

# Quantitative analysis methods for public policies

## Basic notions



Co-funded by the  
Erasmus+ Programme  
of the European Union

Jean Monnet Module · EuroPoIA :: European-focused Policy Analytics

## Research question / hypothesis

Formulating your topic as a research *question*, rather than merely a statement can be a very useful step

**Statement:** The international community's response towards the immigration crisis

**Question:** What is the international community's response towards the immigration crisis?

**Hypothesis:** The international community's response towards the immigration crisis is not effective



# Comments

- **Research questions are more general and are applied for both qualitative and quantitative studies**
- **Research hypotheses provide direction and are used exclusively for quantitative analysis**
- **When in doubt choose research questions**



## Research questions should be:

- **Clear and unambiguous**
- **Related to the research**
- **Are not trivial**
- **Can be answered**
- **Although independent from each other, they should form a coherent research direction.**



# Quantitative research questions / hypotheses

- In general use directional verbs such as “affect”, “influence”, “determine”, “relate”, “impact”, etc.
- Avoid using exploratory verbs such as “discover”, “seek”, “explore”, “describe”, “report”.



## Quantitative research questions /hypotheses (cont.)

- *Research questions* break down the overall aim of the study inquiring about specific relationships among variables.
- Especially used in survey studies
- *Research hypotheses* are specific predictions that the researcher makes about expected relationships among variables.
- Require the use of statistical techniques drawing inference about the population from a study sample.
- Hypotheses are often used in experiments where investigators compare groups.



# Variable

- In quantitative analysis, data consist of variables.
- In Statistics, a variable has two defining characteristics:
  1. A variable is an attribute that describes a person, place, thing, or idea.
  2. The value of the variable can "vary" from one entity to another.

## Examples:

- Students' demographic characteristics can be classified in separate variables.
- Theoretical concepts such as professional satisfaction, job stress are typical variables heavily utilized in social sciences research.



# Types of variables

- There are many kinds of variables in quantitative analysis. Below, we present the most important ones:

## *Discrete or categorical vs. Continuous variables*

- Discrete or categorical variables are variables that take few values. They can be further categorized as either nominal or ordinal.
- Nominal variables are variables that have two or more categories, but which do not have an intrinsic order. When the nominal variable has only two levels, it is called a dichotomous variable. Examples include gender (dichotomous), geographical region, etc.





# Comments

In some cases, the measurement scale for data is ordinal, but the variable is treated as continuous.

For example, a Likert scale that contains five values - strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree - is ordinal.

However, where a Likert scale contains seven or more value - strongly agree, moderately agree, agree, neither agree nor disagree, disagree, moderately disagree, and strongly disagree - the underlying scale is sometimes treated as continuous.

In general, if the number of values is above 5, then we can treat the variable as a continuous one.



## Further comments

- Categorizing variables is somewhat of a choice. Some researchers would argue that a Likert scale, even with seven values, should never be treated as a continuous variable.
- Another important distinction is between Dependent and Independent variables.
- An independent variable, sometimes called an experimental or *predictor* variable, is a variable that is being manipulated in an experiment in order to observe the effect on a dependent variable, sometimes called an outcome variable.
- A tutor wants to know why some students perform better than others in an exam. The tutor thinks that it might be because some students spend more time studying and/or are naturally more intelligent than others. Thus:

**Dependent Variable: Exam grade**

**Independent Variables: Study time and Intelligence**



## Keep in mind

- **In explaining a relationship using quantitative analysis it is necessary to have a dependent variable and a set of independent variables**
- **The dependent variable is usually continuous whereas the independent ones could be either.**

