
Development Economics: Theoretical Overview

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Purpose of This Summer School

- Allow you to become familiar with research frontiers of development economics
- Discuss your research ideas and get feedback
- Get to know people, make friends, and have a good time!

Topics

- Development economics nowadays focuses mainly on empirical micro-development, and the lectures will also be designed this way
- Starting tomorrow, a number of specific topics will be covered: intra-household decision making, gender; firms and trade; migration; technology adoption; microfinance; health
- Today we provide overview and methodology. This lecture is devoted to theoretical methods, the next lecture on empirical methods. These serve as background to the rest of the sessions
- We shall assume you have done the prescribed background readings, and will be reading the essential papers highlighted on the reading lists

Role of Theory

- What are the important questions?
- How to think about them systematically?
- Important in motivating empirical research, and in guiding empirical work
- Essential for interpretation and extrapolation of empirical results, for policy implications

Posing Questions

- What are the big questions? How can they be answered, and how can they be broken down to smaller, more manageable or tractable questions?
- How can we relate answers to the smaller questions back to the big picture? (Particularly important in empirical micro-development)
- Some questions involve systemic, general equilibrium issues or questions concerning long-term impact which are difficult to address using tools of empirical micro-development (e.g., effects of macro policies, trade liberalization, technical change etc.)

Theoretical Techniques

- Three main sets of analytical methods:
 - Price Theory; Partial/General Equilibrium
 - Game Theory
 - Asymmetric Information, Contracts
- Methodology: make assumptions on primitives (preferences, technology, endowments, information, timing); derive behavior of individual agents from these and maximization postulates; equilibrium resulting from agent interactions; comparative statics and welfare analysis of outcomes

Guide for Empirical Work

- What questions are truly interesting?
- Pose question more narrowly in terms of attempts to identify parameters of models or behavioral relationships, or discriminate between rival models
- Use theory to develop some notion of what kind of process or system may have generated the data
- Which are exogenous and which are endogenous variables? What are the underlying identification assumptions?

Interpretation and Extrapolation of Empirical Results

- What do the empirical findings indicate about underlying structural relationships or causal mechanisms?
- To what extent can the results be extrapolated to other contexts, or to draw inferences about how outcomes would change with policy interventions or parameter shocks
- How should those changes be evaluated normatively?

Theories of Development: Macro and Micro

- One set of theoretical approaches deal with the 'Big' questions: What are the underlying causes of differences in levels of development across countries? Across regions? Communities?
- Looking for explanation of long-run differences at the macro level
- Another set of theoretical approaches deal with less grand questions, and focus on understanding a variety of institutions specific to developing countries at the micro-level
- Institutions such as peasant family-based production, contractual arrangements for labor or land, cooperatives, informal credit and insurance, social networks, and interactions between formal and informal sectors

Theories of Development: Macro and Micro, Contd

- The macro- and micro- approaches interact
- The macro theories of differences across economies can often be used to explain long-run differences at the more micro-level (differences between households, within households e.g., gender, or child labor)
- Conversely, the micro-theories provide a microfoundation for the macro-theories (e.g., theories of credit market imperfections or contracts form the basis of dynamic general equilibrium models of economy-wide dynamics)

A. Macro Approach #1: Neoclassical Growth Theory

- Neoclassical growth model *a la* Solow: role of initial conditions, capital and labor endowments
- Delivers an optimistic view of long-run prospects of LDCs, based on the assumption of diminishing returns: backward countries will catch up and grow faster in the interim, provided they have the same savings and population growth rates
- Persistent long-term differences must owe to lower rates of savings and investment, labor force participation, human capital investment, technology adoption, and higher population growth rates in LDCs
- Key shortcoming: Leaves open the question why these crucial parameters or behavioral patterns differ across countries, and therefore does not bring to the forefront key institutions that affect these

Macro-Approach#2: Dual Economy Models

- Related Approach of dual economy models *a la* Arthur Lewis
- Focus on critical role of transformation of a traditional, informal, family-based, rural or informal economy to a modern, formal, commercial, industrial, urban economy
- In particular, role of migration from the informal to the formal sector, which acts as an engine of growth (owing to lower productivity in the informal sector)
- Rate of development is determined by rate of savings, population growth, and technical change in the modern sector (much like the Solow model); eventually LDCs will catch up
- In the interim, there are likely to be problems of inequality, urban congestion and dualism

Macro-Approach#3: Coordination Problems

- Different tradition of theories of underdevelopment as result of coordination problems, which may result in poverty traps or multiple steady states
- Rosenstein-Rodan's theory of big push: coordination failures in demand, infrastructure investments, factor supplies
- Formal models based on imperfect competition: Murphy, Shleifer, Vishny (1989)
- Related: theories of endogenous growth (Romer (1986), Lucas (1988)) with externalities in human capital or technology, in which long-run growth rates can differ (analogous to phenomenon of multiple equilibria in coordination games), combination of history and expectations (but primarily 'Expectations Based Theories of Inertia')

Macro-Approach#4: Path-Dependence and Colonial Institutions

- Role of colonial history highlighted by recent contributions of Engerman-Sokolof (1998), and Acemoglu-Johnson-Robinson (2001)
- Based on historical accounts of divergence between North and South America, and cross-country evidence concerning role of early patterns of colonial settlement in explaining current differences in per capita income
- Colonial settlement patterns in 15th century were based on geography (natural resource and labor endowments, diseases and mortality rates), which affected nature of 'institutions' of rule of law, democracy, property rights, education

Path-Dependence and Colonial Institutions, contd.

- Wealth was based in 15th–18th century on ability to extract natural resources, and required creation of extractive institutions to preserve abundance of cheap, unskilled labor
- Since late 19th century wealth is based instead on industrial and knowledge industries, which required property rights, and a large skilled labor force
- Key factor: institutional ‘lock-in’
- Theoretical reasons for such ‘lock-in’? Redistributive conflicts, institutional inertia etc. Burgeoning recent literature on this (‘Political Economy Theories of Inertia’: e.g., book by Acemoglu-Robinson, or papers by Borghignon and Verdier)

Macro-Approach#5: Capital Market Imperfections and Historical Inequality

- Another influential approach: role of capital market imperfections as a source of persistence of under-development and institutional inertia ('Market-based Theories of Inertia Based on Historical Inequality': e.g., Galor-Zeira (1993), Banerjee-Newman (1993))
- Key idea here: if capital markets are imperfect, opportunities to invest differ with wealth: it is more difficult for the poor to invest, which causes poverty and inequality to be perpetuated
- Capital market imperfections are not sufficient by themselves (Loury (1981), Becker-Tomes (1979, 1986), Mookherjee-Ray (2003)): need to be combined with some technological indivisibilities or nonconvexities

Capital Market Imperfections, contd.

- This approach has some analytical advantages: it is tractable, it provides a concrete account of how history affects current and long-run performance
 - Allows comparative statics/dynamics with respect to historical conditions, policy parameters (e.g., different kinds of anti-poverty systems, trade liberalization, financial market reforms), shocks (technical change, immigration) etc.
 - Rooted in conventional models of competitive equilibrium dynamics, it avoids problems of trying to figure out what drives 'investor expectations', or how to model political institutions
 - In any actual economy, combination of different sources of inertia could be important: e.g., persistence of colonial institutions could be explained primarily by political reasons; subsequently market-based sources could take over
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B. Micro-Theories of Specific LDC Institutions

- List of specific institutions that are sought to be explained, and theories constructed:
 - Fragmented labor/credit/land markets; unequal market access (including rationing/unemployment of poor); market thinness or non-existence
 - Variety of contractual arrangements (contract duration; tenancy; interlinkage; degree of formality of contracts; mode of enforcement)
 - Informal economy: community, network or family-based arrangements for production and consumption

B. Micro-Theories of Specific LDC Institutions, Contd.

- Common elements of these theories: (often endogenously) incomplete markets, nonconvexities, externalities, quite far from Arrow-Debreu theory
- Typically need at least two key imperfections at the same time, and are operating in the economics of the 'second-' or 'third-' or 'nth-best'
- Have to be careful with regard to notions of constrained optimality (Pareto or welfare) when evaluating policy interventions: what are the relevant constraints on social planners (analogous to information or enforcement constraints faced by market agents)

Credit Market Imperfections

- Focus in remainder of this lecture on two simple theories of credit market imperfections
- Will base the discussion on Ghosh, Mookherjee and Ray (2001)
- Much empirical evidence concerning variety of ways that credit markets in developing countries differ from standard neoclassical (Arrow-Debreu) markets:

Specific Credit Market Features of LDCs

- Pervasiveness of informal credit
- Segmentation into formal and informal credit
- Informal credit marked by long-term exclusive relationships and repeat lending
- Big gaps between formal and informal interest rates
- Significant dispersion of interest rates across borrowers within any sector
- Pervasive credit rationing, wide variations in credit access
- Credit access and interest rates depend on collateral, reputation and social connections between borrower and lender
- Interlinkage of credit with land and labor contracts

Stiglitz-Weiss (1981) Theory

- Definition of **credit-rationing** provided by Stiglitz-Weiss (AER, 1981):
 - among loan applicants who appear to be identical, some receive a loan and others do not; rejected applicants would not receive a loan even if they offered to pay a higher interest rate;
 - or there are identifiable groups of individuals who with a given supply of credit are unable to obtain loans at any interest rate, even though with a larger supply of credit they would
- Emphasis in (a) on *unequal* treatment of observationally identical applicants; in (b) on the market closing down altogether.

Stiglitz-Weiss (1981) Theory, contd.

- Stiglitz-Weiss theory to explain this was based on *adverse selection*: borrowers differ with regard to a riskiness attribute that is unobservable, in addition to loan indivisibility (loan size exogenously fixed)
- Banks earn higher profits if they lend to less risky borrowers; riskier borrowers obtain higher net *ex ante* benefit from the loan at any given interest rate
- Raising the interest rate causes the less risky borrowers to drop out of the applicant pool, lowering bank profits
- Hence in times of restricted credit supply relative to loan demand, there may be credit rationing in the S-W sense

Problems with Stiglitz-Weiss Theory

- Based on assumption that interest rate is the only tool available to banks to screen applicants; if collateral is available then S-W rationing disappears (Bester, AER 1985)
- Based on assumption of loan indivisibility: otherwise banks can treat all borrowers equally and grant less credit than is demanded by each borrower at the desired interest rate
- Asymmetric information regarding borrower type is implausible within small tight-knit communities where most informal lending operates

Alternative Approach: Moral Hazard

- Alternative definition of credit-rationing, which does not focus on unequal treatment of identical loan applicants
- Key requirement: existence of credit limits at any given interest rate
- Credit limits depend on the interest rate: *nonlinear* interest rates; also depend on personal characteristics observable to lenders (collateral, reputation)
- Theories explaining this kind of phenomenon rely primarily on moral hazard among borrowers: noncontractible actions they can take that affect lender profitability
- Two kinds of moral hazard: (i) *Ex ante* moral hazard with limited liability: care/effort taken by borrower to prevent project failure (ii) *Ex post* moral hazard: “take the money and run”

Ex Ante Moral Hazard with Limited Liability

- Two periods $t = 0, 1$; population of *ex ante* identical borrowers seeking to finance a given project
- Fix loan size L , to start with; set collateral C to personal wealth of borrower that can be seized by lender in event of default
- Project return is random, and depends on borrower effort e to avoid an accident: it is Q with probability $p(e)$, and 0 with probability $1 - e$, where $p(\cdot)$ is strictly increasing, strictly concave and twice differentiable
- Effort e is noncontractible; borrower liability in accident state is limited to loss of collateral

Ex Ante Moral Hazard, contd.

- Loan repayment denoted by $R(< Q)$, actually repaid only in the non-accident state
- In non-accident state, borrower repays R and retains collateral; in accident state borrower repays 0 and loses collateral
- Borrower's payoff is $p(e)(Q - R) - (1 - p(e))C - e$, lender's payoff is $p(e)R + [1 - p(e)]C - L(1 + r)$, where r is given cost of capital

Ex Ante Moral Hazard, contd.

- First-best outcome: maximize social surplus $p(e)Q - e - L(1 + r)$, by choosing e^* according to $p'(e^*) = \frac{1}{Q}$
- Incentive problem: e chosen by borrower to maximize $p(e)[Q - R] - [1 - p(e)]C - L(1 + r)$, or $p'(e) = \frac{1}{Q - R + C}$, and $e < e^*$ if $-R + C < 0$
- Lender's breakeven constraint: $p(e)R + [1 - p(e)]C \geq L(1 + r)$
- Natural to impose the condition that $C < L$ (otherwise the borrower could self-finance); then the lender's breakeven condition requires $R > L$, i.e., $R > C$, so the moral hazard problem owing to limited liability is inevitable whenever there is a need to borrow

Ex Ante Moral Hazard, contd.

- Competitive equilibrium (with free-entry into financial intermediation):
$$p(e)R + [1 - p(e)]C = L(1 + r), \text{ with } e \text{ determined according to } p'(e) = \frac{1}{Q - R + C}$$
- Higher interest charged on the loan (higher R) lowers the borrower's incentive to exert effort to avoid an accident: the phenomenon of *debt overhang*
- So banks may be reluctant to raise interest rates beyond some point, as direct profitability effect can be outweighed by the increased default risk
- This can give rise to credit rationing analogous to the S-W model: despite excess demand for credit banks may prefer to ration rather than raise interest rates
- Not subject to the Bester criticism: no scope for resolving the moral hazard problem via use of collateral, as it is being used maximally anyway

Implications of Ex Ante Moral Hazard

- Explains why interest rates depend on collateral: lowers default risk, both directly (reduces lenders exposure in the event of an accident) as well as indirectly (increases borrower's incentives to avoid default)
- Implies that the poor will have access to credit at higher interest rates, or not at all — in the absence of collateral there may exist no interest rate which enables the lender to break even
- So the poor are doubly cursed, and inequality may tend to widen, as the poor need to borrow to invest and escape poverty

Implications of Ex Ante Moral Hazard, contd.

- Also explains the role of community relations in lending: lenders from the same social community can impose social sanctions on defaulting borrowers, a form of *social collateral*, the key idea underlying group lending in microfinance
- Role of long-term credit relationships: carry forward debts from current period to the next, thereby enabling promise of future lending as a form of collateral
- Role of exclusive dealings: multiple lenders to the same borrower create externalities among one another as the terms of each loan affects borrower incentives to avoid accident, which affect returns to all lenders

Extension to Variable Loan Size

- Can now allow loan size L to vary: tradeoff between benefits of expansion of project size, and increase in debt overhang which lowers effort incentives
- For any L , there will be a corresponding competitive equilibrium interest rate (which varies with L): phenomenon of nonlinear interest rates (higher loan sizes carry higher default risk, hence necessitate higher interest rates)
- Borrowers may demand more credit than L if they could borrow more *at the same interest rate*: alternative form of credit rationing
- Hence this theory is robust with respect to allowing loan (and project) sizes to vary continuously

Related Theory: Ex Post Moral Hazard and Reputations

- Alternative model: borrower may default despite having the means to repay the loan, because the lender finds it difficult to enforce repayment (via the courts)
- In many contexts of informal credit, there is no written contract at all: why do borrowers ever repay?
- Main reason: effect on their credit access in the future, from this lender or other lenders
- Simple Model: Project return is deterministic, increasing and concave in project size L : $F(L)$
- Assume for simplicity borrower cannot post any collateral

Ex Post Moral Hazard and Reputations, contd.

- Socially optimal loan size: $F'(L^*) = 1 + r$
- Borrower payoff in current period: $w \equiv F(L) - R$; lender payoff: $z \equiv R - (1 + r)L$, where R is actual repayment
- If borrower defaults, assume that for every subsequent date his reputation suffers and gets a per-period payoff of v , fixed for the time being
- Discount factor $\delta \in (0, 1)$ of borrower
- Borrower repays repayment obligation of R^* if $\frac{F(L) - R^*}{1 - \delta} \geq F(L) + \frac{\delta}{1 - \delta}v$,
i.e., if

$$R^* \leq \delta[F(L) - v]$$

Ex Post Moral Hazard and Reputations, contd.

- Lender's breakeven constraint: $R^* \geq (1 + r)L$
- Therefore for the credit market to function there must be loan size L such that

$$(1 + r)L \leq \delta[F(L) - v]$$

- This constraint is more severe, the lower δ is: if it is sufficiently low there may not exist any loan size that is viable
- Even if there exist viable loans, the first-best loan size L^* may not be viable: if $(1 + r)L^* \leq \delta[F(L^*) - v]$
- In that case, second-best loan size will be largest loan size that is viable, where the viability constraint is binding

Ex Post Moral Hazard and Reputations, contd.

- Again get credit-rationing, in the sense that the maximum loan size is smaller than the borrower would demand at the interest rate r , just to ensure a small debt overhang
- Again, as in the *ex ante* moral hazard model, the debt overhang can be limited by use of collateral (financial or social)
- Can extend the theory to a context of multiple lenders: if a borrower does not repay a given loan, and is terminated, (s)he can approach an alternative lender

Ex Post Moral Hazard and Reputations, contd.

- Much depends on how lenders coordinate lending policy: if they collude then the new lender who is approached may deny loans to a borrower who defaults with other lenders
- Also depends on the extent to which lenders share information about credit history of their borrowers
- Developed countries have well-developed mechanisms for sharing such information (via computerized access to credit history information)
- LDCs with weaker information systems may therefore be subject to greater default risk: suggests one possible approach to financial market reform

Role of Information Sharing

- Simple Model of Information Sharing: if a borrower defaults with one lender, and approaches another lender, latter discovers earlier default with probability p , and refuses loan application
- Outside option determined endogenously:

$$v = \delta p v + (1 - p)w$$

where w is payoff from new credit relationship

- Stationary equilibrium: new relationship is same as the old one, so $w = w(v)$ is the highest borrower payoff given outside option v

Role of Information Sharing, contd.

- Hence equilibrium v determined by

$$v = \frac{1 - p}{1 - \delta p} w(v)$$

- RHS is decreasing in v , so there is a unique fixed point v , and it is decreasing in p
- Since $w(v)$ is decreasing, it follows that equilibrium borrower payoff is increasing in p : greater information sharing and coordination across lenders benefits borrowers and reduces extent of credit rationing

Summary: Implications of Credit Rationing

- Unequal access of poor and rich to credit, which may cause inequality to be perpetuated (an issue explored in literature on the dynamics of inequality)
- Wealth inequality or significant extents of poverty can act as a brake on growth, owing to limited investments by the poor: hence classical equality-efficiency trade-offs get overturned, and poor countries may not be able to catch up with rich countries as in neoclassical growth theory
- IMF policies of dealing with debt crises by raising interest rates may serve to perpetuate the crisis, by increasing debt overhang which inhibits borrowing and investments

Implications of Credit Rationing, contd.

- Credit rationing and low access of the poor to credit is a form of market failure, but it is not clear how the government can improve matters by trying to offer credit on cheaper terms, as it will also be subject to the same moral hazard problems (or worse, owing to lack of 'soft information' available to informal lenders)
- Trying to improve competitiveness of credit markets is hazardous: can destroy long term exclusive credit relationships (Kranton-Swamy (JDE 1998))
- Real role of the state could be to improve the institutional infrastructure of the market: legal reforms that enable credit contracts to be enforced effectively; enable lenders to share information about borrowers' past credit records; increase bargaining power of borrowers

Implications of Credit Market Imperfections, contd.

- Other implications of credit market imperfections: lack of 'separation' between production/investment decisions and household characteristics (wealth, preferences etc.)
- Affects education, migration, cropping choices, scale of production (e.g., farm size), technology adoption, entrepreneurship
- Financial market reforms could have important and pervasive effects on production, investment and inequality