EC9011
Microeconomics
Topic 2:
Behavioral Economics

Dr. Michela Redoano

WARWICK
THE UNIVERSITY OF WARWICK

Email: Michela.Redoano@warwick.ac.uk
Webpage: https://warwick.ac.uk/go/mredoano/

2.0 Plan

WARWICK
THE UNIVERSITY OF WARWICK

Introduction (Block 2.1 🎤)

Basics of Behavioural Economics: (Block 2.2🎤)

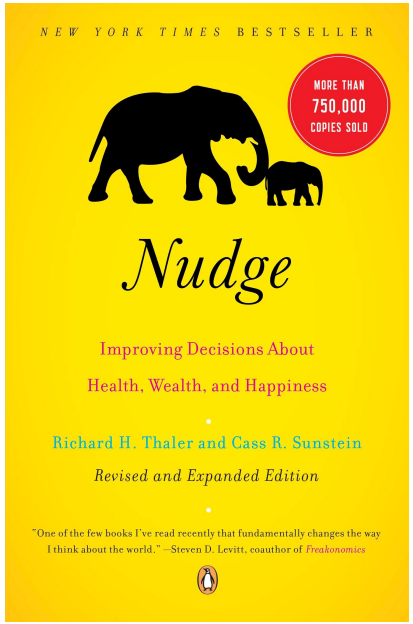
- **Status quo bias**
- **Reference-Dependent Preferences (Endowment effects and loss aversion)**
- **Framing**
- **Mental Accounting**
- **Optimism Bias**
- **Non-exponential Discounting**

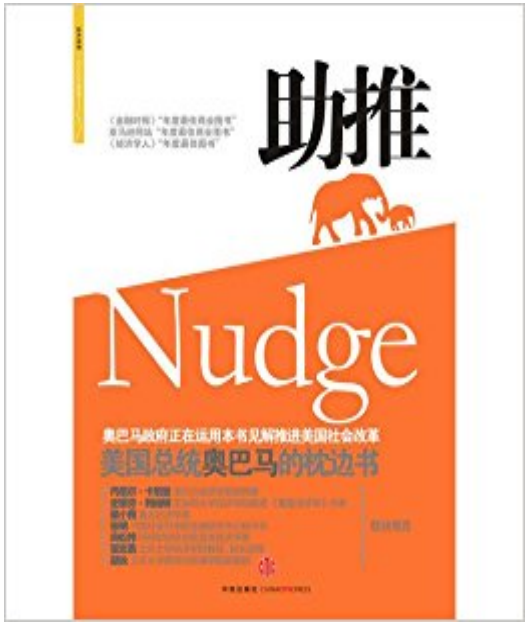
Intertemporal Choice and Self-Control (Block 2.3🎤)

Reference-Dependent Preferences (Block 2.4🎤)

2.1 Introduction

Richard Thaler - 2017 Nobel Prize in Economics





Bl. 2.1

2.1 Introduction

WARWICK
THE UNIVERSITY OF WARWICK

What to read

- **Choices, Values and Frames (ed. Kahneman and Tversky), KT : key readings in the area, with chapter 1 especially useful**
- **Advances in Behavioral Economics (ed Camerer, Loewenstein and Rabin), CLR: more key readings, with more of an economics focus**
- **Camerer, Lowenstein and Prelec (2005), Journal of Economic Literature, CLP : very interesting and accessible survey of neuroeconomics, including the experimental psychology view of human decision-making**
- **Nudge (by Thaler and Sunstein), “popular” intro to behavioral economics and its implications for the design of public policy**

2.1 Introduction

- Modern consumer theory:
  - economic agents act as if they have a utility function over alternatives in the choice set (defined up to an increasing transformation)
  - assumes that "feelings" i.e. preferences can be inferred only from observed choices,
  - no interest in the mental processes that generate preference and choice
  - Also, assumes that decision-maker has unlimited "computing power"
  - A powerful and useful tool: allows mathematical analysis of consumer choice, thus generating precise predictions

- But, an increasing body of experimental evidence about simple economic choices is inconsistent with some basic properties of utility functions

- This experimental evidence, plus new theories to explain it = behavioural economics

2.2.1 Status Quo Bias

Status quo bias - effect that people are biased in favor of choosing the status quo in decision problems

WARWICK
THE UNIVERSITY OF WARWICK

Example : two systems for organ donation in Europe

- Explicit consent (e.g. UK, Germany)
- Presumed consent (France, Belgium)

Often easy to register consent in explicit consent systems:

– E.g. UK: "If you've not signed up to the NHS Organ Donor Register, you can do so on this website or by calling the NHS Organ Donor Line: 0845 60 60 400. Lines open: 24 hours, 365 days a year."

Nevertheless, huge differences in effective consent rates (UK, 17%, whereas 7 European countries with presumed consent have rates between 85.9% and 100%, Johnson and Goldstein, cited in Nudge)

Status quo bias very widespread - see other examples in Nudge

2.2.2 Endowment Effects and Loss Aversion

WARWICK
THE UNIVERSITY OF WARWICK

- Endowment effect: preferences over objects are changed when endowments change
- Specifically, many experiments show that subjects' valuations of objects are higher after they have been given them than before
- Implies loss-aversion; subjects are willing to pay more to avoid losing an object than they are willing to pay to gain it
- A particular form of status quo bias
- Implies change to the "standard" utility function: objects of utility are now gains and losses

Bl. 2.2 🎤

2.2.2 Endowment Effects

WARWICK
THE UNIVERSITY OF WARWICK

The Coffee Mug and Chocolate Bar Experiment (KT, chapter 9)

	Proportion favoring (%)		Number of students
Group	Mug over bar	Bar over mug	
1. No initial endowment	56	44	76
2. Given bar, could exchange for mug	10	90	87
3. Given mug, could exchange for bar	89	11	55

Bl. 2.2 🎤

2.2.2 Endowment Effects

The Coffee Mug and Chocolate Bar Experiment

Kahneman, Knetch and Thaler (1989), ch 2 of CLR

- 44 students, half given coffee mugs worth $6.00, others given tokens of equal value which could be used to buy a mug or cashed for $6.
- Every student with a coffee mug asked what price he would be willing to sell it for, and every other student asked what price he would be willing to buy one for (from discrete set)
- Four repetitions; in each one, demand/supply curves calculated, and market clearing price announced
- In last repetition, trades actually executed.
- Students not told which repetition would be "real": random selection
- Experimental design allows for subjects to gain experience, should lower transactions costs

2.2.2 Endowment Effects

The Coffee Mug and Chocolate Bar Experiment

Given random assignment of coffee mugs, we would expect:

– 11 trades on average, as 22 potential sellers and 22 potential buyers of mugs, and mugs assigned at random

– median buyer and seller reservation prices to be equal

But this is what happened

trial	trades	Market clearing price	Median buyer reservation price	Median seller reservation price
1	4	4.25	2.75	5.25
2	1	4.75	2.25	5.25
3	2	4.50	2.25	5.25
4	2	4.25	2.25	5.25

Bl. 2.2 🎤

2.2.2 Endowment Effects

Evidence from Outside the Lab

- **Stock market:** LA predicts that investors will hold onto stocks that have lost value (relative to their purchase price) too long and will be eager to sell stocks that have risen in value

  – Odean, KT, Chapter 21, finds that a large sample of individual investors held losing stocks a median of 124 days, compared with winners for only 104 days (moreover, no evidence of subsequent mean-reversion in the stocks)

- **Housing market**: "The support for ...loss aversion in the Boston condominium market is quite striking. Sellers whose expected selling price falls below their original purchase price set an asking price that exceeds the asking price of other sellers by between 25 and 35 percent of the percentage difference between the two." (Genesove and Mayer, Chapter 24, CLR)

Bl. 2.2 🎤

2.2.2 Endowment Effects

Evidence from Outside the Lab

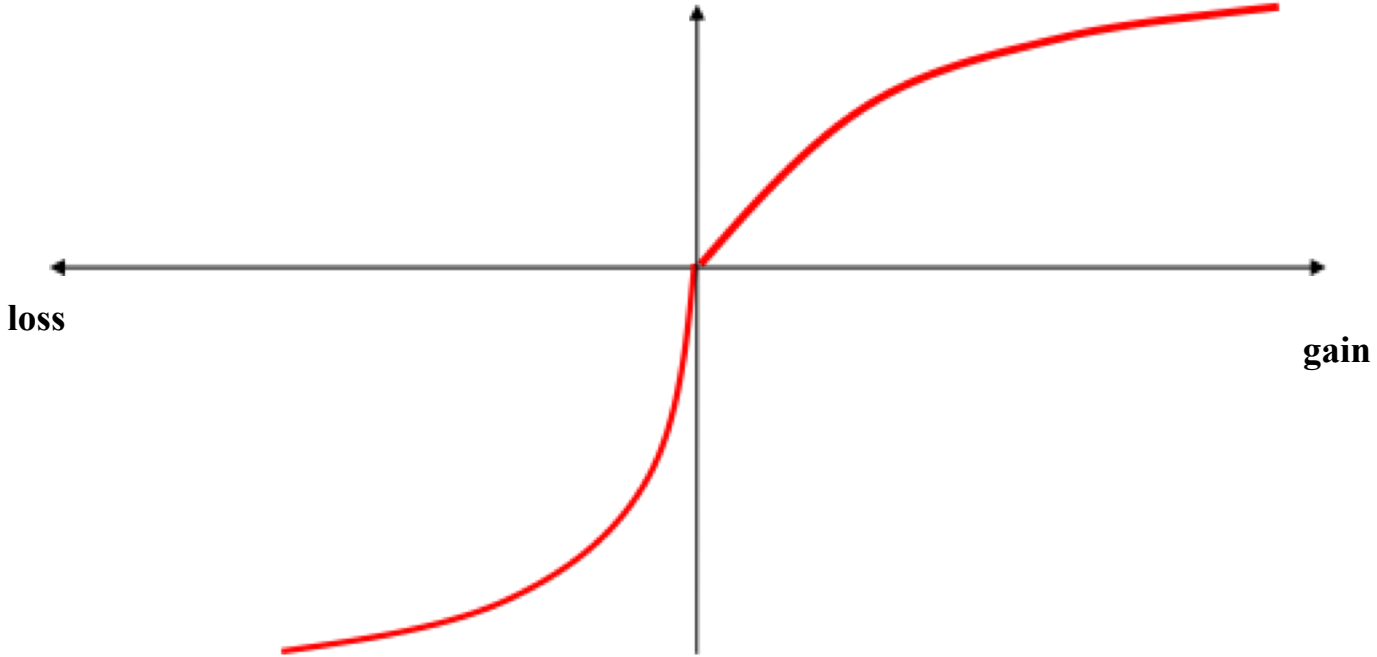
- Labour Market: LA implies that workers are much less willing to take nominal wage cuts than to give up nominal wage increases.
- – Consistent with microdata that suggests downward nominal wage rigidity at the individual level (e.g. S.Kahn, American Economic Review, 87, 993-1008)
- – Distribution of hourly wage changes has spike at zero and is asymmetric around zero
- • Product markets: LA implies that demand will respond more to price increases than price decreases. Some evidence that this occurs for some categories of consumer goods (CLR, chapter 5).

Bl. 2.2

2.2.2 Endowment Effects

The Value Function

“many sensory and perceptual dimensions share the property that the psychological response is a concave function of the magnitude of physical change” (KT, Chapter 2)



Bl. 2.2 🎤

2.2.3 Framing

Choices are affected by the way the choice is “framed”, i.e. described to the decision-maker, contrary to the predictions of standard consumer theory

Framing works in several ways:

- by suggesting to the decision-maker what the status quo is – saves time/effort for the decision-maker

- By drawing attention to either losses of gains from particular decisions

Framing effects important in many “real world” situations

Bl. 2.2 🎤

2.2.3 Framing

WARWICK
THE UNIVERSITY OF WARWICK

Example: house insulation reduces electricity bills by £200 per year.

Two advertising campaigns:

- **Campaign A: "If you insulate, you will save £200 per year"**
- **Campaign B: "if you do not insulate, you will lose £200 per year"**

B type campaigns have been shown to be much more effective, because people are much more sensitive to losses relative to the status quo than gains (Nudge, p36)

2.2.4 Mental Accounting

WARWICK
THE UNIVERSITY OF WARWICK

KT (1981): " A ..frame which specifies (i) the set of .. outcomes that are evaluated jointly and the manner in which they are combined and (ii) a reference outcome that is considered useful or normal"

Thaler, Chapter 3, CLR: " mental accounting is a description of the ways (people) keep track of where their money is going, and to keep spending under control".

2.2.4 Mental Accounting

WARWICK
THE UNIVERSITY OF WARWICK

Example from KT(1981):

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

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

Explanation: in the first case, cost of seeing the play in the "theatre/entertainment mental account" is $10, whereas in the second case, it is $20.

Note: in second case, there is a significant "sunk-cost" effect, not found in standard consumer theory.

Bl. 2.2

2.2.4 Mental Accounting

WARWICK
THE UNIVERSITY OF WARWICK

Thaler argues that mental accounting is important in practice (CLR, Chapter 3). For example:

- **It can explain sunk-cost effects, unlike standard consumer theory**

- **It can explain how people save e.g. in designated accounts (children's education, holidays, etc) in contrast to standard consumer theory, where all forms of saving are fungible**

- **It can explain the failure of the standard life- cycle/permanent income savings model to explain observed consumption behavior i.e. people do not consume some fraction of permanent income in every period, but consumption is more sensitive to current income (CLR, chapter 14)**

2.2.5 Optimism Bias

Optimism bias - the systematic tendency for people to be over- optimistic about their abilities, outcome of planned actions etc, both absolutely and relative to others

- **KT, Chapter 23: "when assessing their position in a distribution of peers on almost any positive trait such as driving ability or income prospects, 90% of people say that they are in the top half".**

- **Armor and Taylor (in Gilovich and Thomas (2002) Heuristics and Biases: The Psychology of Intuitive Judgment, CUP) review a number of studies :**
  - ***Second-year MBA students overestimated the number of job offers they would receive and their starting salary.***
  - ***Students overestimated the scores they would achieve on exams.***
  - ***Almost all newlyweds in a US study expected their marriage to last a lifetime, even while aware of the divorce statistics.***
  - ***Professional financial analysts consistently overestimated corporate earnings.***
  - ***Most smokers believe they are less at risk of developing smoking- related diseases than others who smoke.***

Bl. 2.2 🎤

2.2.6 Exponential Discounting

The discounted utility model (Samuelson(1937)), assumes a constant rate of discount of future utility streams i.e. if consumption at *t* is c_t, utility is:

$$u(c_1) + \delta u(c_2) + \delta^2 u(c_3) + ..$$

$\delta = 1/(1+\rho)$ is the discount factor and ρ the rate of time preference

But, experimental studies have found that the discount factor between successive periods is not constant (exponential discounting), but increasing over time (hyperbolic discounting); see chapter 6 in CLR

For example, the "β-δ model" is much studied: £1 this period is worth £$\beta\delta$ next period, £$\beta\delta^2$ in two periods, etc , $0 < \beta,\delta < 1$

$$u(c_1) + \beta\,[\delta u(c_2) + \delta^2 u(c_3) + ..]$$

- everything in the future discounted by β: "present bias"
- "within" the future, payoffs additionally discounted by δ
- Ordinary exponential discounting the special case where β =1

Bl. 2.2

2.2.7 Conclusion

- **“Behavioral models will gradually replace simplified models based on stricter rationality as the behavioral models prove to be tractable and useful in explaining anomalies and making surprising predictions” (CLR, chapter 1)**

- **We believe that in the long run a model radical departure from current theory will become necessary, in the sense that the basic building blocks will not just consist of preferences, constrained optimization and (market and game- theoretic) equilibrium”. (CLP, Section 6.2)**

Bl. 2.2 🎤

2.3.1 Intertemporal Choice and Self-Control Problems

- **Different “Selves” and Naive vs. Sophisticated Expectations**

- **The Diet Example**

- **Analysis of the Life-Cycle Consumption Savings Model with Hyperbolic discounting**

2.3.1 Intertemporal Choice and Self-Control Problems

With hyperbolic discounting i.e. $\beta<1$, and decisions at t=1,..T helpful to think of T different decision-makers, or "selves"

Period:	1	2	3
Value of 1$ for period 1 "self"	1	β	β
Value of 1$ for period 2 "self"	n.a.	1	β

Example:
$\delta=1$, $\beta<1$

Note period 1 self and period 2 self have different MRS between consumption in periods 2 and 3 : period 1 self has MRS=1, period 2 self has MRS=1/ β

•Implication: period 1 self prefers to postpone costly actions to period 2, as $\beta<1$ •But then period 2 self prefers to postpone costly actions to period 3, as $\beta<1$

• Implies that costly actions which benefit period 1 self may never be made!

2.3.1 Intertemporal Choice and Self-Control Problems

Naive vs. Sophisticated Expectations

- With hyperbolic discounting i.e. $\beta<1$, and decisions at $t=1,..T$ helpful to think of T different decision-makers, or "selves"

- So, we must specify how current self predicts behaviour of future self

- Naïve expectations: the t-self believes that future selves at $\tau>t$ will have the same preferences as himself

- Sophisticated expectations : the t-self understands that future selves at $\tau>t$ will also have "present bias" i.e. τ -self will discount payoffs by β at $\tau+1$, $\tau+2$ etc relative to τ.

2.3.1 Intertemporal Choice and Self-Control Problems

Self-Control Problems: An Example

- Linda is going on holiday in two months, and wants to lose weight by the time she leaves
- Decision problem: she can diet in month 1 or 2, at a current cost of c
- If she diets, she will get a benefit b when on holiday i.e. in month 3, with $b>c>0.5b$
- Baseline case: with exponential preferences and $\delta=1$, Linda will diet as $b>c$, but is indifferent about doing it in period 1 or 2
- Now assume she has hyperbolic preferences with $\beta=0.5$, $\delta=1$
- To predict behaviour, think of different "selves" in months 1 and 2

2.3.1 Intertemporal Choice and Self-Control Problems

Self-Control Problems: An Example

Payoffs/actions	Diet in month 1	Diet in month 1
month 1 self	0.5b-c<0	0.5(b-c) > 0
month 2 self	n.a.	0.5b-c < 0

Conflict here

- **Naive expectations**: period 1 self will not diet as 0.5b-c<0, but anticipates (wrongly) that month 2 self will go on a diet, as 0.5(b-c)>0
- **Sophisticated expectations**: month 1 self will not diet, even though it anticipates (correctly) that period 2 self will not go on a diet

Note: a conflict between month 1 self and month 2 self:

- month 1 self wants month 2 self to diet, but month 2 self does not want to
- furthermore, month 1 self is aware of this conflict in sophisticated case

- Outcome in both cases: Linda does not diet in time for the holiday!

2.3.2 Hyperbolic Discounting and Self-Control

- In the sophisticated case, there is a conflict between current and future selves that can be resolved via external precommitment
- Current self can take (possibly costly) actions that change the incentives for future selves
  - E.g. in the case of the diet example, joining Weightwatchers in month 1 to reduce the cost of dieting in month 2 to some c* below 0.5b, ensuring that period 2 self diets
  - Suppose joining Weightwatchers in month 1 costs K.

2.3.2 Hyperbolic Discounting and Self-Control

WARWICK
THE UNIVERSITY OF WARWICK

- Period 1 self will only join iff $K<0.5(b-c^*)$

- Then, outcome is that period 1 self joins and period 2 self diets

- "Pareto-improvement": payoffs to different selves are $(-K+0.5(b-c^*), 0.5b-c^*, b)$ rather than $(0,0,0)$

- Contrast to the exponential case $\beta=1$: there, diet iff $b>c$, no role
- for pre-commitment

- General point: non-exponential discounting implies a role for pre-commitment mechanisms

Bl. 2.3

2.3.2 Self-Control and Savings

- Savings is a self-control problem: hyperbolic discounters will “spend today, save tomorrow”

- State pensions and occupational savings schemes can thus be desirable because they enforce a minimum rate of savings
  - E.g. USS scheme for university staff has an enforced savings rate of 20% (employer 14%, employee 6.35%).

- Tax relief on personal pension contributions (as used in the UK) can also be justified

- Also, “self-precommitment” via illiquid investments can be explained

- All these measures much harder to justify in the standard life-cycle savings model with exponential discounters

2.4 Reference-Dependent Utility

- KT, Chapter 7 first proposed this alternative to standard consumer theory. Later extended by Koszegi and Rabin, QJE, 2006, 51, 1133-1165, to allow for endogenous reference points.
- Let u(x,r) be the utility from consumption bundle x=(x1,..xn) given reference bundle r=(r1,..rn).
- Assume that for any fixed r, u(.,r) satisfies all the axioms of standard consumer theory (i.e. A1-A5 above).
- Standard consumer theory is a special case when u(.,r) is independent of r. Two-good example (from Koszegi and Rabin, QJE)

$$u(x,r) = x_1 + x_2 + v(x_1 - r_1) + v(x_2 - r_2)$$

$$v(x_i - r_i) \begin{cases} \alpha(x_i - r_i) & , x_i > r_i \\ \lambda\alpha(x_i - r_i) & , x_i < r_i \end{cases}$$

$\alpha > 0 \quad \lambda > 1$

It matters where r comes from : two alternatives, rational and adaptive expectations

This utility function is designed to capture loss aversion (the v part is a linear approximation to KT gain-loss function).

Bl. 2.4

2.4 Reference-Dependent Utility

Endogenous Reference Points with Rational Expectations

- Key paper: Koszegi and Rabin, QJE, 2006, 51, 1133-1165
- As before, let u(x,r) be the utility from consumption bundle x given reference bundle r
- So far, we have taken r as given. Now, we endogenise it
  Say that x* is a personal equilibrium if (i) x=x* maximises u(x,r) subject to the
- budget constraint p.x=m; (ii) r=x*
- A personal equilibrium has rational expectations about the reference point: the reference point is equal to the actual consumption bundle that the consumer expects to buy i.e. r=x*
- If u(x,r) exhibits loss aversion, for some prices, there can be multiple personal equilibria

2.5 Reference-Dependent Utility

Example: Shopping for Shoes

Good 1 - shoes, good 2- a numeraire good (price =1)

$X_1 \in \{0,1\}$, $\quad px_1 + x_2 = m$

$u(x,r) = x_1 + x_2 + v(x_1 - r_1) + v(x_2 - r_2)$

where as before

$$v(x_i - r_i) \begin{cases} \alpha(x_i - r_i) & , x_i > r_i \\ \lambda\alpha(x_i - r_i) & , x_i < r_i \end{cases}$$

Bl. 2.4

2.4 Reference-Dependent Utility

Example: Shopping for Shoes

A personal equilibrium (PE) with no purchase of shoes.

Let $x_N = x_R = (0,m)$, $x_B = x_R = (1, m-p)$

Note that $u(x_N, r_N) = m + v(0-0) + v(m-m) = m$

$u(x_B, r_N) = 1 + m - p + v(1-0) + v(m-p-m)$

$= 1 + m - p + \alpha(1) + \lambda\alpha(-p)$

$= m + 1 + \alpha - p(1 + \lambda\alpha)$

So, for a PE with no purchase, we require simply that

$u(x_N, r_N) \geq u(x_B, r_N) \Longrightarrow m \geq m + 1 + \alpha - p(1 + \lambda\alpha) \Longrightarrow p \geq (1+\alpha)/(1+\lambda\alpha) \equiv p_{min}$

Bl. 2.4

2.4 Reference-Dependent Utility

Example: Shopping for Shoes

A personal equilibrium (PE) with purchase of shoes.

Let $x_N = x_R = (0,m)$, $x_B = x_R = (1, m-p)$

Note that $u(x_B, r_B) = 1 + m - p + v(1-1) + v(m-p-(m-p)) = 1+m-p$

$u(x_N, r_B) = m + v(0-1) + v(m-(m-p))$

$= m - p + \alpha(p) - \lambda\alpha(1))$

$= m - \lambda\alpha + \alpha p$

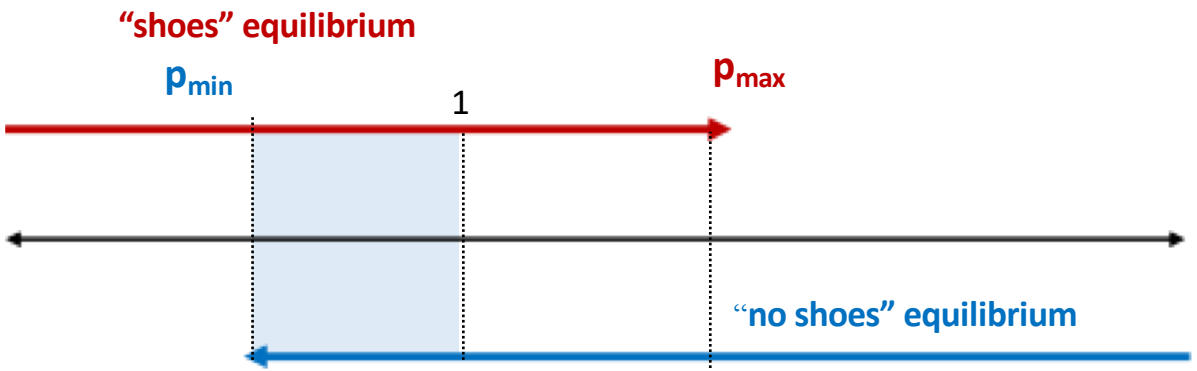
So, for a PE with purchase, we require simply that

$u(x_B, r_B) \geq u(x_N, r_B) \Longrightarrow 1+m-p \geq m - \lambda\alpha + \alpha p \Longrightarrow p \leq (1+\lambda\alpha)/(1+\alpha) \equiv p_{max}$

Bl. 2.4

2.4 Reference-Dependent Utility

Multiple Equilibria



So, for $p_{min} \leq p \leq p_{max}$, there can be multiple equilibria.

- If the household expects to buy shoes, not buying them induces a relatively large loss of utility from lower than expected consumption of shoes. Thus, the price has to be quite high i.e. above pmax to put the household off buying.

- If the household expects not to buy shoes, buying them induces a relatively large loss of utility from lower than expected consumption of the numeraire. Thus, the price can be quite low i.e. above pmin and the household will still not buy.

Bl. 2.4

END OF TOPIC 2

Are Your Ready for the mini QUIZ 2?

Do some practice questions here

Once you feel confident go to Moodle

Available 1-5 pm on Tuesday Week 5.
QUIZ 2 Counts for 1 % of your overall mark on EC901
You have 30 minutes to complete the test once you start, so you should start by 4:30 pm!