Vulnerability Analysis and Risk Management for Water-Related Hazards

PART I: "Socio-economic valuation of risk perception"

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Economic approaches to risk valuation

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Content of "Economic approaches to risk valuation"

1. Overview of economic approaches to risk valuation
2. Revealed vs stated preference methods
3. Revealed preferences methods
   - Hedonic price
   - Travel cost
4. Stated preferences methods
   - Contingent valuation
   - Choice experiments
5. Case studies

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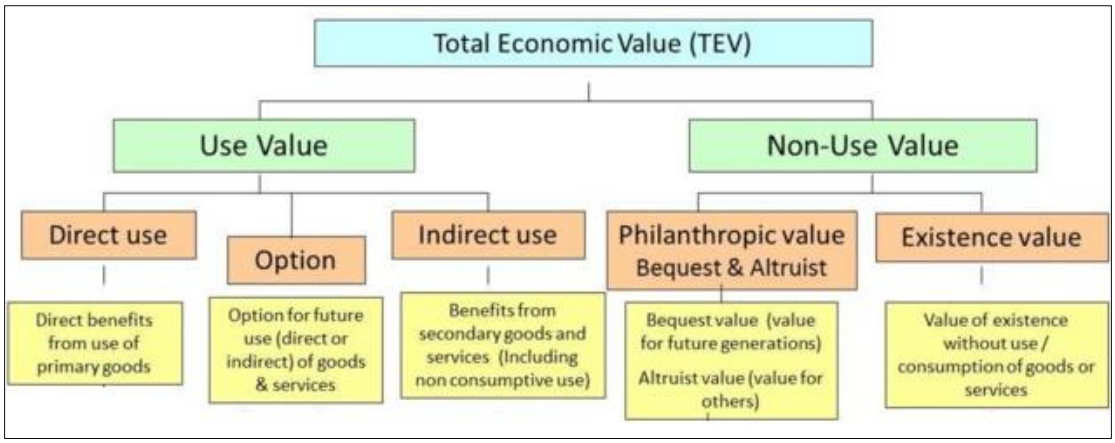
The Total Economic Value



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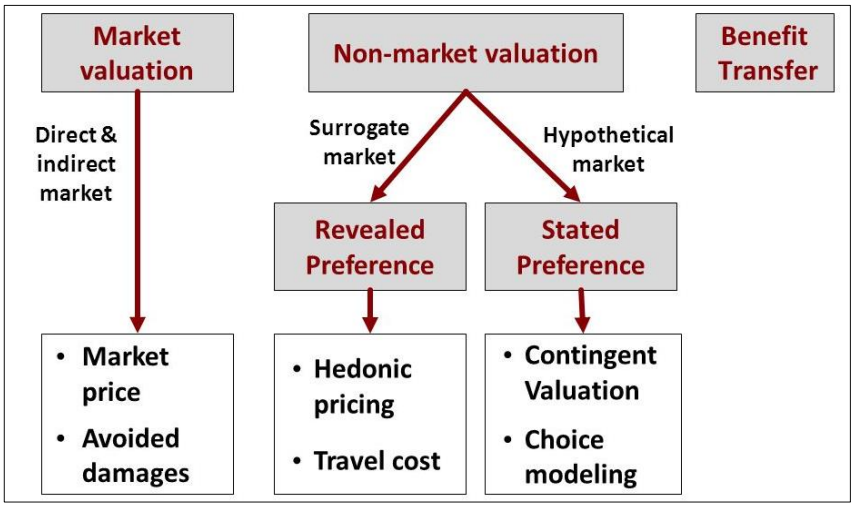
1. Overview of economic approaches to risk valuation



Revealed preference
Only use values

Stated preferences
Total Economic Value

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2. Revealed vs stated preferences

- Valuation methods are divided into two groups: stated (SP) and revealed preference (RP)
- RP methods seek to recover estimates of individuals values for risk protection by observing their behavior in related markets. They rely on data that come from observations of people acting in real-world settings where people live with the consequences of their choices.
- SP methods seek to measure individuals' values for risk protection directly, by asking them to state their preferences for alternative management plans

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Steps in Valuation

- Economic valuation of risk involves:
  1. Selection of valuation method
  2. Data collection
  3. Model specification
  4. Econometric estimation

- Estimation of risk values requires that the researcher either ask people about their values for the good of interest (primary data) or use existing data to infer the values (secondary data).
- Either approach is sensitive to the quality of the data.
- Primary data are typically collected with surveys.

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Types of data (1/2)

Primary Data

Secondary Data

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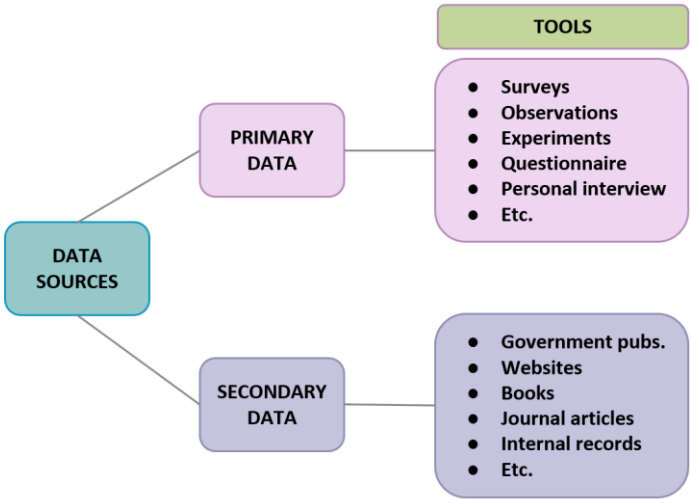
Types of data (2/2)



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Benefits and Limitations of Primary Data

Benefits

- Firsthand data gathered by the researcher himself
- Tailored to the study purpose
- Updated information
- More control over data

Limitations

- Expensive
- Very involved process
- Require more labor
- Feedback may be faulty

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Benefits and Limitations of Secondary Data

Benefits	Limitations
• Lower cost • Less effort • Less time • Sometimes only way to obtain data	• Collected for some other purpose • No control over data collection • May not be accurate • May not be in correct form

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Primary data collection: surveys

Steps for collecting survey data for risk valuation

1. Choose a mode of administration
2. Design the survey
3. Test the survey
4. Administer the final survey

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1. Administration mode choice

A. In-person Interview

B. Telephone Interview

C. Self-Administered Surveys

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A. In-person interview (1/2)

- In-person surveys are administered face-to-face with an interviewer asking the survey questions and recording respondents' answers
- Places: respondents' homes, convenient locations (shopping malls, on the street), places where the participants of targeted activities tend to congregate
- Advantages:
  - control of the survey
- Disadvantages:
  - very expensive
  - "social desirability bias" due to interviewer

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A. In-person interview (2/2)

Situations in which in-person surveys are best suited:

1. surveying populations for which there is no list
2. collecting information from people who are not likely to respond willingly or accurately (or cannot be reached) by mail or telephone
3. using complex questionnaires
4. using experienced interviewers and professional help for well-funded projects

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B. Telephone interview

- Telephone surveys require an interviewer. However, they are not face-to-face.
- They use sample frames such as telephone listings.

- Advantages:
  - interviewer has control over the order of the survey questions
  - geographically dispersed
  - the interviewer can directly enter survey responses into a computer
  - the cost of telephone interviews is substantially less that in-person interviews

- Disadvantages:
  - socially desirable answers
  - communication of complex information may be difficult

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C. Self-Administered Surveys

- This type of survey can be emailed, mailed, faxed or simply handed to the respondent
- No interviewer is involved

- Advantages:
  - Lower cost
  - Reliable answers as no inhibiting intermediary

- Disadvantages:
  - There is no one present to explain things to the respondent and clarify questions
  - No control over how the questionnaire if filled-in

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Factors Affecting the Choice of Administration mode

- Type of Population and Sampling
- Question Form
- Question Content
- Budget
- Duration of Data Collection

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2. Design the survey (1/4)

PLANNING WHAT TO MEASURE

Revisit the research objectives

Decide on the research question(s) of your questionnaire

Get additional information on the research issue from secondary data sources and exploratory research

Decide on what is to be asked for each research question

Decide how you want to analyze the data collected

FORMATTING THE QUESTIONNAIRE

For each research questions, determine the content of each question

Decide on the format of each question

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2. Design the survey (2/4)

QUESTION WORDING

Determine how the question is worded

Evaluate each research question on the basis of comprehensibility, knowledge and ability, willingness/inclination of a typical respondent to answer the question

SEQUENCING AND LAYOUT DECISIONS

Lay out the questions in a proper sequence

Group all the questions in each subtopic to get a single questionnaire

PRETESTING AND CORRECTING PROBLEMS

Read through the questionnaire to check whether it makes sense and it measures what it is supposed to measure

Correct the problems

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2. Design the survey (3/4)

Sequence And Layout Decisions

- Open with an easy and non-threatening question
- Ensure that questionnaire has smooth and logical flow from one topic to the next
- Proceed from broad general questions to more specific ones
- Do not place sensitive or difficult questions dealing with income status, ability, etc. at the beginning of the questionnaire
- Make physical layout appealing and interesting

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2. Design the survey (4/4)

Organization of a typical survey

Location	Type	Function
Starting questions	Broad, general questions	To break the ice and establish a rapport with the respondent
Next few questions	Simple and direct questions	To reassure the respondent that the survey is simple and easy to answer
Questions up to a third of the questionnaire	Focused questions	Relate more to the research objectives and convey to the respondent the area of research
Major portion of the questionnaire	Focused questions; some may be difficult and complicated	To obtain most of the information required for the research
Last few questions	Personal questions that may be perceived by the respondent as sensitive	To get classification and demographic information about the respondent

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3. Test the survey (1/3)

- The final version of a survey often bears little resemblance to the first draft.
- The iterations of revisions facilitate development of a well-designed survey instrument that will, in turn, improve the chances of an individual completing the survey and providing meaningful data.
- Qualitative methods, such as focus groups and one-on-one interviews, are commonly used to refine and develop the survey instrument.

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3. Test the survey (2/3)

Focus groups

- Focus groups are small group (7 to 12 individuals) discussions conducted for the purpose of getting feedback to aid in the development of the survey materials. The discussion is lead by a focus group moderator using an agenda to guide the discussion. The moderator usually asks open-ended questions to facilitate discussion about the relevant topic.

One-on-one interviews

- It allows for detailed feedback on survey materials without concern about a group effect because the interview involves only an interviewer and a survey participant.

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3. Test the survey (3/3)

- Another way to test the survey instrument is to carry out a pilot study
- A pilot survey is a small-scale implementation of the final survey procedures with an acknowledgment that final procedures may be modified based on the results of the pilot survey.
- The pilot survey serves several purposes:
  - it allows for a test of the survey sample
  - it provides information about the anticipated response rate, the number of follow-ups and the expected cost for the final survey
  - it allows for a test of the survey implementation procedures

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Survey example: the VAIA case study

On October 29, 2018, the Vaia storm hits the North-Eastern regions of Italy with extreme cumulated precipitation (up to 850 mm in three days) and wind, causing severe floods, landslides, loss of lives, extended damages to forests, interruption of traffic and electricity supply, as well as other infrastructural damages.

Impacts (Chirici *et al*., 2019; Biolchi et al., 2019; Giovannini et al., 2021):

- The storm caused **16 casualties** in an area from Trentino (northern Italy) to Campania (southern Italy)
- **494 municipalities** registered damages caused by Vaia, mostly in Veneto, Trentino-AltoAdige and Friuli Venezia Giulia.
- Destroyed or intensely damaged forest stands amounted to about **42,500 ha, 8.5 to 8.7 millions m3=** 7 times average annually harvested industrial roundwood volume in Italy

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Survey example: the VAIA case study

- The study aimed at understanding how individuals affected by the storm:
  1. detected the potentially dangerous circumstances
  2. reacted to the storm
  3. adapted their routine to cope with the consequence of the event
  4. changed their risk awareness and perception after the event

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Survey example: the VAIA case study

- To achieve these objectives, we developed a web-based survey addressing 1,388 inhabitants of the Veneto and Trentino Alto Adige regions

- The survey quantitatively documented behavioural responses associated with the Vaia event and included questions related to:
  i. whether respondents changed their normal routine during the storm and if so for what reason
  ii. information received before and during the event and how respondents reacted to it
  iii. damage suffered during the event
  iv. risk awareness and how it changed after the event
  v. personal protection measures adopted before and after the event
  vi. respondents' attitudinal and psychological traits

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