Chapter 1

Financial Markets and Poverty: An Algorithm for Policy-based Research and Research-based Policy

Robert M. Townsend
University of Chicago[*]

This chapter explores the relationship between poverty and financial markets. The document serves as a guide for operations and policy on the one hand and for research on the other. But the chapter does not distinguish between these two uses. Rather, both are merged into a common goal: policy is based on research and research is geared toward generating policy conclusions. The starting point of each section of this chapter is an explicit structural model. A list of data that would be needed to test the model comes next, followed by an outline of exactly how the data would be used: that is, what procedures or tests would be employed in the analysis. The findings of the empirical work from the analysis are then presented. Then and only then are explicit, detailed recommendations for policy offered. The final section offers a few caveats, notes some weakness, and gives some directions for further efforts along this line.   References to the literature are listed by corresponding section at the end of the chapter.

The chapter is laid out by topic. The first topic concerns occupation choice and transitions into business. The goal is to use data to identify the real obstacles or barriers to trade. Wealth may appear to facilitate business formation and investment, and so the poor seem to lack opportunities—but that does not explain whether the fundamental problem is commitment and absence of collateral or moral hazard.

The second section embeds the same micro-underpinnings into a model of growth with changing inequality. An exogenously expanding financial sector is shown to have a huge multiplier effect on growth, though inequality may increase for a time along the growth path. Among those previously lacking access, the talented poor benefit the most from the expanding formal financial sector: that is, their welfare gains are large. The discussion then returns to the micro data to emphasize another feature: the allocation of risk.

The third section evaluates specific financial institutions, formal and informal, to see if they are having a positive impact on households and businesses in terms of ability to smooth idiosyncratic shocks. Then, as before, these micro-underpinnings are embedded into a model of growth with increasing inequality and taken to more macro data, in the fourth section. Policy distortions and barriers to entry are shown to slow down growth, but in this transactions cost framework, the largest gains from financial liberalization are reserved for the middle class. The gain is again quite large. The third and fourth sections provide the background for an evaluation of government development banks.

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[*] Charles E. Merriam Distinguished Service Professor, Department of Economics, the University of Chicago.

The fifth section outlines how to do the accounting, provisioning, and cost-benefit analysis, given an operating system in which credit contracts have insurance contingencies. The welfare gain from improved risk sharing through the development bank is compared to the government subsidy. The sixth section turns to another institution, village banks, as an example of how to evaluate the microcredit movement.

All the sections of this chapter draw on data from one particular country: Thailand. Multiple data bases are used. However, the methods are applicable to any country, with the proviso that there are sufficient data to test the model presented for a given topic. The methods presented in this chapter are applied to countries in Latin America in several companion chapters. Chapter 2 identifies obstacles to small business formation in Nicaragua. Chapter 4 explores growth with changing inequality and financial deepening in Peru.

Business Start-ups and SME Business Investment

The assessment of this first topic is based on "Distinguishing Limited Commitment from Moral Hazard in Models of Growth With Inequality" (2003), and "Entrepreneurship and Financial Constraints in Thailand" (2004), by Anna Paulson and Robert Townsend.

Model-Theory/Logic

Three distinct models are to be distinguished:

> *No credit* – Households must use their own funds (initial wealth, *W*) to start up business, paying a fixed cost, *x*, or expand the business, the usual kind of investment, *k*. Thus the key financial constraint is $k + x \leq W$. The occupation choice is to go into business in this way and earn profits from hired labor at wage *w*—namely, $\theta(k,l) - wl - x$—or stay in the subsistence sector earning a subsistence income, *s*, or equivalently earn (unskilled) wages, *w*, (plus a potential cost of living differential, if employment is in the city). Uninvested initial savings are carried over at home at a low return; there are no financial savings. Households vary in the fixed costs *x* they incur. Specifically, costs vary inversely with talent, which is unobserved but distributed in the population under a to-be-estimated distribution parameterized by *m*: namely, $H(x,m)$. A version of this model is Lloyd-Ellis and Bernhardt (2000).

> *Collateral* – The model is essentially the same, except that now wealth *w* can be used as collateral and households lose that collateral with some probability if they default. (Of course, the advantage to default is absence of loan repayment.) Hence businesses can borrow, unlike the no credit economy, but only up to a proportion of wealth, say *λ*, where *λ* is determined by the probability of capturing the defaulter and the interest rate. Lending is asset-backed only, and other customer characteristics are not taken into account. Thus the higher is wealth, the more businesses can borrow, up to *λW*. In Evans and Jovanovic (1989), talent is now supposed to enter multiplicatively into production, raising the marginal productivity of labor and capital: that is, $\theta \varepsilon f(k,l)$, where θ is talent and ε is an ex post idiosyncratic shock. Talent θ is distributed log normally in the population

with a mean and variance to be estimated and is allowed to be correlated with measured education and with wealth: that is, $\theta + b_1 w + b_2 edu$ plus noise.

Moral hazard – Credit is now constrained by moral hazard considerations. That is, effort *a* in the production function is unobserved. The probability of success, high output, q^h, is $P(q^h / a, k)$, although failure is possible even if the entrepreneur works hard. The households likes consumption and leisure under a concave utility function, $U(c,l)$. Failure is more likely with shirking, but is not detectable. This, then, is the moral hazard problem. Success can be made more likely by talent, multiplying the probability of success by talent θ. With presumed competition, banks are to breakeven on all customers on average: that is, for all (*W, θ*) combinations. In effect, the ex ante expected utility of a representative household is maximized subject to zero profits. The more that is borrowed, *b*, the more must be repaid to the bank if the firm is successful; hence the less is the incentive for the owner to be diligent, the lower is the repayment rate, and hence the higher must be repayment upon success: that is, the interest rate is higher. Thus, as in Aghion and Bolton (1997), the poor can be screened out of the credit market entirely, although if moral hazard is the cause, it is not obvious that there is a remedy. Going in the other direction, the relatively rich can self-finance and escape the damage of the incentive constraints; credit decreases as wealth increases.

Data Needed Overall

Only a subset of variables is used in certain procedures.

Wealth – Retrospective data on the wealth of households that were not in business at some previous year, such as five years ago. Contemporary surveys can measure wealth by asking what assets are currently held and if so, when acquired. Sales of major assets ideally should be included. A depreciation rate can be applied, given retrospective wealth at various dates. An index of wealth can be created by principal components, if all that is known is ownership. Inheritance alone, if measured, can be used as a more or less ideal instrument.

Business starts – Retrospective data on business starts. This is a binary choice: in business or not. The relevant point is the transition into business from wage work or subsistence agriculture.

Savings and borrowing – Contemporary surveys might measure savings (possibly disaggregated into type, whether cash or in-kind) and list institutions, and also credit outstanding.

Investment – How much money it took to start the business.

Measure of constraints – Businesses are asked whether they could make more money if they could expand. If the answer is yes, whether credit is the limiting factor.

Education – Years of schooling of the household head, ideally the one running the business, or the most educated household member, or of parents.

Income – An estimate of income in the past year from a contemporary survey of individual households, distinguishing agriculture, business, livestock, and wage earnings.

Demographic controls – Household size; gender and age composition.

Financial access – Whether the subject is a customer or member of a named financial institution now and had been in the past.

Methods

Method 1– Tabulations of business starts, investment, and net borrowing against wealth and education; nonparametric regressions, also known as locally linear regressions, of these same dependent variables as above, against each one of the covariates, as above.

Method 2 – Probit estimates of business starts and of whether the subject is a net borrower. Also ordinary least squares regressions of initial investment and net borrowing, allowing for multivariate controls such as demographics, education, financial access, and wealth.

Method 3 – Maximum Likelihood estimation of business starts against wealth. Each model suggests the exact form of the probability of seeing in data the observed relationship between wealth and business starts. These likelihoods are maximized by choosing the key parameters of each model—such as the tilt and/or support of the talent distribution, the parameters of the production function, risk and work aversion, and the disutility of effort—parameters mapping talent as a function of wealth and education, and the cross-sectional variation in idiosyncratic and aggregate talent and in the distribution of wages.

Findings

There is little question that credit markets are far from perfect. For business owners, collateral values average nine times the amount of the loan. For other households, the ratio is almost twice as high: seventeen times. Restricting attention to those with the median level of education (in the sample, four years) and comparing the number of households running businesses in the lowest wealth quartile to those in the highest wealth quartile, the fractions of those in business rises from 26 to 43 percent in the central region of Thailand, and from 8 to 16 percent in the northeast.

Similarly, controlling for demographic and geographic variables at the time of the 1997 survey, a doubling of household wealth five years before the interview date leads to a 21 percent increase in the number of households that went into business over the prior five years (1992–97). Likewise, the presence of financial constraints implies that entrepreneurial households that are in business invest less than the optimal amount.

According to the estimates, as of 1992, a doubling of wealth in the cross-sectional sample is associated with an increase in start-up investment of 40 percent. Likewise, under financial constraints, the returns to business investment will be high for low wealth households and will fall as wealth increases.

For the whole sample, median returns to business investment—that is, income to capital ratios—fall from a strikingly high 57 percent for households in the lowest wealth quartile to 16 percent for households in the highest wealth quartile. Entrepreneurial talent, as measured by education and whether parents were in business, does seem to facilitate business entry and the ability to exploit relatively high marginal returns, but it also appears there are a nontrivial number of talented but low-wealth households that are constrained on these margins.

Moreover, if the data on credit as function of wealth for those businesses that report credit constraints are examined, the level of credit decreases with wealth: that is, net savings increases with wealth. Among the subsample of relatively wealthy households in the central region, a doubling of wealth leads to a 40,000 baht increase in savings. This is not true in the northeast. Likewise, the moral hazard model predicts that virtually all businesses that borrow will report some degree of constraints, whereas the asset-based lending model allows low-talent households to borrow and go into business without hitting constraints. The data reveal that being constrained is strongly associated with borrowing in the central region; nearly three-quarters (73 percent) of constrained business in the central region have outstanding debt, as compared to only about half (54 percent) of unconstrained businesses.

Constrained businesses in the central region also have more debt than unconstrained businesses: a median of 50,000 baht versus 30,000 baht. That is, businesses that have managed to secure more credit are businesses more likely to complain about persistent constraints. Neither of these relationships holds in the northeast. The implication of some of the models that investment should increase with education and talent is strongly supported in the data, contrary to the presumption that talented households will need to invest less.

Thus physical capital and human capital are complements. More educated households will want to invest more—and holding wealth fixed, increasing education causes more households to complain of credit constraints.

Policy Implications:

The policy implication is that overall wealth does limit access to credit in the northeast of Thailand in a way that might be remedied by relationship-based lending. The joint liability groups of the agricultural development bank, the Bank for Agriculture and Agricultural Cooperatives (BAAC), are not helping as much as might have been anticipated. The level of credit is still limited by wealth, and indeed entry into a joint liability group may be limited by wealth. This is not to say that the BAAC is not helping. Despite its charter and history, the BAAC does facilitate business entry and business

investment. But it is doing so in a way that links its credit access and credit supply to wealth.

In contrast, neither village-level institutions nor networks of friends and families in the northeast of Thailand have sufficient resources to overcome the simple observed relationship between wealth and credit in a substantial way—despite alternative selection and lending procedures. (For a rigorous assessment of village funds, see Kaboski and Townsend 2001.) Though helping to alleviate constraints in business and agriculture, business start-ups are apparently not facilitated.   Commercial bank lending is so rare in the northeast that it fails to be a consideration in business starts and investment; less than 2 percent of the population have loans.

This is not to say that one should give up on commercial bank lending. It appears that there would be a way for commercial banks to make profits in this sector, in the northeast. In the central region, BAAC credit, though still dominant, at 24 percent of all lending, is matched closely by commercial bank lending, at 21 percent, and from friends and relatives, at 17 percent, respectively. In the sample period, the BAAC gained more in interest income from larger, wealthier clients—precisely those households eligible for commercial banks loans. Thus it is a reasonable inference that the BAAC might be less willing to foreclose when such clients run into difficulties, potentially smoothing consumption or lessening investment fluctuations. The BAAC does have in place a risk-contingent lending system that would allow delayed repayment in some events. This should be viewed a good thing, a priori, although it is not clear why this plays less of a role in business start-ups and financing in the northeast. Ways to make the BAAC risk-contingent credit system more explicit and improve the accounting so as to better assess its benefits are discussed in Townsend and Yaron (2001).

On the other hand, ample credit from the informal sector in the wealthier central region may be the key ingredient that allows for risk-contingencies in loans. When in trouble, a relative or moneylenders pays for the client. Thus the Thai government should reconsider its efforts to eliminate money lending, especially if the credit instruments it promotes in government institutions or imposes through regulation are limited to simple noncontingent loans.

What matters is the nature of the financial instrument. Higher wealth households may be able to piece together a variety of financial instruments in a way that makes the whole greater than the sum of the parts. In contrast, in the northeast, households are more dependent on BAAC—if they can secure credit at all—so much attention should be given to the financial instruments currently offered by the BAAC or those to be offered by newly emerging institutions such as the People's Bank. Optimally designed credit contracts need to take into account risk, incentives, and the ability to repay.

Caveat/Sensitivity/Extensions

These models are static and hence do not capture possible interactions between wealth and talent. That is, wealth may appear to alleviate constraints but part of that may be correlated with underlying, unobserved talent. Instruments for exogenous wealth should

be used where possible. Extensions underway allow for multiple lenders, making explicit a tradeoff between money lenders with full enforcement and lower transactions costs, smaller loans at high interest, versus commercial banks requiring collateral and larger transactions costs, higher rates (Xavier Giné). A larger array of credit contracts allowing for blends of moral hazard and default are being estimated (Alex Karaivanov). Finally, less structure is imposed on the production function and unobserved distributions of talent in each sector (Buera 2002b). The bibliography for this first topic appears at the end of this chapter.

Financial Liberalization and Growth: **Poverty Reduction through Improved Occupation Choice**

The assessment of this second topic is based on "Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice" by Xavier Giné and Robert Townsend.

   Model

   There is a sector of the economy without any intermediation (or in an extension, informal credit only). This sector is like the Lloyd-Ellis and Bernhardt (2000) economy described earlier as the no credit economy (actually its no credit and no financial savings). Wealth is a constraining feature on investment k and occupation choice (particularly transitions into business).

   In a second, intermediated sector, there is an endogenously determined interest rate, r, at which all households can borrow and lend—so it is as if all initial wealth, W, were put on deposit in a bank, earning $(1+r)W$ and those who start a business borrow to cover the setup cost, x, and investment, k. Thus investment and occupation choice are not related to wealth in this sector. Production takes place in cities, and there is a cost-of-living urban/rural differential. The wage rate is common to both sectors, so migrants from the nonintermediated sector can earn wages but cannot deposit earnings in a savings account. Again, setup costs vary inversely with talent, and there are some poor talented households and some rich but not-so-talented households, among other categories.

   This intermediated sector is small initially, but is presumed to grow slowly at the rate observed in the data (to move with measures of financial deepening). More specifically, the rate can be varied exogenously in the model and policy experiments can be conducted. Households choose occupations at the beginning of the period, either nonfarm investment, wage earnings, or subsistence agriculture. Initially, low wealth constrains choice, so wages are low and profits for those in business are high. End-of-period wealth is saved at a fixed rate (myopic savings) or in another interpretation, passed along to heirs (inheritance). As entrepreneurs earn rent, initial inequality grows. Overtime, as wealth accumulates, more households can transit into business. Eventually, however, the wage increases and hence profits decrease. Income differentials decrease and inequality decreases as well. The model has no endogenous growth and so the match should be with GDP growth less total factor productivity. In principle, informal credit can

accelerate the expansion, as could international capital inflows into the intermediated sector.

Data

Micro Data 1 – Some data are used to estimate the underlying parameters of the model: namely those of the production function, subsistence income, and the skewness of the talent distribution. These can be obtained as in Paulson and Townsend (2003); as this was described above, the list is not repeated here. In addition, standard socioeconomic income expenditure surveys can be used.

Micro Data 2

> *Wealth index*– An index of wealth for a cross-section of households is created from data recording the ownership of key assets (principal components).

> *Occupation of the head* – Whether in the nonfarm business or not. It is best to use young households, headed by those between the ages of 20 and 29, who plausibly have not had time to let earnings from businesses influence current wealth.

> *Access to the financial sector*– As recorded in the socioeconomic survey as a transaction in the previous month with a named financial intermediary.

> *Wages and subsistence income*.

Macro Data

> *Income growth over time*, as measured in national accounts.

> *Financial sector access over time*, as previously discussed.

> *Fraction of households in nonfarm business*.

> *Labor share in national income*.

> *Gini measure of inequality,* as computed for household income surveys.

> *Savings*, as measured from national accounts.

> *Total Factor Productivity*, as estimated through Solow residuals from data on capital, labor, and output.

> *International capital inflows*.

Method

> > *Micro 1* – The model delivers a likelihood of nonfarm business occupation as a function of wealth (see Paulson and Townsend 2003).

Macro 2 – A numerical algorithm takes as given an initial, estimated distribution of wealth in an initial year, 1976, although rescaled to fit the model. Occupation choice is determined in this and all subsequent years at the estimated parameter values. Wages and interest rates are found through a bisection algorithm so as to clear the labor market and the credit market in the intermediated sector, respectively, again in each year. Wealth is accumulated across household dynasties by a calibrated savings rate. Finally, the model is simulated. Remaining parameters (cost of living, exogenous growth in the agriculture sector, and savings rate) are calibrated, inducing the best fit of the model economy with the dynamic macro variables.

Findings

Using this simple economic model, one can understand Thailand's remarkable growth from 1976–96, which averaged 6 percent and was much higher in the second part of this 20-year period. The growth rate was driven in no small part by improved financial intermediation. If, contrary to what actually happened, that expansion had been far more limited—virtually zero—then the model predicts that Thailand would not have grown much at all. The best that could have been managed would have been a low and flat 2 percent per year, and that is driven by an overestimate of total factor productivity (TFP) gains in agriculture, at 4 percent per year. The observed increase in the GDP growth rate (net of TFP growth), from the mid- to late-1980s on into the early 1990s, at 8 to 10 percent per year, can be reconciled in the model only by imagining a domestic savings rate at astoundingly high levels. In other words, the model predicts that households would have saved a large fraction of their income, far above what was observed in that period.

However, if one progressively allows the population access to competitive financial intermediaries at exactly the rate observed in Thai data, with its surges from 10 percent with access in the mid-1980s to 20 percent by the mid 1990s, then one can track the upturn in the Thai growth rate reasonably well. More generally, the model is able to reproduce the movements of key macroeconomic variables such as the labor share, savings rate, income inequality, and the fraction of entrepreneurs observed in Thailand during the past two decades. Indeed, with the understanding of Thailand's historical experience that the model provides, one can ask who gained from the observed financial sector expansion. This issue can be addressed by comparing two versions of Thailand's history from 1976–96: the actual one, and a counterfactual one with a policy distortion that limits financial intermediation even below the observed low level.

The results confirm that not everyone benefits equally from the financial expansion. In 1978, for example, the modal gain from intermediation was between 5,000 baht and 17,000 baht per household, measured in 1997 domestic currency (the numbers depend on the specific estimation procedure used). Under the former exchange rate, this is equivalent to $200 to $680 per household for that year. Relative to average income, these numbers represent a 14 to 41 percent increase in the levels of income in 1978, a surprisingly high increment. Moreover, relatively low-wealth households that managed

to switch occupations and go into business gained the most; the welfare numbers would be even higher if the simple arithmetic average had been used. By the year 1996, the wage is roughly 60 percent higher than it would have been without the expansion. Such price movements help determine the distribution of welfare gains and losses attributable to expansion of the financial sector.

The bottom line is that there were still substantial winners in 1996: that is, wealth accumulation had not overcome financing constraints, so the economy without intermediation suffers relative to the one with intermediation at the observed rate. The modal increase in welfare was 25,000 baht, or approximately 26 percent of 1997 average household annual income, equivalent to $1,000. With the wage increase, unskilled laborers employed by business also gained.

However, that wage increase created welfare losses for those running firms: namely 116,000 baht each for such households, on average—roughly $4,600. Surprisingly, capital inflows do not seem to lie behind the dramatic expansion and the welfare gains associated with intermediation. The gains are coming from access for those who previously did not have it, and not from increased credit for those who already have it. Even the addition of informal credit for those without formal access does not alter this picture. Building financial infrastructure would seem to be the key to growth, although again, there would be some who lose.

Policy Implications

If intermediaries had been allowed to expand at a faster pace, and if these same institutions had efficiently allocated credit to productive sectors, as the model assumes, then growth would have been even higher. However, in 1996, the Thai economy still displayed the same symptoms as in its earlier history, and there is no indication that the situation is any different today. That is, in 1996, the number of households with nonfarm businesses stood at only 20 percent of the population. More telling perhaps, the cross-sectional relationship between wealth and entrepreneurship was quite sharp: 8 percent for the low wealth deciles and 30 percent for the highest.

Similarly, the number of those with transactions with a financial intermediary in the prior month stood at only 27 percent of the population in 1996, and the cross-sectional gradient was even steeper: 9 percent at the lowest deciles to 45 percent for the highest. These numbers can be adjusted so that they reflect initial conditions: for example, for the young who have most of their wealth from bequests and little from business operations. One suspects such numbers deteriorated only during the financial crisis. For example, according to the Townsend-Thai data, commercial banks had only a 16 percent share in total lending in semi-urban and rural areas in 1997; this declined to 9 percent by 2000. The number of commercial bank borrowers stood at only 3 percent in 1997, and this dropped to 2 percent by 2000. The bottom line for policy is that an efficient expansion of the Thai financial system now could be an engine for much higher growth. The logic and numbers behind that recommendation are of exactly the same kind as economic/historical mechanics described above.

Still, the solution does not lie in simplistic or blunt policy instruments aimed at expanding credit and saving facilities. It is important that any such expansion take place efficiently. Specific policies need to be directed at specific institutions. Savings mobilization programs and the establishment of village funds continue to be promoted by government agencies, but unfortunately without much critical review. Not all institutions and polices are successful. For a more detailed assessment of the impact of particular institutions and particular policies, see Kaboski and Townsend (1998). Likewise, access to credit is limited and often linked to land as collateral, especially among low-wealth households and those in the northeast. Client-based lending procedures would seem to be helpful, rather than client-blind, collateral-based, asset-backed lending. These are already used, but ironically seem more effective in the central region and among higher wealth households.

For a more detailed analysis of micro underpinnings of credit markets and the macro economy, see Paulson and Townsend (2001). More flexible risk-contingent lending could be helpful, but the current regulatory system forces Thai policymakers to face a hard choice between seemingly popular but potential ad hoc and inefficient debt moratoria, on the one hand, versus inappropriate classification of nonperforming loans and inefficient provisioning, on the other. More generally, there seems to be poor understanding of a risk-contingency system that has served the BAAC and Thai population well. See Yaron and Townsend (2001) for an analysis of the larger, BAAC system and how the regulatory accounting framework and the operation of the BAAC could be improved, specifically coupling accounting standards with micro economic data. Finally, there has not been, to our knowledge, a rigorous assessment of the efficiency of commercial bank lending: an assessment that would also combine models and data, along the lines of this chapter.

In summary, Thailand has within its grasp the ability to increase the growth rate of national income and improve the well-being of talented entrepreneurial households among the poor and middle classes. What is required is a well-functioning financial intermediation system that allows such talented households to go into business or expand existing businesses. Estimation based on a formal economic model suggests that beneficial effects could be large if the financial sector reforms are well-conceived and carefully implemented.

Caveat /Sensitivity/Extensions

A more realistic household-based, dynamic decision model is needed Similarly, a richer model of the credit market might matter for dynamics. (See Karaivanov, in progress). The current model is sensitive to certain parameter values, which can cause binding corners in hired labor. The simulated paths are sensitive to the timing of the depletion of the subsistence sector, especially labor share and inequality.

A bibliography for the second topic appears at the end of this chapter.

Risk, Safety Nets, and the Ideal Role of Financial Institutions and Financial Instruments

The assessment of this third topic is based "Safety Nets and Financial Institutions in the Asia Crisis: The Allocation of Within Country Risk," by Mauro Alem and Robert Townsend (2001).

Model

There are idiosyncratic shocks, ε, hitting households individually and aggregate shocks, θ, hitting everyone simultaneously. The essential idea is that, without moral hazard or reneging problems, idiosyncratic shocks can be shared or pooled, leaving only aggregate shocks to influence consumption. Thus individual income movement, and other shocks, should not determine individual consumption once one controls for aggregate consumption. The basic regression equation captures this succinctly:

$$\Delta c_{t,t+1}^{j} = \beta_{t,t+1} D_{t,t+1} + \delta \quad \Delta \overline{A}_{t,t+1}^{j} + \eta \ \Delta hs_{t,t+1}^{j} + \xi \ \Delta X_{t,t+1}^{j} + u_{t,t+1}^{j}$$

Household consumption change, Δc, is regressed on to fixed time effect, D, and household income change, ΔX, as well as changing household demographics, Δhs, relative to population average demographics.

The coefficient ξ should be zero. This is the benchmark. In practice the issue is whether a positive coefficient is reduced by access to a financial institution or is lower for certain demographic or income groups.

Likewise, in a full neoclassical model, capital should be allocated across projects so as to equate the value of marginal products. Thus individual income change should not determine investment once one controls for aggregate shocks that determine future valuation. Again, a regression equation of household investment, I, onto time fixed effects D and household income change ΔX is:

$$I_{t,t+1}^{j} = \beta_{t,t+1} D_{t,t+1} + \delta \ \Delta A_{t,t+1}^{j} + \eta \ \Delta hs_{t,t+1}^{j} + \xi \ \Delta X_{t,t+1}^{j} + e_{t,t+1}^{j}$$

The coefficient ξ should be zero. This is the benchmark. In practice the issue is whether a positive coefficient is reduced by financial access or is lower for the wealthy, for example. Alternatively, change in investment should be insensitive to cash flow.

Data

Household consumption for a number of years, possibly estimated by a subset of items every year and then weighted and scaled up.

Household income, as measured by gross revenue less expenses for agriculture, business, wage earning, fish/shrimp, and livestock.

Recall, retrospective data on whether this past year was better or worse than the year before, and if worse, the shock or cause, and also the response

Investment, as measured by change in owned capital stock over each sector separately, excluding household durables.

Demographic controls – Age, wealth, gender of the head, household size access to or membership in particular financial institutions, as measured by the household's own response, head of the village, census of nearby villages. These institutions and mechanisms include the BAAC, commercial banks, village funds, the informal sector, having rice storage, change in savings, and change in debt outstanding by institution and/or mechanism.

Methods

Decomposition of income change – Regress household-specific income change against time-specific fixed effects, within regions and overall. Regress household-specific income change against level of income accounted for by each sector in the base year, or growth of income against proportion accounted for in the base year.

Plot histograms of income in the cross-section and compare over time and over sector.

Tabulate proportions of household claiming to have had a bad year, and fraction with particular shocks.

Enumerate claimed response in the face of adversity.

Consumption insurance – Regress household-specific consumption change, per capita and real, against household-specific income change, per capita and real, and also against time-specific *tambon* (county) fixed effects, a term reflecting the change in the demographic characteristics of the household relative to the *tambon* average, and household size. Do this overall and by region. Also stratify by wealth, education of the head, gender of the head, age, and by income source (primary source of income and occupation of head).

Investment efficiency – The same regression with household investment (or change in investment) on the left-hand side.

Evaluate the financial institutions/mechanism –Add a selection or participation equation that regresses household claimed membership in the initial year (or whether or not had savings in that institution in the base year) onto wealth, education, gender, age, household size, and also onto mean wealth of the village and mean education level of the village, and as an instrument, whether or not the headman of the village says there was access in the village to that institution in the initial year, or a smoothed average of whether other villages had access according to a village census of the year closest to initial year, or distance from the district center, or surprises (village that had access but were not predicted to have, and vice versa). Then take the predicted value of access from the participation equation and put that into the consumption or investment equation

above as a right-hand side variable, interacted with income change. Use it also to create time-specific fixed effects that distinguish whether the specific household is a member or not and also the relative demographic change for members and nonmembers. Also enter demographics and wealth interactively with income change so as to better distinguish the effect of the institution interacted with income change.

Findings

It appears that macroeconomic data painted a somewhat misleading picture of the health and well-being of the Thai population. That is, for the semi-urban and rural sample under consideration, macro shocks pale in comparison to the diversity of idiosyncratic shocks to households, villages, and regions. During the period of the financial crisis, households and businesses were suffering from regional shocks such as floods, pests, and drought, and from idiosyncratic shocks such as illness and death in the family. More macro shocks such as fewer days worked, increases in input prices (including increases in business expenses), and decreases in output prices were present as well, but they are only part of the overall story. That is, controlling for the aggregates, one is left with striking residual movements in income, consumption, and investment. The diversity of responses across households and businesses is also striking, and among the measured responses so is use (or disuse) of the formal institutions through which the IMF, World Bank, and Asian Development Bank were implementing macro, reform, and safety net policies. This study singles out commercial banks, the government's Bank of Agriculture and Agricultural Cooperatives (BAAC), and village-level financial institutions such as rice banks and Production Credit Groups (PCG), and also focuses on the informal sector and self-insurance strategies. The bottom line is that macro crisis and subsequent policy play a role—not only directly in terms of macro shocks to income, but also indirectly through the financial institutions that might otherwise intermediate credit and ameliorate idiosyncratic shocks.

Some of the principal safety net policies put in place in Thailand at the time of its financial crisis were misdirected. Wage earners as an occupation group were not particularly vulnerable through unemployment or unpaid wages. Incomes of this group did not fall on average as much as in the other categories. On the other hand, it is important to distinguish the impact of average income on average consumption from the impact of a deviation of a household's income onto its own consumption deviation, holding aggregates fixed. Using the latter metric, it seems that wage earners (and others in agriculture) in the northeast would have benefited from some kind of within-group safety net—that is, increased within-group wage income insurance—even if this had been financed entirely within the group itself.

Further, while households with small businesses were vulnerable as a group to falling incomes, policies to promote small business formation, as though village funds, seem to have been off the mark. Business starts were relatively strong through this period, and business owners seemed to have had a surprisingly high level of within-group insurance, at least for the purpose of smoothing consumption (this had little to do with village funds). Unfortunately though, investment remained sensitive to changes in household

income. Shrimp growers in Chachoengsao seem especially vulnerable to income change on both consumption and investment.

Safety net policies attempt to target particular groups. There is not apparent evidence in the panel data, which reveals particular and consistent vulnerability for the elderly, female-headed households, those with low education, or those with low wealth. There is, however, a distinct regional pattern. Apart from low education, all the other potential targeted groups do worse in investment stabilization in the northeast. But overall, those households suffering a direct consumption impact from bad years lie not in the poorer northeast but rather in the industrialized central region. There are also variations *within* regions, and drought, flood, pests, and illness compete with macro shocks such as unemployment and price movements in an explanation of investment and consumption change.

The primary source of formal credit to Thai farm is the Bank for Agriculture and Agricultural Cooperatives (BAAC), the government's primary development bank. It has in place a risk-contingency system under which loans are extended and interest and/or principal partially forgiven for farmers experiencing adverse events, both household-specific and regional.   Thus one would have thought the BAAC would do a reasonably good job in smoothing consumption or maintaining investment. See, for example, Townsend and Yaron (2001) and Chiarawongsee (2000). But the analysis of the consumption and income panel data here shows that the BAAC was not particularly helpful in buffering consumption from adverse shocks. There are exceptions, mostly in the northeast.   It is conceivable that outside agencies misunderstood the risk–contingency system of the BAAC, and that, as with commercial banks, they curtailed on-lending accordingly. In contrast, on the investment side, the BAAC has performed quite well in buffering investment from adverse shocks. Evidently credit from the BAAC is used to finance the levels of and fluctuations in investment.

Village funds have long been promoted in Thailand as a cooperative solution to an otherwise restricted financial system. Local, microcredit institutions have been established in many villages to expand credit to farmers or small business, as with Poverty Eradication Funds; to promote change of occupation, as with Women's Groups; to mobilize saving, as with Production Credit Groups; and to provide assistance in emergencies, as with Rice Banks. In the larger 1997 retrospective survey, Women's Groups and Production Credit Groups show up as having had a beneficial role in risk reduction, although funds in general suffer from failure and much turnover (see Kaboski and Townsend 2001). The panel data paint a interesting if complicated picture, with funds seemingly helping to smooth consumption when the BAAC does not, and helping to smooth investment when the informal sector is inadequate.

Help from friends and relatives, and from moneylenders, traders, storeowners, and others in the informal sector, shows up as particularly helpful in smoothing the effect of adverse shocks onto consumption. The informal sector is less successful overall in smoothing investment, but there are many helpful exceptions, particularly business investment.

In times of global instability, self-reliance is particularly appealing. Thai farmers free from drought or flood have ample crops of rice, which they store locally, in anticipation of future shortfalls. But the data reveal little beneficial year-by-year impact, at least not in the short run. Indeed, northeastern farmers in Srisaket who escaped the El Niño drought increased their stores of rice in the early "crisis" years even as they reduced consumption. Unfortunately, this seems to have reduced insurance, thus resulting in a perverse effect from rice storage.

Policy

During the financial crisis in Asian countries such as Thailand, macroeconomic aggregates were used to portray the health or state of the impacted economy. Negative GDP growth was taken to indicate a fall in household welfare, for example. As a result, high interest rate policies were initially used to encourage foreign (re)investment and expansionary monetary and fiscal policies were used later. Moreover, as commercial banks and finance companies were thought to be culprits in instigating the crisis, financial sector reforms were also implemented. The focus was on increasing capital adequacy ratios and reducing nonperforming loans. Finally, safety net policies recognized that particular groups or sectors might be more vulnerable than others to downturns, if not to the adverse effects of tight policy. Thus a government agricultural development bank was used as an engine of growth, and the government saving banks was used to promote village funds and small household business.

From this discussion, several related points deserve emphasis. First, macro policy, financial sector reform, and safety nets work in varying degrees through the financial system, sometimes through the very same financial institutions. Yet these policies were implemented without a common conceptual framework. Indeed, there has been little theory-based assessment of the financial institutions or the safety net policies. Nor has there been an integration of any such assessment with the construction of improved macro models.

All of this suggests an obvious alternative strategy: explicitly incorporate the diversity of shocks, use the theory of an optimal allocation of risk-bearing as a benchmark to evaluate the role of the financial system, and thus appraise financial sector reforms and safety net policies, both for their own importance and to formulate improved macroeconomic policy, both in crisis periods and in the long run. This study utilizes a unique set of panel data for Thailand, and the advantage of hindsight and analysis, to establish and carry out this agenda. More specifically, it should not be presumed that in times of macro crisis and structural reform that macro shocks per se are the main source of the problem, nor that the poor are suffering relatively more. In Thailand, the larger effects on consumption were in the industrialized developed region. On the other hand, investment effects were worse in the semi-arid and poorer northeast. Finally, within the northeast, but not the central region, a better case could be made for targeting. That is, low wealth households in the northeast suffered income fluctuations in consumption more, and female-headed households and low wealth households suffered income fluctuations on investment more.

Targeting by occupation group is treacherous. Average wages and remittances did not fall as much as in other sectors , and concerns about unemployment were misplaced. On the other hand, within the group of wage earners, or those within agriculture, there were relatively uncovered idiosyncratic fluctuations. So within-group insurance might be envisioned . In contrast, while profits from nonfarm business and shrimp farmers fell substantially, perhaps justifying efforts to safeguard and encourage small business, within-firm insurance was surprisingly high. It is important to discover what mechanism is at work. Still, fish farmers suffered both relatively uncovered income-induced consumption and investment fluctuations.

Thus idiosyncratic shocks retain their importance even in the macro crisis, and though measured aggregate shocks were not large, the associated macro policies and financial sector reforms may have impeded the ability of the financial system to play its traditional risk reduction role. Under the threat of nonperforming loans and regulatory tightening, commercial banks reduced on-lending dramatically, yet this left household more vulnerable than they might otherwise have been. Ironically, reduced savings accounts did provide ample buffer-stocks, though symptomatic of the disintermediation. This suggests that banks be evaluated and regulated on broader criteria, such as diversification, and that banks be encouraged to make explicit contingencies, or create contingencies in their credit contracts.

The BAAC does have such instruments, as documented in Townsend and Yaron (2001), and it did play a more constructive risk-reduction role in the crisis, with exceptions. Still it was under pressure to reduce loans judged as nonperforming, using a mechanism inconsistent with its own operating system.

Informal sector credit rose in the period, and was quite helpful. The government should view the informal sector and financial markets more generally as co-partners in risk reduction efforts. An enhanced allocation of risk-bearing through formal financial institutions can have a direct, positive effect on growth, as is made clear in the work of Townsend and Ueda (2001). Thus risk reduction is not a simply safety net issue, but rather has consequences for long-run efforts to alleviate poverty.

Caveats/Extensions

Ideally, the risk-sharing regressions should control for labor/leisure choices and employment should be considered jointly with consumption smoothing. Much work remains to be done with the investment equations, distinguishing by sector and purpose, but also modified to include adjustment costs.

It must be emphasized that the standard being employed here is overly strong. A priori, one would not expect many households or businesses to pass the stringent tests of full insurance for consumption and neoclassical efficiency in production. The observed degree of deviation, while a good standard for evaluation, begs for an explicit alternative model that incorporates impediments to trade, private information, limited legal enforcement, or other transactions costs. With these models, one could better gauge whether alternative macro or regulatory policies could have improved matters. Moreover,

there is no attempt in this study to explain movements in the macro aggregates, in consumption, or in investment, for example. Rather, deviations around measured aggregates are used in the full insurance tests. An alternative, more explicit macro model with explicit micro underpinnings and impediments to trade would presumably have something to say about movements in these aggregates. Indeed, the facts that are reported in this study could be used along with risk-bearing analysis to guide the construction of such models.

A bibliography of the third topic appears at the end of this chapter.

Expansion of Financial Services and the Allocation of Risk: Growth with Optimal if Inevitable Inequality

The assessment of this fourth topic is based on "Transitional Growth with Increasing Inequality and Financial Deepening," by Robert Townsend and Kenichi Ueda (2001).

Model

Households maximize the discounted expected utility over their lifetime (infinite horizon in the model) by choice of how much to save, *s*, each period, and how much to invest in a risky as opposed to safe occupation or asset, ϕ:

$$E_1\left[\sum_{t=1}^{\infty}\beta^{t-1}u(c_t)\right].$$

Households investing in the risky enterprise, such as nonfarm business, experience idiosyncratic shocks, ε, and aggregate (macro) shocks, θ. Thus the law of motion for capital is:

$$k_{t+1}=s_t\left[\phi_t(\theta_t+\varepsilon_t)+(1+\phi_t)\delta\right]$$

The financial system provides two benefits. First, idiosyncratic risk is shared better. It is completely pooled, as if setting all idiosyncratic shocks to their zero mean; this is achieved by lenience on loan repayments in adverse years. Second, producers and households receive advance information through experience of others in the financial system) on shocks θ, so that they can choose technologies or occupations under much better information than for those in autarky. But there is an initial fixed participation cost, *q,* a fixed cost upon entry (learning cost or physical infrastructure), and also a marginal transactions cost, c, per unit transaction. This delivers a critical level of wealth, *k**, below which households will decide to not gain access. All agents save, as in a neoclassical model of growth with linear and high return technologies, but the relatively poor save as well, to buffer adverse idiosyncratic shocks and to smooth consumption against eventual entry costs. Over time, households make transitions into the financial sector, and this

changing fraction of the population with access is correlated with income growth and inequality change. Those in the financial system tend to experience high growth, and co-movement of consumption. Those outside the financial system experience slower growth, depending on the mix of traditional to high-risk technologies. Lack of risk-sharing can push them toward safer technologies, but the nonconvexity of the entry decision can push them toward risky if uncovered enterprise, with some failing and falling back. Those outside the formal financial system experience uninsured income fluctuations. Thus this transition economy grows with high and widening income differentials and inequality typically increases. But if the expansion is not restricted, this change in inequality is inevitable. That is, there are not enough resources to instantaneously create financial infrastructure. In the steady state, which is achieved quite slowly, insurance is complete and (without a surprise redistribution) inequality is locked in.

Data

> *Wealth* – Estimated from a cross-sectional income and expenditure survey, using data on ownership of a list of financial assets.

> *Income* from farming or subsistence wage earners, and from nonfarm entrepreneurs.

> *Capital,* as measured by ownership of agricultural, business, household, and livestock assets.

> *Income to capital ratios* for these occupations to mimic average returns to the risky and safe asset.

> *Measures of whether or not a household is participating in the financial sector in initial years,* as measured by a transaction in the prior month with a named intermediary.

> *Participation over time in the financial sector.*

> *Gini measure of inequality over time.*

> *GDP growth, over time.*

Method

Solve a dynamic stochastic optimization problem using the value function approach for each household separately as a function of current wealth. Optimally, this uses the value functions for those in the financial system and those artificially prohibited from ever entering the financial system, creating upper and lower bounds on returns, as well as a good approximation to value functions: functions for high and low capital values. Capital is gridded to a large, fine number of values within these bounds, and value functions within this range are approximated at each step by polynomials and integrated by Gaussian curvature methods. Income to capital ratios are set at observed values. Risk aversion and the intertemporal discount rates are set at typical values, as in the real

business cycle literature. Idiosyncratic and aggregate shocks are entered with nontrivial variances (though these will be estimated in subsequent work). Marginal transactions costs are set at plausible values.

For a household not in the financial sector, the decision is how much to save and how much to invest between the safe and risky assets. For a household in the financial system, advance information is very good and the only decision is how much to save. A solution thus yields endogenous portfolio and savings policy functions and critical values of capital necessary for entry. As an initial condition, start the economy at the initial date with a wealth distribution as measured in the data in the initial year, but centered so that at the derived critical value of capital, the observed participation rate is mimicked.

Next, characterize the mean, analytic path, and the central tendency path of the economy based on the derived policy function, taking expectations over shocks. Plot those dynamics against the observed data on growth and participation for the (Thai) economy. Finally, simulate the same economy 10,000 times and pick the small set of paths from models that are closest to actual dynamic Thai path, comparing the Gini measure of wealth inequality, the participation rate in the financial sector, and the growth rate of income. Alternatively, pick the paths that are closest to the observed Gini coefficient and growth rate of income, and then construct confidence intervals for the range of financial participation predicted from the model, to be compared to the actual participation rate.

Findings

The model at given and nearby parameters tends to under-predict the growth of income, especially during second decade, the 1986–96 period, though its prediction for Thailand is of high growth in the long run, with the associated nontrivial inequality. Income differentials between sectors widen over time. Growth and income inequality are created by shifts in the population to the intermediated sector over time. But at these values, the model tends to over-predict substantially the fraction of the population participating in the financial system. Making households substantially more risk-averse and giving them a higher preference for current consumption tends to slow growth, thus lowering participation; but the model's simulation still substantially over-predicts the actual lower rate of participation in the Thai population, as historically observed. The conclusion is that something in Thailand was impeding the construction of a far-reaching financial infrastructure that households and businesses would have been willing to pay for. One suspects that otherwise well-intended Thai policy is responsible.

Policy Implications

The model tries to capture the impact of the wide array of restrictive policies that existed in Thailand up to the early 1990s, by crudely and exogenously restricting entry to those with even higher wealth: higher than the model without restrictions would predict. It is as if commercial banks and other financial institutions were underinvesting in middle-wealth regions, for example. The welfare losses associated with such restricted policies can then be estimated. These losses are nontrivial—averaging from 4 to 10 percent of wealth—and positive for virtually the entire Thai population, except those high wealth

individuals and businesses already in the financial system by 1976, and those so poor that without some other form of redistribution, eventual entry would be extremely distant. The magnitude of this loss from restricted policies is thus quite large. This is the main lesson learned from the model exercise.

In addition, the concentration of losses in the population is not uniform; it tends to be skewed to the middle class: those with wealth not too far from the imposed value. That is, those that gain the most are those middle-class households and medium-scale enterprises that would be willing to pay fees and enter the system, or obtain yet more credit and insurance, if only Thai financial policy were to permit it.

This concentration of gains among the middle class is the second lesson. The policy recommendation is that Thailand take steps to liberalize its financial system further. In particular, access should be increased in semi-urban and rural areas, with the cost passed on to business and households in the form of higher fees. Widely used macroeconomic and financial ratios, such as M2/GDP, possibly indicative of financial deepening or inflation pressures, can be misleading because they do not capture the underlying disparities in access. Similarly, the financial system needs to play the role envisioned in the model, with better pooling of information on project success and enhanced insurance or credit-guarantee schemes, although again these indemnities should be funded with adequate self-generated premia. Current regulatory efforts concentrating on nonperforming loans have underplayed disclosure and underplayed the risk reduction achievable with portfolio diversification and adequate risk contingencies.

Caveats/Extensions

There is a need to model better, and make a distinction between occupation choice and portfolio choice. Investment in education also needs to be included. Transactions costs need to distinguish households by region and socioeconomic status. Although sensitivity analysis is conduced, some of the parameters need to be estimated from the cross-sections, rather than imposed. As a transition economy, the construction of confidence intervals is also problematic. The model takes the paths of inequality and growth that best fit the Thai data out of the 10,000 simulations at calibrated parameter values, looks at the final value of participation for that subset of paths, clips off the tails—2.5 percent of each tail—and thus plots for the remaining economies a 95 percent band within which the model economy lies.

A bibliography for this fourth topic appears at the end of this chapter.

Government Development Banks and other Financial Institutions: An Assessment though Operating Systems and Financial Accounts

The assessment of this fifth topic is based on "The Credit Risk-Contingency System of an Asian Development Bank," by Robert Townsend and Jacob Yaron (2001).

The intermediary is lending to finance short-term inputs into production (farming and business), long-term investment in these occupations, and credit to smooth consumption and investment from fluctuations from adverse idiosyncratic shocks. The model can allow for interim communication of unobserved shocks to borrowers, costly interim and ex post verification of those shocks, and some nonreneging, or the imposition of continued participation constraints for borrowers. The contract with the intermediary thus consists of a bundle of attributes: capitalization or investment, recommended or induced action, repayment of loans, and insurance against shocks. With competition, such contracts would be fairly priced in the market, and intermediaries would break even. Competitive equilibria would be Pareto optimal. However, target groups such as rural farmers at risk might be given lump sum transfers or grants: for example, for the purchase of insurance. These grants might come from intermediaries, which therefore take losses. Compensation for losses requires transfers from the government, financed in the end by taxpayers—and possibly falling on nontarget groups. In particular, the idea behind provisioning is that not all loans will be repaid, and the intermediary needs to provision against nonpayment, adding to costs. Estimates of nonpayment, or delayed payment in which interest is lost, can vary with client groups, particular branches, or types of idiosyncratic (local or regional) shocks, and vary over time with aggregate shocks. Historical experience can be used to estimate default rates, and priced with risk premia, according to what the market would require. Costs might be covered by higher on-lending rates, as if a premium were charged, or alternatively, covered by transfers from the government.

Data

Annual balance sheets.

Income statements.

Annual reports.

Interviews with staff in main office and in district offices.

Schemata of operating system and procedures.

Methods

Review and summarize the actual operating system of the intermediary and try to match internal procedures with observed accounting entries. Then compare to what theory and better practice would require. Thus examine required, regulated provisioning rates against the historical time profiles of arrears. Use supplementary material to identify historical events and orders of magnitudes. Likewise, identify in the income statements government

inflows to compensate for losses, ideally distinguishing the purpose of the transfer. Estimate the overall level of subsidy and the subsidy-dependency index, and the amount on-lending rates would need to be increased in order to break even.

Findings

The BAAC makes loans to its client farmers, and the bulk of the revenue on its income statement comes from interest paid on its loan portfolio. Yet the BAAC has also developed a system under which clients under duress can request more time for repayment without accrued interest. Typically, a credit officer goes into the field to verify the claimed situation and relief is granted. A handwritten notation is made in the client's loan history. Further, in the case of local shocks such as floods, interest payments for a relatively large group of clients may be reduced and part of the principal may even be forgiven, paid by the government to the BAAC as if paid by the farmers themselves. This was true for the southern storm of 1989 and the floods of 1995 and 1996, for example.

Thus the BAAC has combined two financial instruments: simple credit, on the one hand, and insurance with indemnities, on the other. Neither instrument can be said to be better than the other. Both instruments are important. Indeed, the combination of instruments more resembles relatively sophisticated financial instruments such as futures contracts and options. The option—release from full repayment—is triggered by well-defined events, as verified in the field, if not already evident from the weather. Alternatively, farmers have entered into a hedge, having arranged to receive an indemnity from the insurance contract when principal and interest are due.

The government subsidy dependency index (SDI) for the BAAC stands at about 30 percent, so the BAAC is not breaking even. On the other hand, it is more self-sustaining from deposits than many other rural development banks. A risk-contingency system is in place, as described earlier. That allows delayed repayment so that most loans are repaid eventually. Penalties of 3 percent are charged against willful default, only, as judged by relatively costly field visits from branch staff; and only 1 to 4 percent of loans are in litigation. Provisioning can be excessive, according to some of the branches. This could undercut the insurance function of the bank, and it would appear that costs of operations are high. But subsequent adjustments are hard to disentangle in the accounts. In any event, the required schedule of provisioning for overdue loans is flat, with 10 percent per year to be provisioned over 10 years. This is unlike what is seen in actual, historical repayment data. Instead, most of the loans come in early and more nagging problems showing up later. Thus provision rates should not be flat, but rather rise with the age of arrears. The costs of provisions are not covered by user/client fees, and instead are covered by government transfers. Sometimes large transfers are made for regional shocks, such as floods in 1992 and southern storms in 1989. However, the line item for transfers mixes up the transfers that are government-paid premia with transfers for special government projects. The latter are at on-lending rates that are lower than the BAAC average rate on its own, more standard loans. There is thus no cost-benefit analysis within the BAAC system.

Policy

A bank making loans with the expectation of timely and complete repayment of principal and interest should be assessed and regulated differently from an insurance company that takes in premia ex ante and pays out indemnities to clients that experience adverse events. Similarly, a for-profit commercial bank has as its bottom line the profits it makes for its owners and shareholders, while a government-operated bank must be concerned with public welfare. Hence one should not consider the bottom line of a development bank's income statement as the sole criteria for assessing its contribution to rural welfare.

The Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand falls between these kinds of extremes. It makes loans with the expectation of eventual repayment, but it also services its client farmers by granting them relief in hard times. It tries to cover its costs in the long run and to avoid excessive reliance on government subsidies, but it also receives transfers from the Government of Thailand, to cover the shortfall of revenue created by its implicit insurance system and the failure or decision not to charge sufficient premia. It is thus not at all surprising that BAAC can be misunderstood and that polices toward it have generated some controversy. Is its primary role to make loans to farmers or is it to grant them relief in hard times? How does one trade off the BAAC's own profitability, and hence its long-run sustainability, from the welfare of the farmers that its serves, and the interest of Thailand more generally?

The work here offers some surprisingly straightforward and simple answers to these questions. First, to regulate a financial institution, evaluate its impact, and formulate appropriate policy, it is necessary to understand the operating procedures of that institution and the contracts and implicit arrangements that institution has with its own clients. This is what is meant by international best practice.

First, just as financial institutions that are intimately tied up with volatile international financial markets, such as New York banks, are now encouraged to develop and utilize their own risk metrics and risk assessment systems, so should the BAAC be encouraged to document (and modify) its credit, risk-contingency system as it client farmers continue to experience aggregate shocks such as drought, flood, pests, and fluctuating prices, as well as idiosyncratic shocks such as house-fire and personal illness.

Second, socioeconomic survey data can be used with economic models to estimate the welfare gain made possible by the provision of insurance: that is, by the same risk-contingency system. Third, the operating system and accounts of the BAAC should be made more transparent so as to allow one to estimate the cost to the Government of Thailand of running the risk-contingency system. Fourth, one can use these estimated benefits and costs to do a cost-benefit analysis and then, if necessary, modify BAAC policy accordingly.

The insurance indemnities can help Thai farmers smooth consumption and maintain investment and the use of productive inputs even during bad years. This is a service Thai farmers might be willing to pay for. At the very least, one can assess the value of that service. As a start on this, Townsend and Ueda (2001) model financial institutions as offering such insurance contracts, and calibrate the parameters of the model with socioeconomic survey data. They find that otherwise restrictive policies in Thailand,

which apparently impeded the insurance and banking function, may have caused a welfare loss as high as 7 percent of household wealth, on average. Such numbers can then be compared to government transfers to financial institutions such as the BAAC, which offers such services—using the Subsidy Dependence Index (SDI) methodology developed by Yaron (1992).

Unfortunately, however, the magnitude of the government transfer is not yet clear. If there is a probability that a given farmer or group of farmers will not repay principal and interest, then the BAAC needs to provision accordingly: that is, to enter as a cost the amount it estimates that will not be repaid on a timely basis. In principle, the provisioning and cost accounting could be done using the data the BAAC already has, looking at past histories of actual repayments and magnitude of arrears by age. Moreover, this could be done by type of event, location of the branch, and the state of the national economy (in a recession or not). In practice, both previously and under the new crisis-related change, the BAAC uses some fixed formula for provisioning that is not directly related to the data that it has. However, if provisions were done optimally and costs were entered more accurately, then one would better know the magnitude of the gap between these costs and current revenue. It is that gap that would need to be covered either by increased revenue—with premia paid by the farmers themselves—or by the Government of Thailand, with tax revenue, as a subsidy.

Acknowledgement of the risk-contingency system and its associated costs, and hard-nosed accurate accounting of the same, is the way to derive the magnitude of the government subsidy: a number to be compared to the welfare gain estimated from the micro data. In practice, however, the government subsidy to the BAAC covers not only the risk-contingency system but also the costs of various government special projects, many of which are acknowledged to be making losses, and which in any event should be assessed with a similar but separate accounting system.

With the costs and benefits of the risk-contingency system made clear, a simple cost-benefit calculation would reveal whether the government-paid portion of the insurance is warranted, given the estimated benefit. The larger point is that the government role in the provision of aid to farmers would be rationally assessed as part of a larger well-defined system and not driven in an ad hoc and ill-measured way by year-to-year political pressures.

Caveats/Extensions

Provisions need to take into account temporal variation and the possibly of large unanticipated shocks. Malfeasance could limit insurance, and full insurance is not reasonable, based on a moral hazard model. The welfare measurement of gain from micro data needs to be improved. Finally, the political situation in Thailand is changing, with pressures for debt moratoria and hence for larger losses. Finally, the BAAC should not be thought of in isolation from other financial institutions or other mechanisms.

A bibliography for this fifth topic appears at the end of the chapter.

Microenterprise Institutions: Assessment of Local, Village Funds (and Other Financial Institutions)

The assessment of this sixth topic is based on "Policies and Impact: An Analysis of Village-level Microfinance Institutions," by Joseph Kaboski and Robert Townsend (2005).

Model

The intermediary can provide credit and/or insurance so as to facilitate smoothing of consumption in a bad idiosyncratic year, smoothing of investment in a bad idiosyncratic year, facilitate going into business and occupation transitions, alleviation of credit constraints in agriculture, alleviation of credit constraints in business, reduction of reliance on money lenders, and facilitate asset accumulation.

Data

   Household – Use household retrospective data from village surveys:

      Whether or not in business and when

      Timing of occupation transitions

      Whether potential or actual client claims to be constrained in operation of business or farm

      Whether had to decrease consumption in bad year in last five due to adverse shock

      Demographics (age of head; years of schooling of head; gender of head; number of adult females, males, and children; wealth)

      Whether or not the household participates in a financial institution or agricultural cooperative, or uses a money lender

      Village-level average wealth, education.

   Government village census data on the availability of institution, village by village, for various years.

   Institutional survey using accounts, local records, and interviews:

      Founding (date, funding)

      Training

      Policies on borrowing

      Policies on saving

- Membership criteria

- Emergency services, and retrospective data on growth of members, history of borrowing, history of lending, and past failure.

a. *Headman, Key Informant Survey* on the history of village institutions

Methods

Direct (naïve, without correction for selection). The impact on a household of its use of a financial institution

Run a probit on: whether the household went into business in the last five years (yes, no) onto demographic controls (age of head; age squared; education of the head; gender of head; number of males, females, and children in the household), wealth of household six years ago, wealth squared, and use of the institution in question (village fund), as well use of other institutions (BAAC, commercial banks, and moneylender); and onto village controls (average wealth, average wealth squared, fraction of village population that are rice farmers, average education); and finally onto whether the village in which the household resides has ever had a village institution (using retrospective data, including events after the primary retrospective date).

Also run probits on occupation transition, if any, in the past five years, whether the household was constrained in business, whether it was constrained in farming, had to reduce consumption in a bad year in the last five years(yes, no), and whether was a customer of a money lender.

Run an ordinary least squares regression on asset accumulation using retrospective data.

Correction for individual selection. Predict whether the household was a member six years ago, with the dependent variable from the household survey using household demographics, schooling of the head, wealth, and wealth squared six years ago; whether the village had village institutions six years ago; and use of other institutions six years ago. For access to a village-level institution on the right-hand side, use headman's retrospective history or a GIS measure of availability of village institutions at the retrospective year, using a smoothed probability surface. Then combine the impact equation and the individual selection equation, using simultaneous equation maximum likelihood methods or two stage least squares.

Findings

Institutions have had very mixed experiences. Many institutions fail within the first year or first five years, while in others, membership lending and savings services grow. Some of these experiences are related to chosen policies. The model finds support overall for

the positive impact such institutions can have, under some circumstances. The measured impacts on households can be significant and sizable. Village funds may reduce the probability of a household using a moneylender, and in some estimates, increasing asset accumulation. The latter is measured in the survey by creating a retrospective history of all household, business, and farm assets, and also land: that is, date of acquisition, value, and possible depreciation. When specific types of institutions are examined, the model yields more specific advice:

- Women's groups and production credit groups (PCGs) have the most helpful impact. Women's groups have significant impact on increasing asset growth rates. Being a member of a women's group increases the probability of switching jobs and lowers reliance on moneylenders. PCGs have a sizable impact on asset growth and lower the probability of having to reduce consumption or production inputs in low-income years. The latter is based on the household's self-assessment of their response to the worst year of the last five years.

- Rice and buffalo banks appear to have a negative impact (but this may be due to a negative village selection effect). Despite the fact that more households were members of rice banks than any other institution, effects on asset growth and consumption in a bad year might be statistically significant and perverse. Buffalo banks have a negative impact—that is, a statistically significant and perverse effect—reducing the growth rate of assets and increasing the probability of reducing consumption in a bad year. Open-ended survey answers indicate that the buffalo banks may have suffered because of their small-scale, village-level operations. Some ceased operation if buffaloes died or failed to give birth, for example.

Hence the tentative recommendation is that the promotion of rice and buffalo banks, as currently configured, be discontinued.

However, certain policies offered by some of these institutions can be helpful—even the less successful variations. Indeed, when specific policies are examined, the analysis can yield rather specific advice:

- Institutions offering lending services tended to experience growth in the number of members and promote occupational mobility. However, the impact analysis indicates that they had a negative impact on asset growth and business start-ups. Institutions that used the amount of savings as a criterion for loans lowered the probability of household customers needing to reduce consumption or inputs in bad years.

- Institutions offering emergency services were able to assist households in smoothing consumption and input-use in response to adverse shocks, but raised the probability that households would turn to moneylenders. So in this instance, moneylenders and emergency services were complements.

- Institutions that provide training tended to have both lending and savings services, and these policies produced higher asset growth and less borrowing from moneylenders, and lowered the chance of adverse impacts in a bad year.

- Institutions that offer pledged savings accounts were more likely to experience increases in savings services, and had a favorable impact on asset growth rates, the ability to start businesses, and job mobility, and produced less reliance on moneylenders.

- Institutions that offer standard savings accounts helped households smooth consumption in bad years but experienced declines in membership, and appear to have made households go to moneylenders.

Policy

The tentative recommendation is that the promotion of rice banks and buffalo banks, as currently configured, be discontinued. On the other hand, certain types of policies are particularly helpful. This study recommends that institutions offer training to potential villagers customers and to staff. Institutions should also be encouraged to offer lending services when they are able to do so, by their own assessment. This study's advice on the provision of savings is more qualified; it depends on the local objective. Pledged savings are a surprisingly good vehicle, although the benefits may have more to do with the simplicity of administration and the minimization of transactions costs than the nature of the pledge itself. Standard savings, with more flexible withdrawal, offer benefits similar to those of emergency services.

This analysis is nonexperimental in this sense; the controls that are used in the evaluation are statistical controls. Unlike a scientific experiment, this study could not solicit from villagers whether or not they wanted to have a village fund, or have a fund with a specific set of policies. That is, the study could not solicit volunteers and randomize the placement or treatment among the group of volunteers so that there would be a treated group and a control group. Rather, the study groups villages by whether they had *ever had* village institutions or not. "Ever had institutions" meant a village had an institution in the distant past, at a retrospective time about which the study asked questions or measured certain variables; or was to have an institution in the future, after that retrospective data was collected but before the actual interview data was amassed. Such "ever-had" villages were found to be more agricultural—that is, to have more household members who are rice farmers or agricultural workers; less wealthy—that is, to have households with fewer overall assets and fewer business assets in particular; have more credit, especially loans from family or the BAAC; and have more instruments for saving, especially for emergency reasons. These village characteristics must be controlled for in doing the evaluation; otherwise it would appear that village funds are having a negative, perverse aspect.

For example, households living in villages with village financial institutions were less likely to have changed jobs: that is, to have switched out of agriculture. Likewise, the analysis must control within a village for who decides to become a member of the institution and who does not. This is done by finding variation in institutional membership that has little to do with the household's own choice and much more to do

with simple availability; that is, the village happened to have an operating financial fund at the time of the retrospective interview data, and was surrounded by other villages with active funds, as promoted by a distinct CDD office, for example. Only when these controls are included does the analysis begin to estimate positive, beneficial effects.

We would also recommend the continuation of this kind of evaluation, especially in *tambons* and *amphoes* (districts) in which local officials are inclined to promote village funds. More generally, our analysis would be complemented by the gradual expansion of the villages' funds simultaneously with the implementation of evaluation procedures. Typically, funds cannot be promoted in all villages in a given area all at once, since without training and careful implementation, eventual failure rates would be high (as our evidence shows). Staggered introduction, even with the eventual goal of universal access, would allow randomize experimental controls: that is, initial random expansion. This would allow a much more accurate overall evaluation, with the information gained available to help those villages that get funds later in the implementation process. It would also be possible to evaluate specific policies further, such as deliberate variation in the type of savings accounts that would be appropriate given the mixed evidence presented above.

A bibliography for this sixth topic appears at the end of the chapter.

Bibliography

*For the section on business start-ups and SME business investment (the first topic)***:**

Abbring, Jaap H., Pierre-Andre Chiappori, James J. Heckman, and Jean Pinquet. 2003. Adverse Selection and Moral Hazard in Insurance: Can Dynamic Data Help to Distinguish? *Journal of the European Economic Association* 1(2–3): 512–21.

Aghion, Phillippe, and Patrick Bolton. 1997. A Trickle-down Theory of Growth and Development with Debt Overhang. *Review of Economic Studies* 64(2): 151–72.

Ahlin, Christopher, and Robert Townsend. 2002. Using Repayment Data to Distinguish Models of Joint Liability Lending. University of Chicago Working Paper.

Banerjee, Abhijit, and Andrew Newman. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101(2): 274–98.

Binford, Michael, Tae Jeong Lee, and Robert Townsend. 2001. Sampling Design for an Integrated Socioeconomic and Ecologic Survey Using Satellite Remote Sensing and Ordination. *Proceedings of the National Academy of Science* 101(31):11517–22.

Blanchflower, David, and Andrew. Oswald. 1998. What Makes an Entrepreneur? *Journal of Labor Economics* 16(1): 26–60.

Buera, Francisco. 2002a. Identification of Occupational Choice Models. University of Chicago. Manuscript.

-------. 2002b. A Dynamic Model of Entrepreneurial Choice with Borrowing Constraints. University of Chicago. Manuscript.

Evans, David S., and Boyan Jovanovic. 1989. An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy* 97(4): 808–27.

Feder, Gershon, Tongroj Onchan, Yongyuth Chalamwong, and Chira Hongladarom. 1988. Land Policies and Farm Productivity in Thailand. Baltimore: Johns Hopkins University Press.

Giné, Xavier, and Robert M. Townsend. 2004. Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice. *Journal of Development Economics* 74(2): 269–307.

Greene, William. 2000. Econometric Analysis. Saddle River, NJ: Prentice Hall.

Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98 (5): 1076–1107.

Heckman, James, and Bo Honore. 1990. The Empirical Content of the Roy Model. *Econometrica* 58 (5): 1121–49.

Holtz-Eakin, Douglas, David Joulfian, and Harvey S. Rosen. Sticking It Out: Entrepreneurial Survival and Liquidity Constraints. *Journal of Political Economy* 102(1): 53–75.

Jeong, Hyeok. 1998. Decomposition of Growth and Inequality in Thailand. University of Chicago. Manuscript.

Jeong, Hyeok, and Robert Townsend. 1998. Household Businesses and their Financing in Semi-Urban and Rural Thailand. University of Chicago. Manuscript.

Judd, Kenneth. 1998. *Numerical Methods in Economics*. Cambridge, Mass.: MIT Press.

Kaboski, Joseph, and Robert Townsend. 1998. Borrowing and Lending in Semi-Urban and Rural Thailand. University of Chicago. Manuscript.

Kaboski, Joseph P., and Robert M. Townsend. 2001. Policies and Impact: An Analysis of Village-level Microfinance Institutions. University of Chicago. Manuscript.

Karaivanov, Alexander. 2002. Financial Contracts Structure and Occupational Choice. University of Chicago. Manuscript.

Lehnert, Andreas. 1998. Asset Pooling, Credit Rationing and Growth. Working Paper 1998–52. Finance and Economics Discussion Series, Federal Reserve Board, Washington D.C.

Lerner, Josh. 1999. The Government as Venture Capitalist. *Journal of Business* 72(3): 285–318.

Lloyd-Ellis, Huw, and Dan Bernhardt. 2000. Enterprise, Inequality and Economic Development. *Review of Economic Studies* 67(1): 147–68.

Magnac, Thierry, and Jean-Marc Robin. 1996. Occupational Choice and Liquidity Constraints. *Richerche Economiche* 50(2): 105–33.

Paulson, Anna L. 1997. Financial Intermediation and Inequality: Evidence from Rural Thailand. Northwestern University, Evanston, Illinois. Manuscript.

Paulson, Anna, and Robert Townsend. 2003. Distinguishing Limited Commitment from Moral Hazard in Models of Growth with Inequality. Federal Reserve Bank of Chicago Working Paper Series No. WP-03-06.

---------. 2004. Entrepreneurship and Financial Constraints in Thailand. *Journal of Corporate Finance* 10(2): 229–62.

Petersen, Mitchell A., and Raghuram G. Rajan. 1994. The Benefits of Lender Relationships: Evidence from Small Business Data. *Journal of Finance* 49(March): 3–37.

---------. 1995. The Effect of Credit Market Competition on Lending Relationships. *Quarterly Journal of Economics* 110 (May): 407–44.

Phelan, Christopher, and Robert Townsend. 1991. Computing Multi-Period, Information-Constrained Equilibria. *Review of Economic Studies* 58 (5): 853–81.

Piketty, Thomas. 1997. The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing. *Review of Economic Studies* 64 (2): 173–89.

Seiler, Edward, and Robert Townsend. 1998. Assets in Semi-Urban and Rural Thailand. University of Chicago. Manuscript.

Townsend, Robert, and Jacob Yaron. 2001. The Credit Risk-Contingency System of An Asian Development Bank. *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. XXV, No. 3, Third Quarter, 31–48.

Townsend, Robert, with Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Michael Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family* and NSF Grants. University of Chicago. Manuscript.

Vuong, Quang H. 1989. Likelihood Ratio Tests for Model Selection and Non-nested Hypotheses. *Econometrica* 57(2): 307–33.

Wolak, Frank. 1994. An Econometric Analysis of the Asymmetric Information, Regulator-Utility Interaction. *Annales d'Economie et de Statistiques*. 34(1994): 13–69.

For the section on financial liberalization and growth (the second topic):

Aghion, Phillippe, and Patrick Bolton. 1997. A Trickle-down Theory of Growth and Development with Debt Overhang. *Review of Economic Studies*, 64(2): 151–72.

Alba, Pedro, Leonardo Hernandez, and Daniela Klingebiel. 1999. Financial Liberalization and the Capital Account: Thailand 1988–1997. Policy Research Working Paper Series 2188. The World Bank, Washington, D.C.

Albuquerque, Rui, and Hugo Hopenhayn. 2001. Optimal Lending Contracts and Firm Dynamics. University of Rochester Center for Economic Research Working Paper Series 493.

Banerjee, Abhijit, and Andrew Newman. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101(2): 274–98.

Cooley, Thomas, Ramon Marimon, and Vincenzo Quadrini. 2000. Aggregate Consequences of Limited Contract Enforceability. National Bureau of Economic Research Working Paper Series No. 10132.

Das, Mita MarkRoberts, and James Tybout.1998. Experience, Expectations and Export Dynamics. World Bank. Mimeo.

Deaton, Angus, and Christina Paxson. 2000. Growth and Saving among Individuals and Households. *Review of Economics and Statistics* 82(2): 212–25.

Ericson, Richard, and Ariel Pakes. 1995. Markov-Perfect Industry Dynamics: A Framework for Empirical Work. *Review of Economic Studies* 62(1): 53–82.

Evans, David, and Boyan Jovanovic. 1989. An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy* 97: 808–27.

Feder, Gershon, Tongroj Onchan, Yongyuth Chalamwong, and Chira Hongladarom. 1988. *Land Policies and Farm Productivity in Thailand*. Baltimore: Johns Hopkins University Press.

Feder, Gershon, Lawrence Lau, Justin Lin and Xiaopeng Luo. 1991. Credit's Effect on Productivity in Chinese Agriculture. Policy Research Working Paper Series No. 571. The World Bank, Washington, D.C.

Giné, Xavier, and Robert M. Townsend. 2004. Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice. *Journal of Development Economics* 74(2): 269–307.

Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98(5): 1076–1107.

Griffin, Ronald, John Montgomery, and M. Eduard Rister. 1987. Selecting Functional Form in Production Function Analysis. *Western Journal of Agricultural Economics* 12(2): 216–27.

Heckman, James, Lance Lochner, and Christopher Taber. 1998. Explaining Rising Wage Inequality: Explorations with a Dynamic General Equilibrium Model of Labor Earnings with Heterogeneous Agents. *Review of Economic Dynamics* 1(1): 1–58.

Holtz-Eakin, Douglas, David Joulfaiian, and Harvey S. Rosen. 1994. Sticking It Out: Entrepreneurial Survival and Liquidity Constraints. *Journal of Political Economy* 102(1): 53–75.

Hopenhayn, Hugo, and Richard Rogerson. 1993. Job Turnover and Policy Evaluation: A General Equilibrium Analysis. *Journal of Political Economy* 101(5): 915–38.

Huang, He, Selo Imrohoroglu, and Thomas Sargent. 1996. Two Computational Experiments to Fund Social Security. Hoover Institution Paper No 002, Stanford University.

Jeong, Hyeok. 1999. Education and Credit: Sources of Growth with Increasing Inequality in Thailand. Ph.D. thesis, University of Chicago.

Jeong, Hyeok, and Robert Townsend. 2000. An Evaluation of Models of Growth and Inequality. University of Chicago. Mimeo.

Jovanovic, Boyan. 1982. Selection and the Evolution of the Industry. *Econometrica* 50(2): 649–70.

Klinhowhan, U. 1999. Monetary Transmission Mechanism in Thailand. Master's thesis, Thammasat University, Bangkok.

Kaboski, Joseph, and Robert Townsend. 1998. Borrowing and Lending in Semi-Urban and Rural Thailand. University of Chicago. Manuscript.

Kochar, Anjini 1997. An Empirical Investigation of Rationing Constraints in Rural Credit Markets in India. *Journal of Development Economics* 53(2): 339–71.

Krusell, Per, and Anthony Smith. 1998. Income and Wealth Heterogeneity in the Macroeconomy. *Journal of Political Economy* 106(5): 867–96.

Lehnert, Andreas 1998. Asset Pooling, Credit Rationing and Growth. Working Paper 1998–52, Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C.

Lloyd-Ellis, Huw, and Dan Bernhardt. 2000. Enterprise, Inequality and Economic Development. *Review of Economic Studies* 67(1): 147–68.

Lucas, Robert. 1978. On the Size Distribution of Business Firms. *Bell Journal of Economics* 9(2): 508–23.

Magnac, Thierry, and Jean-Marc Robin. 1996. Occupational Choice and Liquidity Constraints. *Richerche Economiche* 50(2): 105–33.

Okuda, Hidenobu, and Fumiharu Mieno. 1999. What Happened to Thai Commercial Banks in Pre-Asian Crisis Period: Microeconomic Analysis of Thai Banking Industry. *Hitotshubashi Journal of Economics* 40(2): 97–121.

Paes de Barros, Ricardo. The Evolution of Welfare, Poverty and Inequality in Brazil over the Last Three Decades: 1916 to 1990. DIPES/IPEA and Yale University. Mimeo.

Paulson, Anna, and Robert Townsend. 2001. The Nature of Financial Constraints: Distinguishing the Micro Underpinnings of Macro Models. University of Chicago. Mimeo.

Paulson, Anna, and Robert Townsend. 2003. Distinguishing Limited Commitment from Moral Hazard in Models of Growth with Inequality. Federal Reserve Bank of Chicago Working Paper Series No. WP-03-06.

Piketty, Thomas. 1997. The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing. *Review of Economic Studies* 64(2): 173–89.

Schultz, Paul. 1997. Diminishing Returns to Scale in Family Planning Expenditures: Thailand, 1976–81. Yale University. Mimeo.

Silverman, B.W. 1986. *Density Estimation for Statistics and Data Analysis*. London: Chapman and Hall.

Tinakorn, P., and C. Sussangkarn. 1998. Total Factor Productivity Growth in Thailand: 1980–1995. Macroeconomic Policy Program, TDRI. Mimeo.

Townsend, Robert M. 2001. Safety Nets and Financial Institutions in the Asia Crisis: The Allocation of Within Country Risk". Prepared for the IMF conference, Microeconomic Policies and Poverty Reduction, . 14–15 March.

Townsend, Robert, and Kenichi Ueda. 2001. Transitional Growth with Increasing Inequality and Financial Deepening. IMF Working Paper 01(108). Washington, D.C.

Townsend, Robert M., and Jacob Yaron. 2001. The Credit Risk-Contingency System of an Asian Development Bank. *Economic Perspectives*, Chicago Federal Reserve Bank, Vol. XXV, No. 3, Third Quarter.

Townsend, Robert, with Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Michael Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family* and NSF Grants. University of Chicago.

Veracierto, Marcelo, 1998. Plant Level Irreversible Investment and Equilibrium Business Cycles. *American Economic Review* 92(1): 181–97.

For the section on risk, safety nets, and the ideal role of financial institutions and financial instruments (the third topic):

Aghion, Phillippe, and Patrick Bolton. 1997. A Theory of Trickle-down Growth and Development. *Review of Economic Studies* 64(2): 151–72.

Altonji, Joseph., Fumio. Hayashi, and Laurence. Kotlikoff. 1996. Risk-sharing between and within Families. *Econometrica* 64(2): 261–94.

Attanasio, Orazzio, and Steven Davis. 1996. Relative Wage Movements and the Distribution of Consumption. *Journal of Political Economy* 104(6): 1227–62.

Banerjee, Abhijit, and Andrew Newman. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101(2): 274–98.

Bernanke, Ben, and Mark Gertler. 1990. Financial Fragility and Economic Performance. *The Quarterly Journal of Economics* 105(1): 87–114.

Binford, Michael, Tae Jeong Lee, and Robert Townsend. 2001. Sampling Design for an Integrated Socioeconomic and Ecological Survey Using Remote Sensing and Ordination. *Proceedings of the National Academy of Science* 101(31): 11517–22.

Caballero, Ricardo, and Arvind Krishnamurthy. 2002. A Dual Liquidity Model for Emerging Markets. Massachusetts Institute of Technology. Mimeo.

Chiarawongsee, Anant. 2000. Financial Intermediaries as a Channel for Interregional Risk-sharing. Ph.D. dissertation, University of Chicago.

Cochrane, John. 1991. A Simple Test of Consumption Insurance *Journal of Political Economy* 99(5): 957–76.

Giné, Xavier, and Robert M. Townsend.2004. Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice. *Journal of Development Economics* 74(2): 269–307.

Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98(5): 1076–1107.

Holmstrom, Bengt, and Jean Tirole. 1998. Private and Public Supply of Liquidity. *Journal of Political Economy* 106(1): 1–40.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1991. Corporate Structure, Liquidity and Investment: Evidence from Japanese Industrial Groups. *Quarterly Journal of Economics* 106(1): 33–60.

Jeong, Hyeok., and Robert Townsend. 2001. Models of Growth and Inequality: An Evaluation. University of Chicago. Manuscript.
.
Kaboski, Joseph P., and Robert M. Townsend. 2001. Policies and Impact: An Analysis of Village-level Microfinance Institutions. University of Chicago. Manuscript.

Kiyotaki, Nobuhiro, and John Moore. 1997. Credit Cycles. *Journal of Political Economy* 105(2): 211–48.

Mace, Barbara. 1991. Full Insurance in the Presence of Aggregate Uncertainty. *Journal of Political Economy* 99(5): 928–56.

Paulson, Anna, and Robert Townsend. 2004. Entrepreneurship and Financial Constraints in Thailand. *Journal of Corporate Finance* 10(2): 229–62.

Townsend, Robert M. 1994. Risk and Insurance in Village India. *Econometrica* 62(3): 539–91.

Townsend, Robert M. 2001. Safety Nets and Financial Institutions in the Asia Crisis: The Allocation of Within Country Risk". Prepared for the IMF conference, Microeconomic Policies and Poverty Reduction, . 14–15 March.

Townsend, Robert M., with Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Michael Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family* and NSF Grants. University of Chicago.

Townsend, Robert, and Kenichi Ueda. 2001. Transitional Growth with Increasing Inequality and Financial Deepening. IMF Working Paper 01(108). Washington, D.C.

Townsend, Robert M., and Jacob Yaron. 2001. The Credit Risk-Contingency System of an Asian Development Bank. *Economic Perspectives*, Chicago Federal Reserve Bank, Vol. XXV, No. 3, Third Quarter, 31–48.

***For the section on expansion of financial services and the allocation of risk: growth with optimal if inevitable inequality (the fourth topic)*:**

Aghion, Philippe, and Patrick Bolton. 1997. A Theory of Trickle-Down Growth and Development. *Review of Economic Studies* 64(2): 151–72.

Banerjee, Abhijit V., and Andrew F. Newman. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101(2): 274–98.

Bencivenga, Valerie, and B. Smith. 1991. Financial Intermediation and Endogenous Growth. *Review of Economic Studies* 58(2): 195–209.

Bernanke, Benjamin, and Mark Gertler. 1989. Agency Cost, Net Worth, and Business Fluctuations. *American Economic Review* 79(1): 14–31.

Canova, Fabio. 1995. Sensitivity Analysis and Model Evaluation in Simulated Dynamic General Equilibrium Model. *International Economic Review* 36(2): 477–501.

Chiarawongsee, Anant. 2000. Financial Intermediaries as a Channel for Interregional Risk-sharing. Ph.D. dissertation, University of Chicago.

Christiano, Lawrence J., and Wouter J. den Haan. 1996. Small-Sample Properties of GMM for Business-Cycle Analysis. *Journal of Business and Economic Statistics* 14(3): 309–27.

Deaton, Angus. 1989. Saving in Developing Countries: Theory and Review. Proceedings of the World Bank Annual Conference on Development Economics 61–96.

Deaton, Angus, and Christina Paxon. 1994. Intertemporal Choice and Inequality. *Journal of Political Economy* 104(3): 437–67.

Den Haan, J. Wouter, and Albert Marcet. 1994. Accuracy in Simulations. *Review of Economic Studies* 61(1): 3–17.

Gale, Douglas, and Martin Hellwig. 1985. Incentive-Compatible Debt Contracts: The One-Period Problem. *Review of Economic Studies* 52(4): 647–63.

Giné, Xavier, and Robert M. Townsend.2004. Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice. *Journal of Development Economics* 74(2): 269–307.

Goldsmith, Raymond W. 1958. *Financial Intermediaries in the American Economy*. Princeton: Princeton University Press.

---------. 1969. *Financial Structure and Development*. New Haven: Yale University Press.

Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98(5): 1076–1107.

Gregory, Allan W., and Gregor W. Smith. 1991. Calibration as Testing: Inference in Simulated Macroeconomic Models. *Journal of Business and Economic Statistics* 9(3): 297–303.

Gurley, John G., and Edward S. Shaw. 1960. *Money in a Theory of Finance*. Washington, D.C.: Brookings Institution Press.

Heaton, John, and Deborah J. Lucas. 1996. Evaluating the Effects of Incomplete Markets on Risk Sharing and Asset Pricing. *Journal of Political Economy* 104(3): 443–87.

Hildebrand, Francis B. 1987. *Introduction To Numerical Analysis*. Mineola, NY: Dover.

Jeong, Hyeok. 2000. Sources of Kuznets Dynamics in Thailand. Ph.D. Dissertation, University of Chicago.

Jeong, Hyeok, and Robert M. Townsend. 2001. Evaluation of Models of Growth and Inequality. University of Chicago. Manuscript.

Judd, Kenneth L. 1992. Projection Methods for Solving Aggregate Growth Models. *Journal of Economic Theory* 58(2): 410–52.

---------.1998. *Numerical Methods in Economics*. Cambridge, Mass.: MIT Press.

Kaboski, Joseph, and Robert M. Townsend. 1999. Borrowing and Lending in Semi-Urban and Rural Thailand. University of Chicago. Mimeo.

King, Robert G., and Ross Levine. 1993. Finance and Growth: Schumpeter Might be Right. *Quarterly Journal of Economics* 108(3): 717–37.

Klinhowhan, Ubonrat. 1999. Monetary Transmission Mechanism in Thailand. Master's thesis, Thammasat University, Bangkok.

Kuznets, Simon. 1955. Economic Growth and Income Inequality. *American Economic Review* 45(1): 1–28.

Kydland, Finn, and Edward C. Prescott. 1982. Time to Build and Aggregate Fluctuations. *Econometrica* 50(6): 1345–70.

Mulligan, Casey. 2000. Extensive Margins and the Demand for Money at Low Interest Rates. *Journal of Political Economy* 108(5): 961–91.

Mulligan, Casey, and Xavier Sala i Martin. 1996. Adoption of Financial Technologies: Implication for Money Demand and Monetary Policy. NBER Working Paper 5504. National Bureau of Economic Research, Cambridge, Mass. (March).

Nakajima, Tomoyuki. 1999. Essays on Macroeconomic Theory. Ph.D. dissertation, University of Chicago.

Okuda, Hidenobu, and Fumiharu Mieno. 1999. What Happened to Thai Commercial Banks in the Pre-Asian Crisis Period: Microeconomic Analysis of Thai Banking Industry. *Hitotshubashi Journal of Economics* 40(2): 97–121.

Paulson, Anna, and Robert M. Townsend. 1999. Entrepreneurship and Liquidity Constraints in Rural Thailand. University of Chicago. Manuscript.

Piketty, Thomas. 1997. The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing. *Review of Economic Studies* 64(2): 173–89.

Prescott, Edward S. 1995. Communication in Models with Private Information: Theory, Applications, and Computation. Ph.D. dissertation, University of Chicago.

Seiler, Edward, and Robert M. Townsend. 1998. Saving in Rural Thailand. The University of Chicago. Mimeo.

Shaw, Edward S. 1973. *Financial Deepening in Economic Development*. New York: Oxford University Press.

Townsend, Robert M. 1978. Intermediation with Costly Bilateral Exchange. *Review of Economic Studies* 45(3): 417–25.

---------. 1983. Financial Structure and Economic Activity. *American Economic Review* 73 (5): 895–911.

Townsend, Robert, and Kenichi Ueda. 2001. Transitional Growth with Increasing Inequality and Financial Deepening. IMF Working Paper 01(108). Washington, D.C.

Townsend, Robert M., and Jacob Yaron. 2000. The Risk Contingency System of an Asian Development Bank. University of Chicago. Mimeo.

Townsend, Robert M., Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Mike Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family*, and NSF Grants. University of Chicago.

Vissing-Jorgensen, Annette. 2000. Towards an Explanation of Household Portfolio Choice Heterogeneity: Nonfinancial Income and Participation Cost Structures. University of Chicago. Mimeo

For the section on government development banks and other financial institutions: an assessment though operating systems and financial accounts (the fifth topic):

Arrow, Kenneth J. 1964. The Role of Securities in the Optimal Allocation of Risk Bearing. *Review of Economic Studies* 31(2): 91–96.

Asdrubali, Pierfederico, Bent Sorensen, and Oved Yosha. 1996. Channels of Interstate Risk-sharing: United States, 1963–90. *Quarterly Journal of Economics* 111(4): 1081–1110.

Attanasio, Orazio, and Steven J. Davis. 1996. Relative Wage Movements and the Distribution of Consumption. *Journal of Political Economy* 104(6): 1227–62.

Bank for Agriculture and Agricultural Cooperatives. 1997. *Annual Report,* Thailand.

---------. 1998. *Annual Report,* Thailand.

---------. 1999. *Annual Report,* Thailand.

Bernanke, Ben, and Mark Gertler. 1989. Agency Costs, Net Worth, and Business Fluctuations. *American Economic Review* 79(1): 14–31.

Bisin, Alberto, and Piero Gottardi. 2000. Efficient Competitive Equilibria with Adverse Selection. CESifo Working Paper No. 1504.

Bond, Philip, and Robert M. Townsend. 1996. Formal and Informal Financing in a Chicago Ethnic Neighborhood. *Economic Perspectives,* Federal Reserve Bank of Chicago, July/August: 3–27.

Chiarawongsee, Anant. 2000. Financial Intermediaries as a Channel for Interregional Risk-sharing. Ph.D. dissertation, University of Chicago.

Cochrane, John. 1991. Simple Test of Consumption Insurance. *Journal of Political Economy* 99(5): 957–76.

Crucini, M. 1999. On International and National Dimensions of Risk-sharing. *Review of Economics and Statistics* 81(1): 73–84.

Deaton, Angus. 1989. Saving in Developing Countries: Theory and Review. Proceedings of the World Bank Annual Conference on Development Economics 61–96.

Deaton, Angus, and Christina Paxon. 1994. Intertemporal Choice and Inequality. *Journal of Political Economy* 104(3): 437–67.

Debreu, Gerard. 1959. *Theory of Value: An Axiomatic Analysis of Economic Equilibrium.* New Haven: Yale University Press.

Fitchett, Delbert. 1999. Bank for Agriculture and Agricultural Cooperatives (BAAC), Thailand. Consultative Group to Assist the Poorest, Working Group on Savings Mobilization, Eschborn, Germany.

Gale, Douglas, and Martin Hellwig. 1984. Incentive-Compatible Debt Contracts: The One-period Problem. *Review of Economic Studies* 52(4): 647–63.

Huck, Paul, Philip Bond, Sherrie L. W. Rhine, and Robert M. Townsend. 1999. Small Business Finance in Two Chicago Minority Neighborhoods. *Economic Perspective* Federal Reserve Bank of Chicago, Second Quarter, 46–62

Lim, Youngjae, and Robert M. Townsend. 1998. General Equilibrium Models of Financial Systems: Theory and Measurement in Village Economies. *Review of Economic Dynamics* 1(1): 59–118.

McKenzie, Lionel W. 1959. On the Existence of General Equilibrium for a Competitive Market. *Econometrica* 27(1): 54–71.

Muraki, Tetsutaro, Leila Webster, and Jacob Yaron. 1998. The Thai Bank for Agriculture and Agricultural Cooperatives. Sustainable Banking with the Poor. World Bank, Case Studies in Microfinance, Asia Series.

Murdoch, Jonathan. 1993. Risk, Production, and Saving: Theory and Evidence from Indian Households. Harvard University. Manuscript.

Ogaki, Masao, and Qiang Zhang. 2001. Decreasing Relative Risk Aversion and Tests of Risk-sharing. *Econometrica* 69(2): 515–26.

Paulson, Anna. 1994. Insurance Motives for Migration: Evidence from Thailand. Ph.D. dissertation, University of Chicago.

Prescott, Edward S. 2001. Communication in Models with Private Information: Theory, Computation, and an Application. University of Minnesota. Manuscript, revised.

Prescott, Edward S., and Robert M. Townsend. 1984. Pareto Optima and Competitive Equilibria with Adverse Selection and Moral Hazard. *Econometrica* 52(1): 21–46.

---------. 2000. Firms as Clubs in Walrasian Markets with Private Information. University of Chicago. Manuscript.

Rosenzweig, Mark, and Kenneth Wolpin. 1993. Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-income Countries: Investments in Bullocks in India. *Journal of Political Economy* 101(2): 223–44.

Rothschild, Michael, and Joseph Stiglitz. 1976. Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information. *Quarterly Journal of Economics* 90(4): 629–49.

Shiller, Robert. 1993. *Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks.*New York: Oxford University Press.

Townsend, Robert M. 1979. Optimal Contracts and Competitive Markets with Costly State Verification. *Journal of Economic Theory* 21(2): 265–93.

---------. 1994. Risk and Insurance in Village India. *Econometrica* 62(3): 539–91.

---------. 1995. Consumption Insurance: An Evaluation of Risk-bearing Systems in Low-income Economies. *Journal of Economic Perspectives* 9(3): 83–102.

---------. 2000. The Impact of the Crisis in Thailand. University of Chicago. Manuscript.

Townsend, Robert, and Kenichi Ueda. 2001. Transitional Growth with Increasing Inequality and Financial Deepening. University of Chicago. Mimeo.

Townsend, Robert M., and Jacob Yaron. 2001. The Credit Risk-Contingency System of an Asian Development Bank. *Economic Perspectives*, Chicago Federal Reserve Bank, Vol. XXV, No. 3, Third Quarter, 31–48.

Townsend, Robert M., Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Mike Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family* and NSF Grants. University of Chicago.

Yaron, Jacob. 1992. Successful Rural Finance Institutions. World Bank Discussion Paper 150. Washington, D.C.

Yaron, Jacob, Benjamin McDonald, and Piprek Gerda. 1997. Rural Finance: Issues, Design, and Best Practices. *Environmentally and Socially Sustainable Development Studies and Monographs*, No. 14. The World Bank.

For the section on microenterprise institutions: assessment of local, village funds (and other financial institutions) (the sixth topic):

Abadie, A. 2003. Semiparametric Estimation of Treatment Response Models. *Journal of Econometrics* 113(2): 231–63.

Aghion, Phillippe, and Patrick Bolton. 1997. A Trickle-down Theory of Growth and Development with Debt Overhang. *Review of Economic Studies* 64(2): 151–72.

Ahlin, Christopher, and Robert Townsend. 2002. Using Repayment Data to Distinguish Models of Joint Liability Lending. University of Chicago Working Paper.

Alexander, Gwendolyn. 2000. A Dynamic Model of Microfinance: Using Dynamic Incentives to Induce Repayment. Mimeo.

---------. 2001. An Empirical Analysis of Microfinance: Who Are the Clients? Fordham University. Mimeo.

Aportela, F. 1998. Effect of Financial Access on Savings by Low-Income People. Massachusetts Institute of Technology. Mimeo.

Banerjee, Abhijit, and Andrew Newman. 1993. Occupational Choice and the Process of Development. *Journal of Political Economy* 101(2): 274–98.

Banerjee, Abhijit, Timothy. Besley, and Timothy Guinnane. 1994. Thy Neighbor's Keeper: The Design of Credit Cooperatives with Theory and a Test. *Quarterly Journal of Economics* 109(2): 491–515.

Becker, Gary. 1981. *A Treatise on the Family*. Cambridge, Mass.: Harvard University Press.

Benartzi, Shlomo, and Richard Thaler. 2001. Save More Tomorrow: Using Behavioral Economics to Increase Employee Saving. University of Chicago. Mimeo.

Besley, Timothy, and Stephen Coate. 1995. Group Lending, Repayment Incentives, and Social Collateral. *Journal of Development Economics* 46(1): 1–18.

Binford, Michael, Tae Jeong Lee, and Robert Townsend. 2001. Sampling Design for an Integrated Socioeconomic and Ecologic Survey Using Satellite Remote Sensing and Ordination. *Proceedings of the National Academy of Science* 101(31): 11517–22.

Bourguignon, Francois, Martin Browning, Pierre Chiappori, and Valerie Lechene. 1994. Incomes and Outcomes: A Structural Model of Intra-Household Allocation. *Journal of Political Economy* 102(6): 1067–97.

Browning, Martin, and Pierre Chiappori. 1998. Efficient Intra-Household Allocation: A General Characterization and Empirical Tests. *Econometrica* 66(6): 1241–78.

Coleman, Brett E. 1999. The Impact of Group Lending in Northeast Thailand. *Journal of Development Economics* 60(1): 105–41.

Conning, Jonathan 1999. Outreach, Sustainability and Leverage in Monitored and Peer-Monitored Lending. *Journal of Development Economics* 60(1): 105–41.

Evans, David S., and Boyan Jovanovic. 1989. An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy* 97(4): 808–27.

Feder, Gershon, Laurence Lau, Justin Lin, and Xiaopeng Luo. 1991. Credit's Effect on Productivity in Chinese Agriculture. Policy Research Working Paper Series No. 571. The World Bank, Washington, D.C.

Ghatak, Maitreesh. 1999. Group Lending, Local Information and Peer Selection. *Journal of Development Economics* 60(1): 27–50.

Giné, Xavier, and Townsend, Robert M. 2004. Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice. *Journal of Development Economics* 74(2): 269–307.

Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98 (5): 1076–1107.

Heckman, J., R. Lalonde, and J. Smith. 1999. The Economics and Econometrics of Active Labor Market Programs. In *Handbook of Labor Economics*, Volume III, O. Ashenfelter and D. Card, eds. Amsterdam: Elsevier Science.

Jain, Sanjay, and Ghazala. Mansuri. 2003. A Little at a Time: The Use of Regularly Scheduled Repayments in Microfinance Programs. *Journal of Development Economics* 72(1): 253–79.

Jeong, Hyeok. 2000. Education and Credit: Sources of Growth with Increasing Inequality in Thailand. Ph. D. thesis, University of Chicago.

Jeong, Hyeok, and Robert Townsend. 2000. An Evaluation of Models of Growth and Inequality. University of Chicago. Mimeo.

Kaboski, Joseph, and Robert Townsend. 1998. Borrowing and Lending in Semi-Urban and Rural Thailand. University of Chicago. Manuscript.

---------. 2000. An Evaluation of Village-Level Microfinance Institutions. University of Chicago. Mimeo.

---------.. 2005. Policies and Impact: An Analysis of Village-level Microfinance Institutions. *Journal of the European Economic Association* 3(1): 1–50.

Laibson, David. 1996. Hyperbolic Discount Functions, Undersaving, and Savings Policy. NBER Working Paper 5635. National Bureau for Economic Research, Cambridge, Mass.

Lloyd-Ellis, Huw, and Dan Bernhardt. 2000. Enterprise, Inequality, and Economic Development. *Review of Economic Studies* 67(1): 147–68.

Morduch, Jonathan. 1998. The Microfinance Promise. *Journal of Economic Literature* 37(4): 1569–1614.

---------. 1999. The Role of Subsidies in Microfinance: Evidence from the Grameen Bank. *Journal of Development Economics* 60(1): 229–48.

Paulson, Anna, and Robert M. Townsend. 1999. Entrepreneurship and Liquidity Constraints in Rural Thailand. University of Chicago. Manuscript.

Pitt, Mark, and Shahidur Khandker. 1998. The Impact of Group-based Credit Programs on Poor Households in Bangladesh: Does the Gender of Participants Matter? *Journal of Political Economy* 106(5): 958–96.

Piketty, Thomas. 1997. The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing. *Review of Economic Studies* 64(2): 173–89.

Ravicz, R. M. 2000. Searching for Sustainable Microfinance: A Review of Five Indonesian Initiatives. Development Economics Research Group, World Bank Working Paper, Washington, D.C.

Rhyne, Elizabeth, and Maria Otero. 1992. Financial Services for Microenterprises: Principles and Institutions. *World Development* 20(11): 1561–71.

Stiglitz, Joseph. 1990. Peer Monitoring and Credit Markets. *World Bank Economic Review* 4(3): 351–66.

Townsend, Robert M. 1995. Financial Systems in Northern Thai Villages. *Quarterly Journal of Economics* 110(4): 1011–46.

Townsend, Robert, and Kenichi Ueda . 2000. Transitional Growth with Increasing Inequality and Financial Deepening. University of Chicago. Mimeo.

Townsend, Robert M., Anna Paulson, Sombat Sakuntasathien, Tae Jeong Lee, and Mike Binford. 1997. Questionnaire Design and Data Collection for NICHD Grant *Risk, Insurance and the Family*, and NSF Grants. University of Chicago.

Woolcock, Michael. 1999. Learning from Failures in Microfinance: What Unsuccessful Cases Tell Us About How Group-Based Programs Work. *American Journal of Economics and Sociology* 58(1): 17–42.