Behavioral Development Economics

RSF Summer Camp

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Based on Handbook Chapter with Michael Kremer (Chicago) and Gautam Rao (Harvard)

This lecture: behavioral development economics

- Brief overview and history of behavioral development economics
- Euler equation puzzle
- Health
- Firms
- Technology adoption/learning

Historical perspective

- **Historical views of development:** People were thought to be very different before and after the advent of "modernity". e.g.
  - Pre-capitalist vs. capitalist (Marx)
  - Tradition vs. rationalism (Weber and Durkheim)
  - Modernization theory: viewed modernization as a process of radical social change but also change in ways of thinking and seeing the world

- **The rise of development economics:** Development economics emerges as a critical response to this view:
  - Sees farmers as essentially rational capitalists (but maybe facing market failures)
  - Rejects seemingly unfalsifiable cultural explanations (e.g. "Hindu rate of growth")

The rise of behavioral development economics (cont'd)

- The dominant view in development economics up to about the 1990s is that the poor are "poor but efficient" (Schultz, 1964)

- However, this view started to change during the past two decades:
  - With rise of behavioral economics, a more psychologically realistic view of human behavior has entered development economics
  - Systematic deviations from standard models in preferences, beliefs and decision-making

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- However, this view started to change during the past two decades:
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  - Systematic deviations from standard models in preferences, beliefs and decision-making
  - So far, relies mostly on "universal" insights from psychology about human behavior
  - Increasing attention to differences in psychology across cultures or rich and poor
  - Interaction of behavioral biases with institutions & markets specific to developing economies.

Caveats and critiques of behavioral development economics

Behavioral development economics...

(1) Attempts to augment and improve, and not supplant, existing models.

(2) Does not deny the importance of institutions for development

(3) Sometimes critiqued for dismissing real incentives and constraints that apparently "irrational" actions reflect (e.g. Rosenzweig and Udry 2014). The best research overcomes this challenge by testing specific behavioral mechanisms rather than simply identifying an apparent failure of the standard model.

Caveats and critiques of behavioral development economics (cont'd)

Behavioral development economics...

(4) Does not "blame the poor" for their poverty since it is (i) typically concerned with universal psychological factors and (ii) does not stipulate that behavioral biases are blameworthy.

(5) Critique that behavioral econ proposes paternalistic policies that restrict individual choices. There might be some truth to this critique. But weigh this against bad policy outcomes that can result from misunderstanding human behavior.

(6) Occasionally rejects robust lab-experimental results which are found to be less important in the real world (e.g. Cohen and Dupas 2010; Ashraf et al. 2010)

What makes behavioral development particularly exciting?

- Combines best features of several fields:
  (1) Development economics: experimental approach to tackling high-stakes, policy-relevant questions in field settings
  (2) Experimental economics: careful procedures and methods in carefully controlled lab settings; focus on mechanisms
  (3) Psychology and other fields: novel ideas and concepts; new models to test

- Lots of space for creativity and novel ideas or insights!

Topics covered (organized by behavioral concepts)

- **Non-standard preferences**
  - Time preferences (present focus)
  - Risk preferences (loss aversion, reference dependence, narrow bracketing)
  - Social preferences
- **Non-standard beliefs**
  - Naivete, projection bias
  - Non-Bayesian learning, redundancy neglect
  - Motivated reasoning
- **Non-standard decision-making**
  - Limited attention and memory
  - Mental accounting
  - Default effects

Topics covered (organized by development economics)

(1) Introduction
(2) **High rates of return without rapid growth (Euler equation puzzle)**
(3) Health
(4) Savings
(5) Risk and insurance
(6) Technology adoption
(7) Labor
(8) Behavioral firms
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High returns to capital in many contexts (Banerjee and Duflo, 2005)

- Borrowing at very high rates (70 to 100% annual rates and more)
  - Small-time fruit vendors in Chennai who borrow at daily rates of 5%
    $\rightarrow$ >50,000,000% annual interest! (Karlan, Mullainathan and Roth, 2018)
- High returns to small-business grants (de Mel et al., 2008)
  - 55 to 63% (real) annual rate of return to capital
- High returns to inventories (Kremer, Lee, Robinson, Rostapshova, 2013)
- Predictable large increases in prices between seasons (Burke et al., 2018)

Euler equation: high rates of return in the absence of consumption growth

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- Implies (unrealistically) high consumption growth rates. Why?

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    - Implies consumption growth rate of $\frac{\dot{c}}{c} = 44\%$.
  - Suppose instead constant intertemporal elasticity of substitution utility with $\sigma = 2$.
    - This yields $\frac{\dot{c}}{c} = 20\%$.
    - Still implies 38-fold consumption growth in 20 years.
- How can we resolve this puzzle?

How can we resolve this puzzle? Potential neoclassical approaches

$$u'(c_t) = \delta F'(K_t) u'(c_{t+1})$$

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  - But allowing for realistic values of such taxes does not resolve puzzle (Jakiela and Ozier (2015)).

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  - Leads to counterfactual implications (ask Matthew for some examples!)

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- Risk aversion?

Do people not invest because investments (e.g. fertilizer) are risky?

- Suppose income in period t is:

$$Y_t = Y_0 + \epsilon_t + \sum_{i=1}^{n} \mu_{i,t} F_i(K_{i,t}), \tag{2}$$

where n assets/capital goods, arbitrary pattern of correlation.

- Stochastic Euler equations:

$$u'(c_t) = \delta \mathbb{E}_t[\mu_{i,t} F_i'(K_{i,t}) u'(c_{t+1})], \quad i = 1, 2, ..., n \tag{3}$$

- Given initial capital stock, risk aversion will:
  - Reduce investment in assets which covary positively with consumption
  - Increase investment in assets which covary negatively with consumption

But: optimal to build buffer stock savings (Deaton 1991; Carroll 1997)

- If patient, risk averse, subject to large shocks, want large safe buffer stock. At any one time, only a few people should have low buffer stock.
- For majority with large buffer stock, consumption should not move much with:
  - high-frequency income shocks
  - predictable income changes (e.g. seasons)
- Implies that even if returns to fertilizer highly correlated with income in season, only modestly correlated with lifetime income and thus consumption
  - Beta (correlation of asset return with consumption) of fertilizer investment will be modest (i.e. using fertilizer doesn't add much risk to lifetime consumption)
  - So risk aversion will only modestly reduce fertilizer investment.

Model with patient consumers seems to make incorrect predictions.

- In fact:
  - Liquid buffer stocks are often modest.
  - Consumption covaries with income, including *predictable* income.
- These predictions emerge if agents are impatient.
- Thus with either deterministic or stochastic Euler equation, matching the data requires a high effective discount rate.

How can we resolve this puzzle? Potential non-standard explanations

- Present focus
- Loss aversion
- Misperceptions of rate of return
- Other explanations?

Implications of present-focused preferences

- Present-focused agents will:
  - Rapidly spend down liquid assets, becoming effectively liquidity constrained
  - Build up (or hold) a stock of *illiquid* assets that pay off in distant future
  - Leave high rate of return investments on the table, if effectively liquidity constrained
  - Not be able to smooth consumption; consumption will co-move with income shocks, even with predictable income variation
- Sophistication regarding present bias will determine the degree of procrastination and demand for commitment devices.
- See Laibson 1997; Angeletos et al., 2001; O'Donoghue and Rabin 1999 & 2001.

Loss aversion and investment

- Shopkeepers in Kenya exhibiting greater loss aversion in experimental tasks maintain lower inventories (Kremer et al., 2013).
- Asset by asset; people may be hesitant to give up existing assets to invest in new assets, making asset allocations sticky, maybe reducing migration
- Under loss aversion, loans collateralized with assets purchased under the loan will have high uptake and low default (Jack et al. 2016; Carney et al. 2022).

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Under-investment in preventive health

- One widely studied case of underinvestment in high-return opportunities: low investment in preventive health
  - E.g., vaccinations, deworming, bed nets, water treatment, hypertension

- Recent work has established several stylized facts regarding health behavior in developing countries (Kremer and Glennerster 2011; Dupas and Miguel 2017):
  (1) Low willingness to pay for preventive health
  (2) High expenditures for treatments of acute conditions
  (3) High sensitivity of health investments to price and convenience

Investment in preventative health: Low WTP and high sensitivity to price

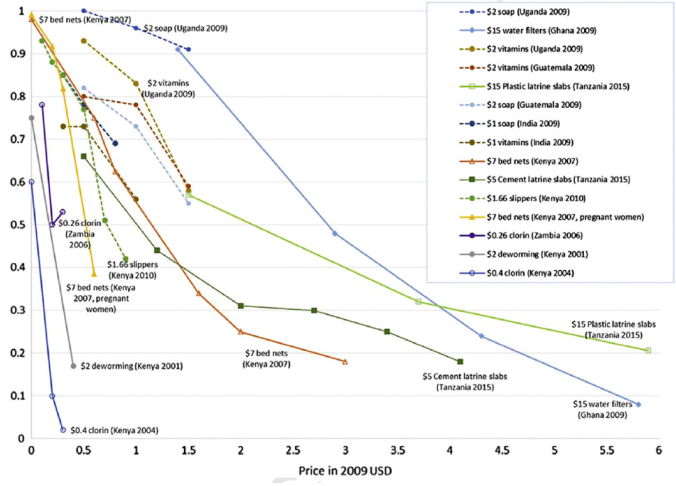

Figure: Share of individuals taking up the product as function of price (Dupas and Miguel 2017)

Under-investment in preventive health: High-price sensitivity

- High price sensitivity in many settings:
  - Deworming medication (Kremer and Miguel, 2007);
  - Mosquito nets (Cohen and Dupas, 2010);
  - Water treatment (Ashraf, Berry, and Shapiro, 2010).
- Small (and time-limited) incentives for vaccination (Banerjee et al., 2010) or collecting HIV tests (Thornton, 2008).
- Example: estimated private financial benefit of deworming is $142 (Baird, et al. 2015), yet $0.30 per child cost-sharing fee decreased take up by 80 percent (Kremer and Miguel, 2007).

Under-investment in preventive health: expenditures on acute conditions

- Arguably excessive treatment for some acute conditions.
  - E.g., low price sensitivity for anti-malarial treatment (Cohen et al. 2015)
- Implied cost of prevention is high
  - Perhaps high hassle costs, worries about side effects, etc.?
  - Knife-edge balance between benefits and costs of prevention?

Present bias and underinvestment in health

- Ways in which present bias may generate this underinvestment:
  (1) Lower (effective) discount factor
  (2) Procrastination
  (3) Liquidity constraints due to present bias

- For some behaviors (e.g. deworming), hard to see explanation based on time preferences alone, especially for one-shot opportunities.

- Many studies of demand for commitment but few settings in which commitment devices actually improve outcomes (Laibson 2015).

Biased beliefs

- Making good health decisions is difficult (Arrow 1963).
  - Requires forming accurate beliefs about numerous variables
  - Self-limiting nature of diseases; uncertainty; heterogeneity across individuals
- Misperceived returns to health investments could help explain under-investment
  - Some evidence for inaccurate beliefs regarding health in developing societies (e.g. Delavande and Kohler 2009; Godlonton et al. 2016) – more evidence needed!
  - Excellent review of eliciting beliefs in development economics by Delavande (2022)
- Mixed evidence of information interventions (Dupas and Miguel 2017)
  - More work is required to understand the determinants of success in various contexts
  - See excellent review by Haaland et al. (2022)
- What is the role of motivated beliefs?

Incorrect mental models

- Individuals may interpret what they observe through the wrong causal model or theory (Schwartzstein 2014, Gagnon-Bartsch et al. 2018)
- Incorrect mental models include superstitious beliefs or beliefs in magical theories of sickness and health which include witchcraft.
- Ashraf et al. 2017 illustrate this with the case of maternal risk in Zambia and a wide-spread belief about martial infidelity and complications during childbirth
- Parents across the world confidently hold wrong beliefs about the need to rehydrate their children in response to diarrhea (Datta and Mullainathan 2014)

Beliefs in higher powers

- Individuals' beliefs might deviate in more dramatic ways from standard probability assessments.
- Beliefs in higher powers might suppress demand for insurance
- Ingenious experiment by Auriol et al. (2018)
  - Hard to manipulate religion
  - But can vary outcomes that may be affected by religion
  - Offering insurance to people affects their demand for religious donations.

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Behavioral firms

- Is it reasonable to assume firms (as opposed to individuals) make choices that maximize profits?
  - Here: broad definition of "behavioral": deviations from profit maximizing behavior

Behavioral firms

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  - Here: broad definition of "behavioral": deviations from profit maximizing behavior
- Lucas (1978) span of control model and Chicago critique of behavioral economics:
  - Behavioral firms will be weeded out of the market.
  - Even if only 5% of people don't have behavioral biases, they will become managers of firms.
- Are there reasons to believe firms in developing economies are more or less behavioral?

Reasons developing economy firms could be more behavioral

(1) Distortions in developing countries prevent efficient firms from growing and displacing less efficient ones. Lower competitive pressures due to:

(i) Import restrictions

(ii) Restriction of new entrants into markets based on regulation, financial constraints, and agency problems

Reasons developing economy firms could be more behavioral (cont'd)

(2) Limited scope for within-firm competition that causes non-behavioral agents to rise to management:

(i) Smaller firm sizes and high prevalence of family firms (Hiseh and Olken 2014), markets) potentially due to:

- Taxation and regulation (e.g. labor regulation), predation
- Credit market issues (but profitable firms should grow over time?)
- Firm size correlated with family structure (Ilias (2006); Bertrand et al. (2008))
- Difficulty of cooperation and trust?

(ii) Implications

- Firms may only replace self employment when productivity advantage becomes large enough to outweigh these costs.
- Reduces ability of innovations to spread, incentives to innovate
- Reduces replacement of inefficient producers

Reasons developing economy firms could be *less* behavioral

- Higher stakes for self-employed owners of small firms
  - But: behavioral biases also important in high-stakes settings (e.g. 401k savings)
  - Also: consumption closely linked to profits and revenue, so behavioral factors (e.g. present focus, loss aversion) might have more bite
- Many seemingly-identical firms (e.g. small shops selling identical products) suggesting high levels of competition

Behavioral firms: management practices

- Improved management practices have been shown to increase firm profitability in developing country contexts (Bloom et al., 2013; Bruhn et al., 2018).
- Why are such services not demanded and offered more? Why do firms not experiment more on their own?
- Firms that fail to adopt these profitable practices are not necessarily weeded out of the market.

Lots of unexplored areas waiting to be explored:

- Many open areas:
  - The nature of the objective function of small (family) businesses
  - Demand forecasting/estimation by firms
  - Optimality of pricing or product choices by firms
  - Inventory management
  - Firm labor and capital-investment decisions
  - Technology adoption
  - Experimentation with new techniques, products, etc.
  - Learning and communication within firms
- More generally, we know little about how many of these firms function
- Opportunities to observe and talk to firms and managers in person!

Technology adoption

- Various examples with apparently non-optimal technology choice:
  - Pineapple farming in Ghana, HYV seeds, seaweed pod size, fertilizer, contraceptives, soccer ball manufacturing techniques, layout of equipment in textile factories
- Do external analysts correctly understand payoffs?
- Do decision makers have adequate information?

Technology adoption: present bias and loss aversion

- Present bias (Duflo et al., 2011)
  - If adoption requires costly experimentation, individuals might procrastinate since benefits are often much delayed.
  - Is there demand for commitment for technology adoption (training)?
  - Time-limited discounts around harvest effective at increasing take-up of fertilizer
- Loss aversion
  - Conjecture: relevant reference point when trying something new is the status quo. Possibility of losses with respect to the status quo will trigger loss aversion
  - Possibility of insurance or informal risk-sharing to improve outcomes?

Technology adoption: attention and complexity

- Inattention and wrong mental models (Hanna et al., 2014)
  - Production function is complex and attention is costly.
  - Individuals will pay attention to the dimensions they think are important.
  - If start off thinking something is not important (wrong mental model), will not pay attention and may never learn, even with lots of available data.

- Complexity of information
  - Provision of simplified information about seaweed pod size (Hanna et al., 2014), water safety (Bennear et al., 2013) or business practices (Drexler et al., 2014) may be more effective than providing full information.
  - Downsides of presenting simplified information: heterogeneity in population; external analysts might misunderstand decision problem

Technology adoption: behavioral social learning

- Rational social learning will lead society to right long-run choice if some can get past initial experimentation costs
- Banerjee (1992) herd behavior: model converges on optimal technology under some conditions (e.g. observability of investment and output).
- Why might individuals not converge on optimal technology? We distinguish:
  (1) Barriers to sharing or seeking information
  (2) Barriers to correctly interpreting information

Barriers to sharing and seeking information: social-image concerns

- The degree of communication between people is endogenous. Providing and soliciting information is a decision.
- People may be hesitant to ask for or provide information when doing so signals effort or ability (Chandrasekhar et al., 2018; Banerjee et al., 2018);
- People may not be willing to provide information to others for free if they paid for it or put in effort to get it.
- Concerns about being blamed.

Barriers to interpreting information

- Benjamin (2018): review of biases in learning and errors in probabilistic reasoning.
  - Plenty of lab evidence but limited field evidence, e.g. on how non-Bayesian social learning influences technology adoption. Lots of opportunities!
- Imitating common sources without accounting for redundancy in the signals received can create confident and incorrect beliefs (Eyster and Rabin, 2014).
- Empirical evidence of naive, non-Bayesian updating
  - Correlation and selection neglect (Enke and Zimmermann, 2019)
  - Use weighted average of neighbors' actions or opinions (Chandrasekhar et al., 2015)
  - Failing to learn from others (Conlon et al. 2022)
- Want: applications in high-stakes settings, e.g. agricultural technology adoption

Handbook chapter covers many other exciting topics!

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Opportunistic behavioral economics

- Empirical behavioral economics relies heavily on running experiments.
- Experiments in developing countries are inexpensive.
  - Large-scale and large-stake experiments possible
  - Can do things like set up firms, hire subjects as full-time "employees" over long periods (Kaur et al. 2015; Breza et al. 2016; Bessone et al. 2021)
  - Development has embraced both field and lab experiments (Cameron et al. 2016; Imas and Gneezy, 2016)
- Infrastructure for running experiments: JPAL, IPA, Busara, experienced staff, streamlined recruitment and training of staff and subjects, etc.
- Caveat: Depending on setting, literacy and numeracy can be issues; ethical concerns are important

Conclusion

- Ideas from behavioral economics help explain important puzzles in development. Many unanswered questions remain!
- Taking behavioral development economics seriously, going forward, involves testing specific mechanisms and providing calibrations and estimations where possible
- Other important topics in development to which behavioral economics may be fruitfully applied
  - Education
  - Political economy
  - Economics of the family
  - Aging

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