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Introduction

Ricardo Fuentes-Nieva and Papa A. Seck

In the last days of August 2005, a massive tropical storm—Hurricane Katrina—ravaged the southeast of the United States; the city of New Orleans, home of nearly half a million people, according to the 2000 census,¹ was almost entirely flooded. After the chaos subsided, the damage assessment was dire: The death toll reached 1,464² and the economic losses were estimated at over 200 billion US\$ (King 2005).

Move forward 40 months later to December 5, 2008, when the *New York Times* published an article about Hurricane Katrina survivors. According to the article, in one of the trailer camps set up by the federal agency in charge of emergency management (FEMA) the affected children presented rates of iron deficiency anemia twice as high as those recorded in homeless shelters in New York City. Three and a half years after the hurricane, long after the waters receded and following the US administration's floundering response to the disaster, the negative effects of the massive storm were still emerging.

This book is about large shocks and their impact on people's well being, in particular what we call human development. The *New York Times* article suggests that the general public understands well that large, unexpected shocks—such as Hurricane Katrina—can have devastating effects on people's lives. Just how large these effects are and how long they last is still being studied but it is clear that magnitude, location and socio-economic context certainly play a central role in that respect. For instance, according to US Census Bureau estimates from 2005,³ poverty rates were nearly 8 percentage points higher in the State of Louisiana than in neighboring Florida, which is also very often battered by powerful storms but has not nearly suffer damages of that scale. Furthermore, it is no wonder that the most disadvantaged groups suffered the worst losses. According to the Louisiana Department of Health and Hospitals, over half of all casualties were from African American descent, by far the most disadvantaged group in that state.

2 Introduction

As the *New York Times* article shows, even though most coverage focuses on the number of deaths and the economic damage in the immediate aftermath of the disaster, years later the negative consequences still persist. Our purpose in this book is multifold: we aim to provide a conceptual framework to understand the issue of long-term negative effects of risk and shocks. At the same time, we explore different episodes of large shocks and evaluate the mechanism of transmission to human development and the lifespan of the consequences. Finally, we explore the responses to these shocks, both from the private (and by that we mean communities and households) perspective as well as some government interventions.

The academic literature started to explore not long ago the consequences of exogenous shocks on livelihoods and long-term well being. In the late 1990s and early 2000s, a lot of attention was devoted to the “soft” consequences of financial crises, the most pervasive of exogenous shocks in the last decades of the twentieth century: among these “soft” effects were the increases in poverty, dropout rates, and malnutrition for children. It was a welcome development in the analysis, as financial crises were mostly studied for their impact on the aggregate economic variables—exchange, inflation, and unemployment rates; aggregate production; and public deficit among others. While these indicators are very important in the context of financial unraveling, they often mask the changes in well being at a deeper, more individual level: a sudden increase in inflation, for instance, has regressive effects that are not captured by the overall price index.

Over the last decade, attention moved from financial crisis to natural disasters, which shared some common characteristics: in many cases they were exogenous to the communities and individuals and had a large covariate impact. The shift in interest was overdue, partly because financial crises in emerging economies were not as frequent as in the 1980s and 1990s, and partly because of the impending threat of climate change (which is how the present writers first came to the ideas explored in this book).

While we are finishing this Introduction, the multiple threats of a huge financial crisis around the world and accelerating climate change provide renewed justification for understanding the consequences, mechanisms, and possible responses to large, covariate, unexpected shocks.

The basic premise of the book

The development process consists of a complex chain of stages. Simplifying for purposes of discussion, some of these stages are: being well nourished in early childhood, going to school, and participating in society. Some researchers call these the initial stages of this process of (or slight variations of) human capital accumulation while others term it human development. The difference of opinion lies on the emphasis given to the intrinsic value of each stage: accumulating

years of education is a productive investment, according to the human capital accumulation hypothesis. According to the human development hypothesis, in addition to being a productive investment, it has also an intrinsic value in its own right.

The level of development achieved in each stage and many of the achievements that are obtained throughout our lifetime are determined by who our parents are or where we go to school. This idea has gained recognition in recent years. The World Development Report 2006, *Equity and Development*, explicitly described the different life paths for two imaginary children born in different socio-economic circumstances. One was born to highly educated parents in a well-developed urban center; the other was born in a rural area to illiterate parents from the racially discriminated group. As that Report argues, the circumstances in which they were born could hardly be their responsibility, yet they determine the difference in life expectancy (18 years) and the chances of surviving the first year of life (less than half for the poor child, relative to the infant with wealthier parents).

To the entrenched inequalities present in most societies, there are the additional negative consequences of climatic shocks that are to a certain extent acts of nature beyond the individual's control. These are generally referred to as exogenous shocks.⁴ These shocks, depending on their scope and severity, can sometimes alter the set of choices available to households and communities. In the absence of credit or insurance markets, short-term survival outweighs the longer-term perspective of welfare: it is in situations like these that parents resort to the reduction of the caloric intake of children, often to the detriment of girls; or when children drop out of school in favor of income-generation activities that can help sustain household income in the short term but reduce their future chances. Furthermore, the specter of a shock—what we usually call risk—can have a strong influence on some of these decisions, even if the shock ultimately never materializes (see Chapter 1 of this volume).

Both inequality and long-term dynamics are definitely part of the story, and any complete analysis of such phenomena must take that into account. Even though this is not something that we explore in this volume, the importance of this issue is fully recognized. Some academic studies in Honduras and Ethiopia (and additional anecdotal evidence) suggest that exogenous negative shocks exacerbate the preexisting conditions of inequity. Taking a snapshot, we see that poor households have less capacity to cope with shocks, despite the fact that richer households have a larger asset base at risk. The very short-term dynamic suggests, less conclusively, that inequity initially falls as the losses caused by a shock are larger for the richer household; recovery, however, is usually slower for the poor (Carter et al. 2007).

That said, it is important to mention that neither the place of birth nor the experience of a large negative shock implies lifetimes of deprivation: some

people and communities succeed despite their unprivileged start; and some societies have successfully reduced the gap between groups. However, there is a scope for public policy to play an important role to “level the field” and provide the necessary opportunities for everyone. We will argue that this process must invariably start with an adequate level of protection from the pervasive effects of shocks, but need not end there. After all, shocks are to a large extent unpredictable acts of nature that are bound to happen, making ex-post intervention crucial and inevitable. Hence, one of the key challenges in public policy design nowadays is to devise ways to adequately protect households from long-term negative impacts on their well being that encompass both ex-ante and ex-post instruments. As an example, if FEMA had reacted appropriately, the trailer camps reported by the *New York Times* would not be a field of undernourishment and anemia, but had the State of Louisiana designed appropriate levees and adequate emergency management systems, the storm would perhaps not have had its devastating consequence.

Background and previous findings

The human development framework

For a better understanding of the development process and the effects through time of risk and shocks, we (mostly) use the human development framework throughout this book. Human development, as defined by different editions of the Human Development Report, is about expanding people’s choices. Arguably, to expand people’s choices, an increase in income and material well being is very important. Yet it is not sufficient. Other dimensions of human development—to be knowledgeable and to have a long and healthy life, for instance—are equally important.

The human development framework is based on the capabilities theory developed by Amartya Sen. This theory describes people’s welfare as a result of what individuals can achieve, her “doings and beings” or in general her “functionings.” The capability approach is at the same time a critique and an expansion of the utility framework used extensively in economic analysis. By developing the capability approach, Sen demoted the idea that human welfare can be described completely by a unique dimension of “commodities” (Sen 1999).

The human development framework has been used extensively since the publication of the first Human Development Report (HDR) in 1990. Since then, the empirical and conceptual elements of the human development approach have been explored at length: the family of human development indices (Human Development Index, Gender Development Index, and the two versions of the Human Poverty Index) published each year alongside the HDR are just a sample of the measurement dimension of human development. At the same time, the human development framework has also been used to explain

cultural liberty (UNDP 2004), democracy (UNDP 2002) and to make the case for greater gender equality (UNDP 1995).

Central to the capability approach is that “capability reflects a person’s freedom to choose between different ways of living” (Sen 1999, pp. 5). In that broad sense, anything that limits that choice can be seen as a hindrance to the expansion of capabilities and substantive freedoms. Our attempt is to analyze the impacts that one-time shocks can have in the present and future levels of human development for households and individuals. In other words, we study how some such events, occurring over a very short time period, can permanently diminish the set of choices that people have, by limiting their education or nutrition. We make explicit the idea that negative shocks can alter not only the level of human development, but also its path.

Some building blocks

Throughout this book, we make use of the findings linking adequate nutrition and productivity or more generally the functional role of being nourished. This theory states that there is a fundamental two-way linkage between undernourishment and work and cognitive ability. For instance, at one extreme, the consequence of undernourishment can be the existence of a low-income undernutrition trap (Ray 1998, p. 289). Moreover, under-nutrition affects cognitive skills and diminishes immunity to disease. The latter is arguably negatively correlated to schooling and although causality has been harder to establish (Behrman 1996), recent data availability supports this hypothesis. Using a carefully conducted study in Kenya, Miguel and Kremer (2004) have shown convincingly that children are more likely to attend school if they are not sick. Similarly, Glewwe, Jacoby, and King (2001), Alderman et al. (1997) have shown that children perform better in terms of their test scores if they are better nourished. Other evidence includes findings that malnourished children are likely to delay school entry, which in turn affects lifetime earnings. (Alderman, Hoogeveen, and Rossi, 2009; Yamauchi, 2008). Studies focusing on long-term effects on wages suggest a positive relationship between good nutrition levels and earnings capacity: early intervention targeted at improving nutrition levels has long-lasting effects on wage rates (Maluccio et al. 2006; Smith 2008, Alderman et al. 2006).

The literature just described details the “building blocks” of different stages in the development process. Another set of studies has explored the effects of random shocks on these building blocks. A study in India found that lower-than-usual rainfall has a significantly more pronounced negative effect on girls’ education (Rose 2000). Research in Côte d’Ivoire shows that regions that suffered a weather shock (measured as more than one standard deviation from the historical mean in a given year) experience enrollment rate declines of 20 percent—although there was no difference between enrollment rates of

boys and girls. (Jensen 2000). A longer-term study in Indonesia analyzed the effects of rainfall in early life. The results suggest that higher rainfall—leading to higher agricultural output—in the year and location of birth increased average height, schooling, and earnings for women (Maccini and Yang 2009).

Rainfall variability has also been used to explain an increase in accusations of witchcraft followed by the murder of poor, elderly women, mostly by their relatives, in rural Tanzania. These women, lacking their own assets and no longer as economically productive, become scapegoats for adverse changes in weather and subsequent decline in incomes in the community (Miguel 2005). A study in Zimbabwe showed that shocks have large impacts in children's nutritional status. This negative gap associated with the shocks resulted in a loss of stature of 3.4 cm, 0.85 fewer grades of schooling, and a six-month delay in starting school. The accumulated effect on lifetime earnings, calculated using observed returns to schooling, is 14 percent (Alderman et al. 2006).

Structure and content of the book

These studies and other similar ones referenced throughout are the building blocks of the analysis undertaken in this book. What is different is the treatment of the subject matter, which goes beyond a simple metric of the immediate consequences of these shocks, but examines also how they have the potential to change the life-paths of their victims. This difference is important and is not always clearly spelled out in the current approach to studying the impacts of shocks. As an example, Fuentes-Nieva argues in Chapter 2 of this volume that there is currently a contentious debate in academia and in policy circles as to whether poverty traps actually exist beyond the theoretical sphere. More concretely, shock persistence is a feature that has been highlighted by many authors (Dercon, Hoddinott, and Woldehanna, 2005; Lokshin and Ravallion 2004; Ravallion and Jalan 2004).

However, that line of argument misses an important point, which is that even a one-time shock can have lifetime consequences by reducing the set of choices and freedoms that are available to the individual. For instance, after a shock, both the household's asset base and income levels may recover after some time. However, if in the aftermath of that shock children are taken out of school to engage in income-generating activities, their human development will be permanently affected; a similar line of argument applies to nutrition. Indeed, in the case of China, the study in this volume by Fung and Ha finds the great Chinese famine in the late 1950s even had consequences on the next generation. As this study illustrates, to analyze the impact of shocks, one needs to look beyond the simple prism of what happens immediately and into the sphere of what the real human development consequences are. That is exactly the intended contribution of this volume.

Therefore, our aim in this book is to expand understanding about the effects of shocks in each of the building blocks in the process of human development, and the overall effects on the “final structure”—or for how long negative shocks affect the overall level of human development for people and households—if the metaphor is allowed. The book consists of three parts. The first three chapters provide the conceptual foundation of the volume. The second section explores different case studies where a large, exogenous shock affected large swaths of population. This set of studies explores the effects in the short, medium, and long term, with one chapter testing the hypothesis of intergenerational effects. Finally, the last section of the book attempts to explore and provide a preliminary evaluation of different coping mechanisms, both public and private.

In the first chapter, Stefan Dercon provides the conceptual framework linking risk, shocks, and human development. One important element in this discussion is the fact that risk—understood as the possibility of negative shocks—has impacts on human development outcomes. Dercon makes this point several times (and he has explored the issue in detail in other publications). It is important to highlight the distinction between risk management strategies (before the shock occurs, if ever) and risk-coping strategies (once the shock occurs) as they are very different in nature, and so are the efficient policy responses in each case. Another important point in Dercon’s chapter is that risk—or the specter of something bad happening—represents an important element in personal well being and is by itself a major determinant of poverty as people devise ways to protect themselves that are not always optimal. Thus he argues that there is a clear rationale for including risk in the Millennium Development Goals. More generally, his argument points to the fact that an analysis of risk should be integral to the process of increasing opportunities for people.

The issue of shocks and long-term deprivation is the topic of the second chapter. Using the work on entitlements, functioning, and capabilities first developed by Amartya Sen, Ricardo Fuentes-Nieva explores the consequences of uninsured shocks in long-term deprivation and contrasts the results with the literature on poverty traps. The results show that even when poverty traps are avoided, long-term deprivation in the capability space—the set of opportunities of what people can do and be—might be present. This result arises because shocks that alter the total endowments of an individual can also alter this person’s ability to use these endowments. Thus, Fuentes-Nieva concludes, risk management and risk-coping policies should not only protect the assets and endowments of people at risk, but also their ability to transform these commodities into capabilities.

To apply these concepts developed in Chapters 1 and 2 is not a trivial exercise, not least because of the related onerous data requirements. An analysis of the basic tools necessary to conduct such studies is taken up in Chapter 3 by John Hoddinott and Agnes Quisumbing. First, they look at the different

definitions of vulnerability in the debate. These basic definitions exhibit subtle as well as functional differences, and Hoddinott and Quisumbing analyze the pros and cons of each of them. Second, they described in great detail the data needed to conduct comprehensive vulnerability assessments. Taken together, these two sections provide a complete set of tools for researchers interested in studying vulnerability. The authors argue that any such assessment should include at least three elements: identifying the correlates of vulnerability; examining the sources of vulnerability by characterizing the risks and shocks faced by the populations as well as the distribution of these shocks; and assessing the gaps between risk and risk management strategies.

The second section of the book contains the set of empirical analyses. In Chapter 4, Alejandro de la Fuente and Ricardo Fuentes-Nieva use the set of surveys (ENCEL) designed to evaluate the conditional cash transfer program *Progres-Oportunidades*. Taking advantage of the panel structure of the data, they estimate the effects of climatic shocks on the likelihood of illness. The results show that children exposed to floods and frost are more likely to suffer from disease within six months of the event, although there appears to be some seasonality in the results.

In Chapter 5, Indhira V. Santos analyzes the effects of two earthquakes in El Salvador. Using the BASIS Rural Household Survey and peak ground acceleration as a proxy for exposure to the shock, Santos estimates that a 10 percent increase in the severity of the shock translates into a decrease of 4.2 percentage points in school enrolment. The impact of the earthquakes in overall labor force participation is negative; however, labor participation outside the household increases for the most affected children.

In Chapter 6, Ricardo Fuentes-Nieva and Papa A. Seck merge Demographic and Health Surveys with disaster data from the Emergency management database (EM-DAT) on natural disasters to estimate the effects of droughts on malnutrition variables. Fuentes-Nieva and Seck take advantage of the spatial and temporal aspect of the shocks to develop an identification strategy using a difference-in-difference strategy with a single cross-section. Their results for three countries—Ethiopia, Kenya, and Niger—show a mild but significant negative marginal effect of droughts on malnutrition on those who were born during the shock, even years after the event occurred. An interesting aspect of this study is that it shows that researchers can make use of already existing data sources to conduct some of these vulnerability assessments.

In Chapter 7, Namsuk Kim explores the consequences of extreme climate events on educational attainment using the same data as Fuentes-Nieva and Seck. Kim focuses on three countries—Cameroon, Burkina Faso, and Mongolia—using a combination of DHS and Living Standard Measurements Surveys and the EM-DAT mentioned above. The lack of panel data provides a challenge for Kim, which he circumvents by using cross-sectional education

profiles: primary completion rates are smaller for older age cohorts as newer generations have more schooling. Kim utilizes deviations from this a priori trend as an identification strategy. The results show that climatic shocks have negative effects on the likelihood of finishing primary school, ranging from 1.9 percent in Burkina Faso to 14.4 percent in Mongolia. Finally, Kim calculates the welfare effect of this loss in schooling: his results show that the shock in Mongolia translates into a loss of 2.7 percent in wages.

A slightly different type of shock is analyzed in Chapter 8 by Damir Cosic and Partha Deb. The authors focus on the welfare effects of adult deaths in South Africa—an important question given the AIDS epidemic ravaging the whole continent. Using the KwaZulu Natal Income Dynamic Studies (KIDS), they estimate the welfare loss caused by the loss of an adult member in the household. The long time span of the dataset and the possibility of tracking split households provide an identification strategy for the authors. Their estimates point to lower total, food, and education expenditure for households where a core member had died within the previous five years. They did not find evidence of risk-sharing among related households.

The intergenerational effects of a large shock are studied in Chapter 9 by Winnie Fung and Wei Ha. Using data from the 1959–61 China famine, they explore the health and education outcomes for children born to people who were born during the famine. These children present lower height-for-age and weight-for-age scores than children born to parents who were not exposed to the famine. The results suggest a strong gender bias against girls. Fung and Ha take advantage of the temporal and regional intensity of the famine as well as the tight migration controls present at the time in China to identify the causality.

The final section of the book provides an entry point for understanding how people, communities, and governments respond to crisis. This section is not exhaustive, and should only be viewed as an entry point into the wider discussion on private coping mechanisms and public policy. As a result, it combines both empirical studies and others meant to survey the field. The four chapters in this section analyze different elements of risk-coping strategies: in Chapter 10, Liliana Carvajal and Isabel Pereira use information on Hurricane Mitch and household data from Nicaragua to estimate the impact of the hurricane on the likelihood of migration. The authors utilize a panel data set where the two surveys coincidentally straddle the hurricane, which facilitates the estimation procedure. The results for the overall sample are positive (meaning that exposure to Mitch increased the probability of migration), with strong impacts found for the rural subsample. This is consistent with the fact that the costs of internal migration are much lower than those of international migration, which presumably would be the only meaningful migration choice for people in urban areas. The relevance of this chapter is twofold: first, it shows that households and individuals are not passive when faced with shocks; they devise ways to cope with

them, and changing location or diversifying income-generation activities and migration of a member are certainly among them. Second and more importantly, it fills a huge gap in the literature on environmental migration, which to this day suffers from a lack of rigorous empirical analysis. This is important as climate change is set to exacerbate this form of migration (Brown 2007).

Households and communities rely extensively on each other in the face of a crisis, but the analysis of social capital as a coping mechanism is scarce. Wei Ha explores this issue in Chapter 11 using data on the 1997–8 financial crisis in Indonesia. Ha focuses on communities' initial level of "social capital"; he uses the number and density of religious locals as a proxy for social capital. He then estimates the likelihood of communities engaging in informal community insurance such as rotations savings associations (ROSCAS)—a well-known hedge mechanism against downside shocks. While the results suggest a positive relationship between the initial stock of social capital and the use of informal coping strategies, Ha underscores that causality has not been established. The need for further research on this topic is warranted.

The last two chapters present surveys on the state of knowledge on two important topics: the gender dimension of risk and government responses in face of a shock. In Chapter 12 Roshni Menon provides an exhaustive review of the gender bias present during external shocks. Discrimination against women—and many other groups as well—is an often overlooked element of public policies and urgently needs to be addressed. Finally, in Chapter 13, Alejandro de la Fuente explores, with a critical eye, the current state of public responses to crises. De la Fuente argues that current policies are biased toward ex-post policies—mainly disaster relief—and that building risk reduction into any relief effort is of paramount importance.

Who is the audience for this book?

The analysis presented in this book is fairly technical and presumes at the very least a basic acquaintance with economic theory and econometric analysis. Therefore, its primary audience is the world of policy-makers—which also includes development professionals who design humanitarian assistance programs or those geared toward long-term poverty alleviation—and academia. The various chapters contained in this volume lay bare the case that risk, shocks, and human development are inextricably linked and that more should and can be done to protect people from these adverse impacts. Therefore for any policy-maker or those who intend to get into the policy sphere, this book provides an excellent opportunity to understand and grasp some of these concepts. It provides a valuable complement to the many volumes that have already been published in the social sciences such as Anthropology, Economics, Political Science, and Sociology.

For academics, the debate will certainly rage on. However, the novel aspect of this work means that researchers need not be confined to the sphere of their own disciplines when analyzing risk and shocks and even poverty. As our analysis shows, the emphasis in the human development approach on both the intrinsic and instrumental values of human capabilities means that one should take a more holistic approach to the analysis of risk and shocks, and not just what happens to certain measurable outcomes. For students, this book provides an excellent entry point for understanding the theory of human development, while also learning about the practice of analytical rigor.

For a more general audience, although the terms exposed are fairly technical, the narrative itself is not as we have tried to ensure a detailed explanation of the terms and concepts used throughout. Therefore this book should at the very least provide a thorough understanding of complex phenomena for the general reader.

The length of the book might put off some less motivated readers. For that purpose, we have tried to ensure that each chapter is self-contained. However, we also took pains to ensure that there is a narrative across sections and chapters. We hope to have succeeded in these tasks.

Notes

1. Source US Census bureau http://factfinder.census.gov/servlet/QTable?_bm=y&-qr_name=DEC_2000_SF1_U_DP1&-ds_name=DEC_2000_SF1_U&-lang=en&-geo_id=16000US2255000. Accessed March 2009.
2. Source: Louisiana Department of Health and Hospitals. <http://www.dhh.louisiana.gov/offices/page.asp?ID=192&Detail=5248>. Accessed March 2009.
3. <http://www.census.gov/cgi-bin/saige/national.cgi?year=2005&ascii=->. Accessed March 2009.
4. This book is mainly concerned with exogenous shocks which are shocks than can be thought of as largely outside of the control of the individual. However, we do recognize that there is often a gray area when one talks exogeneity. For instance, it is reasonable to say that lower than average rain is largely outside of the individual's control, making that event largely exogenous. However, the fact that someone chooses agriculture as an occupation or lives on degraded agricultural land is certainly endogenous to other social processes such as poverty, policy and so forth. Therefore the combination of these two makes the distinction not so clear cut.

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