Scientific Thinking and Writing in Economics

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Outline of class today

- **Part A**: Introduction to “scientific thinking”
- **Part B**: Scientific writing, and some pointers for reading academic texts, with focus on Economics. Reading and writing are intimately connected, and you learn how to write by reading existing papers.

    - We will also go through typical paper and introduction structure in Economics, and prepare for the assignment.

PART A

Introduction to Scientific thinking

Introduction to Scientific thinking

All research is based on assumptions about how the world “works” and how we can best come to understand it.

Ontology and epistemology:

Two philosophical concepts related to what exists in the world, how the world works (ontology) and to what counts as ”knowledge” about the world and how we can obtain it (epistemology).

Useful to be familiar with these when engaging with academic research, both as a reader or as an author of e.g. a thesis.

Different academic fields have different ”takes” on ontology and epistemology!

Ontology

Comes from greek ”onto”= existence and ”logia” =science or study

Related concepts in philosophy of science:

1. Positivism: there is an absolute and objective truth. There is a reality that exists independent of human perception and interpretation.

2. Post-positivism (and similarly: constructionism or interpretivism): the truth is socially constructed, subjective and may change. scientists just like everyone else, are inherently biased by their cultural experiences and world views and this affects how they perceive “reality”.

Positivism and post-positivism represent two different ontological positions, as they have fundamental different interpretations of what constitutes truth and reality.

Epistemology

- Comes from greek ”episteme” = knowledge and ”logia” science or study
- What are the necessary conditions for how I can know something? What kind of things do/can we know?
- One common definition is that knowledge is

  “justified, true belief”.
- How can you justify a belief? This has to do with following a scientific method for testing and arriving at that belief. Epistemology deals with what are the appropriate measures for arriving at such a justified belief.

Epistemology is hence closely tied to scientific methods or research methods, and the view on what are the most correct and credible methods also differ between academic disciplines.

Theory vs. empirics

- Empirical research is research that is primarily based on data from the world. It canbe motivated by an existing theory, but the main focus is on obtaining and analyzing data from real people, firms, country national accounts, etc.

- Theoretical research: based on modelling concepts from the world, in economics mostly through mathematical models. Can involve data to test the predictions of the model, but is mainly concerned with systematizing impressions into a model that describes e.g. a certain pattern, type of interaction, or causal relationship.

Qualitative vs Quantitative approaches

"The **quantitative paradigm** is based on **positivism**. Science is characterized by empirical research; all phenomena can be reduced to empirical indicators which represent the truth. The ontological position of the quantitative paradigm is that there is only one truth, an objective reality that exists independent of human perception. Epistemologically, the investigator and investigated are independent entities. Therefore, the investigator is capable of studying a phenomenon without influencing it or being influenced by it. The goal is to measure and analyze causal relationships between variables within a value-free framework (Denzin and Lincoln, 1994). Techniques to ensure this include randomization, blinding, highly structured protocols, and written or orally administered questionnaires with a lim- ited range of predetermined responses. Sample sizes are much larger than those used in qualitative research so that statistical methods to ensure that samples are representative can be used (Carey, 1993)."

Source Sale, J.E., Lohfeld, L.H. and Brazil, K., 2002

Qualitative vs Quantitative approaches

"The **qualitative** paradigm is based on **interpretivism** (Altheide and Johnson, 1994; Kuzel and Like, 1991; Secker et al., 1995) and **constructivism** (Guba and Lincoln, 1994). Ontologically speaking, there are multiple realities or multiple truths based on one's construction of reality. Reality is socially constructed (Berger and Luckmann, 1966) and so is constantly changing. On an epistemological level, there is no access to reality independent of our minds, no external referent by which to compare claims of truth (Smith, 1983). The investigator and the object of study are interactively linked so that findings are mutually created within the context of the situation which shapes the inquiry (Guba and Lincoln, 1994; Denzin and Lincoln, 1994). This suggests that reality has no existence prior to the activity of investigation, and reality ceases to exist when we no longer focus on it (Smith, 1983). The emphasis of qualitative research is on process and meanings. Techniques used in qualitative studies include in-depth and focus group interviews and participant observation. Samples are not meant to represent large populations. Rather, small, purposeful samples of articulate respondents are used because they can provide important information, not because they are representative of a larger group (Reid, 1996)."

Source Sale, J.E., Lohfeld, L.H. and Brazil, K., 2002

In Economics

The positivist approach is the most relevant one in mainstream economics (also including subfields such as behavioral economics!)

This is reflected in the research methods used in empirical research: ***quantitative*** method and a strong focus on uncovering ***causal relationships***.

Theory is…..

A theory is a system of concepts (variables) that are related to each other by propositions, within some boundary conditions that sets the limitations and assumptions in applying it (e.g., context, space, time)

A theory can help organize and communicate thoughts by:

- Providing explanation for why something may occur
- Explain patterns in individuals' behavior
- Explain causal relationships: why does A lead to B?

Theory is developed in order to explain AND predict complex events, objects or phenomena

Theory in Economics

When we talk about "theory" in Economics, we usually refer to models expressed through a set of mathematical expressions.

- A theoretical model typically fomalizes:
  - Decision makers
  - Possible actions available to them (e.g. consumption choice, investment level, pricing, etc.). These choice variables are the *endogenous variables* of the model.
  - Objectives of the decision makers (e.g. maximize utility, maximize profits)
  - Description of the environment and how exogenous and endogenous variables relate to each other
  - Solution concept (in case of one decision maker: optimal solution; in case of many decision makers: equilibrium)

- A model typically belongs to one of the following categories:
  - One decision maker -> optimization problem (e.g. monopoly firm choosing optimal pricing structure)
  - N strategic decision makers -> game (e.g. oligopolistic firms choosing their prices/quantities in a market)
  - Multiple decision makers taking prices as given -> competitive equilibrium models (e.g. large number of firms competing in a market)

Empirical research means…

Research that is based on empirical material, i.e. data, which comes from observations and measurements from the real world.

Common types of data used in Economics are survey data and register data (for example from the tax registry).

Empirical research is different from *theoretical* research.

Empirical work in Economics

These are a few typical features of empirical research in Economics:

Quantitative – large datasets and statistical analysis methods are used to answer the research question. This can be contrasted to qualitative methods which are common in many other social sciences.

Strong focus on identification of *causal* effects This is related to the use of specific econometric methods to try and isolate the causal effect. Studying causal effects can be contrasted with studying *correlations.* Empirical papers in economics often claim to provide "evidence" on something.

- but note that *descriptive* studies (using large datasets) are also used in Economics.

Often connected to an economic theory: the empirical research use a theoretical prediction to motivate their work, they can test a theory, or use the theory to understand which mechanism may be driving a causal relationship between two variables.

Validity and Reliability

Two concepts you will also come across are Validity and reliability, which are measures of how well a research method "works". There are also different types of validity!

- *Construct validity* is defined as the extent to which a concept is accurately measured in a quantitative study.

- *Reliability* has to do with the quality of measurement. In its everyday sense, reliability is the "consistency" or "repeatability" of your measures.

- A simple example of validity and reliability: an alarm clock that rings at 7:00 each morning, but is set for 6:30. It is very reliable (it consistently rings the same time each day), but is not valid (it is not ringing at the desired time).

- Source: Heale, R. and Twycross, A., 2015. Validity and reliability in quantitative studies. *Evidence-based nursing*, *18*(3), pp.66-67.
- See also https://conjointly.com/kb/introduction-to-validity/

Internal and external validity

- Internal validity is relevant for studies that aim to study causal links, which is very common for empirical studies in economics. If you want to study the impact of a policy on an outcome, you have high internal validity if you can credibly claim that you have isolated the causal link and eliminated other factors that may correlate with both X and Y (such as omitted variables).
- External validity has to do with the extent to which you can generalize the results from the study to other contexts, populations, policies, etc.

You can read more on validity (not specifically for econ) here: https://conjointly.com/kb/internal-validity/ and https://conjointly.com/kb/introduction-to-validity/

Links to additional reading

On Ontology and epistemology

Ladyman, J., 2012. *Understanding philosophy of science*. Routledge. Avaliable in electronic format from the Learning centre. *This is a textbook on the philosophy of science that includes a brief history on scientific thinking that I found very clearly written and useful to get a quick overview of central norms in scientific thinking.*

On the ”qualitative vs. quantitative” debate:

Sale, J.E., Lohfeld, L.H. and Brazil, K., 2002. Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. Quality and quantity, 36(1), pp.43-53.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4623759/

(an article in medicine, but some parts are general and relevant)

Several of these issues (e.g. internal validity and quantitative vs qualitative philosophy) are covered briefly in this online textbook:

Trochim, W.M. and Donnelly, J.P., 2001. *Research methods knowledge base* (Vol. 2). Macmillan Publishing Company, New York: Atomic Dog Pub. Found at: https://conjointly.com/kb/

PART B

Scientific writing and the reading of academic papers.

Introduction to Scientific writing

Academic/scientific writing is different from literary writing (and of course also from informal writing e.g. between friends).

You can get familiar with academic writing by reading academic texts, through personal experience with academic writing and through following conventions and rules of thumb, some of which we will go over now.

Since writing conventions differ between disciplines, I will focus specifically on writing in Economics.

Academic writing in economics

Emphasizes clarity rather than “creative”, suspenseful or complicated writing styles.

Clear writing requires:

- A lot of thought and processing of the material to ensure a strong internal logic of your claims.
- Good understanding of economic theories, relevant literature, data and empirical research methods.
- Even someone who is not talented in writing can write a good paper in economics.

Academic writing in Economics

As McCloskey (1985), one “guru” of economics writing, tells us: “it is good to be brief in the whole essay and in the single word, during the midnight fever of composition and during the morning chill of revision”

Clarity in writing is about

- Formulation and phrasing
- Organization of the text
- Layout and organization of paragraphs and sentences
- Choice of words

How to achieve clear writing

- Organize your ideas into claims
- Define and explain the key terms you will use.
- Avoid slang, empty words, and (too much) repetition,
- Read and edit what you wrote, remove redundant words, and go over your text several times.
- It is highly recommended that you read what you wrote to someone else, or have another student read your text.
- In the beginning of a section or subsection, tell the reader what is the purpose of the section in the big picture of the paper or thesis. At the end of the section, summarize main takeaways.

“tell them what you’re going to tell them, tell them what you want to tell them, and tell them what you just told them.”

Economics writing is predictable!

Some concrete examples 1

Avoid passive voice!

~~In this paper, the effect of centralized wage-setting institutions on the industry distribution of employment is studied.~~

This paper studies the effect of centralized wage-setting institutions on the industry distribution of employment.

Some concrete examples 2

Remove redundant words

~~In spite of the fact that the stock market is down, many experts feel that financial markets may perform reasonably well this quarter.~~

Although the stock market is down, financial markets may still perform reasonably well this quarter.

Some concrete examples 3

Stick to the same tense:

~~This study showed that dividend payouts increase when dividend income was less tax-disadvantaged relative to capital gains.~~

This study shows that dividend payouts increase when dividend income is less tax-disadvantaged relative to capital gains.

From reading to writing

One way (the best?) of learning how to write an economics paper or thesis is to read many such papers and pay attention to how they are structured and what they emphasize.

Structure of an economics paper

- Abstract
- Introduction (often includes the literature review)
- Literature review (if not already in intro)
- “Body” of the paper
  - Details about the context of the study (optional)
  - Theoretical/Conceptual framework (optional, empirical papers)
  - introduction to data and empirical strategy (empirical papers), intro to model and assumptions (theoretical papers).
  - empirical analysis and results (empirical) or presentation and predictions of the model (theoretical)
  - Additional extensions (depends on paper)
- Conclusion
- Bibliography
- Tables and Figures (these can also be included in the text)
- Appendix (optional)

How is the article placed in the existing literature?

In the introduction, the author should make clear how the paper is related to existing literature. Thus is typically done in two steps:

1. Mention the research contribution of the article

- How does this paper add to the existing literature, what is the Innovation, contribution? **concisely summarized**
- Of course it is in relation to the literature, but we are not reviewing the literature here, we are only highlighting what is new: "The first study to examine this question in Finland", "The first study that relaxes the assumption of full information", "The first study that integrates the wage expectations mechanism into a standard model", "the first randomized study to examine This question" etc.

How is the article placed in the existing literature?

2. Review of the related literature

Here, the paper/thesis
- mentions articles that answered a closely related research question (or the same research question) and makes clear how is this study different from them?

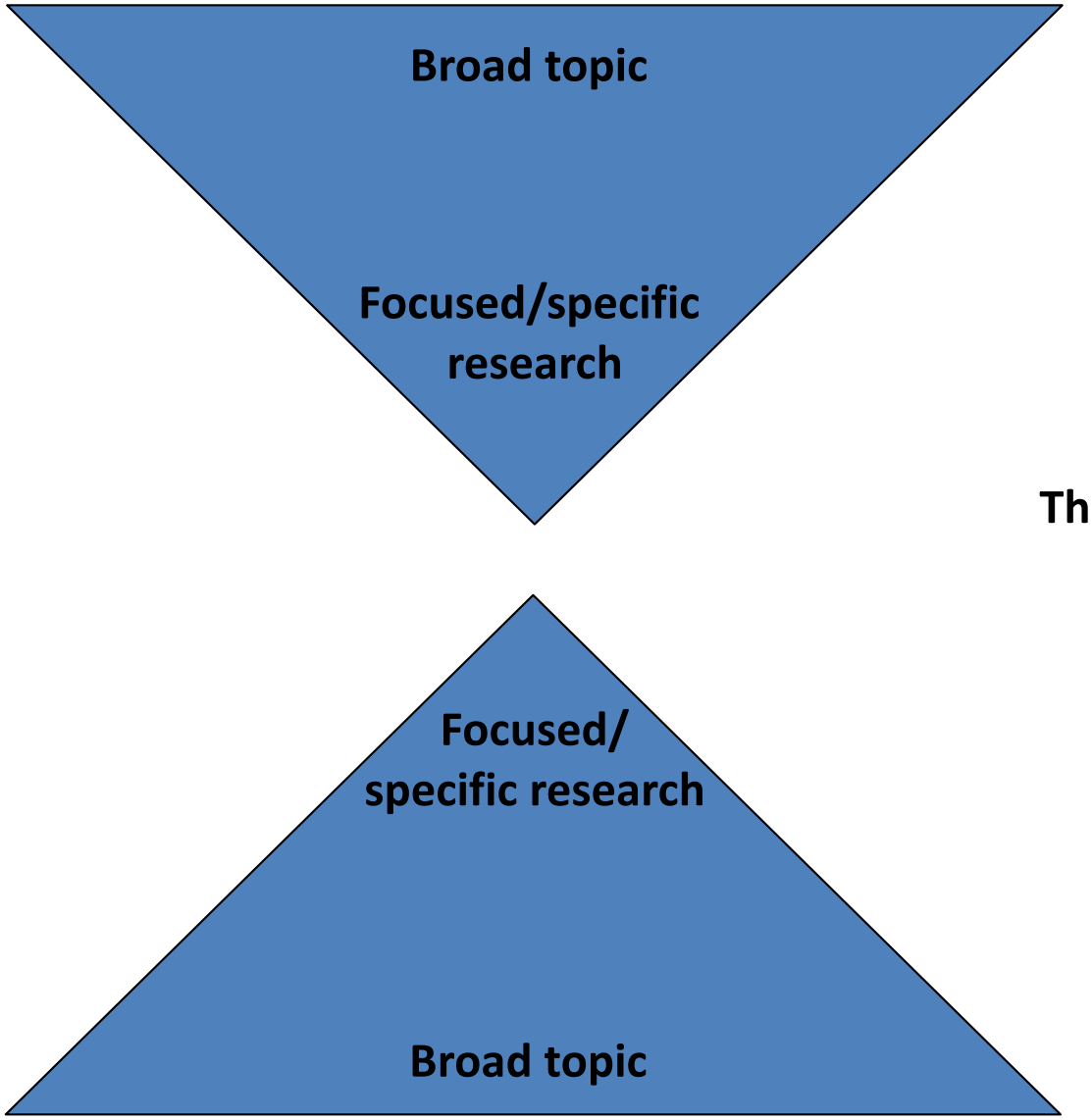
    Differences could e.g. lie in model assumptions, sample, identification method…

- Mentions articles with different/opposite findings, and provide a satisfactory explaination to this.

- It may be that the article is related to several areas of literature – based on the research question and methodology.

    For example, the same article can be related to the literature on intergenerational mobility and to literature on dynamic models on savings over the life-cycle.

Funnel approach& zooming in on a research question



Introduction

The body of the paper/thesis

Conclusion

Additional tips for the different parts of a paper or thesis

- Title

https://bit.ly/1b1KPzl

- Abstract

http://blogs.lse.ac.uk/impactofsocialsciences/2011/06/20/essential-guide-writing-good-abstracts/

- Intro

http://blogs.ubc.ca/khead/research/research-advice/formula

- Middle Bits

http://marcfbellemare.com/wordpress/12797

- Conclusion

http://marcfbellemare.com/wordpress/12060

Note: many of these tips are for more advanced papers and not for thesis writing. But they may still be illuminating for understanding the "writing style" that you see in economics papers.

Assignment

- A concise summary of each paragraphs of the introduction in an economics paper
- Summarize in 1-2 sentences what the paragraph is about and/or what is its role in the paper
- Remember to add the complete reference to the paper in the assignment.
- See further instructions in MyCourses

Introduction example

Are Ethnic Divisions a Tragedy for Public Good Provision in Africa? By Gwen-Jiro Clochard and Guillaume Hollard, 2018 working paper.

1 Introduction

In their influential analysis of the determinants of growth in Sub-Saharan Africa, Easterly and Levine (1997) singled out the effect of ethnic divisions. Ethnic diversity has been shown to be negatively correlated with a variety of economic outcomes. For instance, La Porta et al. (1999), Alesina et al. (2003) and Banerjee et al. (2007) found that more heterogeneous societies have worse infrastructure, and higher illiteracy and infant-mortality rates. In Alesina et al. (2003), *ceteris paribus* completely heterogeneous societies produce 20 percent less public goods than homogeneous ones.

Motivation: there is an influential literature that shows a negative relationship between ethic diversity and economic performance of countries. Focus on public goods.

Twenty years after the pioneering work of Easterly and Levine (1997), we here propose to revisit one of the most thoroughly-investigated questions in Development Economics, that of the "diversity burden", in the light of the substantial progress that has been made in data availability and econometric analysis. Our aim is to contribute to the still rapidly-growing literature on the link between diversity and public goods in the following ways.

Tells "generally" what this paper does – contributes to this literature, using newer and better data and methods.

Our first contribution relates to data availability. Most work on diversity uses cross-country analyses (Alesina et al. (2003), Fearon and Laitin (2003), Posner (2004)), and there have been only few attempts (Alesina and Zhuravskaya (2011), Gerring et al. (2015), Gershman and Rivera (2018)) to look at the impact of diversity at the sub-national level. Combining surveys, geographical information and historical ethnic data, we are able to carry out our estimations at the regional level (the first sub-national administrative level) in 32 African countries. Regional-level analysis enables us to use country-fixed effects, capturing all of the unobserved characteristics at the country level, such as colonial legacy or labor-market policies.

The following 3 paragraphs tell more specifically what paper does, and at the same time how this paper contributes to the literature: what are the innovations? Contribution 1: use data from a lower geographical level, allows for a regional level analysis and including country FE.

Our second contribution regards the large set of public goods for which we estimate the effect of ethnic diversity. The link between ethnic diversity and public-good provision is typically investigated for one particular public good, such as health centers, schools or roads. In contrast, we here consider a set of nine public goods: the electricity grid, cellphone service (which in many African countries is publicly provided), sewage-treatment facilities, piped-water systems, post offices, schools, police stations, health centers and paved roads.

Contribution 2: Estimate effect of diversity on a larger set of public goods than what previous studies have done.

The third, and main, contribution is to propose a new instrument, based on a pre-colonial measure of ethnic diversity, for the instrumental-variable regressions. To the best of our knowledge, previous results have all used simple OLS regressions. It is well known that OLS regressions are subject to a number of caveats, such as omitted-variable bias, reverse causality and measurement error, leading to biased estimates. In contrast to the standard OLS approach, IV regressions provide *causal* estimates.

Contribution 3: a new instrument that improves over previous literature and allows for making (more) causal claims.

We find that the impact of ethnic diversity depends on the public good considered: in line with previous work, we find a negative effect for access to the electricity grid, clean water and roads. However, there is no significant impact on cellphone service, sewage treatment or health centers and, surprisingly, a positive effect on schools, post offices and police stations. We estimate an average effect on public-good access by constructing a general index. This index is slightly negatively correlated with diversity: *ceteris paribus*, completely heterogeneous societies produce 3 percent less public goods than their homogeneous counterparts, as compared to the 20 percent figure found in Alesina et al. (2003).

Finds a negative effect on diversity on some public goods: electricity, clean water and road but no effect on some others, and positive effect on schools, post offices and police stations. The overall effect is negative but much smaller than previous studies found.

We test the validity of our findings via a series of robustness checks. We first control for multiple-hypothesis testing. Second, we use alternative measures of ethnic diversity, namely the polarization index and a notion of proximity among groups based on language. Third, we use an alternative data set to calculate our ethnic-diversity measures. Fourth, we use alternative specifications of the instrument. Fifth and last, we use alternative data for the pre-colonial population. In (almost) all of the specifications, ethnic diversity continues to adversely affect public-good provision on average. However, the size, and even sign, of this effect varies across specifications. In sum, we confirm the existence of a "diversity burden", but only limited in size and not systematic.

Robustness checks include using alternative measures of diversity and for the "ingredients" of the instrument.

The remainder of the paper is organized as follows. In Section 2, we present the data and the variables of interest, and the instrument is then discussed in Section 3. The estimation framework is presented in Section 4, and the results in Section 5. The different robustness checks appear in Section 6. Last, Section 7 concludes.

Tells how the rest of the paper is structured.