

Helping Farm Households Cope with Climate Change and Adverse Events¹

By Majah Leah V. Ravago,² James A. Roumasset,³ and Karl Jandoc⁴



The Philippines is the second on the list of nations which are prone to disasters, according to the 2014 World Risk Report of the United Nations University. The country is highly exposed to natural disasters such as volcanic eruptions, tropical cyclones, and floods.

This vulnerability is heightened by climate change as it affects weather patterns among other natural environmental occurrences. Projections from meteorologists showed that from 2020 to 2050, wet seasons will be wetter and the dry seasons will be drier. Eighteen to 20 typhoons are expected every year with flooding projected in different parts of the country.

Farmers are highly affected by these vulnerabilities for they are the ones most exposed to weather extremes. One implication of these changes is that farmers' experience of the frequency, duration, strength, severity, and timing of rainfall and the frequency of droughts will be less reliable; hence, the accuracy of their subjective decision-making processes will decline, causing their level of risk to rise. The bottom line is that past experiences are less useful as predictors of future experience. Adaptation and coping instruments of these farm households were analyzed to provide understanding of their micro-level coping strategies.

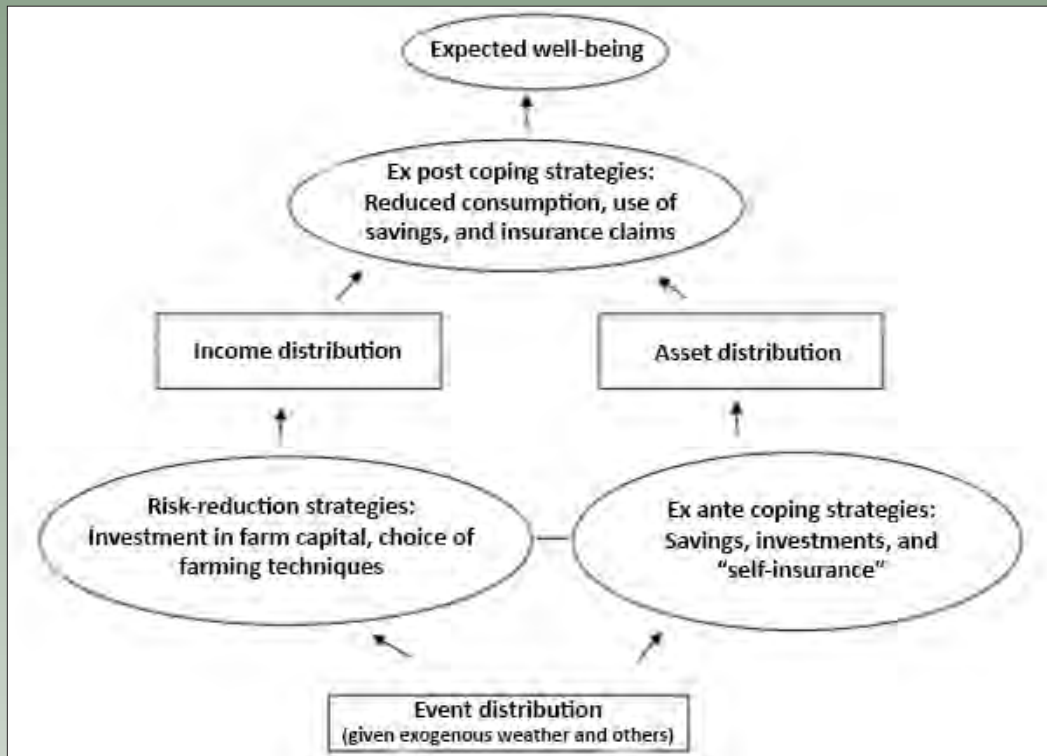
Climate change is expected to cause an increased probability of flooding in the country due to the expected increase of more concentrated rainfall. This poses the question: Is public resilience now an objective of public policy?

Objectives

A framework of priorities for government programs was devised to decrease farm household vulnerability in the Philippines. To be able to manage disaster risk effectively, there is a need for a coherent framework, which integrates risk-reduction and coping strategies, and allows for both the good state and bad state of the analyzed situation.

In order to come up with an economic model, decisions done by the farmer on risk management shall be considered. Figure 1 shows the schematics of the economic model using farm capital and non-farm capital instruments.

Figure 1. Farm-level risk management



Precaution includes both risk management techniques as well as ex ante coping. Risk management is mostly on-farm activities and investment but also includes household activities such as tying the house with ropes before an expected storm. Ex ante coping is preparation for things households will do after experiencing damage. This includes stock-piling on food, insurance, and other forms of savings.

The objective of this model is to maximize expected well-being covering the following factors: coping, income distribution, assets, risk-reduction, precautionary savings, event distribution, weather, and neighboring pest population. The factors were considered in order to grasp the farm households' risk management and coping strategies.

Methodology

A two-period expected utility (or well-being) model was developed to integrate risk management and coping strategies into a single decision-making framework. The household is assumed to know the likelihood of a disaster in the next period and must determine how much of its disposable income ("endowment") can be allocated into current consumption, on- and off-farm investments, and self-insuring farm management techniques that limit the variability of output. On-farm capital investments are vulnerable to natural disasters, whereas off-farm investments are assumed to be safe. The households' ex ante problem is to choose investment in on-farm capital, "insurance", and off-farm capital to maximize their welfare, given their preferences

regarding consumption in the current period and in one "good" and one "bad" future state.

The simulation was complemented by empirical evidence using the Philippine Center for Economic Development (PCED) Social Protection Survey.

Findings

Results of numerical simulation show that high-endowment agents will put less into on-farm capital and more into off-farm capital to help smooth consumption between the good and bad states. The ability to undertake off-farm investments lowers the need to employ risk-reducing measures on the farm.

In contrast, low-endowment, risk-averse households have limited means to smooth consumption. Borrowing for off-farm capital is either unavailable (for unsecured loans) or carries interest rates that are higher than expected returns. Borrowing for farm capital is unattractive in the face of high interest rates and the fact that more farm capital renders the households even more vulnerable by increasing assets at risk. The only remaining strategies are to reduce current consumption to finance small, additional amounts of farm capital and to choose farming techniques that sacrifice expected returns in order to reduce the variation of returns. These prospects leave the poor with low consumption in two of the three states and extensive exposure to disaster risks. This does not imply that there is a strong case for government-subsidized social insurance. Resources

may be better spent in removing the underlying causes of poverty, such as low agricultural productivity and transaction costs that tend to isolate disadvantaged areas.

The main takeaway of the modelling exercise is that well-off farmers who are less inclined to smooth consumption will invest heavily in high-payoff farm capital, which will allow them to consume more in the future good state but will consequently make them consume less in the current period and the future bad state. The more these farmers prefer smooth consumption, the more they adjust their portfolios toward safer off-farm investments and away from farm capital (which can be damaged if a disaster occurs). When the probability of disaster increases, rich farmers likewise allocate more to safer investments and also invest more in risk-reducing techniques. Poorer farmers borrow and invest in farm capital until its return is equal to the cost of borrowing. Since they face a borrowing rate that is higher than returns to off-farm investments, these farmers do not invest off-farm.

The survey, on the other hand, revealed that farm households employ different coping mechanisms when faced with shocks or disasters, such as: borrowing money, drawing on savings, selling household assets, harvesting early, selling harvest that they might have otherwise consumed, and asking assistance from the government, individuals, or groups and from non-government organizations.

Conclusion

As either risk aversion or the probability of disaster increases, wealthier households tend to substitute less vulnerable off-farm capital for farm capital and increase risk-reducing investments to avoid dramatic decreases in consumption when a negative event occurs. Poorer households, who are unable to borrow for off-farm investments, are also discouraged to borrow more than negligible amounts for farm capital because of high borrowing rates and the fact that farm capital is vulnerable to natural disasters. Given the severe limits on risk-reducing investments, there may be little that low-income households can do in response to increased vulnerability from climate change.





A farmer works on a field covered with volcanic ash from Mt. Sinabung in North Sumatra, Indonesia. Photo by Jefri Tarigan

Empirical data also shows that farm households that experienced shocks also took risk-reducing measures at the start of the planting season. Adjusting planting time and choosing a different crop variety were the most common and important of these measures. Like any public goods, however, households seldom invest in cleaning streams and canals or building dikes because these activities benefit the whole community. Further research is

needed to determine priorities among the risk management and coping strategies represented in the conceptual framework provided.

With this framework, farm households are now given an idea on how to manage and prioritize off-farm and on-farm investments to lessen the risk brought by climate change and other adversities.

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²Dr. Majah Leah V. Ravago is an Assistant Professor at the University of the Philippines School of Economics and Project Director of the Energy Policy and Development Program of the USAID-UPecon Foundation. For more details, contact the author at mravago@econ.upd.edu.ph

³Dr. James A. Roumasset is a Professor of Economics at the University of Hawaii and visiting Professor at the University of the Philippines School of Economics.

⁴Karl Jandoc is a PhD candidate at the University of Hawaii.

Full text of this study is forthcoming in the book titled "The Future of Philippine Agriculture: Scenarios, Policies, and Investments under Climate Change," a publication by the International Food Policy Research Institute (IFPRI) and the National Economic and Development Authority (NEDA).

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Adaptation in Agriculture and Natural Resource Management
in Southeast Asia

Southeast Asian Regional Center for Graduate Study
and Research in Agriculture (SEARCA)
SEARCA, College, Los Baños
Laguna 4031 Philippines
Phone: +63 49 536 2290 local 161/406
Phone: +63 49 536 2283
Fax: +63 49 536 2283
Email: kc3@searca.org