold as add-on insurance.

Add-on insurance is not usually offered up-front, but rather only at the completion of the purchase of the associated product. As a result, the customer has typically not prepared for the purchase of insurance, such as researching the market or shopping around. This means customers are often buying the first and only insurance product they see. They are more likely to accept very expensive offers and unlikely to choose the best deal available (as the add-on offer is rarely the best deal). The relativity of the add-on price to the primary product

(e.g. a car) also reduces the attention given to the add-on price. Further, some consumers are confused about whether they are required to purchase the insurance as a condition of buying the product (Iscenko et al. (2014)).

Australia has introduced regulation implementing a deferred sales model for add-on insurance providers. Add-on insurance should not be offered until four days after the sale of the product to which it relates. A deferred model is intended to make the price of the add-on more salient, increase the likelihood of price comparison or shopping around, and enable decision making at a time when they may be experiencing decreased cognitive load. It might also remove any confusion about the insurance being a condition of the purchase.

## 24.2 Mandated disclosure

We have seen in this book that the information provided to customers, whether in the form of marketing, more formal information provision, or advice, can affect customer decision making and financial wellbeing. This opens the door, at least theoretically, for mandated disclosure to improve outcomes.

However, the evidence for the positive effect of mandated disclosure is limited. Disclosure is often found to be inadequate to overcome fundamental problems with products, and can sometimes backfire.

One of the main barriers to disclosure is that complexity is hard to explain simply. If a product is complex, no amount of disclosure can change that. People can hold only a small number of chunks in their mind, and even if the language is plain, they will have that fundamental constraint.

The other barrier is that disclosure is typically implemented by self-interested firms. The idealised implementation wanted by a regulator and actual implementation are often markedly different. For example, find the required warning label on the homepage for Nimble.

Achieving the desired effect with disclosure is also difficult. Below is one example.

### 24.2.1 Superannuation disclosure

Australian superannuation funds are required to provide short product disclosure statements to customers. They are designed to be shorter than historic product disclosure statements and enable people to compare superannuation products across areas such as risk, returns and asset allocation.

Bateman et al. (2016) examined the effect of the standard information in these documents on consumer choice (using Unisuper templates as a foundation). They found that one third of consumers were not affected by the information provided and the risk information was irrelevant to three quarters.

The most influential element of the dashboard was the asset allocation pie chart. Customers preferred options where the assets were allocated evenly across the categories. This finding opens the potential for manipulation of choice by changing the asset categories such that allocations appear more even.

| Description of option/ Type of investor | Invests in a diversified portfolio, comprising mainly growth assets, such as Australian and international shares, property and alternative investments, and with some bonds investments. Designed for investors with a high risk tolerance who are seeking a high level of expected returns. | Description of option/ Type of investor | Invests in a diversified portfolio comprising Australian and international shares that are selected on the basis of sustainable investment criteria (refer to pages 22 to 25 for further details) and in fixed interest and cash assets. Designed for investors with a high risk tolerance who are seeking a high level of expected returns. |
|---|---|---|---|
| Investment return objective* | To achieve returns (after Fund taxes and investment fees) that are at least 3.0% p.a. more than inflation (CPI). | Investment return objective* | To achieve returns (after Fund taxes and investment fees) that are at least 3.0% p.a. more than inflation (CPI). |
| Strategic asset allocation and ranges | Alt. investments: 5% (0% - 17.5%), Property: 9% (0% - 21.5%), Intn'l shares: 20% (7.5% - 32.5%), Aust. shares: 36% (23.5% - 48.5%), Cash & fixed interest: 30% (17.5% - 42.5%), Growth (70%), Defensive (30%) | Strategic asset allocation and ranges | Intn'l shares: 24.5% (12% - 37%), Cash & fixed interest: 30% (17.5% - 42.5%), Aust. shares: 45.5% (33% - 58%), Growth (70%), Defensive (30%) |
| Minimum suggested timeframe for investment | Six years | Minimum suggested timeframe for investment | Six years |
| Expected frequency of negative annual return | Four in twenty years | Expected frequency of negative annual return | Four in twenty years |
| Summary risk level | High | Summary risk level | High |

## 24.2.2 Disclosure of conflicts of interest

Earlier in this book we saw evidence that financial advisers often act in their own interest when giving advice to customers. Customers also appear to be naive as to these effects.

One possible intervention to overcome this conflict is to require disclosure of conflicts. However, there is experimental evidence that this could backfire.

Cain et al. (2005) found in a lab experiment that when conflicts of interest are disclosed, advisers give even more biased advice. This may be due to moral licensing, or a strategic response as the adviser believes they need to be more extreme in their recommendation in anticipation that their advice will be discounted. Consumers also fail to discount the advice due to the conflict as much as they should, even though disclosed. The net result is that disclosure could worsen outcomes.

Sah et al. (2013) showed in another lab experiment that although disclosure can decrease trust in advice, it can create a perverse incentive for the customer to follow the advice. Failure to follow the advice would signal that they don't trust the adviser, creating social pressure to give in to the adviser's interest. Given the nature of this particular effect, disclosure of the conflict by an external party or an opportunity to make the decision to follow advice in private reduced the extent of this unintended consequence.

## 24.2.3 Listen

Sunitah Sah is interviewed on the BETA podcast.

PM&C · BETA podcast: When conflict of interest disclosures backfire

# 25 Personal interventions

Consumers can and do use their own behavioural interventions to overcome their own limitations.

## 25.1 Commitment and self-control

One of the primary ways consumers can do this is through committing themselves to a future course of action. If they have a degree of sophistication and know that they may fall victim to present bias in the future, they can act now to remove that possibility.

A simple way people can do this is by placing their savings into a less liquid investment, such as a term deposit. In one experiment, Beshears et al. (2020) found that when people can invest in two accounts, one liquid and the other with liquidity constraints such as withdrawal penalties, the experimental participants put nearly half of their money in the illiquid account even though it paid the same interest rate. This contrasts with the standard economic prediction that all money should go to the liquid account, which enables all actions plus more than can be done from the illiquid account. Even when the interest rate on the illiquid account was lower, it still attracted around a quarter of the money.

This extract from Table 3 in the paper shows the proportion of funds allocated to each type of "commitment account" when experimental participants were given a choice between an account with no liquidity constraints paying 22% interest and the commitment account.

| Withdrawal restrictions on commitment account prior to commitment date | Commitment account interest rate | | |
|---|---|---|---|
| | 21% | 22% | 23% |
| 10% early withdrawal penalty | 27.6 (2.8) | 38.9 (3.4) | 58.2 (3.4) |
| 20% early withdrawal penalty | – | 44.8 (3.4) | 61.1 (3.4) |
| No early withdrawals | – | 56.0 (4.1) | 59.9 (3.6) |

You can see that where the interest rates between the liquid and illiquid accounts were equal, the accounts with harsher constraints attracted more money. The account with a higher withdrawal penalty (20% compared to 10%) attracted more money, and the account that barred withdrawals attracted even more.

This result suggests a demand among sophisticated, present-based agents for products that will enable them to control their future behaviours.

## 25.2 Mental accounts

Mental accounts can often act as a form of commitment despite the absence of any physical barriers.

One example of mental accounts that we have already come across in Section 13.1.3 is the co-holding of savings and debt to create constraints against even worse outcomes. People often hold both high-cost credit card debt and savings that provide low rates of return (Gathergood and Weber (2014)).

Co-holding the two can be a self-control strategy. A failure to divert the savings to pay off the credit card decreases the amount of unused credit capacity, which may reduce future spending.

Another example of the use of mental accounts working as a control was an intervention designed to help micro-entrepreneurs in the Dominican Republic make financial decisions (Drexler et al. (2014)). They were placed in one of two programs. The first was standard accounting training. The second was a rule-of-thumb training that taught basic financial heuristics. The major heuristic was for them to physically store their their household and business money in separate drawers.

The rule-of-thumb training improved their financial practices and revenues. Among those with lower skills or poorer initial practices, the rule of thumb training had better results than the accounting training. (While being seen as a self control mechanism that can be implemented by someone, this could also be seen as a tick for a non-traditional financial literacy intervention.)

# 26 Exercise: The bonus saver account

Many banks offer a 'bonus saver' account. The major feature of these accounts is the ability to earn "bonus interest" each month if the customer satisfies certain criteria, such as making a deposit each month, withdrawing no savings, growing the balance, or making a minimum number of card transactions.

When these accounts are offered, many account holders do not receive bonus interest each month. They fail to make the required deposits, withdraw funds despite the effective penalty, and do not make the requisite number of transactions. Many customers accumulate no substantive savings or regularly withdraw their accumulated balances.

A range of customer characteristics could be causing those failures, including:

- Lack of attention or mental lapses, leading them to forget to deposit or to make a withdrawal without considering the consequences

- Present bias, whereby withdrawn money has far higher value today that the savings or potential interest

- Regret/disappointment aversion, whereby customers do not deposit (or constrain deposits) as they fear they may regret that later if they have to withdraw

## 26.1 Designing the bonus saver account

What changes to product design could lead to better customer outcomes?

> **i Feedback**
>
> One simple intervention to improve the customer decision would be to remove the requirement for deposit and/or withdrawal. The customer would no longer have an opportunity for failure, and the 'bonus' interest would be paid by default.
> There are some questions we might wish to ask before taking this step:
>
> 1. Do the criteria to receive the bonus interest incentivise the accumulation of savings? Would removal of the criteria have unintended consequences for some customers?
>
> 2. Does this feature enable better pricing? What would be the negative effect on the

interest received for those who normally met the criteria?

3. What are the distributional consequences of the pricing arrangement? What are the characteristics of those who fail to receive bonus interest and those who might receive lower interest if pricing was changed?

Obviously, the bank would likely have other questions. Does the ability to advertise a higher interest rate assist marketing? Is the product viable without the attraction of the bonus rate?

## 26.2 Distributing the bonus saver account

You suggestions to improve product design have not been accepted. What measures could you introduce during the sales process to increase the proportion of customers who appropriately select the product?

## 26.3 Servicing the bonus saver account post-sale

What post-sales measures could you introduce to increase the proportion of customers who receive the bonus interest each month?

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