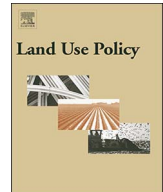




Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Evaluation of Pakistani farmers' willingness to pay for crop insurance using contingent valuation method: The case of Khyber Pakhtunkhwa province

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ARTICLE INFO

Keywords:
Willingness to pay
Flood risk
Crop insurance
Contingent valuation method
Pakistan

ABSTRACT

In Pakistan, agriculture is susceptible to numerous risks, particularly in flood prone areas. Crop insurance could act as an effective tool for managing risks in Pakistan. For many years, the country has confronted with the losses from natural disasters without crop insurance. This study aims to examine the willingness of Pakistani farmers to pay for insurance premiums by conducting a household survey. Primary data of 600 farmers were collected in the four flood prone districts namely Charsadda, Peshawar, Mardan and Nowshera of Khyber-Pakhtunkhwa (KP) province of Pakistan. In a rural farm-household survey, residents of the study area were asked about their preferences for a hypothesized crop insurance program using contingent valuation (CV) method by asking their willingness to pay (WTP) for crop insurance to eradicate forthcoming disaster risks. Multiple linear regression model was utilized to check construct validity and reliability of the WTP estimates. The outcomes of the study revealed that about 30% of the participants accepted the concept of crop insurance as the mechanism for disaster risk reduction. Our findings reveal that the severity and frequency of past weather associated extremes, farm typology, socio-economic settings, and the ability of farming communities to pay should be considered while introducing crop insurance programs in the region. Moreover, disseminating awareness in farming communities regarding the futures changes in climate and the related risks of the existence of extreme weather incidences is important. The government support to subsidize insurance schemes might increase the need for crop insurance among subsistence farmers in and cushion them against adverse effects arising from such extreme weather conditions for sustenance of livelihoods.

1. Introduction

The projected changes in climate and increasing climatic risks over the 21 st century pose serious challenges to agricultural development in developing countries including Pakistan (IPCC, 2014). Pakistan is one of the most vulnerable and prone to uncertain events due to low adaptive capacity (Fahad et al., 2017). The Global Climate Risk Index (GCRI) is ranked Pakistan number 8 in a list of countries which are affected most by the climate change and extreme weather events between 1995 and 2014 (Kreft et al., 2016). The resilience of the agriculture sector to climate change and extreme weather-related events is one of the most important concerns for economic development in Pakistan, where two-thirds of the total population residing in the rural areas and depends on agriculture for their livelihoods (WB, 2014). Agriculture remains an indispensable sector to the economy of Pakistan despite its dwindling share of the national income. In 2010–11, the sector contributed 21% to the gross domestic product (GDP) of Pakistan. The significance of agriculture transcends its income contribution. The sector involved 43% of the workforce in 2010–11, and was

characterized by subsistence farmers with less than 2 ha landholding (representing 80% of the total farmers) and relies largely on agriculture for their survival. Any adverse effects from climatic changes might affect the survival of many people (GOP, 2012, 2013). Considering the role, it plays in poverty reduction, economic change of rural areas, stabilizing food security, and generation of overall economic development, these events could have multidimensional effects on the agricultural sector. Given the dimensions of the effects, it is necessary to put in place mechanisms that mitigate the economic effects caused by extreme weather situations and secure farmers' livelihoods in Pakistan.

There is extensive literature (Kurukulasuriya and Rosenthal, 2013; Mendelsohn, 2008; Mendelsohn and Dinar, 1999; Mendelsohn et al., 2001; Seo et al., 2005; Huang et al., 2017) that shows the sensitive nature of agriculture crops to shifting climatic conditions, particularly those situated within arid – low lying regions (Mirza, 2003) storm-generated surges, coastal storms, cold waves, tropical cyclones (typhoons, hurricanes), droughts (agricultural, meteorological, hydrological) and floods (glacial lake overflow, flash, storm, rain, and riverine floods). However, the focus of this study is on floods, which

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constitute the most common event in Pakistan's recent history. Like other regions across the globe, there is a likelihood that the ubiquitous nature of the events in Northwestern Pakistan could escalate in the 21st century. It is necessary to initiate risk-reducing measures at global, regional, national, and local levels (Field, 2012) and safeguard their livelihoods from the adverse impacts by adopting risk reduction strategies at the farm level (Fahad et al., 2017; Shah et al., 2017).

The vulnerable nature of rain-dependent agriculture to adverse weather situations leads to significant loss of income to the farm households. The farm households receive little assistance from the government in the form of subsidies or insurance cover to overcome the disasters (Khan et al., 2003). In Pakistan, the penetration of insurance accounts for a paltry 0.7% of the gross domestic product—the lowest across the globe, and the past one decade has not witnessed any growth. The actions taken by different governments to increase agricultural insurance across Pakistan have had little success.

This study examines the use of insurance as a non-structural mechanism for mitigating floods. For sustainable rural, environmental, and socioeconomic development, it is important to have innovative disaster risk adaptation, management, and reduction methods in developing countries such as Pakistan. Although extensive literature exists (Akter et al., 2009; Botzen et al., 2009; Kwadzo et al., 2013; McCarthy, 2003) that determines the demands for insurance against natural calamities across many countries, the real micro-level determinants of need for crop insurance are yet to receive significant attention. Providing impoverished communities with insurance programs has remained a significant challenge in the past years (Clarke and Grenham, 2013), and the rigorous participation has been cited as an essential aspect of nurturing insurance markets. Surprisingly, studies concerning potential crop insurance markets for addressing the challenges linked to adverse weather conditions are yet to be conducted in a country like Pakistan, that is ranked among those that are prone to natural calamities in the world.

Based on the above mentioned research gap, the study mainly focus on the willingness of farmers to ensure their crops from adverse climatic conditions including flood as means of an effective adaptation strategy in the rural areas of Pakistan, particularly in the four districts located in Khyber-Pakhtunkhwa (KP) province of Pakistan, which are the most vulnerable areas and prone to flood risk. Keeping in view of the technical and socio-economic antecedents of farmers' willingness to pay premiums for insurance programs that tackle the risks linked floods; this study will examine the possible premium range that farmers desire to pay for crop insurance.

The remainder of this paper is structured as follows: The methodology used is defined in the following section (Section 2). Section 3 presents the survey design and data collection. The results are discussed in Section 4, while Section 5 concludes the study.

2. Research methodology

2.1. Study area and data collection

Primary data were collected from four districts namely Charsadda, Peshawar, Mardan and Nowshera in Khyber Pakhtunkhwa province of Pakistan, which are predominantly flood prone areas of the region. Fig. 1 shows the map of the flood-affected areas of Pakistan where the locations of study area are marked. A thorough survey was undertaken using a properly structured questionnaire. Information on several household assets, income, socio-economic variables, production of food, and cash crops were gathered from 600 farm households, majority were subsistence farmers. The study area constitutes the most underdeveloped regions of Pakistan in terms of communication, road transport alongside other infrastructural facilities, for instance, access to micro-credit, health and medical services, and safe drinking water. Furthermore, the area is marred by high poverty levels because of limited livelihood opportunities besides farming and cyclical exposures

to destruction emanating from natural disasters. Currently, the area lacks implicit or explicit mechanisms for spreading or sharing natural disaster risks.

2.2. Questionnaire design and survey set up

About 120 interviews were undertaken in three tehsils¹ in each district (shown in Table 1). The choice of households within each village adhered to a systematic random sampling technique whereby every fifth household was interviewed. In the survey, the researcher only interviewed heads of households. The questionnaire utilized within the case study was created based on the focus group discussion as well as three pre-tests with about 40 individual household heads in various parts of the study area. 600 heads of households were interviewed in the final survey from the third week of January 2017 through the end of March 2017 by three experienced and trained inter-viewers. The interviewers utilized for the general survey also took part in the pre-test and underwent one-week training. The questionnaire, which was utilized for the final survey featured about 50 questions and was sub-divided into three sections; socio-economic background of the households, flood damages, and the attitude toward the flood insurance mechanism, as well as questions to determine a household's WTP for an insurance premium (contingent value questions), Extent and type of suffering from incidental and annual natural disaster (preparedness level, damage (extent and type), inundation level, duration of disaster, frequency of natural disasters).

After a comprehensive description of the hypothetical crop insurance program, participants were asked three WTP questions. First, participants were asked whether or not they were wishing take part in the principle within the proposed crop insurance program. Participants who responded 'no' to the initial WTP question were asked for reasons for not purchasing crop insurance. Those participants that cited income constraint as the reason for not taking part within the insurance program were also asked their preferences of paying in kind and requested to show the maximum in kind WTP based on crop.

Part of participants that said 'yes' to the initial WTP question, were followed up with the valuation question asking participants for monthly premiums ranging from 0.07 US dollars to 0.71 US dollars. A total of 6 different starting bids are utilized. The levels of bids were allocated randomly across participants to avert starting point bias (Mitchell and Carson, 1989). The yes/no DC question were followed up by two closed-ended WTP questions, asking respondents whether they were willing to pay a lower or higher amount. Participants that cite limited financial resources or limited cash income as the major reason for their unwillingness to pay the monthly premium offered were asked if they were willing to pay in kind or not. Participants that consented to paying in-kind were then asked to show their optimum WTP in-kind within open ended format.

2.3. Analytical approach

2.3.1. Construct validity and reliability for contingent valuation response

Contingent valuation (CV) method constitutes one common survey-oriented non-market valuation methods. It is commonly utilized for estimation of monetary values of environmental services and goods that are purchased and disposed of at the market (Arrow et al., 1993; Bateman et al., 1999; Mitchell and Carson, 1989). In a traditional contingent valuation survey, households are asked to directly estimate the WTP on monetary basis for a service or good in a hypothetical scenario. Because of the hypothetical form of the study, the technique is susceptible to various biases. Because of this, testing the precision of the responses constitutes a crucial component for contingent valuation analysis.

¹ Pakistan's second-lowest tier of local government.

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