

Section 4: Intertemporal Choice

Most decisions we make involve elements of time tradeoff. We can expend effort now for rewards later or forgo future rewards for current benefits. Most policy questions are also inter-temporal in nature. Costs and benefits accrued in the present are traded off against costs and benefits accrued later in time. Many of the major decisions we make in life are inter-temporal in nature and policy and business forces interact in these decisions to influence behaviour to alter trade-offs.

Discounted Utility

The basic model of time discounting assumes that people have smooth preferences for the trade-offs they face throughout their life. Exponential discounting implies that people will value something more today than if promised it tomorrow. There is no question that [Paul Samuelson](#) did not intend the discounted utility model to be a descriptive account of how people actually make intertemporal decisions but it is also unquestionable that its wide adoption across a wide array of economic domains led to it becoming the normative model of how people actually choose.

Hyperbolic Discounting

Discounting is a standard concept in standard economics, meaning that the value of a future outcome is reduced as it will not occur for some time, or because there is a less than certain probability of the outcome occurring. This implies that ceteris paribus we have a preference for immediate over distant rewards. Standard models generally assume exponential discounting, a fixed rate of discounting dependent only on the distance in time between the point of decision and the outcome; the farther into the future the reward comes, the more it is discounted. [Laibson \(1997\)](#) put forth an alternative model based on hyperbolic discounting, which demonstrates that preferences can be inconsistent over different time-horizons.

For example, if I ask “Would you prefer €10 today or €11 tomorrow?”, most people prefer the €10 today. If I ask “Would you prefer €10 in one year or €11 in one year and one day?”, most people are willing to wait an extra day for the larger sum. This reversal of preference is indicative of a disproportionately high weight on present value, and an underweighting of future outcomes.

How do people make inter-temporal decisions?

As well as the distinction between discounted and hyperbolic discounting, several other questions emerge about how people make inter-temporal choices. [Frederick et al's](#) excellent 2002 reviews identifies a number of key aspects of how people make intertemporal choices:

- a) Time preferences are not stable. Many economic models assume a constant rate of discount across people and situations. There is very little evidence that this is the case.
- b) People have different discount rates in different domains of activity.
- c) People are more impatient than standard economic models would imply.
- d) People discount the future hyperbolically
- e) People have preferences for ascending sequences of benefits

4.2 Key Concepts in Behavioural Economics

Neuroeconomic models

Recently, a literature has emerged as a collaborative endeavour between economists, psychologists and neuroscientists attempting to examine the neural foundations of choice. One of the most attempts to develop a neuroeconomic model of intertemporal choice comes from [McClure et al \(2004\)](#). They propose that time discounting is a dual-process activity. On the one hand a planning system evaluates short and long-term rewards and calculates the relative costs and benefits. On the other hand a short-run system focuses on benefits immediately available. They associate these two systems with different neural mechanisms and, in a famous study, examined brain activity in the presence and absence of immediate reward. They found that parts of the limbic system of the brain were differentially activated in the presence of immediate rewards whereas brain areas in the frontal and parietal area of the brain were active both in the presence and absence of immediate reward.

Stress, Poverty and Time Discounting

A key recent literature has examined the consequence of stress for time discounting. When stressed people tend to discount the future more heavily. This may itself be a potential self-perpetuating factor in poverty over time. [Shafir](#) and colleagues have argued for a model of framing whereby poverty makes short-run benefits more salient.

Readings

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