Neurofinance & behavioural finance

Dr Stephen Kinsella/stephen.kinsella@ul.ie/stephenkinsella.net
(With slides from Dr. Liam Delaney, UCD)

LAST TIME.
Behavioural Finance Basics
EMH/AMH/E(U) Theory, Prospect Theory
Anomalies: (Winner’s Curse, Loss & Risk Aversion, Jan. Effect)

NOW.
Neurofinance & Policy-driven behavioural economics
WHAT I WANT YOU TO LEARN TODAY

1. Overview of Neuroeconomics & Neurofinance
2. Myopic Loss Aversion/Hyperbolic Discounting
3. Policy and Neurofinance/Criticisms

“Neuroeconomics is an emerging transdisciplinary field that uses neuroscientific measurement techniques to identify the neural substrates associated with economic decisions” (Zak, 2004, p.1737)

NEUROECONOMICS

Combination of Psychology, Economics and Neuroscience
Decisions under certainty and uncertainty: Game Theory using formal economic tasks
Neuroscientific Imaging Techniques
NEUROFINANCE

Neuroeconomics: Focused on Finance
Focused on how people make risky decisions by focusing on the workings of the brain
Implications for Financial Markets

Brief Anatomy of the Brain

Neurons
Synapses
Lobes
  Frontal
  Temporal
  Occipital
  Posterior
Subcortical Structures

IMAGING TECHNIQUES

- Electroencephalogram (EEG)
  - Record Electrical Activity on the Scalp
  - Excellent Temporal Resolution
- Functional Magnetic Resonance Imaging
  - Measures blood flow
  - Excellent Spatial Resolution
- Transcranial Magnetic Stimulation
- Positron Emission Topography
- Also lesion studies
3. RATIONALITY AND FINANCIAL BEHAVIOUR

- Axioms of Choice Under Certainty
- Axioms of Choice Under Uncertainty
- Contradictions with Experimental Evidence
- Money Burning
- Physiological Basis for these Contradictions

ULTIMATUM GAME

- Simple Game usually with two players
- Two People Decide how to split a sum of money
- The first person proposes an amount
- The second person can accept or reject
- If accept then they split the money as player one has proposed
- If reject then both get nothing
- Dictator game removes the second step
- Let's play!!

EMOTIONS AND FINANCE

- Elster in several papers indicts economics and finance for excluding emotion
- Emotional Processing in the Limbic System particularly important for understanding emotion
- Emotion alters risk processing and time trade-offs
PETerson 2005 – Neuroscience of Investing

- Neurons that Carry Rewards from Motivation Centres to Cognitive Centre
- Dopamine System
  - Base Part of the Brain
  - Limbic System
  - Frontal “Executive” Areas
  - “Pleasure Chemicals”

Neuroscience of Investment

- Activation of Emotional Reward Systems in the presence of prospective rewards
- Can be activated by “non-standard” features
- Investors Who Cannot Get Enough
- Investors Who are too timid

Loss Aversion

- Fundamental to Behavioural Finance
- Kahneman and Tversky Prospect Theory
- Sapra and Zak (2008)
- Equity Premium Puzzle
- Gneezy and Potter (1997)
  - Lengthening the time horizon leads people to make “riskier” decisions
Zak (2004) states that one of the major behavioural differences that exists between humans and other animals is the ability to postpone immediate gratification for a future (possibly larger) reward.

SMALLER SOONER  V  LARGER LATER
EXPONENTIAL V HYPERBOLIC DISCOUNTING

Exponential Discounting:
Exponential discounting implies that a constant preference between rewards should exist over time.

Hyperbolic Discounting:
Studies show that a clear tendency to discount expected outcomes proportionate to their delays exists and often there is a preference reversal between the immediate and the delayed reward in the period of time just before the reward is due.

EXAMPLE: DISCOUNTING

From McClure et al. (2004):
A person offered the choice between $10 today and $11 tomorrow may be tempted to choose the immediate option of $10 today.

However, a person offered the choice between $10 in a year and $11 in a year and a day may prefer the slightly delayed but larger amount.

What causes this inconsistent choice behaviour?

Immediate Rewards ($\beta$ areas):
- Ventral striatum
- Medial orbitofrontal cortex
- Medial prefrontal cortex
All Intertemporal Choices (σ areas):
• Lateral prefrontal (and associated parietal) areas
• Visual cortex
• Motor areas

POLICY IMPLICATIONS
• Agreement on a new model of human nature
• Communication to Financial Markets
• Training and Testing of Traders
• “Nudge”
• Libertarian Paternalism

THALER AND SUNSTEIN – LIBERTARIAN PATERNALISM
• Libertarian Paternalism
• Nudge Nudge
• A political philosophy that argues that psychology can influence public policy without coercion
• “Libertarian Paternalism” is an oxymoron
• Vigorous Debate underway about the nature and scope of these ideas
POLICY PROGRESS SO FAR

- Most effort has been placed on interventions aimed to simplify savings mechanisms, reduce procrastination or apply “nudges”
- Less work on integrating economics of identity, more complex theories of emotion and more psychological theories of intertemporal choice

SOME RELEVANT PUBLIC POLICY PROBLEMS

- Savings too low to fund retirement all around the world
- Obesity rates likely to lead to chronic illness levels that will place high health burdens
- Consumption patterns arguable unsustainable and inefficient
- Psychological health arguably being undermined by rapid social change

EXAMPLE – SAVE MORE TOMORROW

- Thaler and Benartzi (2004)
- Public Policy Issue: All industrialised countries are aging and savings rates are too low to provide for expected standards of living
- Psychological Insight: Individuals discount the future hyperbolically, procrastinate and so on
- Solution: Pension mechanisms with payments made from future pay increases
OTHER CURRENT EXAMPLES

- Opt-Out Mechanisms for Organ Donation
- Stick.com – Online Commitment Devices
- Financial Simplification Mechanisms
- Drug Compliance Regimes
- Cognitive Behavioural Therapy Roll Out in the United Kingdom

BEHAVIOURAL ECONOMICS AND POLITICS

- Barack Obama
  - Reports that his campaign strategy were influenced by Behavioural Economics
  - Advised by Chicago Economists who lead in behavioural economics

CRITICISMS

- Student Samples
- Small Samples
- Potential for Dual-Use
- Not Needed – The Mindless Critique
- The New Phrenology?
• Friday: Are you sure this is the woman you saw in the post office?

• Burns: Absolutely! Who could forget such a monstrous visage? She has the sloping brow and cranial bumpage of the career criminal.

• Smithers: Uh, Sir? Phrenology was dismissed as quackery 160 years ago.

• Burns: Of course you’d say that...you have the brainpan of a stagecoach tilter!

READINGS ON BLOG
Camerer (2005), Zak (2008)
NEXT TIME: LAST LECTURE!