Bridging the gap: towards greater policy relevance of poverty trap research

IDEC8028 Microeconomics of Development

Research proposal

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Michael Wulfsohn

u5248529

Motivation

In recent years a number of academic studies have been undertaken to understand and test for the existence of a variety of different types of poverty trap. This research often yields important insights since, any given context, the existence of a poverty trap and its specific nature have important implications for the selection of appropriate economic policies. Unfortunately, there are likely to be far more poverty trap instances in the world than research grants available to rigorously test for them.

This proposal presents a plan to investigate how accurately the existence of poverty traps in a specific context can be predicted by the perceptions of people such as government officials, local leaders, aid workers and NGO representatives, when combined with certain measurable contextual information such as population density and infrastructure quality. The motivation of this project is to improve the lives of the poor by bridging the gap between academic work on poverty traps and policy in developing countries. While perceptions are unlikely to be as reliable an indicator of poverty traps as rigorous research, this project could enable any community that has not been the focus of a poverty trap study to nevertheless benefit from the insights gained from work in this field.

For a description of different types of poverty traps, methods for empirical testing and implications for policy, the latest thinking is well summarised in Barrett and Carter (2013). Literature identifying poverty traps in specific contexts is presented in Appendix C and briefly discussed under “Research design and methodology” below.

Description of research project

As mentioned above, this research project will make use of the responses that local government officials, local leaders, aid workers and NGO representatives in developing countries (hereafter referred to as “local agents”) give in surveys specially designed to identify poverty traps that exist within local communities. Specifically, this project will use statistical methods to attempt to establish links between these survey responses and the results of empirical studies testing for single- and multiple-equilibrium poverty traps. If successful, this will enable the development of a model that will be able to tentatively identify poverty traps through only surveying the local agents, without the need for detailed research. A provisional set of survey questions is provided in Appendix A. The issues surrounding the design of the survey questions are discussed under “Key challenges” below.

The project will also make use of measurable contextual information, such as population density, density of police stations, hospitals, schools, quality of infrastructure etc. which could provide additional predictive capability. A provisional list of such measurable contextual information is provided in Appendix A.

The project will make use of existing studies into the presence of poverty traps in specific contexts, locations or situations (“contexts” hereafter). However, given the relatively low number of such studies, there may not be sufficient degrees of freedom in the analysis to provide satisfactory predictive power. Therefore, as well as carrying out surveys as part of this project, additional empirical work will also be carried out, with the specifics of this explored under “Research design and methodology” below.

However, the greatest potential to improve the reliability of the model lies in future poverty trap research by others. Therefore, an additional objective of this project is to produce a set of guidelines that future research into poverty traps can follow in order to be able to contribute to the ongoing improvement of this model. A provisional set of guidelines is provided in Appendix B.

Research question

The research question is therefore whether and how the perceptions of local agents, combined with measurable contextual information, can predict with some level of reliability the existence or otherwise of a single- or multiple-equilibrium poverty trap.

The standard definition of poverty trap normally involves wealth equilibria below some notion of a poverty line. However, for the purposes of this project, this definition is inappropriate because the project will use behavioural traits to identify single- and multiple-equilibrium wealth dynamics, and behavioural traits are not affected by an arbitrary poverty line threshold. Thus, in the cases where these dynamics exist but all equilibria happen to be above some poverty line, the model should still include such cases as a trap, because this will help the model to more strongly associate the appropriate behavioural characteristics with such dynamics. Further, it is arguable that understanding these wealth dynamics is beneficial in forming public policy even when the households concerned do not fall below the poverty line.

Therefore, for the purposes of this project, the definition of a poverty trap is a situation where a household is not able to accumulate assets over time, i.e. where at least one equilibrium level of wealth exists.

Project design and methodology

This section covers several issues pertaining to the details of the design of the project.

Stratified sampling

If the model needs to be able to be applied to new contexts where no research has been carried out, then the research that contributes towards the calibration of the model needs to cover as wide a range of contexts as possible. Thus, it would be preferable to have access to research, along with surveys and collection of contextual information, in respect of a number of areas for each of the possible combinations of the below dimensions:

- Poverty trap vs. no poverty trap
- Rural vs. urban
- Culture/nationality; broad categories may include continents (Africa, Middle East, Asia, Latin America), whereas more granular categories may include countries
- Average income (while still focussing on contexts with significant levels of poverty)
- Poverty trap types
  - Single-equilibrium: arising from education, lack of natural resources, water and sanitation, institutional quality e.g. law enforcement, infrastructure, available technology, social exclusion
  - Multiple equilibrium: arising from nutrition, herd size dynamics, networking or other spillover effects, soil/fertilizer investment, increasing returns to scale e.g. fixed costs of technology adoption

The above list represents a large number of possible category combinations, so it is unrealistic to expect to obtain multiple data points for each one in the near future. However it is nevertheless desirable to attempt to achieve even coverage of these areas to the extent possible.

Unfortunately, this is not possible from existing research alone. As is evident from the table of existing research in Appendix C, some of the stratification categories are poorly represented in existing poverty trap studies, most notably urban environments, countries outside Africa and contexts where no poverty trap exists. While the table in Appendix C is not an exhaustive investigation, it is clear that the contexts for the research conducted as part of this project should be chosen so as to improve coverage of the abovementioned areas to the extent possible.

Once these contexts have been determined, decisions will need to be made as to the best way to carry out the tests. It is likely that direct methods (e.g. using asset indices) will be employed given the need to identify both single- and multiple-equilibria poverty traps, although this would not preclude the use of supplementary indirect, behavioural tests. Care will need to be taken given the challenges associated with the construction of asset indices for direct poverty trap tests. However, ultimately the approaches used will be context-specific, and since the contexts have not yet been determined, it is not currently possible to provide detail on the methods that will be used in this part of the project.

Model and estimation techniques

The statistical model to be used will consist of two regression equations to be estimated by Ordinary Least Squares (OLS), and is defined as follows:

$\text{Single}_i = F(Y_{\text{single},i}) = c_s + \beta_s X_i + \delta_s Z_i + \varepsilon_{si}$
$\text{Multiple}_i = F(Y_{\text{multiple},i}) = c_m + \beta_m X_i + \delta_m Z_i + \varepsilon_{mi}$

Where:

- i = number denoting the context that the data apply to
- Single_i = probability of a single equilibrium in context i, given by empirical research
- Multiple_i = probability of multiple equilibria in context i, given by empirical research
- F = cumulative probability distribution function
- X_i, Z_i = survey responses and de-meaned measurable contextual information in respect of context i, respectively
- c_s, β_s, δ_s, c_m, β_m, δ_m = parameters
- ε_{si}, ε_{si} = error terms

Please note that the exact form of the equations, and the estimation methods used, are not final and may be adjusted as required.

Additional points regarding the above prediction model:

- Most empirical tests into poverty traps have identified at least one equilibrium level of wealth or income, and have primarily focused on whether or not the equilibrium or equilibria are above the poverty line. However, this model does not pre-suppose that all situations are wealth traps; that is, it does not rule out the situation where most households are able to accumulate assets over time. This is also consistent with the definition of a poverty trap for the purpose of this project, given under "Research question" above.
- In this model, it is possible for a particular study to contribute to the estimation of only one of the equations, instead of both. As previously noted, if multiple studies are conducted in respect of the same context, their results should be combined into a single probability for each type of poverty trap (single and multiple) in respect of that context.
- The measurable contextual information is de-meaned, so that if some of the information is not available for a given context, then the mean value will effectively be assumed.
- The regressors in the model are the survey responses and the demeaned measurable contextual information. Pairwise interactions between regressors will also be investigated (for example between a rural/urban indicator and asset stock-related survey questions, in case the urban poor are more likely to be employed by others), and higher-order interactions may be included if qualitative reasoning suggests that they should be. The Akaike Information Criterion (AIC) will be used to choose between different sets of regressors in order to a) maximise the predictive accuracy of the model (unlike criteria with greater parsimony such as the Schwarz Criterion), while b) limiting multicollinearity, due to the penalty for complexity present within the AIC criterion. Multicollinearity could arise through indiscriminately including an excessive number of regressors; in particular, there is

overlap between many of the measurable contextual information and the survey questions. Multicollinearity is undesirable as it could lead to significant changes in predictions for a given context as new information becomes available and is used to refine the model. Such variation must be kept to a minimum in order to maximise the perceived usefulness of the model.
- To avoid bias, survey responses must be obtained before any results of the quantitative research are communicated to anyone, and the research must be conducted before the researchers view the results of the survey.

Expected outcomes

This project is expected to contribute to the establishment of a model that is able to estimate the likelihood of the existence of single and multiple equilibrium poverty traps in a given context, based on survey responses from local agents combined with measurable contextual information. This may be achievable from this project alone, or further work may be required to attain an acceptable degree of reliability.

Once such a model is constructed, it could then be transformed into a tool or service that could be used to guide policy through tentative identification of poverty traps and their type. Examples of this may include a website that allows a local agent to submit some information and receive an estimate of the likelihood of different types of poverty trap, or a consulting service to identify poverty traps based on the model. Such tools and services would be much easier to apply to a given context than rigorous empirical testing. They would also be accompanied by easily digestible information on poverty traps and their policy implications for local agents, such as leaflets and informational videos. This would help decision-makers to understand the benefits of carefully targeted interventions, such as cargo net programs targeted at households near the threshold point of a multiple-equilibrium poverty trap.

If the number of data points is too low and the coverage of the various stratification dimensions too thin to provide reliable predictions, then the model may not achieve sufficient predictive accuracy to be helpful in tentatively identifying poverty traps. However, it could still be used to indicate potential areas for further, more rigorous analysis.

In any case, the predictive ability of the model will naturally grow with the body of empirical work in this area. Therefore, another outcome of the project will be to take advantage of this work by establishing a set of guidelines for future poverty trap tests to follow so as to contribute to the refinement of the model. A provisional set of guidelines is included in Appendix B.

Key challenges and mitigation strategies

Achievement of sufficient degrees of freedom and valid representation of all stratification categories from existing empirical work

In order to increase the degrees of freedom in the prediction model, additional empirical research will be carried out as part of this project in carefully chosen contexts, as explained under "Research design and methodology" above. This will to some extent relax the constraints on the predictive power of the early versions of the model. However, over time, additional research testing for poverty traps will be carried out by others, which will be used to improve the reliability of predictions of later versions of the model.

Difficulty in successfully identifying the key productive assets

The problem of identifying which specific assets are relevant to wealth dynamics in a given context is one that applies to most poverty trap research. In some cases it is relatively straightforward, such as herd dynamics in northern Kenya (Barrett et al. 2006). However, the productive assets that actually matter tend to vary according to each context, and the accumulation process may not be uniform either. Even if poverty trap dynamics do exist in certain assets, they may not be easy to detect empirically, since unobserved heterogeneity such as ability may mean that some households in the context in question experience poverty trap wealth dynamics while others do not (Barrett & Carter 2013).

It would be quite difficult to design survey questions that implicitly identify which assets are key to households' productive capacity. Therefore, the survey takes the explicit approach of asking respondents to identify which asset or set of assets is key to households' productive capacity. Subsequent questions refer back to this identified set of assets. This explicit approach leverages the local knowledge of each respondent in order to maximise the relevance of responses given and thus their predictive power. Although respondents will not always agree on which assets are key, this may actually be an advantage to the extent that respondents' perspectives differ due to them being involved in a varying ways with the households in question. If this is the case, having access to differing perspectives could help provide a more holistic view of the daily economic lives of empoverished people.

Other challenges relating to the effectiveness of the survey questions in identifying poverty traps

Apart from identifying the key assets, the survey questions need to be specific enough to capture the dynamics particular to each situation but also broad enough to be generalisable outside the original sample. The survey therefore attempts to make use of economic theory as it pertains to behaviour in the presence of poverty traps in order to achieve a certain measure of universality. Further, questions are designed to be as universal as possible; for example, the concept of "borrowing" is not confined to monetary loans. In addition, the survey responses will be supplemented with measurable contextual information, as explained previously in this proposal.

Achievement of sufficient clarity and universality of survey questions

A key concern in conducting any survey is that there is lots of room for misunderstanding and misinterpretation. In the case of this project, this concern is especially acute due to wide cultural differences and potentially low level of education of respondents.

Thus making the survey questions clear and as simple as possible is a necessary condition for success. Professional guidance on survey design and question wording, as well as continual refinement in this area, will be used to achieve this to the greatest extent possible. In particular, extra effort will be put towards the explanation of "key productive assets", given the reliance of other survey questions on responses to this initial question.

Limitations of existing empirical work in establishing the existence or otherwise of a poverty trap

The fact that even rigorous empirical tests for poverty traps are not perfectly effective is certainly an inherent limitation of this project. However, the purpose of this project is not to attain perfection; rather, it is to enable a trade-off between rigour and accessibility, so it is not disastrous that such limitations exist. Nevertheless, this uncertainty present in empirical work is represented in the prediction model by its dependent variables being probabilities.

Additional caveats exist pertaining to the use of existing research in regards to timing differences between the research and any survey conducted as part of this project. For example, if the research led to changes in policies applicable to the context in question, or if conditions and perceptions changed subsequently to the research project for other reasons, then the results of the survey will not match up properly with the results of the research. This means that care must be taken to identify the extent to which actual and perceived welfare dynamics may have changed. It also means that research that is more than a few years old may not be useful.

Appendix A – Provisional survey questions and measurable contextual information

Provisional survey questions

- What asset or group of assets are the key productive assets that matter to households' livelihoods in the context in question? These assets will be referred to in subsequent questions as KPAs.
- Do most of the households in question engage in similar work to each other, e.g. factories, or agriculture?
- Does the typical or average household get most of its income from a) running a business (e.g. a farm or shop) or b) working in someone else's business or organisation?
- If the answer to the above question is b), do most of these workers receive a fixed wage or a wage that is determined by the worker's productivity?
- Does the typical or average household build up KPAs over time?
- How easy is it for the typical household to borrow when they need to?
    - 1 = no access to any form of borrowing, even from friends or family
    - 10 = can borrow as much as desired
    - This question should be answered in respect of all types of borrowing, including monetary and non-monetary, formal and informal, etc.
- How easy is it for the typical household to save, assuming that they have extra money or other resources that they want to save?
    - 1 = no possibility of saving, e.g. for cultural reasons if any excess money or assets will just be "requested" by relatives
    - 10 = readily accessible forms of saving (e.g. inexpensive deposit accounts available from various trustworthy banks) exist
- Rate the level of isolation of the typical household – how much contact do people have with the outside world?
    - 1 = hardly ever have significant interaction outside the household, e.g. isolated subsistence farming household
    - 10 = daily interaction with a diverse range of people, e.g. work in a tourist market in a large city
- Rate the income risk exposure of the typical household – is their income the same every year, or does it vary from year to year?
    - Given the difficulty of the concept of risk, restrict this to 3 options:
        - Hardly any variation
        - Some variation
        - Significant variation
- Rate the asset risk exposure of the typical household – how stable is the typical household's level of KPAs? Stability might be affected just by the day-to-day running of the household, or it might be affected by some kind of adverse event, such as a drought, flood, theft, medical emergency, etc.
    - Options:
        - Fairly stable (vary within +/- 20%)
        - Unstable (vary within +/- 50%)
        - Very unstable – typical household risks losing almost all its KPAs from time to time
- Does the typical household have access to formal insurance, e.g. a contract with an insurance company?
- Does the typical household have access to informal insurance, e.g. friends and family helping each other out, or groups that form a mutual insurance arrangement?
- Rate the "tightness" of social networks, where:

  - 10 = very tight, it's clearly defined who is "in" and "out", similar people network together
  - 1 = people aren't generally stuck within one group and tend to know lots of very different people
- Focus on the most recent negative shock (if there is one), i.e. where some adverse event reduced the level of the typical household's KPAs. For example, bad harvest, natural disaster, food crisis etc.
  - What proportion of households' KPAs was typically destroyed by the shock?
  - How long ago was the shock?
  - Did any households go hungry/cut back on consumption to deal with the crisis, rather than sell KPAs?
  - How wealthy did people have to be to "weather the storm" comfortably?
  - Did some people take more risks than usual in response to losing assets?
  - Have some households not recovered to the same level of KPAs they were at before the disaster?
- Focus on the most recent positive shock (if there is one), i.e. where some positive event raised the level of the typical household's KPAs
  - By how much (in % terms) were households' KPAs increased on average by the shock?
  - How long ago was the shock?
  - Did the shock appear to have permanent effects for some?
  - Did some people take less risk than usual in response to gaining assets?
- Psychological effects - do those in poverty often feel hopeless about the chances of things improving for them?
- Do you believe that, for a typical household, if they received a one-off transfer equal to their yearly income, would this lead to a permanent increase in their level of KPAs or would they soon revert back to their original level?

Measurable contextual information (provisional list)

- Is the context in question rural or urban?
- In which country is the context in question located?
- Average household income
- Measure of income inequality
- Availability of formal or informal credit, insurance
- Population density
- Density of police stations, hospitals, schools
- Availability of electricity, clean water
- Internet and mobile phone penetration
- Average government transfers per household/individual

Appendix B – Provisional set of guidelines for future research

From the "Research question" section above, for the purposes of the prediction model and framework, a poverty trap is defined as a situation where a household is not able to accumulate assets over time, i.e. where at least one equilibrium level of wealth exists. This is to facilitate behaviour-based identification of poverty trap dynamics, independently of any particular measure of a poverty threshold.

The key outputs required are the probability of the existence of a) a single equilibrium level of wealth, and/or b) a multiple equilibrium levels of wealth. The model can still make use of studies that only produce one of these probabilities. The probability can be based on the researcher's subjective reasoning in addition to data analysis, and should attempt to account for the level of certainty about the conclusion.

To avoid the potential for bias, survey responses must be obtained before any results of the quantitative research are communicated to anyone, and the research must be conducted before the researchers view the results of the survey. The exception to this is that researchers may view responses to the survey question that asks respondents to identify the key productive assets. These responses may help to guide researchers to focus on collecting and analysing the right data, and do not have the potential to introduce bias similarly to those questions that are designed to uncover the existence or otherwise of poverty traps.

The selection of survey respondents is very important since the responses given will contribute to the model's calibration. Respondents should exhibit these two key criteria to the greatest extent possible:

1. Significant local knowledge and experience in working with people and households in the context in question, with a good sense of the key challenges faced by the community. These people are more likely to hold perceptions that closely reflect reality.
2. Possession of ability to make decisions or influence policy that affects the lives of the people and households in the context in question. The model's opportunity to have an impact on policy will be in the event of its use by someone who is in a position to influence policy. Therefore, the model should be calibrated by using the responses of such people in order to maximise its accuracy in this situation.

Finally, when researchers are choosing between different contexts for poverty trap testing, they may wish to lean towards those stratification categories in which little research exists, in order to improve the coverage of different types of contexts by the model. The stratification categories are listed under "Research design and methodology" in this proposal.

Appendix C

Table 1 **Contexts in which poverty trap tests have been conducted**

Authors & year	Likely poverty trap type	Country	Rural/urban
Adato et al (2006)	Multiple equilibria	South Africa	Both
Antle, Stoorvogel and Valdivia (2006)	Multiple equilibria	Peru	Rural
Antman and McKenzie (2007)	Single equilibrium	Mexico	Urban
Barrett et al (2006)	Multiple equilibria	Kenya	Rural
Barrett et al (2006)	Multiple equilibria	Madagascar	Rural
Carter and Lybbert (2012)	Multiple equilibria	Burkina Faso	Rural
Carter et al (2007)	Multiple equilibria	Ethiopia	Rural
Carter et al (2007)	Multiple equilibria	Honduras	Rural
Dercon and Christiaensen (2011)	Multiple equilibria	Ethiopia	Rural
Dercon (1998)	Multiple equilibria	Western Tanzania	Rural
Giesbert and Schindler (2012)	Single equilibrium	Mozambique	Rural
Hoddinott (2006)	Multiple equilibria	Zimbabwe	Rural
Kwak and Smith (2013)	Single and multiple equilibria	Ethiopia	Rural
Lybbert et al (2004)	Multiple equilibria	Southern Ethiopia	Rural
Marenya and Barrett (2009)	Multiple equilibria	Western Kenya	Rural
McKay and Perge (2013)	Single equilibrium	Uganda	Both
McKay and Perge (2013)	Single equilibrium	Vietnam	Both
McKay and Perge (2013)	Single equilibrium	Peru	Both
McKay and Perge (2013)	Single equilibrium	Bolivia	Rural
McKay and Perge (2013)	Single equilibrium	Tanzania	Both
McKay and Perge (2013)	Single equilibrium	South Africa	Both
Naschold (2012)	Single equilibrium	India	Rural
Naschold (2013)	Single equilibrium	Pakistan	Rural
Naschold (2013)	Single equilibrium	Ethiopia	Rural
Quisumbing and Baulch (2013)	Single equilibrium	Bangladesh	Rural
Stephens et al (2012)	Multiple equilibria	Kenya	Rural
Total contexts	**26**		

Coverage of stratification categories

Type of poverty trap	Multiple equilibria 13	Single equilibrium 12	Single and multiple equilibria 1	No poverty trap 0
Rural/urban setting	Rural 19	Urban 1	Both 6	
Continent	Africa 17	Latin America 5	Asia/South Asia 4	Middle East 0
Average incomes	Information not available			

Sources: Individual research papers, author's calculations

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