

# **1. TITLE PAGE**

Microfinance in Theory and Practice: Field Experiments in South Africa

Proposal to BASIS CRSP via the University of Wisconsin

## Principal Investigators

Dean S. Karlan, Princeton University and Innovations for Poverty Action  
Pieter LeRoux, University of Western Cape and Institute for Social Development  
Jonathan Zinman, Federal Reserve Bank of New York

## Affiliated Investigator

Lia C. Fernald, University of California - Berkeley

### Dean S. Karlan

Assistant Professor of Economics and International Affairs; Department of Economics and Woodrow Wilson School; Princeton University; 337 Wallace Hall; Princeton, NJ 08544; phone: (609) 258-6916; fax: (609) 258-5974; [dkarlan@princeton.edu](mailto:dkarlan@princeton.edu)

### Pieter le Roux

Director and Professor in Development Studies; Institute for Social Development and School of Government; University of the Western Cape; Private Bag X17; 7535 Bellville, South Africa; +27 21 959 3858/6; [Pleroux@worldonline.co.za](mailto:Pleroux@worldonline.co.za)

### Jonathan Zinman

Economist; RMAG, Payments Studies; Federal Reserve Bank of New York; 33 Liberty Street, 3rd Floor; New York, NY 10045; phone: (212) 720-1204; fax: (212) 720-8363; [jonathan.zinman@ny.frb.org](mailto:jonathan.zinman@ny.frb.org)

### Lia C. Fernald

Assistant Research Professor; Demography and Economics; Institute for Business and Economic Research; University of California, Berkeley; F502, Haas School of Business Building; Berkeley, CA 94720-1922; Phone: 415 577-5423; Fax (415) 704-3104; [fernald@haas.berkeley.edu](mailto:fernald@haas.berkeley.edu)

## **2. ABSTRACT**

We study fundamental questions related to microcredit markets using field experiment methodologies. This proposal encompasses three related projects, to be conducted throughout South Africa: 1. the responsiveness of borrowing and repayment to interest rates; 2. the impacts of access to consumer credit on borrowers; 3. the impacts of access to credit on microentrepreneurs.

For policymakers, our results will bear directly on critical issues: Does access to capital help poor borrowers accumulate assets and working capital? What interest rate policies should regulators and donors set? What disclosure requirements should regulators mandate? Can the private sector deliver microcredit that is socially beneficial? These are pressing questions for the Micro Finance Regulatory Council, which receives significant funding from the USAID South Africa mission.

For microfinance institutions, we examine how interest rate, marketing, and credit evaluation policies can be optimized in order to deepen financial sustainability and outreach to the poor.

For academics, we address open theoretical and empirical questions across various fields: development economics, contract theory, behavioral economics, banking, finance, public health, psychology, and decision sciences.

More generally our findings, and especially our methodologies, will develop impetus and templates for further research on policy and practice worldwide.

### **3. PROJECT DESCRIPTION**

#### **Overview**

This proposal presents a two-year plan to test fundamental questions related to microcredit markets, using a combination of field experiment methodologies and supplementary data collection. This relatively novel approach enables us to shed new light on open questions of great interest both to academics and policymakers. These questions pertain to a broad range of fields, including micro-development, contract theory, banking, finance, behavioral economics, psychology, and public health. Our results will bear directly on critical and topical policy issues such as the degree to which credit screening and contract enforcement problems motivate intervention in credit markets; the efficacy of alternative disclosure requirements; and whether the private sector can deliver microcredit that is socially beneficial. As such this project will provide direct support for the USAID Mission in South Africa, which has funded data collection and oversight activities by the Micro Finance Regulatory Council (MFRC) that are designed to improve the stability and reach of microcredit markets in South Africa. The Appendix contains a letter of support from the MFRC. More generally our findings, and especially our methodology, will provide impetus and templates for the rigorous examination of microfinance policy and practice worldwide.

We propose three experiments: 1. testing the responsiveness of borrowing and repayment to interest rates; 2. testing the impacts of access to consumer credit on marginal borrowers; 3. testing the impacts of access to credit on micro-entrepreneurs. In each of these three projects the Lender has agreed to implement experiments that are structured to reveal specific economic parameters of interest and shed light on fundamental policy issues related to microfinance. See the Appendix for a letter confirming the Lender's commitment to these experiments.

These projects will produce several public goods in addition to the research output and related policy implications. First are replicable methodologies that can be used by other researchers and microfinance organizations, and financial institutions more generally, to optimize pricing, marketing, and underwriting practices and thereby enhance sustainability. Second are rich data, to be made publicly available, that can be

used for future work on contract theory, household decision-making, experimental design, and other questions. Third is the training of two South African graduate students at the University of the Western Cape.

This proposal builds on ongoing collaboration with a South African consumer lender (the “Lender”) to “working poor” borrowers. Part of this proposal is to fund a significant extension of prior work with the Lender that randomizes interest rates and marketing strategies in order to estimate the prevalence of adverse selection and moral hazard, derive demand curves, and test the sensitivity of consumer behavior to decision frames and cues (Project 1). The bulk of our proposal seeks funding for entirely new work that combines the random assignment of credit to marginal borrowers with extensive household data collection designed to measure the impact of microcredit and related mechanisms (Projects 2 and 3). In this new project, the Lender will loan both to employed individuals as well as microentrepreneurs.

### **Background**

The microcredit market in South Africa is distinct from most other developing countries in that there is a large, for-profit industry segment extending “cash loans” to individuals with verifiable employment (Porteous, 2003). This consumer credit market is quite large relative to the financing options available for South African microentrepreneurs lacking wage income. Cash lenders offer small, high-interest, short-term credit with fixed repayment schedules to a “working poor” population estimated to comprise anywhere from 2.5 million to 6.6 million people. Institutional players have come to dominate this market, displacing traditional “informal sector” moneylenders, following the 1992 elimination of interest rates caps on small loans extended by firms who agree to be regulated by the Micro Finance Regulatory Council (MFRC).

The working poor population lacks the credit history and/or collateralizable wealth needed to borrow from traditional institutional sources such as commercial banks. Loan sizes tend to be small relative to the fixed costs of underwriting and monitoring them, but substantial relative to borrower income; e.g., our cooperating Lender’s median loan size of R1000 (\$150) is 32% of its median borrower’s gross monthly income. Not surprisingly, credit card and mortgage markets are extremely thin in South Africa (and other developing countries) compared to the U.S. Accordingly the cash loan market is important in the aggregate, with outstanding loans totaling 1% of GDP and 5% of non-mortgage consumer credit (The DTI, 2003).

Cash loans are very short-term and expensive relative to credit card or mortgage rates in industrialized nations, although their terms compare favorably to informal sector substitutes in South Africa and elsewhere. Cash lenders focusing on the observably high-risk market segment typically make one month term loans at 30% interest *per month*. Lenders targeting observably lower risk segments may charge as little as 3% per month. Note there is essentially no difference between these nominal rates and corresponding real rates, since inflation continues to be relatively low in South Africa (e.g., 10.2% in 2003 and 0.4% in 2004). Rationing appears prevalent despite these high rates; e.g., the Lender rejects 50% of new loan applicants.

### **Partnering Institution**

The Lender has been in business since 1978 and is one of the largest micro-lenders in South Africa, with over 150 branches located in both rural and urban areas throughout the country. Unlike many of its competitors, the Lender is transparent in its pricing – with no surcharges, application fees, insurance premiums, etc., added to the cost of the loan. The Lender also has an unusual “medium-term” product niche, with a large concentration of 4-month loans (85%). Most other cash lenders focus on 1-month or 18-month loans.<sup>1</sup> The Lender’s standard 4-month rates, absent the experiment described in Project 1, range from 7.75% to 11.75% per month, depending on credit history and prior transaction frequency with the Lender. These rates are lower than the 1-month (30%) lenders, but higher than commercial bank rates. All loan underwriting and transactions are conducted face-to-face in the branch network, with the risk assessment technology combining centralized credit scoring with decentralized loan officer discretion. Collection strategies rely on frequent contact and pricing incentives for timely repayment, rather than the collateralization practices (direct debit from paychecks, holding bank books and ATM cards) used by many of its competitors.

### **Project 1: Prices, markets, and marketing: borrower behavior and credit market efficiency**

This first project builds on an experiment, completed in 2003, that will shed light on fundamental questions related to contract theory and consumer choice. This experiment randomly assigned interest rates and marketing strategies to 57,703 *former* clients of the Lender, and was successfully implemented as part of the Lender’s everyday operations between July and December 2003. We designed this experiment to: 1.

---

<sup>1</sup> The Lender does also have 1, 6, 12, and 18 month products, with the longer terms offered at lower rates and restricted to the most observably creditworthy customers.

estimate the importance of specific information asymmetries typically thought to be prevalent in credit markets for the poor; 2. derive price elasticities of demand, and 3. test several stylized facts about consumer choice from behavioral economics, experimental economics, and psychology. The results bear directly on several topical policy issues, including interest rate caps, disclosure requirements, and collection/enforcement practices. We are currently writing three academic papers based on these results but with further funding can expand the sample frame to new clients (i.e., clients that have no history with this Lender) and thereby improve the generalizability of our findings.

This interest rate and marketing experiment contains two especially novel features. One is that we randomize interest rates offered along two different dimensions: first on a direct mail solicitation and second after the borrower applies (hence accepting the offer rate on the direct mail solicitation). By separating the “offer rate” from the “contract rate”, we can identify cleanly any adverse selection on interest rates. Further components of the experiment test theories of the impact of debt burden, including specific types of moral hazard and refinancing incentives on repayment. The second novel feature randomizes marketing treatments on the direct mail solicitation. These are designed to test several influential stylized facts from behavioral and experimental economics that have yet to be validated in the field. Specifically, we use scripted communications (via letter, telephone, and/or SMS) to test whether consumer choice is sensitive to manipulations such as: reference points (e.g., presenting the offer itself vs. as a comparison to a competitor’s rate), the amount of information provided (e.g., a small table with few options vs. a large table with many loan options), deadlines (sooner to stimulate a sense of urgency, vs. later to provide more time to accept the offer), subtle cues (e.g., a photo, an ad for a prize drawing), and suggestions (on borrowing needs, loan term).

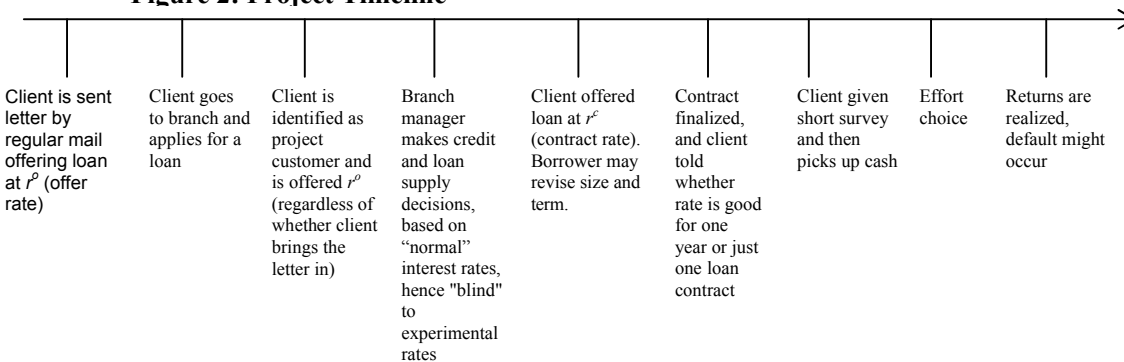
The experiment proceeds as follows. The Lender begins by randomizing interest rates attached to “pre-approved,” limited-time offers that are communicated by directed marketing that contains randomized treatments. Two rates are randomly assigned to each client, an offer rate included in the solicitation, and a contract rate that is equal or less than the offer rate and revealed only after the borrower has accepted the solicitation and applied for a loan. For 60% of the clients, the contract rate is identical to the offer rate. Final credit approval (i.e., the Lender’s decision on whether to offer a loan after updating the client’s information) and maximum loan size are set “blind” to the experimental interest rates. This is enforced using internal

control software and monitored statistically as well. Therefore the two interest rate randomizations enable us to cleanly distinguish selection effects from moral hazard effects, since some clients will select on different interest rates *ex-ante*, but then have identical repayment burdens *ex-post*, while other clients will select on the same rate *ex-ante*, but have different repayment burdens *ex-post*.<sup>2</sup> Figure 1 depicts this intuition. We also randomly assigned differential “contract rate windows” (W), with some clients receiving the lower rate for one year (W=1) and others obtaining it for just the first loan (W=0). This “dynamic repayment incentive” enables us to test whether access to future financing at preferable rates reduces any moral hazard found in this market.<sup>3</sup> Figure 2 shows the experimental operations, step-by-step.

**Figure 1: Analytical Framework**

	High Contract Rate	Low Contract Rate
High Offer Rate		
Low Offer Rate	N/A	

**Figure 2: Project Timeline**



<sup>2</sup> Methodologies relying on a single interest rate face difficulty disentangling selection from moral hazard effects (Ausubel, 1999). More generally, the stock of empirical evidence on the prevalence of information asymmetries in credit markets is scant relative to the wealth of influential theoretical results; e.g., Stiglitz and Weiss (1981). The 2001 Nobel Prize Committee’s extended citation for pioneering work on asymmetric information did not cite any empirical work on credit markets, while citing six empirical papers on labor markets and four on insurance markets (Bank of Sweden, 2001).

<sup>3</sup> As noted above, the Lender elects not to use collateral to screen or incentivize borrowers as in Boucher and Carter (2001)

We now seek to extend this experiment to *new* potential clients of the Lender; i.e., to consumers who have not previously transacted with the Lender. To-date only *former* clients have been subject to the interest rate and marketing treatments. The distinction between new and former clients is especially critical in estimating the prevalence of information asymmetries. Preliminary evidence based on former clients finds some evidence of adverse selection, and relatively strong evidence of moral hazard. The question naturally arises whether private information (e.g., on a borrower's "type", or inherent riskiness) may be revealed over time, via the process of transacting with the Lender. If this is true then our existing estimates may understate the extent to which information problems (particularly adverse selection) prevent truly marginal borrowers (i.e., those without a prior lending relationship) from obtaining credit. Extending the experiment to new borrowers also permits exploration of heterogeneity in elasticity with respect to price and marketing as well.

Extending the interest rate and marketing experiment to new clients will thus produce more precise and generally applicable evidence that can feed into policy and practice. Specifically, our work on information asymmetries will help shed light on the extent to which adverse selection and particular types of moral hazard can explain the credit rationing observed in this market, and yield insight into whether investments in screening, incentives, and enforcement are likely to mitigate rationing. Meanwhile our price and marketing elasticities will generate rich evidence on how prospective borrowers make decisions. These findings bear directly on the optimality of various consumer "protections" being contemplated in South Africa and elsewhere. For example, preliminary results indicate that the Lender's prior borrowers: a) exhibit nontrivial price elasticities; b) are more likely to choose longer term loans as interest rates drop; c) are more likely to borrow when presented with *fewer* example loans in a direct mail solicitation; d) respond strongly to other non-price marketing manipulations. These findings present a complex but revealing picture of consumer rationality—one that the proposed extension to a different client base will refine and enrich.

## **Project 2: The Impacts of Access to Consumer Credit: What, How, and Why**

### *Overview*

This project tests the impact of access to credit on marginal borrowers using a “derationing” field experiment and related household data collection. It is scheduled to begin in October 2004, in cooperation with the same Lender described above. The Lender has been contemplating changes in its credit scoring process, with an eye towards relaxing credit requirements. In order to make such changes cautiously and systematically, it has agreed to experiment with the lending to marginal applicants. From a research perspective, this is an excellent opportunity to generate random variation in access to credit and thereby assess the impact of microfinance on poverty and capital accumulation. Specifically, the Lender will grant loans randomly to some clients who normally would be rejected. These treated households (“derationed”) are by definition marginal borrowers, and hence likely to be both credit constrained and the target of policy interventions. Rationed (rejected) applicants form the control group. The research team will follow-up the experiment with household data collection designed to measure loan uses and impacts, and then compares the observed behavior and outcomes of the derationed to the rationed. Accordingly, this experiment addresses the fundamental question of whether microcredit produces measurable benefits, broadly defined. There is remarkably little convincing evidence on this question relative to the amount of resources allocated to microcredit initiatives across the world.

This project is also designed to generate unique evidence on the decision-making behind the impacts (or lack thereof) of microfinance. On the borrower side, we will explore how preferences and choice mechanisms, including household bargaining and financial sophistication, map into loan uses and outcomes. Our methods here will link the experimental design with survey modules incorporating practical insights from psychology and behavioral economics on preference elicitation and cognition. On the Lender side, we will test how specific types of qualitative and quantitative information can be used to predict repayment and thereby optimize risk assessment models. Our methods here will layer randomizations designed to: a) capture the influence of specific types of information on underwriting decisions; b) test whether incentives and/or decision-making tools can help loan officers use readily available information to make better credit decisions.

In all, this project will shed light on several critical policy issues facing microfinance markets in South Africa and elsewhere:

1. Clean measurement of impacts will address the multi-billion dollar question of whether microcredit is an effective anti-poverty tool. Does microcredit help the poor (either employed individuals or microentrepreneurs) accumulate assets? Or does debt burden cause the poor to accumulate *fewer* assets in the long run? Moreover the market setting will generate evidence on the specific issue of whether for-profit microlenders can deliver such benefits to borrowers.
2. Measurement of borrower investments (broadly defined) and related decisions will shed fresh light on the “affordability” issues that dominate microcredit policy debates. Specifically, we will test whether poor households make optimal decisions in the face of high rates and uncertain cash flows, and if not, whether mistakes are systematic in ways that can be remediated through policy.
3. Experimentation with credit underwriting procedures will shed light on the optimal mix of “hard” and “soft” information, and the effectiveness of decision-making tools, and thereby shed light on sustainable risk assessment practices. This will provide critical information for South African policymakers dealing with “reckless” microlending operations that appear to have caused the recent failures of two large commercial banks.
4. More generally, our methodology can be replicated to test impacts and/or optimize underwriting procedures in any setting.

#### *Ethical Considerations*

We have secured approval from the Princeton University Institutional Review Panel for all experiments in this proposal. Although the Lender in South Africa does not have a human subjects review panel in the same way a university does, it does have a legal department which reviewed the procedures in place and concluded that neither the Lender nor ourselves are violating any contractual obligation or privacy law. Princeton’s approval of the derationing project requires that the firm we select to administer the household surveys also fulfills the human subjects requirements that are standard for South Africa and the University of the Western Cape.

The experimental design itself, while designed to shed insight into academic questions: a) provides a profitable and conservative methodology for the Lender to explore changes to their credit and pricing policies; b) does not deny credit to any applicant who would be approved under the Lender's standard policies.

### *Existing Literature on Impact of Microcredit*

Despite the proliferation of microfinance projects and markets around the world, and related impact studies, relatively little is known about the distributional and welfare impacts of attempts to ease credit constraints. *A priori*, any impacts on borrowers depend on the nature and magnitude of any credit constraints, and on household preferences and decision-making.<sup>4</sup> Under credit rationing, if marginal borrowers are typical economic optimizers, then expanding credit access should benefit them (by revealed preference). If instead marginal applicants are boundedly rational, overconfident, and/or have self-control problems, then expanding credit access could produce “over-borrowing”.<sup>5</sup> There is little evidence on the nature of credit constraints or the mechanics of household optimization to guide priors. As such, our study endeavors to fill these gaps as well as those related to measuring overall impacts.

Previous studies on impacts have found mixed, although typically positive, results. No study to-date has used an experimental methodology. The experimental design in our project solves two endogeneity problems that plague microcredit impact studies: self-selection of clients into programs, and targeted program placement by microfinance institutions. These problems make it difficult to draw firm conclusions from non-experimental studies without heroic assumptions. A classic example concerns relatively “spunky” individuals (i.e., those bent on improving themselves) selecting or being selected into microcredit borrowing, and thereby confounding any causal effect of access to credit on well-being with causal effects of individual characteristics (including those that may change unobservably over time). Selection can work in the opposite direction as well; e.g., if households tend to take microcredit in anticipation of needing to smooth upcoming *negative* shocks. Three econometrically rigorous evaluations that attempt to address this issue find conflicting results regarding the sign of this bias.

---

<sup>4</sup> Impacts on lenders of lending on the margin are *ex-ante* uncertain as well, as evidence by the Lender's willingness to experiment! This is not surprising given the possibility of information problems, as studied in project 1.

Pitt and Khandker (1998) and Coleman (1999) each rely on quasi-experimental methods to estimate the causal effect of credit access on outcomes of interest. The former relies on arguably exogenous qualification criteria (maximum of 0.5 acres of land) to identify participation in the Grameen Bank, BRAC or BRDB in Bangladesh, and uses limited information maximum likelihood estimation to compare households with the choice to enter a lending program to households without such a choice. This study finds a 0.3 standard deviation shift (18 taka) in household consumption expenditures for every 100 taka borrowed by a woman, and a 0.2 standard deviation shift for men. Since program placement is not random, village-level fixed effects are used to address community unobservables. In contrast, Coleman (1999) finds that while “naïve” estimates of impact of a group lending program in Northern Thailand are strong and positive, correcting for self-selection eliminates the observed positive correlation.

Kaboski and Townsend (2002) takes advantage of a particularly thorough dataset on communities, households, and institutions in Thailand to examine the relative impact of different types of institutions. Although no instrumental variable or randomization exists to provide a clean identification of causal effects, the rich data permits extensive controls for community and household characteristics. Like Pitt and Khandker, this study finds that selection bias understates the true effect of access to credit.

The existing studies on impact of microcredit have no evidence on psychosocial outcomes, yet individuals clearly pay a physiological price for living at low levels of socio-economic status (SES). Although only a few researchers have looked at how adverse social status can have direct effects on physiological conditions, the results have been fairly consistent. In both non-human primates, (Sapolsky et al., 1997) and in human populations, (Kelly et al., 1997, Lupien et al., 2001) there appears to be a strong correlation between lower social status (either in terms of social hierarchy or in terms of socio-economic status) and physiological outcome measures that reflect aberrant stress system activity. These findings suggest that stress is a possible critical link between low SES and poor health outcomes in adults, and an important “hidden indicator” of the success or failure of microfinance initiatives, and antipoverty programs generally.

---

<sup>5</sup> Household bargaining dynamics might also produce outcomes that are privately beneficial to certain members but detrimental to others. More on this below.

### *Existing Literature on Risk Assessment*

Despite a large technical literature on centralized, quantitative risk assessment via credit scoring models (see, e.g., the Journal of Banking and Finance's April 2004 special issue) relatively little is known about the nature of delegated, qualitative risk assessment. A large literature in banking and finance has found that lending "relationships" appear to add value on balance, but relatively little is known about the nature of such relationships and the types of information that are gleaned from them (Boot, 2000). Understanding such features of credit markets are critical for deriving optimal policy (which depends on the information structure) and disseminating best practices.

Studying the nature of discretionary judgment will also reveal whether loan officers are prone to "biases" in processing information, and whether incentives, learning, and/or treatments can overcome systematic misperceptions. This will contribute to a large "debiasing" literature from decision-making sciences that is based almost entirely on theory and laboratory evidence, but lacks field testing (Larrick, forthcoming).

### *Specific Research Questions*

Our "derationing" experiment will address nine specific sets of questions on the impacts of microcredit, and on related underlying mechanisms in markets and individual choice:

1. How credit constrained is the marginal borrower? (e.g., what is her propensity to borrow out of available credit?)
2. What is the nature of any credit constraint? (e.g., how much does total debt increase when available credit from the Lender increases exogenously, and what other sources of finance are crowded-out or in?)
3. How are funds invested (broadly defined) on the margin?
4. What is the return to these marginal investments, and what are the short/medium-run impacts of these investments on welfare proxies? These proxies will include micro-enterprise investments, household consumption, household durables, health, and psychological stress.
5. How will access to credit affect migration and remittance decisions, taking into account families that have household members in both rural and urban areas?

6. What are the distributional impacts of derationing on different types of households and individuals? Specifically, how does this differ across rural and urban areas?
7. What are the overall welfare implications of derationing, taking into account the Lender's outcomes as well as those of the borrowers?
8. How do households make intertemporal choices? In particular, what are the relationships between bargaining dynamics or "behavioral" proxies for preferences and bounded rationality, and loan usage and outcomes?
9. What specific types of quantitative and qualitative information does a successful Lender use? What is the optimal mix of discretion and credit scoring, and can effective discretion be "bottled"; i.e., replicated across loan officers through analysis and training?
10. Can underwriting be improved through incentives, and/or decision-making tools that mitigate systematic "biases" in judgment?

#### *Methodology: Overview*

As outlined above, our research design combines a field experiment designed to optimize credit risk assessment (questions 9 and 10) and generate random variation in borrower access to credit with independent, extensive household data collection designed to produce data related to questions 1-8. The experiment builds on the Lender's existing underwriting process. The Lender currently uses a quantitative credit scoring model that produces a default recommendation on whether to extend credit and how much to offer. Loan officers then have the discretion to override the model's recommendation. In practice, overrides are frequent and almost always lead to rejections.<sup>6</sup> We will generate random variation in access to credit by having the Lender implement two final steps *after* loan officer has made her usual decision: 1) randomly granting loans to a subset of "normally" rejected clients (this is the "derationing"), and 2) randomizing the loan size (within a predefined range) for those clients ultimately approved by either the branch manager or the *ex-post* randomization.<sup>7</sup> The sample frame will be every loan application processed for applicants who have no prior

---

<sup>6</sup> On the yes/no decision of whether to offer a loan, loan officers go against the scoring model's recommendation 52% of the time. 95% of these deviations are rejections where the model says "approve". Loan officers also strongly tend to offer a smaller maximum loan size than the model allows.

<sup>7</sup> Our experience with the first (interest rate) project suggests that the derationing experiment will be straightforward to implement operationally. The randomizations will be performed by a simple software package akin to the one used to assign the

borrowing history with the Lender, in 25 participating branches, for a 2 month duration. Branches will be clustered geographically to economize on costs associated with both the survey, and the Lender's operations. The Lender then will provide the research team the contact information needed to locate borrowers for the household survey. We will sample both from those randomly assigned credit (the "derationed", or "treated" group) and those left as rejected (the "rationed", or "control" group) to reach a target sample size of 2,000. An initial survey will be conducted three to six months after the loan application is completed (to get timely measures of liabilities and use of funds, but leaving rationed individuals enough time to find alternative sources of credit), with a follow-up twelve to eighteen months later to measure longer-term impacts. This sampling and survey strategy will enable us to address questions 1-7, listed above, on the impacts of microcredit and related mechanisms.

Before detailing our plans for measuring impacts and related aspects of borrower decision-making, we turn to aspects of the research design that focus on the role of information and discretion in the Lender's risk assessment.

#### *Methodology: Optimizing Risk Assessment*

In addition to derationing borrowers, our experiment is designed to optimize a financial institution's risk assessment rules. This will provide important information on effective methods for microfinance institutions to deepen outreach and sustainability, in order to best provide financial services to the poor. We are particularly interested in the optimal weighting of quantitative credit scoring and qualitative loan officer discretion (research question 9), and in whether there are specific incentives and/or interventions that can be used to harness and maximize effective discretion (question 10). We address these two questions through a simple combination of experimental protocol and treatment. On the protocol side, we will elicit and record the loan officer's approve/reject and maximum loan size decisions on *every* loan application in the sample frame *prior* to the derationing and loan size randomizations. We then will compare the accuracy of loan officer vs. credit scoring model decisions by mapping them to actual repayment performance. This will provide a reduced-form answer to whether pure credit scoring, or a mix of scoring and discretion, is more efficient

---

final contract interest rate in the first project. Experience thus far indicates that a combination of *ex-ante* training and internal controls (including ongoing statistical monitoring of loan officer decisions) will lead to proper implementation of the

(question 9). As noted above, we will maximize compliance through software that provides built-in operational controls and monitoring, and by setting treatment parameters that produce overrides of loan officer decisions only infrequently.

We also will employ additional treatments designed to explore the microfoundations of discretion and “soft” information. An extensive literature on “debiasing” in judgment and decision-making finds that humans make systematic errors in predictive (and other) tasks, and suggests three types of treatments (Larrick, forthcoming): “motivational” (encompassing financial and accountability incentives), “cognitive” (tools which focus on training or guiding reasoning), and “technological” (tools which supplant or structure individual judgment). We have built-in tests of technological approaches using the Lender’s credit scoring model, both as described above in evaluating its current performance, and in testing variants derived from extensive analysis of historical data. We will also test the relative effectiveness of motivational and cognitive strategies by randomly assigning loan officers and/or loan applications to different treatments. Examples of motivational treatments include introducing variation in financial incentives, and introducing accountability by establishing audits or presentations to management. Examples of cognitive treatments include training, delivering a simple instruction to “consider the opposite” (which has been remarkably effective at improving prediction tasks laboratory settings), and introducing a checklist into the underwriting process. In studying the latter two treatments we will test both whether the tool improves forecasts *when the tool is used*, and also if, over time, the tool induces learning and thereby improves loan officer forecasting *on all loans*. This is done by looking at whether the within-manager treatment effect disappears over time (i.e., does the manager eventually make decisions identically whether or not the tool is being used?). In all cases we will measure the realized riskiness of rejected applicants using credit bureau data. More formally, our empirical model for questions 9 and 10 will take the form:

$$Y_{it} = f(M_{it}, D_{it}, Q_{it}, B, T, A)$$

Where  $Y$  is a measure of repayment of loan  $i$  (or by applicant  $i$ ) from the Lender or credit bureau,  $M$  is the credit scoring model’s recommendation,  $D$  is the loan officer’s recommendation,  $Q$  is a vector of treatments

---

experimental protocols. Limiting the derationing “treatment” to a small fraction of applicants further reduces any loan officer incentive to try to anticipate the randomization outcome, or to otherwise deviate from the experimental procedures.

(including exposure to incentives), B includes branch and/or loan officer effects, and T captures time effects. The subscript t and applicant fixed effect A allow for the possibility of multiple applications per applicant, although this is not likely to be important (or econometrically feasible) to analyze empirically given the short duration (2 months) of the experiment.

*Methodology: The Impacts of Access to Credit and Borrower Decision-Making*

As outlined above, we will study the impacts of microfinance by linking the “derationing”-- the experimental assignment of access to credit-- with extensive household data collection. Studying the extent and nature of credit constraints (questions 1 and 2) demands rich information on the household’s liabilities, including the amount and number of loans from the “informal sector” (friends, family, moneylenders, and community-financed institutions). Examining the use of funds (question 3) requires a battery of questions on the deployment of loan proceeds. Preliminary data collection suggests that many borrowers use the money for financing educational investments in their children, buying durables, employment-related expenses, entrepreneurial ventures, health care, and weddings. Measuring returns, distributional, and welfare impacts (questions 4-7) calls for data on consumption, income, wealth, health, school attendance, and demographics. Studying choice mechanisms (question 8) depends on question modules designed to elicit preferences and decision-making processes. We now discuss measurement strategies and specific outcomes in greater detail.

*Impact Measurement Outcomes*

The initial household survey will contain six components: debt, consumption (durables and non-durables), investment, welfare and wellbeing, migration and remittances, household decision-making, and household demographics. The survey will be modeled after the World Bank’s Living Standards Measurement Study, and we will focus on behaviors and outcomes particularly relevant to this study, such as recent attempts to borrow and the presence of large expenditures. The primary survey components will cover:

1. **Debt.** We will ask about any loans applied for over the prior six months and all loans currently held. For each application, we will ask about the result, and if a loan was given, how the funds were spent (see 2. and 3. below). These questions will first focus on formal sector borrowing, and then on informal borrowing from moneylenders as well as from peers and family. A catalog of household balance sheets will inform ongoing MFRC efforts to promote credit market efficiency via information sharing.

2. **Consumption** (durables and non-durables). Presumably, if marginal debt is not used to pay down existing debt, then it will be used to either invest or accelerate the timing of consumption. This section examines the latter, and is divided into two parts: durables and non-durables. For non-durables, we will collect data on basic consumption in the household such as the amount consumed in the last 30 days on food and drink, transportation, domestic employees, entertainment, etc. We then will examine expenditure on durables, such as children's clothing, furniture, radios, bicycles, household appliances, household improvements, etc. For each consumption item, we will focus on the timing of the expenditure in order to understand the impact of access to credit on the intertemporal tradeoffs made by the recipient. Naturally, there is no perfect solution for which time period to examine, as it is possible that any time period we examine is too short to capture the full extent of tradeoffs made as a result of the credit.

3. **Investment.** Preliminary data collection suggests that there are several types of investments, broadly defined, made by borrowers in this market. Many borrowers report making human capital investments in their children, so we will ask about paying for school fees and health care. Another common use appears to be home repairs. Borrowers also report wage-employment related uses, so we will ask about car repairs, clothing for work, and employment status. There appears to be some entrepreneurial investment as well, so we will ask simple questions about business activity and related assets (Project 3, in contrast, is focused exclusively on microenterprise).

4. **Welfare, wellbeing and stress.** Since peace of mind is presumably an important component of utility, we are particularly interested in whether credit serves to alleviate psychological stress (by facilitating productive investments, or providing buffers to adverse shocks) or exacerbate it (by creating a repayment burden). These measures of mental health are of special interest in the South African setting, given high levels of HIV and crime. Dr. Lia Fernald is involved in this project specifically to help build these outcome measures into our survey. Specific outcomes to be measured are salivary cortisol,<sup>8</sup> heart rate and blood pressure, perceived stress,<sup>9</sup> depression,<sup>10</sup> and subjective social status.<sup>11</sup>

---

<sup>8</sup> Salivary cortisol is an excellent indicator in short-term stress situations, and is a well-established measure in people of all ages (Kirschbaum and Hellhammer, 1994, Walker, 1989). Three saliva samples of approximately 0.5 ml each will be obtained from each adult. To control for the known diurnal rhythm in cortisol levels in the study design, time of testing will be balanced across people from all groups. The first sample will be a baseline measure and will be taken as soon as the interview team arrives. The second sample will be linked to the first part of the physiological test session, and the third to a post-test relaxation, based on an

**5. Migration and Remittances.** Internal migration is a major issue within South Africa, where many workers live far from their family home, to which they only return occasionally and/or remit funds. Providing credit to the working poor potentially alters the incentives for and consequences of these patterns.

The effect of access to credit in *rural* areas to these issues is unclear. It could reduce incentives to migrate to urban areas if the credit provides rural citizens better opportunities to prosper in their current environment. On the other hand, it could provide the funding which enables those in rural areas to migrate to urban areas. The effect of access to credit in *urban* areas is not so ambiguous: it should increase the incentives to migrate from rural to urban areas, particularly if remittances can be sent back home. Because this study will take place in both rural and urban settings, we can treat the two settings as two distinct experiments and in each area separately evaluate the causal relationship between access to credit and the decision to migrate internally, remit funds back to family, or receive funds from family members living away.

**6. Household decision-making.** This component speaks to the particular concern that “vulnerable” borrowers are prone to “overborrowing”, and more generally to the growing interest in the foundations of intertemporal consumer choice. We will focus on measuring three types of parameters here: preferences, rationality (decision-making), and bargaining power. We will draw questions designed to elicit relevant

---

approximate 20-25 minute time delay between cortisol secretion and subsequent salivary levels (Gunnar and Nelson, 1994). All samples will be collected in sterile collection tubes (Salivettes, Sarstedt: Newton, NC) centrifuged briefly (1000g, 2 minutes, 20°C), transferred to cryo vials, and then frozen at -20°C. The field teams will use portable centrifuges to spin the saliva in the field. Salivary cortisol is stable at room temperature for a substantial period of time; thus, the samples will be kept at room temperature by field workers until the evening when the samples will be refrigerated. In order to determine the cortisol concentration in the saliva sample we will have the samples assayed at the Biochemical laboratory, Psychobiology, at the University of Trier, where they will use a time-resolved fluorescence immunoassay.

<sup>9</sup> The Perceived Stress Scale assesses the frequency of both stressful situations and feelings of stress over the last month, and was designed for use with community samples (Cohen et al., 1983). The scale has been shown to be highly valid in terms of its predictability of the common cold, and its association with relapse after quitting smoking (Cohen and Lichtenstein, 1990, Cohen et al., 1993).

<sup>10</sup> The Center for Epidemiologic Studies of Depression Scale (CES-D) was designed to measure current level of depressive symptomatology, and especially depressive affect (Radloff, 1977). The 20 items were chosen (from 5 previously used depression scales) to represent all major components of depressive symptomatology. These include: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, loss of appetite, sleep disturbance, and psychomotor retardation. Each item is rated on 4-point scales indicating the degree of their occurrence during the last week. The scales range from “rarely or none of the time” to “most all of the time.” The scale distinguishes between clinical groups and general community group, and has shown correlations with SES (Roberts et al., 1990), (Wong, 2000).

<sup>11</sup> Subjective social status (SSS) has been found to strongly predict health outcomes and stress physiology, and is likely to be a factor mediating the relationship between objective SES and health outcomes. We will use the MacArthur Scale of Subjective Social Status to measure SSS. This instrument has two parts, one linked to traditional SES indicators (assessing placement in society at large) and one linked to a more local, immediate, local environment (assessing placement in local community). Scale rankings have shown very powerful associations with health-related outcomes in several studies (Adler et al., 2000, Goodman et al., 2001, Ostrove et al., 2000).

features of preferences (e.g., self-control, impatience) and decision-making skill (e.g., overconfidence) from recent advances in psychology and behavioral economics (Ameriks et al., 2003). These measures will permit examination of whether these proxies correlate with loan uses and ultimate outcomes, and thereby shed some light on the mechanisms underlying any observed impacts. Intrahousehold bargaining power is potentially another important mechanism, as evidenced by the microcredit industry's particular focus on female borrowers and the extensive literature on the impacts of intrahousehold resource control on family and child outcomes (Duflo and Udry, 2003). As such, the survey will include questions that review specific important decisions (related to, e.g., large purchases, employment, borrowing, school attendance) and ask who discusses these decisions and who ultimately decides in the face of conflict.<sup>12</sup> We also will examine whether access to credit impacts power and decision-making itself.

**7. Household demographics.** Attributes including gender, age, and education will be measured in order to assess the distribution of impacts across different subsamples. Such analyses on smaller subsets of the data should be productive given the targeted sample size.

#### Identifying Impacts: Empirical Strategy

Our econometric framework will estimate the effects of obtaining a loan on the derationed, using the rationed as a control group:

$$Y_{it} = f(X_{it}, L_i, H_i, T_t)$$

Where  $i$  indexes households or individuals (say households for simplicity), and  $t$  indexes time. The latter allows for the facts that: a) eventually (with the follow-up survey) we will have multiple observations on household outcomes and characteristics, and b) surveys will be administered at slightly different times even within waves, out of operational necessity.  $Y$  is a measure of liabilities, investment, or any outcome of interest.  $X$  is a vector of observable household characteristics.  $L = 1$  if a borrower in the household was derationed, and  $= 0$  otherwise (alternately,  $L$  can be a continuous measure of loan size, randomly assigned). In some cases it will be natural to add  $H$ , household fixed effects and/or  $T$ , time effects, to check robustness or improve precision.

---

<sup>12</sup> In order to address both of these questions, we will have to ask some of these questions on a recall basis, or in changes, as in

This model will enable us to test whether (and how) derationing works by estimating directly whether the derationed (relative to the rationed):

1. Enjoy a greater quantity of financial intermediation; e.g., does total debt increase (question 1)?
2. Obtain a greater quality of financial intermediation; e.g., is institutional debt substituted for informal debt (question 2)?
3. Are more likely to make investments, broadly defined; e.g., do school-, work-, or business-related expenditures increase (question 3)?
4. Make profitable investments on the margin, and at what short/medium-run returns; e.g. does employment, health, income, or consumption increase, and if so, by how much (question 4)?

Additionally, we will study the distributions and mechanisms underlying the estimated impacts (questions 6) by using sample splits and interaction terms to estimate heterogeneity in responses across demographics and decision-making variables. Finally, we will examine the welfare implications of derationing by incorporating any effects on Lender profitability into our estimates of any benefits gleaned by the derationed (research question 7). This is an accounting exercise that can be checked for identification/robustness by using the empirical results to estimate the average profitability of the marginal (derationed) loan. This will be done simply by setting  $Y$  equal to a measure of revenue or net revenue, where  $i$  now indexes loans.

One limitation of this project, in terms of its direct policy implications, is that the product under consideration is *consumer* debt. More to the point, borrowers must demonstrate stable *wage* income to be deemed creditworthy by the Lender. In contrast, the worldwide “microfinance revolution” has focused on expanding access to credit for *entrepreneurial* activity. Our next project deals directly with this market.

### Project 3: Expanding Access to Entrepreneurial Finance

This project will apply the methodologies developed in Project 2 to a new product line that targets micro-entrepreneurs. Currently the Lender provides consumer loans to households with verifiable wage employment. The Lender is extending its program to include micro-entrepreneurs. The methodology developed in Project 2 will systematize the Lender’s experimentation with entrepreneurial risk assessment by testing the ability of different types of information, and different types of underwriters (e.g., generalists vs.

---

“Do you make more decisions now relative to a year ago regarding X?”

specialists), to predict the performance of loans to micro-entrepreneurs. We will modify our borrower/applicant sample frame and survey instrument accordingly to focus more on business investment and related decision-making (e.g., risk assessment and project choice by the *borrower*), and less on consumption smoothing. As before, we expect that 2,000 completed surveys will be required to identify impacts on the outcomes of interest (e.g., business assets, revenues, income, profits).

Of course this work has clear policy and practical implications. The ability to measure impacts of entrepreneurial finance with this project meshes with the worldwide focus on expanding credit access for microenterprises. And the focus on optimizing the mechanics of risk assessment speaks directly to widespread concern with developing sustainable (cost-effective) business models of microfinance delivery. An additional benefit is that this project will provide a case study on launching a new microfinance product line via rigorous experimentation. We expect that this will provide a boilerplate that can be used by practitioners, and promoted by policymakers, to derive sustainable practices that effectively extend access to capital.

#### Data Release and Related Work

We will release data produced by these experiments to other interested academics, and expect that these data (and perhaps the sample frame as well) will provide a rich resource for questions in econometrics, contract theory, finance, and consumer choice.

We are currently exploring several extensions to the work described above, in cooperation with econometricians and contract theorists. (We also expect that researchers will make good use of the data independently of our own pipeline). On the applied econometric side, our experiments are conducive to implementing new techniques in program evaluation and optimal policy choice. Although a vast econometric literature considers estimating treatment effects, relatively little work has focused on deriving optimal treatment rules from experimental evaluations. Dehejia (2004) and Manski (2003) each discuss how approaching program evaluation as a decision problem, rather than estimation problem, poses unique issues and is critical for drawing policy implications from experiments. In particular, two elements of our experiments make this an interesting setting to explore such issues. First, we have a complex randomization, rather than the typical treatment/control setup. For instance, we have random variation of some continuous, not binary, variables, as well as random variation on several dimensions (loan size, loan approval, offer rate,

length of offer, etc.). Second and most importantly, we have the ability to run repeat experiments with this Lender. This allows us not only to test explicitly competing decision rules generated by the initial experiments, but also explore how to optimize the experimental design when sequential experiments are possible.

We are also exploring using our data to test theoretical models on optimal contract design. Our intuition is that the parameter estimates and rich data should help identify the microfoundations of the credit market under consideration. For example, given the observed constraints on the set of feasible contracts, the observed elasticities of borrowing and repayment with respect to interest rates, and the observed importance (or lack thereof) of specific informational frictions, we should be able to derive the optimal contract and compare it to what actually prevails in the market.

### Conclusion

The practice of microfinance has advanced much further in practice than our understanding of it. We propose several field experiments that will answer critical and open questions that non-experimental methodologies have not been able to answer. These include questions as basic as what is the impact of expanding credit to the poor, to the more subtle but equally important, what is the nature and extent of information asymmetries in credit markets for the poor. Furthermore, given our access to a branch network throughout South Africa, in both rural and urban areas, we will be able to examine how these issues differ between rural and urban areas, and also perhaps equally importantly, how these issues actually affect migration and remittance decisions across rural and urban areas.

These projects cross many bridges: for academics, we answer important theoretical questions about contract theory, banking and finance, and behavioral economics; for policymakers, we learn about effective methods to help poor individuals accumulate assets effectively, and about appropriate interest rate regulatory issues; for financial institutions, we learn, and develop methodologies to continue learning, about how to strengthen financial sustainability and deepen outreach to the poor.

## **4. ANTICIPATED OUTPUTS**

The proposed research will produce several academic publications (listed below). Our work will also answer several critical questions for microfinance stakeholders in South Africa and the worldwide microfinance community, and below we outline explicit plans to disseminate these findings-- to donors, policymakers, and regulators— and maximize their impacts on policy and practice. Indeed, two of the four institutions involved (Innovations for Poverty Action and the Federal Reserve Bank of New York) have direct vested interests in ensuring that the research findings do influence actual policy decisions, both in South Africa and in other countries around the world.

The explicit activities and channels planned include the following:

1. Academic publications: We envision several academic articles geared towards journals in various (sub-)disciplines, including economics, development, public policy, public health, finance, and decision theory. The papers we foresee include:
  - a. “Observing Unobservables”: This paper will estimate the prevalence of asymmetric information in a consumer credit market using a field experiment. Specifically, by randomizing the interest rate on loans twice, first on a direct mail solicitation and second on the actual loan contract, the experimental design distinguishes adverse selection from moral hazard effects on repayment and profitability. This generates unique empirical evidence on the sources and importance (or lack thereof) of asymmetric information.
  - b. “The Price Elasticity of Demand for Credit: Evidence and Implications from a Randomized Field Experiment”: We will estimate demand curves for

consumer credit loans in South Africa; explore heterogeneity across demographic background, prior borrowing experience, and investment plans; and tie our results to the hotly contested literature on modeling intertemporal consumer choice.

- c. “Pricing Psychology: A Field Experiment in the Consumer Credit Market”: We will test-- and price-- the prevalence of deviation from standard economic models of rationality, using the random assignment of interest rates and marketing strategies on actual loan offers. We find that consumer borrowing decisions depend at least as much on psychology as much on price, but that laboratory findings do not necessarily map into real world behavior.
- d. “Impact of Microcredit on Consumers”: This paper will be the first experimental impact evaluation of extending credit to the working poor. We will measure outcomes on many levels, including consumption, investment and health.
- e. “Impact of Microcredit on Microentrepreneurs”: This paper will be the first experimental impact evaluation of extending credit to micro-entrepreneurs. This will allow us to examine the returns to capital for micro-entrepreneurs and study the social welfare implications of microenterprise credit programs.
- f. “To Stress or Not to Stress: Psychological Impacts of Debt”: We postulate that stress is a useful “hidden indicator” of the success or failure of microcredit programs, and will test whether access to credit alleviates stress (by helping to absorb shocks), or exacerbates stress (due to debt burden or dreading the consequences of default).

g. “Soft Information and the Nature of Judgement: Evidence from the Field”:

We will test for the presence and meliorability of biases in loan officer evaluation of credit applications by closely monitoring the exercise of discretion and applying several layers of randomized treatments that are integrated into the day-to-day operations of a large consumer lender. The results will shed light on the mechanics of individual choice generally and credit market information issues in particular.

2. Conference titled “Improving Policies on Finance and Poverty through Experimental Research”: The Institute for Social Development at the University of Western Cape will host a conference to bring together both academic researchers and policymakers. First, the conference will include academic papers that use experimental methodologies and shed insight into important policy questions for finance and poverty. Second, the conference will include break-out sessions for policymakers and academics to discuss presented work, consider implications for critical practical issues, and design experiments to study these issues.
3. Micro Finance Regulatory Council (MFRC): The MFRC (supported by USAID) has expressed interest in the research we are conducting, and is eager to see the findings once they are developed. Several of the questions we are asking are critical to current policy issues that the MFRC faces. Furthermore, through further meetings with them, we hope to address some of these issues via refinements to our research design.
4. Innovations for Poverty Action (IPA): The mission of IPA is to work with organizations and policymakers world-wide to put the lessons of academic research into practice. Specifically, IPA works to replicate and scale successful interventions,

and to discourage unsuccessful ones. As such IPA will work to ensure that our findings will be properly translated and disseminated to organizations, donors and policymakers worldwide so that microfinance programs can improve their sustainability and targeting, and hence maximize their overall social impact.

5. Federal Reserve Bank of New York (FRBNY): We will make presentations to researchers and policymakers within the Bank and the rest of the Federal Reserve System, and also outreach to other central bankers via the FRBNY's Central Banking Seminar, an annual two-week conference that draws policymakers and regulators from around the world.

## **5. SCHEDULE OF ACTIVITIES**

10/2004:	Launch information asymmetry experiment (randomized interest rates) on non-prior-clients
10/2004:	Launch impact experiment on consumer lending operations
11/2004:	Pilot test survey instrument for consumer lending impact experiment
1/2005:	Launch impact experiment on microentrepreneur lending operations
2/2005 – 4/2005:	Conduct household surveys for consumer lending impact experiment
4/2005 – 7/2005:	Conduct surveys for microentrepreneur impact experiment
2/2006 – 4/2006:	Conduct 2 <sup>nd</sup> household surveys for consumer lending impact experiment
4/2006 – 7/2006:	Conduct 2 <sup>nd</sup> surveys for microentrepreneur impact experiment
8/2006:	Host conference on policy implications from field experiments in microfinance (at University of the Western Cape)

## **7. RESEARCH QUALIFICATIONS**

### Dean S. Karlan

Dean Karlan, Ph.D. in Economics, M.I.T. (2002), has been Assistant Professor of Economics and International Affairs at Princeton University since 2002. He is President of Innovations for Poverty Action, a Research Fellow at the M.I.T. Poverty Action Lab, and an Affiliate of BREAD. His research focuses on microeconomic issues of poverty, typically employing experimental methodologies to examine policy issues, such as the effectiveness of particular policies to fight poverty or the relevance of economic theories of individual decision-making. Much of his work uses behavioral economics insights and approaches to examine economic and policy issues relevant in developing countries. He has consulted for the World Bank, the Asian Development Bank, and FINCA International. He participates in a working group at CGAP on Savings Mobilization. He also holds an M.B.A. and an M.P.P. from the University of Chicago (1997) and a B.A. in International Affairs from the University of Virginia (1990). He has conducted field research in Peru, South Africa, Honduras, Philippines, India, Kenya and Brazil. He has received funding from the National Science Foundation, the Social Science Research Council, the Henry E. Niles Foundation, Asian Development Bank, the World Bank, the Russell Sage Foundation, the SAGA Field Research Grant, the Center for Retirement Research at Boston College, and the M.I.T. Shultz Dissertation Fund.

### Pieter le Roux

Pieter le Roux, D.D.E, University of Cambridge (1972), has been the Director of the Institute for Social Development at the University of the Western Cape since 1978 and Professor of Development Studies at the University since 1981. He has produced numerous publications on the topics of social development and political economy, and focuses much of his research on South Africa and the rest of the African continent. He has also served on various South African governmental committees, working on such issues as pensions and old age grants, child support grants, and the restructuring of social development. He was a Senior Research Fellow at the Arnold Bergstasser Institute in Freiburg, in 1996. More recently, he was invited as a Visiting Professor both at the Woodrow Wilson School of Princeton University in 2001 and at the University of Bochum in 2003. He additionally holds a B.Com Law in Economics and Private and Roman Law and a B.Comm Honours in Economics from Stellenbosch University.

### Jonathan Zinman

Jonathan Zinman, Ph.D. in Economics, M.I.T. (2002), B.A. in government, Harvard (1993), has been an economist in the Federal Reserve Bank of New York's Research and Market Analysis Group since 2002. He conducts applied research on intertemporal choice, with a focus on consumer and entrepreneurial finance. His work tests fundamental economic theories and develops new empirical methodologies designed to generate unique evidence on questions related to the optimal regulation of financial markets in the United States and developing countries. Examples of his work include using data on debit and credit card use to test theoretical models of consumer choice, and using the deregulation of credit card interest rate caps to test the impacts of credit constraints on asset portfolio choice. He has also worked for the Massachusetts Community Development Finance Corporation, and has received research funding from the Truman Scholarship Foundation, the Social Science Research Council, the Small Business Administration, the National Bureau of Economic Research, the Schultz Dissertation Fund (MIT), and the John Castle Fellowship (MIT).

Lia C. Fernald

Lia Fernald, Ph.D. in Clinical Medicine, University College London, University of London Medical School, has been Assistant Research Professor in Demography and Economics at University of California at Berkeley since 2002. Her research focuses on health and development, with an emphasis on nutritional status. She was a Fulbright Scholar in Kingston, Jamaica, and has worked and lived in Kenya, Nepal, Zimbabwe, India and Mexico. She has published several articles and book chapters relating to nutritional deficits and child development, in addition to papers about obesity, adolescent risk behavior and stress physiology. More recently, she has been working on the *Oportunidades* evaluation of children's physical and mental development for over 12,000 rural and urban Mexican families in 2001 and 2003. She continues to be involved in the evaluation of this program and is currently preparing for follow-up assessments that will occur in 2005 and 2007. She also holds an M.B.A. with a Certificate in Health Care Management from the University of California at Berkeley and a B.A. in Biological Anthropology from Swarthmore College. Dr. Fernald was recently awarded an Independent Research Scientist Development Award (K01) from the Fogarty International Center at NIH to evaluate the impact of the *Oportunidades* program on stress and mental health in children and their mothers.