6.1 Introduction
This chapter brings out the study design and sampling framework for conducting the survey. The research instrument chosen is the personal questionnaire method to elicit both stated preferences and revealed preferences.

6.2 Scope of the survey
The survey was conducted with a broad objective of overall assessment of floated crop insurance schemes, appeal of weather derivative products and farmers' willingness to pay for such schemes. The survey had the following specific objectives:

i) To assess farmers' awareness levels on agricultural insurance schemes floated so far and the satisfaction levels with various insurance schemes

ii) To assess the links between availability of irrigation and desire to insure against weather variability

iii) To assess the acceptability of weather derivatives

iv) To assess the weather factors which farmers would prefer to hedge through weather derivatives

v) To assess the nature of hedging perceptions of the farmers and their willingness to pay for weather derivatives

vi) To assess the preferences of and confidence levels associated with private/government weather stations and weather derivative schemes.

Weather derivatives could be offered by various institutions, which would be interested in offering risk cover. The attempt of the present research was to assess responses to scenarios of the derivatives being offered by the government, by private players or by both simultaneously. An attempt was also made to infer whether farmers would be willing to pay differently for different scenarios i.e., would the choice of supplier of the derivative influence their WTP.

The study was conducted in two districts viz., Jhalawar and Tonk of Rajasthan where the AIC has launched crop insurance schemes. These districts were chosen based on the district-wise number of policies sold in the Varsha Bima-
2006 scheme and the Rabi Weather Insurance scheme 2006-07. Data on the number of policies sold and of the subscribers to the two schemes was obtained from the Agriculture Insurance Company of India.

6.3 Methodology
6.3.1 Research technique
As the study was diagnostic in nature, quantitative and qualitative techniques were used for data collection, which included structured interviews with mostly coded and a few open ended questions. As part of the study, data was collected from primary sources (interviews) and Secondary sources (data from the Agriculture Insurance Company of India, India Meteorological Department, and the Directorate of Economics and Statistics, Government of Rajasthan).

Freeman (1993), has pointed out that scenario misspecification can result in erroneous findings. He has suggested the use of a focus group discussion and a pilot survey, in order to be at the right level while interviewing the farmers. In our case, we had the advantage of other crop insurance schemes in the past, and the Varsha Bima Scheme, at present, providing the base, and some amount of awareness of terminologies. However, it was decided to precede the survey with a focus group discussion and a pilot survey so that a better understanding could be built into the final questionnaire.

Various elicitation methods were studied, and the bidding-game method was considered the one with the maximum advantages in the scenario. In the bidding game designed, it was decided to start with the highest value. It was considered that if we start with the lowest bid, then farmers are likely to catch-on that the value is being raised, and they would stop at the lowest or the next lowest. We start by asking if the respondent would be willing to pay Rs $x$ for the proposed hypothetical weather derivative. If he answers in the affirmative, the game ends there. If he says No, then a lower price is quoted and the question repeated. The point at which he says Yes, is taken as his maximum WTP.

Considering the level of the presently charged premiums for crop weather insurance, it was decided to start the bid at 10% of the value of the maximum payout of the weather derivative, ie., the farmer would be willing to pay Rs 100 for a possible payout of Rs 1000 from the weather derivative. Subsequent steps of the bidding game were kept at 8%, 5%, 3% and finally at 2%. Thus there were five steps designed into the bidding game.
6.4 Questionnaire design

A structured interview schedule was prepared for the survey. The content and format of the questionnaire used in the survey were decided on, based on the objectives of the survey. The questionnaire was then translated into local language (Hindi) and pre-tested among respondents from the sampling universe.

6.4.1 Target group

Although the target group is the entire farmer population in India, this study was restricted to the farmers in Rajasthan.

6.4.2 Sampling design

As brought out above, to factor-in the effect of prior knowledge of crop insurance products, it was decided to select the sample from two categories of farmers – one, who have, in the past, subscribed to the recent Varsha Bima and Rabi crop insurance schemes and the other who have not.

Based on this, and from data obtained from the AIC, Jaipur office, three villages were chosen in each of the two districts – Jhalawar and Tonk, where the largest subscription had taken place in either of the two crop insurance schemes. For each of the six villages, lists of names of farmers who had subscribed to the two schemes was taken from the AIC, Jaipur office.

Of the 5839 farmers who took up policies in Rajasthan in the Varsha Bima – 2006 scheme, 1255 were from Jhalawar district. Similarly, of the 4400 farmers who took up the Rabi weather insurance- 2006-07 scheme, 489 were from Tonk district (Data from AIC). Further, three villages were chosen for the study in Tonk district (Deopara, Chandlai and Soothra) and three villages in Jhalawar district (Donda, Salawad and Khanpuriya). These villages, too, were chosen based on the number of policies sold in the two insurance schemes, and the number of respondents chosen were proportional to the number of farmers who had opted for the schemes.

Amongst the two categories (subscribers of crop insurance, and non-subscribers), random sampling was used for selection of the farmers who were finally interviewed. Help was provided in all the villages by the sanchalaks of the ITC e-chaupals and by the gram-panchayat members in locating the farmers from the lists of subscribers and non-subscribers.
Details of the study area chosen, and of the agriculture, in general, of the state of Rajasthan are given in Appendix II.

6.4.3 **Focus group discussion**

The concept of weather derivatives was discussed in a focus group discussion which was held in village Chandlai in Tonk district. The aim of this was to introduce the concept to the farmers and gauge their initial reactions as also to get familiarised with the terminologies commonly used by farmers. The group discussion included farmers who were presently subscribers of crop insurance schemes, as well as those who were not. Help was taken from an agricultural scientist from the Jaipur office of the Agriculture Insurance Company of India, who helped in providing the correct agricultural terminologies. The village Sarpanch also joined in the discussion and provided some valuable inputs. These were kept in mind when the final questionnaire was drawn-up.

6.4.4 **Pilot-testing**

The prepared questionnaire was then pre-tested, by, once again, randomly selecting farmers who had taken up crop insurance and those who had not. This was of immense help, not only in correcting a large number of questions asked in the survey, but also in cutting down on what was initially planned as the length of the questionnaire. The final questionnaire included a script which was used to describe the concept of the proposed weather derivatives. This script was tried out during the pre-testing, and was subsequently modified, taking into account the learnings from the responses.

6.4.5 **Final questionnaire**

The final questionnaire took an average of 20 minutes for a respondent to complete. It comprised a ‘profile’ section, which brought out the social and economic characteristics of the respondent, an ‘opinions’ section which covered perceptions on stress levels related to weather, awareness levels about crop insurance schemes, acceptability of weather derivatives, levels at which hedging would be desired, preferred lengths of contracts, preferences towards hedging in groups etc. and a ‘valuation’ section.

The valuation section of the survey comprised a bidding game, where respondents were asked to indicate, with a YES or NO answer, whether they would be willing to pay a certain amount for a weather derivative which would provide a maximum payout of Rs 1000 (about $25).
The bidding game was started with a question on whether they would be willing to pay a price of 10% of the expected payout amount. The game was brought to an end if a respondent answered in the affirmative. If the response was negative the next bid of 8% was offered and the game continued in the same fashion with subsequent bids being successively lowered to 5%, 3% and finally 2%.

The final questionnaire used is attached to this thesis as Annexure I.

6.5 Data collection

The entire survey and the attempt to determine the willingness to pay, was based on the stated preference method for determining benefit estimation.

Closed ended questions were asked and the specific question asked in the WTP section of the questionnaire was:

"If you were to insure your crop or purchase weather derivatives for an amount of Rs 1000, a premium or charge would have to be paid for this. We will now read out some premiums to you. Please tell us if you will be willing to pay this amount. (Note: You can insure/purchase weather derivatives for more than Rs 1000 – the premium would be for each Rs 1000 insured)"

The bidding game was commenced with Rs 100 and was subsequently lowered to Rs 80, Rs 50, Rs 30 and finally Rs 20. These amounts were chosen based on premiums of existing crop insurance schemes, and the outcomes of the focus group discussion and the pre-testing.

The respondents were asked to respond with a simple Yes or No. If they answered Yes at the first bid, the game was stopped there itself. Otherwise, the next lower bid was offered and their response was elicited.

6.5.1 Sample size

The formula for sample size selection is given by Cochran (1977):

\[ n = \frac{z^2(p)(1-p)}{d^2} \]

where,

- \( n \) = sample size
- \( z \) = \( z \) value associated with desired confidence level
- \( p \) = percentage picking a choice, expressed as a decimal
d = confidence interval
We take a confidence level of 95%, i.e. a z value of 1.96 and a confidence interval of 4%, i.e. d=0.04

The value of p is decided based on the percentage of the sample that picks a choice. Since we are not sure of this, we take p as 0.5. Put simply, if 99% of a sample gave the same answer to a question and only 1% differed, then the chance of an error is very small. On the other hand, if the percentages are 51% and 49% then the chances of an error are much larger. Therefore in determining the sample size needed for a given level of accuracy, the worst-case percentage (50%) is generally assumed.

This gives us a required total sample size of 600 respondents.

Finally, however, based on economic constraints, it was decided to go in for a sample size of 500. This, when included with the respondents of the pilot survey done for the purpose of pre-testing the questionnaire, gave us a final sample size of 536 – of which, 283 were subscribers and 253 were non-subscribers.

Working backwards on the formula given above, this gives us a confidence interval of 0.042 i.e. 4.2% with a confidence level of 95%.

The sample per village was decided on, proportionately from the total number of farmers who had taken crop insurance schemes in each selected village. An attempt was made to contact an equal number of respondents for both the categories. However, in two villages, where a large number of farmers had taken up the insurance scheme, a slight mismatch occurred since there were only a limited number of farmers available, who had not taken up the scheme. Table 6.1 provides details of samples covered in the two districts.

<table>
<thead>
<tr>
<th>District</th>
<th>Village</th>
<th>Subscriber Targetted</th>
<th>Subscriber Achieved</th>
<th>Non Subscriber Targetted</th>
<th>Non Subscriber Achieved</th>
<th>Total Targetted</th>
<th>Total Achieved</th>
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<td>Khanpuriya</td>
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<tr>
<td>District</td>
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<td>Non Subscriber</td>
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<td>283</td>
<td>265</td>
<td>253</td>
<td>530</td>
<td>536</td>
</tr>
</tbody>
</table>

* In Salawad and Khanpuria villages an exactly equal number of respondents in both the categories were not covered due to non-availability of eligible respondents (farmers who had not taken crop insurance).