

Economics

Essays on Programme Impacts, Vulnerability and Welfare Measurement

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Aalto University

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Essays on Programme Impacts, Vulnerability and Welfare Measurement

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Essays on Programme Impacts, Vulnerability and Welfare Measurement

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This dissertation consists of three essays on programme impacts, poverty and vulnerability. The first essay explores for the first time the impacts of the Mexican conditional cash transfer programme 'Progresa' on vulnerability to expected ultra-poverty (less than US\$0.5 per day) using consumption and income. Different from traditional ex-post poverty measures, the paper explores the Vulnerability as Expected Poverty model (VEP) ex-ante that yields probability statements regarding vulnerability, the risk that an individual will suffer from poverty in the future. The results indicate that the treated population has lower levels of vulnerability to ultra-poverty (20 percentage points) and higher levels of expected consumption (17 log-percent) and income in the future (over 50 log-percent, when including transfers) compared to the counterfactual group. Treatment effects on disadvantaged groups are even larger. This paper suggests that the expectations for better future livelihood of the treated people have clearly changed after the launch of the cash transfer programme.

The second essay evaluates the impact of an intervention to improve farming techniques and food security in the Gaza area in rural Mozambique. We examine the impact of a group-based approach to technology adoption in subsistence agriculture, using self-collected panel data on over 200 households from treatment and control villages from 2008-10. The intervention was successful in encouraging vulnerable households to participate in farmers' groups. The impacts on farming techniques, such as fertilizer use, are significant in the first treatment year. The impact on food security is mixed across indicators but similar in both treatment years.

The third essay examines the measurement of social welfare, poverty and inequality taking into account features that have been found to be important welfare determinants for people. Most notably, we incorporate reference-dependence, loss aversion and diminishing sensitivity – aspects emphasized in Prospect Theory – to social welfare measurement. We suggest a new notion of equivalent income, the income level with which the individual would be as well off, evaluated using a standard concave utility function, as he actually is, evaluated with a reference-dependent utility function. We examine the differences between standard poverty and inequality measures based on observed income and measures that are calculated based on equivalent income. These differences are illustrated using household-level panel data from Russia and Vietnam.

Keywords risk, vulnerability, poverty, inequality, aid impact, consumption, Progresa, food security, fertilizer use, farming technology adoption, impact evaluation, Mozambique, Prospect Theory, welfare measurement

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Helsinki, June 2018

Milla Nyysölä

List of Essays

This dissertation consists of an introduction and the following three essays:

Essay 1: “The Impact of Conditional Cash Transfers on Vulnerability to Extreme Poverty – Evidence from Progresa” unpublished manuscript, 2018

Essay 2: “Technology Adoption and Food Security in Subsistence Agriculture – Evidence From a Group-Based Aid Project in Mozambique” Finnish Economics Papers, 27:1-33, November 2014.

Essay 3: “Poverty and Welfare Measurement on the Basis of Prospect Theory” The Review of Income and Wealth, 60:182-205, March 2014.

1. Introduction

Poverty and hunger are still limiting many people's opportunities for a better life. Despite promising reductions in global poverty made during the last two decades, there still is a considerable number of people living in scarcity. There is an ever-growing mass of households, living just above the poverty line, facing a serious threat of poverty due to a negative shock. Ending poverty by 2030 is the new and bold Sustainable Development Goal (SDG) of the United Nations. Making poverty history requires also understanding who is likely to be poor in the future and knowledge regarding the possible ways to protect these vulnerable people from poverty.

Living in poverty is hard both physically and psychologically. Insecurity of future livelihood is in the core of poverty and for the very poor; even a relatively small shock can lead to the destruction of physical as well as human capital. In scarcity, people experience stress that not only jeopardizes their health, but also limits their focus, targets, far-sightedness and rational decision-making capacity (Mani et al. 2013). Poverty can change people's risk attitudes and for example, it can drive people to avoid lucrative opportunities or overly diversify their earning strategies to avoid taking risk (Banerjee and Duflo, 2007). All these factors and many more have a role in how long people remain trapped in a poverty trap – sometimes even for generations.

Accelerated economic growth and the combined effort of governments, international organizations, non-governmental organizations and civil society actors have all done their part in achieving the first Millennium Development Goal of halving poverty in the course of the last 25 years. Unfortunately, economic growth does not happen everywhere, and sometimes even when it does, it does not necessarily guarantee poverty reduction in the absence of progressive or redistributive policies. This is when actions targeted directly to the ultra- and extremely poor are of crucial importance. Researchers have classified three avenues that seem to work for poverty alleviation; first, creating conditions that enhance improved asset creation possibilities for the poor; second, improved

opportunities for the poor to use available assets more productively; and third, more effective and inclusive social protection programs targeted to the chronic poor (Janvry and Sadoulet 2004). Interventions presented in this dissertation work towards poverty reduction by improving these aforementioned avenues. Simply put, traditionally poverty and wellbeing are measured by estimating per capita or per adult equivalent income, consumption or wealth and these levels are compared to an appropriately defined poverty line. To answer the growing need to address other aspects of poverty, the literature provides models that consider for example deepness and severity of poverty (Foster et al. 1984), persistence of poverty over time (e.g. Calvo and Dercon 2009; Clark and Hulme 2005), likelihood of poverty or effects of risk and insecurity (see survey by Hoddinott and Quisumbing 2003). Not to mention lack of opportunity and multidimensional measures such as multidimensional poverty index or human development index (UNDP 2010). Essay 3 in particular, explores welfare indicators that take into account that wellbeing, measured using consumption or income, is not a static state, but tends to shuffle. Vulnerability analysis again, can help us understand why some impoverish and some do not. Indeed, one motivation for developing these measures further is that in many cases non-standard, behavioral economic models work better in predicting how people behave for example after a policy reform, as these movements have ex-ante and ex-post implications on wellbeing.

The concept of vulnerability has many definitions. In these essays, people that bear a significant probability of being poor next year are considered vulnerable. Vulnerability can be seen as the inability to manage risks and it incorporates the sense of insecurity and defenselessness that results from being exposed to risks (de la Fuente et al. 2015). Producing results regarding expected poverty and vulnerability is important. The mere expectation of poverty decreases welfare today (Weissman et al. 2015) and can change how people behave (Dercon 2006). Predicting who is likely to stay in poverty or fall into it the next period can be done using models that directly predict poverty (Sumarto et al. 2006) or measure vulnerability (Christiaensen and Subbarao 2005; Chaudhuri et al. 2003). This information could help in knowing to whom to target new social protection schemes and further how the likelihood of poverty and its deepness changes once these programs are introduced.

Essays one and two focus on how poverty programs impacts on either vulnerability or poverty on rural contexts. The magnitude of risk in many low-income rural areas is significant and it results in highly variable agriculture outputs and food security shortfalls that can be a serious threat for survival (Zimmerman

and Carter 2003). Poor farmers with subsistence constraints minimize their exposure to uncertainty by avoiding new opportunities, such as new technologies. This dissertation looks at two ways to tackle these problems: the essay one examines, direct interventions that decrease insecurity by providing cash transfers, and essay two studies organizing direct assistance for taking up new technologies. Both of these interventions also have a special emphasis on women. Cash transfers are paid to a female in the household in order to have impact on subsistence and nutrition of the whole household. In essay two that examines aid efficiency in Mozambique, technology assistance is given to subsistence farmers who in Mozambique are typically women and who produce food for household consumption. Targeting interventions that decrease risk and vulnerability to women is likely to be prolific, as females are known to be more risk averse than men (e.g. Borghans et al. 2009).

This dissertation uses data from randomized experiments to find out the interventions affected outcome indicators of interest. Previous literature has shown that Progreso/Oportunidades/Prospera (POP) in Mexico was a success in many ways and became incrementally nation-wide. Even though randomized controlled trials have become more prominent in development economics, they have their caveats. For example for Progreso evaluation data the baseline data concerning consumption was inadequately gathered, which has forced researchers to compare outcomes for treatment and control groups only after intervention (Hoddinott and Skoufias 2004). This is fine as long as randomization is done well and treatment and control groups can be assumed to have the same initial welfare levels and that they, in the absence of the program, would develop similarly. If not, there exists useful methods to correct for these shortcomings. The first and the second essay conduct a difference-in-differences analysis for the randomized experiment data. Luckily, Progreso has been replicated and similar randomized evaluations have been done in several other Latin American countries with results consistent with the original study. This clears some the doubts regarding its randomization and results (Banerjee and Duflo, 2009). Another issue with randomized trials is spillovers. In many poor countries, households share risk and provide support to other households such as their extended family. In Progreso, contamination of the control group has not been reported before phasing-out of the program, but Angelucci and de Giorgi (2009) have detected spillovers inside treatment villages in the form of gifts and loans from beneficiaries to non-beneficiaries. The same applies for the Chigubo study in Mozambique. This has affected the multitude of chosen identification strategies

in the essays, as looking at the effect only on the treated underestimates the full impact of the program.

1.1 Overview of the essays

1.1.1 Essay 1

The first essay ‘The Impact of Conditional Cash Transfers on Vulnerability to Extreme Poverty – Evidence from Progresa’ examines the impact of conditional cash transfers on expected consumption, income and vulnerability to expected poverty. This study is part of a larger research project called ‘Designing and funding social protection in low-income countries’ and it is funded by the Academy of Finland. Vulnerability is an important, emerging theme as it has been shown that vulnerability to poverty, and in particular, the uncertainty and exposure to risk, embedded in the definition, have implications on wellbeing and behaviour.

Progresa (Programa de Educación, Salud y Alimentación) is one of the earliest and most influential conditional cash transfer programs and since its beginning, and similar programs have been replicated widely around the developing world. The actual fixed cash transfer in the program is paid conditional on schooling and health care and it is large enough to make a difference in poor people’s lives. I use Progresa’s randomized evaluation data that was collected bi-annually in 1997-1999 from control and treatment localities, populated by poor predominantly agrarian villagers. The data was randomized on locality level, but on the household level, there are some issues that are addressed in the essay. I study vulnerability in four survey rounds: November 1997 (baseline), November 1998, June 1999 and November 1999 and present effects using two identification strategies: average treatment effect of living in the treatment village and intention to treat effect on the treated households.

Previous literature regarding conditional cash transfer programme impacts on vulnerability to poverty has mainly focused on ex-post measures, whereas the novelty of this essay is that it looks at the causal treatment effects of cash transfer programme on ex-ante vulnerability measures. The vulnerability as expected poverty model is useful, since it can be performed even with cross-sectional data. Moreover, it does not require subjective information on risk preferences and does not require a particular functional form for a social welfare function. The model gives a probability statement about future poverty and allows analysing the effect of each predictor, in this case the effect of the treatment dummy, on the predicted conditional variance of the expected consumption (income). In

the data, practically all people are extremely poor. Therefore, in order to find positive treatment effects on vulnerability, I use the international ultra-poverty line, approximately \$0.5 a day (using IFPRI's definition). The results indicate that the likelihood of falling under the poverty line is lower for people living in treatment villages than in control villages. In 1999, the likelihood of falling in poverty if living in control villages is on average almost 60 percent, whereas in treatment villages it is lower, 46 percent. This suggests that in average the control group is very vulnerable to ultra-poverty as they have such a significant probability on average of being poor in the next period. Furthermore, I find that when contrasting traditional headcount poverty with the vulnerability headcount (population with 50-50 chances of impoverishment) the intention to treat effect is roughly double regarding vulnerability headcount contrasted to the equivalent program effect on traditional poverty headcount. Therefore, in addition to measuring traditional treatment impacts on poverty ex-post, there are program impacts, often larger in magnitude on vulnerability to expected poverty worth considering.

Mainly, I focus on the vulnerability – the magnitude of the probability of falling into poverty, but I also look at the impacts on expected income and consumption. When focusing on the treated households (the so called initially eligible) and the disadvantaged groups the effect appears larger. The results suggest that it is expected that people exposed to the program can expect to spend in the future, either directly or indirectly, more on food and other durables due to the program.

In the essay, I point out that even though on locality level the randomization was done following the ideals of randomized controlled trials, on household level there were some underlying differences in incomes at the baseline. Therefore, I test in the paper also a set of differences-in-differences models for expected income and expected poverty. First, I find that when conditional cash transfers are included in income, the treatment effect on expected income is over 50 log-percent higher for the initially eligible households (approximately treated) living in treatment villages compared to their counterparts in control villages. This effect is mostly stemming from the direct effect of having more cash available. However, approximately one third (in percentage points, in the case of the initially eligible households) of the total effect seems to be resulting from an indirect programme effect for higher expected income in the community on average, most likely due to the additional cash injected into the community. I also study the probability of poverty with the differences-in-differences model and I find that the treatment has had an impact on the expectation of

income poverty of more than 25 percent. The direct effect accounts for the most of this impact, but the indirect effect regarding the likelihood of probability to be considered poor in the post-treatment period in average is statistically significant, despite being approximately only about one fifth of the total effect.

In addition to the main analysis, I complement the analysis with some additional estimations. I run a quantile regressions model for expected consumption and income and I find that when cash transfers are included there are progressive treatment effects on the initially eligible population living in the treatment villages in all post-treatment rounds. I also find positive effects when studying expected consumption using a linear probability model on the probability of ultra-poverty.

This essay shows that the effect of a cash transfer program on expected poverty and vulnerability is rapid and significant in size. Actual vulnerability to poverty is lower for households living in treatment villages, as the effect of the cash transfers lifts people away from expected consumption poverty. Cash transfers have a way of protecting people from the largest downswings and people are able to adjust their expectations for a better future.

1.1.2 Essay 2

The second essay, co-authored with Jukka Pirttilä and Susanna Sandström, evaluates the impact of a group-based farming intervention that aims to promote agricultural development and food security in the Gaza area of rural Mozambique. The study was part of a larger, Academy of Finland-funded research project called ‘The effects of Finnish foreign aid on recipient countries’ economic performance, inequality, poverty and wellbeing’ that took place in 2007-2010. It appeared first in UNU-WIDER’s working paper series in 2012 under the ‘Research & Communication on Foreign Aid’ (ReCom) – project. In 2014, the final paper was published as a journal article in Finnish Economic Papers.

The farming intervention was part of a larger integrated village development programme that covered several development objectives. The intervention took place in the poorest rural villages of the area. The programme was carried out by the local Lutheran World Federation (LWF) in Mozambique. The idea in the farming intervention was to encourage group-based subsistence farming, where participants were working on joint plots of land. The groups received joint training, improved crop varieties, tools and fertilizers. Materials to the farming groups were channeled with the help of LWF from the government of Mozam-

bique under their agriculture development framework. These groups were essentially formed of women, who often are in a particularly vulnerable situation especially in the Gaza region. The programme was completely financed by Finnish funds from Finn Church Aid.

This was the first time a completely Finnish-funded development aid project was evaluated using statistical longitudinal impact-evaluation methods. We managed the on-field evaluation procedures and examined the impact of the intervention on one hand on people living in the treated villages using the difference-in-differences technique and on the other hand, on actual treated farmers using instrumental variables approach. The final three-year panel data collected with the help of local interviewers is quasi-experimental and it covers more than 200 households from two treatment villages and four control villages.

Using the household survey data, we found that the intervention was successful in encouraging villagers to participate in joint farming activities and to use improved seeds. Among the intervention participants the fertilizer use improved by 20% and the number of crops farmed increased on average from four to six varieties in 2009. During the programme, participating households moved to more sustainable strategies to cope with food shortages. However, the impact on food security is mixed across indicators, but consistent in both treatment years. Positive programme impacts concentrated on 2009 only. This may be due to a drought that hit participating villages harder than those in the control group, as well as delays in delivering the aid in 2010, suggesting that if constant and long-term view of aid is ensured, improvements can be achieved for those living in these challenging conditions.

1.1.3 Essay 3

The third essay, co-authored with Markus Jäntti, Ravi Kanbur and Jukka Pirttilä, presents a new measure for estimating social welfare, which takes into consideration aspects emphasized in Prospect Theory (Kahneman and Tversky 1979). The essay was done in a research project at UNU-WIDER called ‘New Approaches to Measuring Poverty and Vulnerability’. It was published in a special issue of the Review of Income and Wealth in March 2014.

This essay was motivated by the fact that traditionally social welfare measurement has been silent regarding certain behavioral economics aspects emphasized in Prospect Theory such as reference-dependence, loss aversion and diminishing sensitivity. The incorporation of these features can for example help

us understand tensions and disagreements after policy changes. The closest work to ours is by Günther and Maier (2014), who use the formulation of Köszegi and Rabin (2006, 2007) and build reference-dependent multi-period poverty and vulnerability indices based on it.

As Prospect Theory deals with changes and is silent regarding utility derived from levels, we shape the utility function so that one part continues to reflect standard utility derived from income, and an additional part reflects reference dependency, loss aversion and diminishing sensitivity. Adding loss aversion means that the formulation emphasizes losses more than gains of equal size. In the empirical application, we use the individual's past income as reference income in the utility function. Our "hybrid" formulation enables us to compare reference-dependent utility to the standard utility derived from current income. The novelty of our paper is the new proposed tool for analysis – the notion of equivalent income. It is the income level with which the individual would be as well off, evaluated using standard concave utility function, as he actually is, evaluated with our reference-dependent utility function. One key result is thus that reshuffling of income among households, while holding the overall income fixed in the society, does not change conventional measures, but does affect welfare measures that are endowed with features from Prospect Theory.

We empirically examine the differences between standard poverty and inequality measures, and measures that are estimated using the notion of equivalent income. We use actual data from two countries: Russia, after the transition and Vietnam in early 2000s. This reveals how their different paths are reflected in the outcome of the reference-dependent measure vis-a-vis with standard measures. Despite rapid income growth in both countries, inequality increased in both cases, even though traditional measures showed decreasing inequalities.

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