

Shocks, Assets and Credit: *a discussion document*

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1 Shocks

1.1 Introduction

Well functioning credit and insurance markets, in many respects, obviates the need for public policy that is oriented at providing support to households when they face economic hardship. But when the market for cheap informal credit is altogether absent, risk-averse (poorer) households will generally respond to such risks by adopting strategies that have long term consequences for their well being. For example *ex-ante* risk pooling and risk spreading activities are commonly adopted to mitigate the effects of shocks.¹ Households operating under these types of circumstances will generally try to avoid having to pool risks with other households by making sure that income is generated through a variety of livelihoods that are not subjected to correlated shocks. For example, for agricultural households that engage in crop production, this means making sure that household members engage in some activities that are not subject to the same shocks as cropping or to engage in intercropping so that if a weather shock is experienced, crop failure is not universal across all plots farmed. Likewise, devoting some labour time to petty commodity production accomplishes the same goal.

The module on shocks presents an opportunity to try and distinguish the primary ways in which households insure against shocks. Specifically, what is the extent of inter-temporal consumption smoothing (through savings, and credit) and is there any evidence to suggest that community-level smoothing of consumption takes place (say through inter-household transfers of resources or people), and if it occurs, to what extent does it amount to a Pareto Efficient allocation of risk? Is there evidence to suggest that households adopt *ex-ante* methods of smoothing consumption that are inefficient? These two mechanisms of coping with shocks – precautionary savings or *ex ante* risk spreading – suggest

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¹Pooling happens across households and is generally only possible if shocks are idiosyncratic to households, whereas spreading happens within households and possibly within persons.

very different policy responses. Knowing what evidence there exists for such strategies is a necessary first step in working out what role there might be for public policy. Since the consequences of precautionary savings motives is relatively well explored (see Deaton (1991, 1999) for example), we begin our motivation by illustrating the simple mechanics behind a model of portfolio choice involving risk and uncertainty.

1.2 Theoretical Reflections on Coping with Shocks: Why Credit and Assets matter

A key puzzle concerning poverty in South Africa is the relatively small amount of informal sector activity that takes place. One possibility that could account for this observation might be systematic mis-measurement of such activity. Another, arguably, more likely possibility, is that would-be traders are not incentivised enough to undertake the risks associated with such activity. This coupled with the lack of formal sector credit to the poor might account for why more poor households don't resort to self-employment in the guise of household commodity production or informal trading. The following model illustrates why this might be so by making transparent the role played by economic shocks in such a process. Readers might recognise it as a simple model of intertemporal choice, adapted to reflect the impact of an idiosyncratic shock to the households consumption, investment and production decisions.

Individuals are risk-averse and liquidity constrained. They face a portfolio choice in which a good event (positive shock) complements their savings and investment decisions, but a bad event (negative shock) reduces it drastically. Imagine that the choice is whether to (a) go into business as an informal trader selling vegetables that are grown in a community garden using a high-yielding variety of corn seed, or (b) to work as a casual labourer earning a low, but relatively stable daily wage. Individuals live T periods, discount future consumption at a constant rate, and have expected utility functions of the form:

$$U_t = E_t \sum_{T-t}^T \beta^{T-t} u(c_T) \quad (1)$$

where $u(\cdot)$ is twice continuously differentiable with $u' > 0$, $u'' < 0$, and marginal utility tending to infinity when consumption tends to zero. Let A_t and y_t be the individual's asset stock and realised income at the start of period t . The proposition we wish to establish is that when individuals do not have access to full community-level insurance against shocks, and when credit markets are imperfect so that some individuals face a liquidity constraint, risk-averse individuals will tend to do more of the safer activity at the expense of a potentially higher income from the alternative. To contextualise this idea, assume now that borrowing is not possible, but saving is, so that $A_t + y_t - c_t \geq 0$. To fix ideas, note that if individuals could borrow, there would not be any need to choose the safe activity since they could simply borrow when a shock is experienced.

Now suppose that individuals face a portfolio choice between these two activities and note that working as a casual labourer is less risky in the sense that the payout does not depend on the state of nature, but the activity itself is less profitable than the alternative. Let period t income be determined by a random shock, ϵ which is independently and identically distributed over all individuals living in a community, and the previous period portfolio choice, x_{t-1} . Thus, $y_t = y(x_{t-1}, \epsilon_t)$. A further refinement on the structure of the problem is such that the effect of portfolio choice on income realisation depends on the state of nature, such that: $\frac{\partial y_t}{\partial x_{t-1}} > 0$ if $\epsilon_t > 0$ and $\frac{\partial y_t}{\partial x_{t-1}} < 0$ if $\epsilon_t < 0$. The individual's period t value function is then given by:

$$V_t(A_t + y_t) = \max(u(c_t) + \beta E_t V_{t+1}((1 + r_t)(A_t + y_t - c_t) + y(x_t, \epsilon_{t+1})) + \lambda_t(A_t + y_t - c_t)) \quad (2)$$

The first-order condition of this problem (assuming complementary slackness between λ_t and $(A_t + y_t - c_t)$) is given by:

$$u'(c_t) = E_t \beta (1 + r) V'_{t+1}((1 + r_t)(A_t + y_t - c_t) + y(x_t, \epsilon_{t+1})) + \lambda_t \quad (3)$$

Using the envelope theorem, x_t will satisfy

$$E_{t-1} \frac{dV_t(\cdot)}{dx_{t-1}} = E_{t-1} u'(c_t) \frac{\partial y}{\partial x_{t-1}} = 0 \quad (4)$$

Combining equations 3 and 4, we can re-write equation 4 as

$$E_{t-1} (\beta (1 + r) V'_{t+1}(\cdot)) \frac{\partial y}{\partial x_{t-1}} = 0 \quad (5)$$

When credit markets are complete, portfolio choice is unconstrained as individuals can borrow in times when income realisation is low owing to negative shocks. In other words, if $\lambda_t = 0$ for all states of nature in period t , x_{t-1} is chosen so that

$$E_{t-1} V'_{t+1}(\cdot) \frac{\partial y}{\partial x_{t-1}} = 0 \quad (6)$$

However, if λ_t binds for some states of nature, then x_{t-1} is chosen so that

$$\beta (1 + r) E_{t-1} V'_{t+1}(\cdot) \frac{\partial y}{\partial x_{t-1}} = -E_{t-1} \lambda_t \frac{\partial y}{\partial x_{t-1}} \quad (7)$$

Two observations follow from this analysis. First, this expression is clearly positive since the liquidity constraint only ever binds in periods when income is low (i.e., when negative income shocks occur) and in such periods we know that choosing more of the risky activity by devoting more time to working as a trader leads to a reduction in realised income (i.e., $\partial y_t / \partial x_{t-1} < 0$). Therefore, the expected marginal utility of undertaking of this activity must be higher and thus the level of risk-taking must be lower, when individuals face liquidity constraints. On the other hand, when credit markets are complete, individuals

will not need to adopt such risk spreading strategies as they can simply smooth consumption through borrowing.

Second, note that risks are idiosyncratic across households in this model implying that households could instead elect to pool risk and insure one another but elect not to. Two features of the set-up of this problem accounts for why this is so: individuals are risk averse and inter-household insurance requires some enforcement mechanism. Thus any study of community-level pooling of risk cannot be undertaken without serious attention being given to the links that form between households and the institutions and norms that sustain such links. Differences in institutions and norms between communities makes it entirely possible that households that start out looking very similar to one another, end up having very different wealth levels because of the interaction between bad-luck, the non-existence of formal insurance. The long-run consequences of poorer households forgoing more risky but higher reward livelihood strategies in itself could explain the relative insignificance of the informal sector activity in South Africa, compared to other countries with similarly high involuntary unemployment. These types of intuitions about the role of credit, risk and insurance are at the heart of the more well known models of poverty traps such as Banerjee and Newman (1993), and Galor and Zeira (1993)).

1.3 Potential Topics to Explore

1.3.1 Savings and Investment

In a survey of the dynamics of income and accumulation, the role of savings in relation to consumption is central. Investigating these issues requires first an accurate assessment of the extent to which households save, the availability of formal insurance and credit, and an extensive module on consumption patterns. Two key hypotheses that we might want to explore are whether there is any evidence of widespread precautionary savings or whether the evidence lies more firmly on the side of the life-cycle hypothesis. There is extensive evidence that in developing countries, households save as a precautionary measure in order to insure themselves against negative income shocks. This is especially true of economies that rely heavily on agriculture. If households save as a precaution, their savings are likely to be kept in very fungible forms. One consequence of this is a tendency to underinvest in productive assets. Panel data on household incomes and consumption patterns along with detailed information on shocks will allow an assessment of the extent to which investment in assets (and thereby accumulation) is constrained because households under-invest in productive assets. Of course, the other side of this coin is to be able to give a comprehensive account of credit availability. Indeed, questions concerning the broader impact of credit (as distinct from its role in coping with risk) warrants a separate discussion which we postpone till section 3.

1.3.2 Risk Pooling through Informal Savings and Credit

When the poor are excluded from formal credit and insurance markets and risks are highly correlated, risk pooling is not possible. Informal loans between members of the same community are also unlikely because any bad luck that befalls one household will also have affected the rest of the community (e.g., natural disasters, or a fast spreading infectious disease).² In such instances, the only option open to households is to save for such contingencies. However the extent of formal saving that takes place is not widely known. What we do know is that households (urban and rural alike) are far more likely to engage in informal savings schemes. The same is true of credit. The PSLSD estimated that the percentage of loans originating in informal credit markets to be about 80% of all loans taken in 1993.

Yet it is not exactly clear that these activities don't amount to the pooling of risk at the same time. For example, in a between-wave survey of KIDS households participation in informal savings and credit schemes (hereafter referred to as NETS) , Keswell (2006) finds that positive shocks have a smaller positive effect on individuals' employment probability if the individual is a member of such a scheme, than if they are not – something one would expect if these types of organisations also pool risk among its members. Table 1, shows the effects of positive and negative shocks on individual employment probabilities, where the shocks enter non-linearly. Numerical column 1 of the table shows the marginal effect of a variable for individuals who participate in informal savings/credit schemes, and numerical column two shows the same for individuals who don't participate. Note the statistically significant differences in the impact of positive shocks on individual employment probabilities between participants and non-participants. Specifically, an individual's probability of finding employment is about 26% higher if they are non-participants who had experienced a positive income shock (versus those who had not), whereas this advantage is reduced to about 11% when one is a participant.

One interpretation of this finding is that the positive effects on employment produced by the windfall (say through lowering the costs of job search) is muted when one is a member since it has to be shared amongst other members. An alternative explanation is that members are much more risk averse than non-members (which is why they join in the first place) and so are less likely to take risks with the windfall (and thereby improve their chances of getting a job). The first explanation would suggest there is some smoothing of consumption across members. The second is a stronger interpretation that suggests some type of risk-spreading (as opposed to risk pooling) is going on. Both of these interpretations, however, would suggest that the strategies open to households when credit is not an option, are not mutually exclusive. Individuals clearly save as a precaution against negative shocks, but do they really pool-risk at the same time, or is it the case that apparent risk pooling behaviour merely reflects

²Interestingly, here is a case where credit rationing happens because of the stochastic nature of the economic environment and not necessarily because of informational asymmetries between borrower and lender.

differences in relative degrees of risk aversion?

1.3.3 The Strength of Weak Ties in Pooling Risk

Informal credit associations also might fail to solve credit rationing when the largest risks faced are correlated negative shocks. In such environments, it is not unreasonable to find that organisations like rotating savings and credit associations (ROSCAs) rarely give out loans as these organisations tend to be community based and thus have no way of spreading their own risks because they face the same risks as their average client. Do households respond to such multiple market failures by forming ties with other households by maximising the geodesic distance between a potential tie? This type of strategy would get around both idiosyncratic as well as covariate shocks. One could investigate this by asking individuals that are members of informal savings schemes, how many of their fellow members live in the same community as them.

1.3.4 Endogenous Network Formation and the Market for Contingent Commodities

A separate but related point is whether there is any evidence to suggest that these gaps are filled by markets for contingent commodities. This is only really possible if shocks are not highly positively correlated. Of course a negative correlation of shocks would make trade in contingent commodities an attractive insurance option. Indeed consider the extreme case with two possible events (e_1 and e_2) and two possible actions; a which reaps a payoff of 1 under e_1 or 0 under e_2 , while for action b , the payoffs are reversed for each state of nature. These shocks therefore have a correlation of -1, implying that perfect insurance is possible if each player agreed to take a different action. In other words, if the parties are able to come to an agreement to share the payoff, whatever happens (i.e., in either state of nature) complete insurance results.

If such trading in risks through contingent commodities exists, it is vital that we study the connections between households. This is one important reason why a network mapping of households might become important, i.e., perfect insurance of the sort mentioned above is only possible if one could connect the shocks experienced by household a and those experienced by household b . One would then be interested in studying whether consumption patterns change between these two households. If there is this type of community level smoothing of consumption going on, this would signal an important contribution to our understanding of how households cope with shocks. Udry (1990), Morduch (1991), and Townsend (1993) are three important contributions that show that correlated shocks are low enough to permit these households to behave as if they were operating in an Arrow-Debreu world of contingent commodities. However these studies are the exceptions. Recent work has tended to show the opposite. Community level insurance across households (if it exists) is Pareto inefficient. While households do behave in ways that allow them to insure one another, it is highly contested whether this insurance is more or less anonymous across house-

holds. Graphing the network of community level ties allows us to monitor the development of informal insurance through trading in contingent commodities, as well as the complexities regarding contract enforcement that such strategies give rise to.

1.3.5 Coping with Disaster

Of course, if households are not insured against shocks, or if the range of informal mechanisms are inefficient so that a significant proportion of households are always plunged into destitution, it becomes important to quantify the associated costs of this. Some measurable outcomes that have been shown in the development literature of late to be connected to inadequate insurance/credit when faced with negative shocks are:

- (1) fluctuations in BMI over time (and over the duration of a long-lasting negative shock).
- (2) taking children out of school
- (3) selling off assets (if assets are collateralisable, we should not see households resorting to this as they should be able to access some form of credit, even if interest rates are unusually high....or would we?)
- (4) mixing of livelihood strategies, or crop diversification

1.3.6 Extended Families

Household-level responses to widespread risk will in general cut across existing schemes that operate at the community level. Being able to identify *non-linearities* in responses is therefore important. One important dimension of this problem is the role played by extended families. There is some evidence to suggest that people are less inclined to resort to sub-optimal *ex ante* consumption smoothing if they have help from extended family members. However, this result seems to depend on the types of shocks one is exposed to.

Turning again to Table 1 we see that the effect of chronic illness on employment is no different between participants and non-participants of formal savings schemes. However, being in a household with a co-resident mother seems to change this result making non-participants more likely to be employed. Clearly there are non-linearities at work, but we have few clues as to the causal pathways. Most strikingly, the effect of the shock on employment when it is conditioned on maternal co-residence is positive.

If we can identify the more important types of non-linearities that might be present in the way households' or individuals respond, we might be able to ask how state intervention helps or impedes households' abilities to respond optimally to situations involving risk. There is now an extensive array of social grants available to poorer households in South Africa. From the point of view of income generation and asset accumulation, the most pressing question now

seems to be which types of grants complement the actions of households to smooth consumption or cope with risks *ex ante*.

1.4 Issues on the Design of the Module

The ability to measure the types of risks households might face, the range of formal credit and insurance options available to them, and what they might do to cope with these risks (*ex ante* and *ex post*) is central to studying the empirical dynamics of income distribution because of the way in which it might affect occupational choice and savings behaviour. Public policy might have a role to play in preventing households from getting stuck in a poverty trap. However, in order for the right types of policy responses to be formulated, we need to know which of the many competing explanations of household saving, production, and consumption to base our recommendations on.

1.4.1 Objectives of the Module

A module on shocks should attempt to do at least the following four things:

- (1) piece together a picture of when the shock took place
- (2) get a sense of how long it lasted
- (3) capture the implicit or explicit costs of the shock to the household
- (4) capture what actions the household took to cope with the shock

The last of these objectives is crucial because we want to be able to measure outcomes both directly in the module on shocks, but also indirectly through the other modules. If we have some binary responses of pre-identified possible actions, this will serve as an important back-up if the indirect route fails for some or other reason.

But collecting this information isn't as straightforward as one might think. If the fourth objective listed above is accepted, there are two issues involving design that are of fundamental importance:

- (1) making sure we have a comprehensive enough list of possible actions that households could take
- (2) designing the module such that we are able to observe whether households take these actions under the counterfactual of not experiencing any shock

It is quite surprising that many surveys don't deal with the second of these problems, when the solution is quite simple: at the end of the demographic section of the questionnaire, ask of all households (for the same recall period that the shock question is asked) if they have ever done [x], reading off the list of potential actions. Then put this same question into the shocks module. The latter gives the actions taken only by households exposed to shocks and the former will give the same for the whole sample. In this way, responses to the counterfactual can be created. This innovation by itself would be an improvement over the shock modules in KIDS, the IFLS as well as the MFS.

1.4.2 Types of Shocks

Appendix A.1 gives examples of the specific types of shocks we need to ask about. Here we merely note that there are two categories of risks any list of shocks should aim to elucidate. The first are household-specific or idiosyncratic risks (e.g., illness not obtained through infection, losses to property originating with events occurring within the household (e.g., fire caused by gas stove)). Such shocks are approximately independent across households. The second are correlated shocks that affect all households in any given community.

1.4.3 Individual or Household Level Shocks?

Should we capture these shocks at the individual or household level? On this point there is the concern of potentially overestimating impact if certain shocks are correlated within a household. For example, death or illness could result in the loss of a regular job. These are distinct shocks, but the latter would not have taken place were it not for the former. KIDS is particularly bad at separating out correlated shocks within the household. If one wanted to avoid having extensive follow-up questions that would be aimed at piecing together a timeline of events, one could simply ask the question at the individual level. This has the added benefit of being able to study the effects of shocks on immediately obvious individual level outcomes of interest, such as short term health. Having this information would also obviate the need for having an explicit model of intra-household allocation in mind. In addition, some not so immediately evident individual level outcomes, like enrollment of children in school, could also be studied. In households that contain a large number of extended family members living off incomes generated by one or two individuals, it would be interesting to study which children take the immediate knock, so to speak. Of course, some types of shocks don't make much sense if asked at the individual level - acts of nature, being the most obvious. For these, the standard household module would suffice. Appendix A.1 gives our draft version of such a module.

1.4.4 Recall Period and Dating of Events

Should the interview ask for a date of when a shock occurred? It is not clear what the point of asking for a date would be as any response given is going to be measured with considerable error because respondents are unlikely to remember the precise timing of events. Field-assistants should be trained to ask the questions relating to shocks in relation to some other occurrence, the timing of which can be more easily identified. For example, if a household reported that they had a crop failure "a few years ago", they could then be asked whether it happened before or after the birth of a young child in the household, or before or after the death of a senior household member, or some other widely reported event (such as a national election). Then they should probe by asking how many months, weeks, days etc. before/after this event did the shock occur.

The issue of the length of the recall period is of course a separate issue to the question of the dating of shocks. There is always a tradeoff between length

of recall period and accuracy of the data. For subsequent waves, the obvious recall period should be the inter-wave period. For the baseline, we recommend a period of 2 years.

1.4.5 Recall Bias

It is harder to uncover idiosyncratic positive shocks when correlated negative shocks have been recently witnessed. For example, we discovered an enormously high frequency of negative shocks in an ethnographic follow-up study in four of the sample clusters of the NETS study. By contrast the frequency of positive shocks was close to zero in these communities. It is possible that positive shocks were severely understated because in the intervening period between the survey and the qualitative study, the province suffered extensive flooding, and all four communities we had revisited had been affected. The flooding also occurred at a time when these households were just beginning to recover from a particularly bad spate of crop fires. Although the phrasing and recall periods of the qualitative questions on shocks mirrored those of the actual survey, the responses on positive shocks were quite different in the follow-up study. The most likely explanation for this difference in average responses is that the relative immediacy of the negative shocks induced a bias in recall by respondents

How then does one make sure we are able to capture positive shocks adequately? One way is to have a longer recall period and begin with the sub-module on positive shocks. One could also separate the two sub-modules and place them at different points in the questionnaire.

2 Assets

Data on assets is vital and needs to be collected at both the household and individual level. At the household level, this data is important for understanding the extent to which households draw on their asset stock in order to cope with negative shocks, and the ways in which asset accumulation occurs during times of economic prosperity. Moreover, given measurement error associated with the use of expenditure data, asset data can be used to find suitable IVs for household per capita expenditures. The asset portfolio of a household should not, however, be seen as a proxy for current consumption or poverty status, but rather, as a proxy for long run economic status (although this will vary to some extent according to the fungibility of the assets), with the advantage of such a measure being that it may be less sensitive to transitory fluctuations than consumption expenditures. At the individual level, asset ownership data is important for understanding intrahousehold bargaining, resource allocation, and individual vulnerability.

An important question that must be addressed is the amount of detail that needs to be captured in relation to a household's asset portfolio. In part, this depends on how one thinks the data might be used in a subsequent analysis. One possibility is to estimate the current value of household assets using explicit and

implicit prices as weights, to create a household wealth variable that is a stock. To do this requires that data be collected on the current value of household assets, or in the event that this is not available, data on the purchase price of the asset, and the purchase date. The researcher then has the option to apply a reasonable rate of depreciation to the purchase price in order to arrive at an estimate of current market value.

A second, less data-intensive approach, is that adopted by Filmer and Pritchett (2001) in which they relied only on indicators of asset ownership (i.e. a series of dummy variables that took a value of 1 if the household owned the specified asset, and zero if not), in combination with data on physical household characteristics (such as access to electricity, water and other services).³ These asset ownership indicators were combined to form a linear index, relying on principal components analysis⁴ to derive the weights to be accorded to each asset. Using Indian data, they show that this index is robust to the kinds of assets included, and that state-level results correlate well to independent data on per capita output and poverty. Moreover, the classification of households based on expenditure data corresponds closely to the classification that is derived from reliance on the asset index. Finally, using data from Nepal, Pakistan and Peru, they show that the asset index predicts school enrollments⁵ for children as accurately as expenditure measures. Thus, at a minimum, we propose that data on asset ownership must be collected at the household and individual level. Additional questions pertaining to asset market value should also be included, but in the event that this data is unreliable or sketchy, sufficient data will exist to create asset indices in the same way as Filmer and Pritchett did.

However, an outstanding question is the level of detail at which to record the asset data. For example, data could be asset specific (e.g. radio, television, refrigerator) or at the level of an asset category, such as Household appliances which would be broad enough to encompass all of these items. In order to compute a meaningful asset index in line with the approach followed by Filmer and Pritchett (2001), the data needs to be relatively disaggregated (i.e. related to specific asset items as opposed to categories), since most households would record a positive response against a category such as “Household Appliances, reducing variation in the index. The disadvantage of such an approach, however,

³Note that Filmer and Pritchett (2001) effectively treat access to services as a household asset in the construction of their asset index

⁴An alternative approach would be to simply enter the asset indicator dummy variables into a regression separately, and allow the regression co-efficients to reflect the relative weights attached to each asset. However, this method isn’t able to properly estimate the impact of household wealth on the outcome of interest since assets may enter both as direct and indirect effects on the outcome. For example, having access to electricity may serve as an indicator of household wealth, which may in turn, positively affect child schooling outcomes, but at the same time, electricity allows children in the household to study at night, which may also produce better outcomes. Thus, while the co-efficients in a linear regression implicitly produce the weights for a linear index of household assets, it is difficult to infer the impact of an increase in wealth on the outcome of interest from these unconstrained co-efficients.

⁵While they limit their analysis to demonstrating the validity and usefulness of the asset index in predicting school enrollments, it might be equally useful in examining wealth differences in other socio-economic dimensions, such as fertility decisions, and mortality.

is that it may be very time consuming, particularly if additional data on market value and buying and selling behaviour is to be collected.

What is clear though is that the collection of good quality asset data is central to questions of credit use and access, as well as the ways in which households cope with shocks. As such, these topics cannot be de-linked from one another. While panel data on asset portfolios allows an examination of asset accumulation and decumulation over time, this in itself is relatively uninteresting. The larger policy questions at issue are the ways in which asset portfolios of households change in the face of shocks to the household over time, whether households are ever able to rebuild an asset portfolio that is depleted during times of crisis, and the extent to which households are able to access particular types of credit in order to smooth consumption in the face of income shocks. All of these questions have a dynamic element, and thus require panel data in order to begin to unpack these interlinked processes.

3 Credit

3.1 Potential Topics

Below we highlight a range of potential topics that might be of interest. Many of the topics covered here cut across the themes covered in the previous sections. Almost all of the potential research questions that follow on from these topics require panel data.

3.1.1 Credit Rationing

What is the extent of credit rationing? All of the discussion on shocks is predicated on the assumption that there are multiple market failures in operation, the most important among these being credit and insurance market failures. Rather than assuming that these imperfections actually do exist, the survey presents an opportunity to quantify the extent of these failures. Even if individuals had access to comprehensive forms of insurance against shocks, moral hazard, adverse selection and contract enforcement problems could still result in widespread credit rationing, thus limiting the amount of investment in productive assets that households are able to undertake, ultimately constraining the overall rate of household savings (or productivity in the case of agricultural households). If this work is to say something about what types of state intervention is required to promote household saving, we first need to get a handle on the extent of credit rationing.

3.1.2 Impact on Productivity

what is the impact of increased access to credit on entrepreneurial activity (household enterprises, small-scale agriculture, informal trading etc.) This type of question is only worth pursuing if there is widespread credit rationing going on. If households are getting all the credit they desire, then it won't be

altogether surprising if we find little impact on invest, productivity and savings. That being said, evidence from other countries do suggest that credit does increase productivity, primarily through technology adoption in the case of agricultural households.

3.1.3 Impact on Savings and Asset Accumulation

What role does credit play in the coping strategies of households facing shocks? Deaton (1991) showed that access to credit decreases the need for a household to hold assets for precautionary purposes, thus freeing up household resources for asset accumulation that is less liquid, and therefore of more productive value. A related question is what are the determinants of household access to formal and informal credit? What types of asset portfolios are important determinants of formal and informal credit access? What are the main demographic determinants? This line of thought is connected to any analysis of impact because of the instrumental role served in controlling for the endogeneity associated with credit use. We return to this issue at greater length below.

3.1.4 Impact on Intrahousehold Dynamics

What is the impact of credit use on intrahousehold allocation of resources and decision-making? For example Pitt and Khandker's (1998) study of the impact of participation in group lending schemes in Bangladesh showed increased credit to positively affect educational attainment, labour supply and household consumption. They also studied the impact on household fertility and contraceptive use and found that fertility declined and contraceptive use increased if the credit was received by women.

3.2 Issues on the Design of the Module

Appendix A.4 provides greater detail on the exact questions we recommend be asked in the survey. Here we briefly summarise some of the important sources of credit that will be pertinent to answering the types of questions we highlighted as interesting to us, along with some of the broader issues concerning measurement that one needs to keep in mind.

3.2.1 Sources of Credit

- (1) formal: banks, government agencies
- (2) semi-formal: NGOs, employers, credit unions, burial societies
- (3) informal: trade credit (shopkeeper credit and hire purchase)
- (4) informal: ROSCAs
- (5) informal: money lenders
- (6) pawning of goods, especially jewellery

- (7) informal lending without interest of collateral between individuals that know each other.

3.2.2 Other Important Sources to Include

- (1) supplier credit for productive purposes
- (2) consumption credit (particularly purchases of food on credit).

3.2.3 Why Collect Credit Data at the Individual Level?

Link to intrahousehold issues : Individual command over collateral determines individual access to credit. Given the evidence against income pooling at the household level, there is no reason to assume that any credit accessed by one member of the household will be shared (equally) with other members of the household. For studying how households respond to shocks differentially when credit is available, many of the outcomes that one might want to look at are at the individual level. For example, in extended families, who gets taken out of school, or whose consumption takes a knock when a shock is experienced, might be expected to depend heavily on who holds the loan. The work of Duflo (1993) would suggest that households are unlikely to smooth the shock over all members of the household. The relevant question to ask then is, what difference does access to (different types of) credit make in the way households respond. This question cannot be posed if the credit data are collected at the household level. Similarly, the important insights about the effect of credit on fertility and contraceptive use studied by Pitt and Khandker (1998) would not have been possible if the identity of the credit recipient was not known.

Measurement error : measurement error is probably compounded if a key informant is used. Credit use is a very sensitive topic, particularly among individuals that rely heavily on unscrupulous money lenders and the like. Key respondents, not matter how informed they might be, may be reluctant to share the details of other members' credit transactions with the enumerator. This is likely to lead to a much larger non-response rate than would be the case if each household member were asked directly about their access to credit.

3.2.4 Options for Controlling for the Endogeneity of Membership

Getting the unit of analysis right allows us to pose interesting questions like “what difference does credit make to household responses to shocks”. Answering such questions convincingly is a different matter entirely because one’s asset portfolio choice and implicitly, one’s take up of credit opportunities, is a choice and is therefore endogenous. To give a concrete example, suppose we wanted to know whether or not the health impact of an income shock is muted for individuals that have credit. The problem is that those same latent factors

which might explain why some individuals have a lower base metabolic rate than others (which means they require fewer calories to expend more energy over some range of lung capacity and can therefore worker longer and harder at manual tasks) might also influence their ability to get loans, leading to a standard endogeneity problem. Another way to phrase the problem is to see the question we are asking as an evaluation problem. Because loan take-up is non-random across the sampled individuals, any estimate of the impact of credit will suffer from omitted variable bias that is in general impossible to sign. (for more general discussion of these types of estimation problems, see Manski, 1993; Blume and Durlauf, 2001; and Durlauf, 2003).

But with careful design of the survey instrument, we might be able to give ourselves some options for solving such problems down the line. One standard solution is think about strategies upfront (i.e., build into the design of the survey) that will allow us to create exogenous variation in loan take-up. The easiest approach is to ask questions that get at the respondent's eligibility for various credit programmes that are available (both formal and informal). To begin to do this, we would first need to commission a review of existing credit programmes to get a feel for what's available to households, particularly in so far as programmes run by NGOs and the state. This would give us external information on eligibility (mostly from the eligibility rules established by the agencies running the programmes). In the section in which we ask about the sources of credit, we would add a few additional questions to make sure that the eligibility information generated in the survey is externally valid (both in terms of knowledge of the rules and perceptions about the implementation of those rules). Finally, the survey would ask individuals if they participate in the programme. This should be sufficient to generate an eligibility variable that could be used as an IV for take-up.

3.2.5 Measuring Credit Rationing

One simple way to measure credit rationing is to ask individuals if they have ever applied for credit, and whether the application was rejected or approved. If it was approved, then ask if they obtained the full amount requested. This need not be asked at the individual level because here the interest is in getting a sense of whether the absence of credit for the poor has to do mainly with informational asymmetries. What is important however, is to make sure we ask follow-up questions for households that say they had never applied since one of the reasons for not applying could be a perception on the part of the household that their application will be rejected. Without this question, the extent of credit rationing will likely be under-estimated.

A Draft Input into the Modules on Shocks, Assets, Credit and Savings

A.1 Questions on Shocks

A.1.1 Types of Negative Shocks

- death of a household member that you depend on for financial assistance
- death of a non-resident family member that you depend on for financial assistance
- death of a close friend that you depend on for financial assistance
- death of a friend or relative that you do not depend on for financial assistance
- sickness of a household member that necessitated hospitalisation or continuous medical treatment
- major crop failure due to (tick one)
 - drought
 - flood
 - hailstorm
 - pests
 - fire
 - other (specify)
- widespread death/disease of livestock
- failure or bankruptcy of business
- theft, fire or destruction of household property
- loss of a regular job of a household member
- cut-off or decrease of remittances to household
- cut-off or decrease in government grants

A.1.2 Potential Actions Household Members Could Take to Cope

- (1) get extra job
- (2) take loan from family or friend/employer
- (3) take loan with crop as collateral
- (4) take loan with other assets as collateral

- (5) take loan from stokvel or burial society
- (6) sell next harvest in advance (below market value)
- (7) sell food (rice) supply
- (8) sell cattle/poultry
- (9) sell jewelry
- (10) sell other assets (e.g., car, home, specify)
- (11) use savings (or other liquid assets, e.g., stocks, bonds, etc.)
- (12) get money from family/relatives, friend or employer
- (13) get assistance (in the form of goods) from family/relatives, friend or employer
- (14) cut household expenses
- (15) take children out of school
- (16) use money from formal insurance payoff (e.g., death benefit)
- (17) use money from informal insurance payoff (e.g., burial society)

A.1.3 Types of Positive Shocks

- new regular job for household member
- new or increased remittances
- new child support grant
- new disability grant
- new state pension
- inheritance, large gift, lottery winnings
- large payment from firm (including retirement payments)
- scholarships for household member
- other, specify....

A.2 Questions on Assets

These questions can be asked in the household module. One possible design is to list in each row of the table each asset we would like to ask about (see below for a standard listing) and then as columns have each of the following questions. Questions on asset ownership to be addressed at the individual level are included in the input document on intrahousehold allocation of resources, social networks and social cohesion.

A.2.1 Ownership, Value and Use

For each of the assets listed below, ask the following questions:

- (1) Does any household member own any of the following (yes/no) (where by ownership, we mean the individual has the right to sell and dispose of the asset)
- (2) Specify the ID codes of the individuals who own this item.
- (3) Do all household members have equal claim to the use of this asset? (yes/no)
- (4) What is the current market value of this asset? (i.e. what price would be paid if you bought it today OR what price would you receive if you sold it today)
- (5) Did you inherit [x] or receive it as a gift or in-kind transfer?
- (6) What is the total value of [x] purchased in the previous 12 months?
- (7) What is the total value of [x] received as an inheritance or gift or in-kind transfer in the previous 12 months?
- (8) What is the total value of [x] sold in the previous 12 months?
- (9) What was the main reason that [x] was sold? (Answer codes should include possibilities that deal with mediation of negative shocks)
- (10) Did you give any amount of [x] away as a gift, inheritance, in-kind transfer or lobola/dowry payment in the previous 12 months? If yes, specify value of [x] given.
- (11) What is the total income generated from the rent/leasing/interest of [x] in the previous 12 months?
- (12) If this asset was/were to be sold, which household members did/would make this decision? (specify ID codes)
- (13) If this asset was/were sold, which household members did/would share in the proceeds of the sale? (specify ID codes)
- (14) If this asset were to be bought, which household members would make this decision? (specify ID codes)

- (15) If this asset were bought, which household members would contribute the finances required for the purchase? (specify ID codes)

A.2.2 Types of Assets

To some extent, it makes sense to separate out household durables, from assets proper which we take to mean things that are collateralisable. This view of assets requires the good to have some productive value. Here we group both categories, but it should be noted that some types of productive assets will be captured in other modules (land and farming equipment, for example, will be captured under that section of the employment module that deals with agricultural activities). However, it makes sense to include productive assets here as well because if there is a comprehensive module on household enterprises and farming, these are unlikely to ask questions that probe the flow of such assets into and out of the household. Including such assets in this module will allow us to detect whether households employ complex strategies and reasoning to avoid having to choose more conservative portfolios of assets and investments as an *ex ante* mechanism for spreading risk. Rosenzweig and Wolpin's (1993) study of the selling off of bullocks in some parts of India to cope with shocks is a case in point. Bullocks clearly have productive value but are also tradable when idiosyncratic shocks are experienced.

- Clock/Watch
- Bicycle
- Radio
- Television
- Sewing Machine
- Refrigerator
- Car
- Farm land currently utilised by this house
- Farm land not currently utilised by this household
- Housing occupied by this household
- Housing not occupied by this household
- Livestock, poultry, or fish
- Vehicles (bikes, trucks, boats)
- Tractor
- Non-farm equipment (sewing machines, carts etc)

- Office equipment (computers, typewriters, photocopiers etc)
- Tools
- Household appliances (Radio, TV, fridge, washing machine)
- Jewelry
- Furniture

A.3 Questions on Savings

Even though one of the “assets” we asked about above was savings, bank deposits and the like, we are unlikely to get good answers to these questions. This is because ownership of liquid assets is easy to hide and is usually held in the names of individual members of a household. Therefore to best get at these issues, we should ask each individual directly about these types of liquid holdings. At the bare minimum, the question should be phrased along the lines of:

A.3.1 Savings in the form of Liquid Assets

Do you have any of the following:

- Government Bonds
- Stocks
- Shares in Private companies
- Unit trusts or other financial investments
- Current checking account
- Savings account
- Post office account
- Other savings account (specify)
- Insurance Policies
- Informal Savings Schemes (Stokvels etc.)
- Informal Food Savings Groups
- Other types of liquid investments

Informal food savings groups are an interesting phenomenon worth including. These types of groups tend to be fairly common across poor communities. They are usually very localised, and differ from other informal savings groups like *stokvels* as they do not operate through any of the standard allocation mechanisms identified in the literature such as random allocation or bidding (see Besley, Coate and Loury (1993) for example). Rather, a group of individuals make regular monthly contributions which are deposited into a bank account held under the name of a single member of the group who would usually be conferred the title of “treasurer”. This person would typically travel to the nearest town on a given day (usually the day on which pensions are disbursed as most members of such groups seem to derive their incomes mainly from state pensions, either directly or indirectly) and deposit the money in the bank account, sometimes accompanied by one other individual. Every detail of the

costs involved would be taken into account, including the subsidisation of transport costs of the individual making the trip. Then, at certain appointed times during the year, the money would be withdrawn from the account, and used to purchase food items in bulk at substantially lower prices. The food would then be distributed equally amongst group members. Typically this happens before some annual event, mostly just before the commencement of year-end festivities. The food received from this once-off purchase can sometimes carry households through the first four to five months of the year (Keswell, 2004).

A.3.2 Tracing Movements in Accounts

Depending on space constraints, we can then ask a series of more detailed questions that is aimed at tracing how these holdings are drawn down when things are bad. This is far more difficult to do without asking more invasive questions (for example, a question like “May I see a statement of this account”), but it will provide very useful information over shorter periods than the panel is able to capture. If this is not possible, we should at least ask about the current value of these assets/balance in these accounts.

A.4 Questions on Credit

As discussed earlier, questions on credit should in general be asked of each household member directly. One could ask a key respondent a handful of general questions about the total amount of debt currently held and paid off over some length of time, but this information is likely to be highly inaccurate and if we have a module on credit in the individual questionnaire, it is not clear what is to be gained by having such a section in the household module.

The lead question in the module on credit could be phrased along the lines of: “I would now like to ask you about loans that you may have taken in the last 12 months”. Most surveys ask about loans over the past 12 months, but we might want to increase this to 24 months, given that some types of loans (e.g., car finance) run for much longer periods. However, the tradeoff here is that mis-measurement and non-response on questions that probe the details of such loans are likely to increase with the recall period.

A.4.1 All Loans

For each of the possible loan sources (see list below), ask the following:

- (1) How many times did you borrow or obtain funds that you have to repay from [x] (include all loans in previous 12 months)
- (2) What was the total amount borrowed
- (3) What was the main reason for borrowing these funds? (Answers include Consumption needs; purchase or improve dwelling; ceremonial reasons (wedding/burial/religious), purchase consumer durables; pay school expenses; on-lending; purchase equipment; buy inputs; purchase animals etc)
- (4) What collateral were you asked to provide in order to obtain these funds? (Answers include None; agricultural land; building or other property; car or other vehicle; savings; other assets; personal guarantee; group lending)
- (5) Are you (did you) pay interest on these loans. If yes, specify interest rate and repayment unit (daily, weekly, monthly, etc)
- (6) In total, how much do you still owe [x] (including all loans outstanding regardless of when obtained)
- (7) How often do you make repayments?
- (8) What amount do you repay at each payment?
- (9) Are you behind (in arrears) on your loan repayment?

A.4.2 Most Recent Loans Received

Now I would like to ask you some more detail about the most recent loan you obtained.

- (1) When did you most recently borrow money or obtain funds that need(ed) to be repaid?
- (2) Where did you obtain this most recent loan?
- (3) What was the main reason for borrowing or obtaining this loan? (Answers include Consumption needs; purchase or improve dwelling; ceremonial reasons (wedding/burial/religious), purchase consumer durables; pay school expenses; on-lending; purchase equipment; buy inputs; purchase animals etc)
- (4) How much did you borrow in this most recent loan?
- (5) What is the rate of interest and unit of repayment for this loan?
- (6) During the last 12 months did you try to borrow money from any person or institution and were refused?
- (7) Who turned you down?
- (8) Why did you not attempt to borrow money in the last 12 months? (Answers include No need; Believed I'd be refused; Too expensive; Inadequate collateral; Don't like to be in debt; Don't know any lender; other).

A.4.3 Most Recent Loans Made

Now I would like to find out whether you have made any loans to any one in the past 12 months:

- (1) Have you made any loans to others in the previous 12 months?
- (2) Does anyone owe you money?
- (3) How many individuals owe you money?
- (4) For each loan made, specify how these individuals are related to you (Answers include Relative within the same household, relative in other household; friend, employee, other)
- (5) When did this individual take a loan from you (month and year)
- (6) What was the loan amount?
- (7) What was the main reason for the loan?
- (8) What collateral did you require from this individual?
- (9) What interest rate are you charging this individual?
- (10) How far away does this individual live from your household?

A.4.4 Loan Sources

- Family member, friends or other individual
- Employer
- Landlord
- Bank
- Government Agency
- ROSCA/Stokvel
- Other

Table 1: Shocks, Employment, Informal Savings and the Extended Family

Variable	$\frac{\partial E(y_i z_i=1)}{\partial v_i}$	$\frac{\partial E(y_i z_i=0)}{\partial v_i}$
KwaZulu	-0.06 (1.47)	-0.108 (1.53)
Female	-0.01 (0.50)	0.019 (0.58)
Years of Education	0.00 (0.39)	0.004 (0.64)
Resident Father	-0.01 (0.18)	0.002 (0.04)
Aged 30-39	-0.01 (0.12)	-0.002 (0.02)
Aged 40-49	0.01 (0.12)	0.033 (0.36)
Aged 50-59	-0.10 (1.30)	-0.101 (1.05)
Aged 60 and above	-0.28 (2.67)	-0.306 (3.41)
Aged 30-39 \times Resident Mother	-0.08 (0.93)	-0.073 (0.63)
Aged 40-49 \times Resident Mother	-0.17 (1.36)	-0.171 (1.32)
Aged 50-59 \times Resident Mother	0.04 (0.56)	0.129 (1.01)
Aged 60 and above \times Resident Mother	0.00 (0.01)	0.097 (0.48)
Resident Mother	-0.04 (0.57)	-0.121 (1.37)
Positive Shock	0.11 (2.03)	0.264 (3.19)
Recent death in household	-0.13 (2.20)	-0.215 (3.01)
Recent chronic illness in household	0.00 (0.08)	0.032 (0.34)
Recent destruction of property	0.12 (1.68)	0.321 (2.93)
Resident Mother \times Recent death	0.05 (0.96)	0.018 (0.23)
Resident Mother \times Recent chronic illness	0.10 (2.34)	0.161 (2.21)
Resident Mother \times Recent destruction of property	-0.03 (0.18)	-0.146 (0.61)
Pensioner	-0.14 (3.41)	-0.092 (2.00)

Absolute t-ratios are in parentheses. Standard errors are corrected for within-household clustering. All other variables are binary. $\partial E(y_i|z_i = 1)/\partial v_i$ gives the partial effect of each explanatory variable on the employment probability of individuals that have access to informal savings /insurance, whereas $\partial E(y_i|z_i = 0)/\partial v_i$ does the same for individuals that do not. In the case of dummy variables, the estimates are to be interpreted as the difference in the predicted probability of employment between the event occurring and not occurring. The results are based on a bivariate probit specification where employment and (access to) savings/insurance equations are jointly estimated. The exclusion restriction that identifies the model is whether one is a pensioner, which is by definition orthogonal to whether one is employed or not (as pensioners are not captured as part of the sample of labour force participants).

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