Writing and LaTeX Tips for Ph.D. Students

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Abstract

This note provides small tips for using LaTeX and writing in general so that Ph.D. students can improve their papers.

1 LaTeX

Nowadays almost all working papers as well as published papers in all serious economics journals are typeset using LaTeX. For people below a certain age, writing an academic paper without using LaTeX will signal that your research is not serious. If you do not know how to use this system, you have to learn it now. A very good source of information is the LaTeX Wikibook.[1] If your operating system is Windows, then MikTeX[2] will give you a no-brainer installation. I don't know about other operating systems. To use LaTeX, you need a text editor. There are many of them, and you can compare them here.[3] Personally, my favorite is TeXstudio.[4] What I like about this editor is that

1. there is text highlighting and auto completion (though the latter is sometimes annoying),

2. you can compile a document by just hitting the F5 key,

3. after compiling, the PDF displays the location you were editing (which is a huge advantage because you don't need to navigate through your lengthy document to look for where you were editing!).

1.1 Small LaTeX tips

1. You have noticed that this document has footnotes and URLs with hyperlinks. You can do so by loading the `hyperref` package.

2. Always load the `amsmath` and `amssymb` packages. Otherwise you can't type symbols like $\succsim$ (`\succsim`).

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[1] https://en.wikibooks.org/wiki/LaTeX

[2] http://miktex.org/

[3] https://en.wikipedia.org/wiki/Comparison_of_TeX_editors

[4] http://texstudio.sourceforge.net/

3. Define macros for symbols that you often use. For example, instead of writing $\mathbb{R}$ (`\mathbb{R}`) each time, define your command like

    `\newcommand{\R}{\mathbb{R}}`

    and write `\R` throughout.

4. When you accumulate many macros of your own, it's simpler to create a style file (`.sty` file). Mine is here.[5]

5. As you read papers, create your own bibliography (`.bib`) file and use BibTeX to cite papers using the `\cite` command, for example Arrow and Debreu (1954). `\citep` will output (Arrow and Debreu, 1954), and `\citealp` will output Arrow and Debreu, 1954. (Notice the differences in the parentheses.)

6. Loading the `doi` package lets you insert a hyperlink with a digital object identifier (DOI). (See the reference list below for an example.) Doing so will benefit the readers since they only need to click the link to get the reference.

7. You can customize the style of the reference list by loading an appropriate bibliography style file (`.bst` file). Personally I just use `plainnat`, but you need to load the `natbib` package to use this format. Furthermore, to cite papers with names and years with parentheses, write

    `\usepackage[authoryear,round]{natbib}`

    in the preamble.

8. Some journals require specific margins. An easy way to accommodate is to load the `geometry` package.

9. Sometimes you want to include NBER recession bars in your Matlab figures. This happened to me once, and I spent many hours figuring out how to do properly. The problem is that, usually you save Matlab figures in `.eps` format and include them in the LaTeX document, but EPS figures are not transparent so the recession bars become quite ugly. On the other hand, if you save the figure in `.png` format, the resolution of the figure becomes low and it looks very unprofessional.

    Here is how you can create a high quality figure with transparent recession bars *without* blank spaces around the figure. First, use the `recessionplot` command in Matlab to create the figure. Next, execute the following lines after the figure:

```
fig = gcf;
fig.PaperPositionMode = 'auto';
fig_pos = fig.PaperPosition;
fig.PaperSize = [fig_pos(3) fig_pos(4)];
print(fig,'filename','-dpdf')
```

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[5]https://github.com/alexisakira/alexisakira.github.io/blob/master/files/test.sty

This way a figure called `filename.pdf` will be saved. See Figure 1 for an example.

10. Sometimes you want to provide detailed explanations under tables and figures. To do this load the `caption` package and use the `\caption*` command. To make the text font size smaller, you can use `\footnotesize`. See Figure 1 for an example.
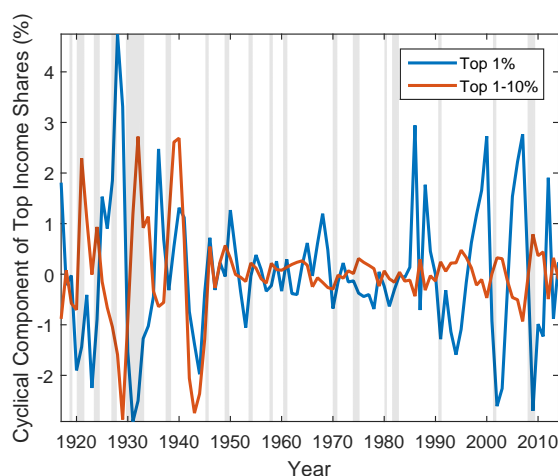

Figure 1: Cyclical components of top income shares.

Note: the figure shows the cyclical components of the U.S. top income shares obtained by the HP filter with smoothing parameter 100. The shaded bars indicate the NBER recessions. Source: a very old working paper version of Toda and Walsh (2020).

1.2 Common mistakes among novices

1. Don't quote text like "this". The correct way is "this", which is typed `''this''`. Some text editors like TeXstudio will automatically replace double quotes by the correct quotes in each language (English, French, German, etc.). Click here for more details.

2. Be careful with the dots. $a_1 \times a_2 \times \ldots \times a_N$ (`\ldots`) and $x_1, x_2, \cdots, x_N$ (`\cdots`) are incorrect. ($a_1 \times a_2 \times \cdots \times a_N$ and $x_1, x_2, \ldots, x_N$ are correct.) Most of the time, using the `\dots` command will automatically choose the correct dots style. Click here for more details.

3. When writing texts within an equation, use the `\text` command. Compare "$subject~to$" (`$subject~to$`) and "subject to" (`$\text{subject to}$`). In LaTeX, MRS (marginal rate of substitution, `$MRS$`) is interpreted as $M \times R \times S$. Write instead MRS (`$\mathrm{MRS}$`).

4. Do you see the difference between Prof. Arrow (`Prof. Arrow`) and Prof. Arrow (`Prof.~Arrow`)? In the former case, the dot is interpreted as a period and the spacing is wider. In the latter case, the dot is interpreted as abbreviation and also ~ prevents a line break between Prof and Arrow

because it is interpreted as one word (if you do not need to prevent line breaks, write `Prof.\ Arrow`). Be careful when you spell U.S., U.K., Dr., etc.

2 Writing

Once you master how to write professional documents using LaTeX, the next thing you need to learn is how to write well. Writing well is very important, because referees get annoyed when the paper is poorly written, and even if the paper is published, readers will be frustrated and you will not get as many citations as you deserve. To learn how to write well, start from reading Strunk and White's "The Element of Style",[6] Halmos (1970), and John Cochrane's "Writing Tips for Ph. D. Students".[7]

A paper consists of the title, abstract, introduction, and the rest. The title is the shortest summary of the paper, the abstract is a short summary of the paper, and the introduction should contain the longest summary of the paper as well as a literature review.

2.1 Body

Start writing the paper from the body.

1. Think hard about what the main contributions are. You can have many small results in the paper, but they should be connected by one big theme.

2. Since readers are impatient, you should get to the main results as soon as possible. Write the paper in a logically linear order (i.e., stuff A must precede stuff B if and only if A is necessary to understand B) as much as possible. If this is not possible (say A is too long or technical), you can either relegate A to the appendix or make the model less general to say the same thing under stronger assumptions.

3. Whenever you have a proposition, try to explain the intuition.

4. Don't call a model "general equilibrium" unless all endogenous variables are endogenously pinned down. (Once a researcher from Minnesota presented a "general equilibrium" model with an exogenously fixed interest rate, and Michael McGill politely pointed out that such a model is called partial equilibrium.)

5. A proposition is a statement that can be proved to be true. A theorem is an important proposition. A lemma is a small proposition that is used to prove a theorem. A corollary is a proposition that is easily derived from a theorem. (There are some exceptions: Zorn's lemma and Ito's lemma are important theorems.) Some people claim "propositions" without actually stating the precise assumptions or rigorously proving them (such things are called "observations", "claims", "conjectures", etc.): never do this.

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[6] The book is no longer copyrighted: you can find a free copy by Googling.

[7] The link is here: `https://faculty.chicagobooth.edu/john.cochrane/research/papers/phd_paper_writing.pdf`. Note that "Ph. D." should be either "Ph.D." or "Ph. D.", right?

6. When you label objects such as $x_1, x_2, \ldots$, label them as $\{x_n\}_{n=1}^N$, not as $\{x_i\}_{i=1}^n$. That is, use a lower case letter to denote the general element, and an upper case letter to denote the cardinality of the set. That way you only need to introduce one alphabet, which makes easier to remember what is what.

2.2 Introduction

The introduction is extremely important. Usually readers look at the title and the abstract, and if interested, skim through the introduction. If the introduction is boring, readers stop reading. You need to write an introduction that compels the reader to keep reading. Here are a few tips for writing the introduction.

1. Don't start the introduction from a literature review.

2. The reader should be able to grasp what the paper is about (i.e., introducing the problem you are going to address) by the end of the second paragraph in the introduction.

3. Think about potential readers and referees and try to convince them to keep reading.

4. Most of the time, the problem you are going to study is already studied by previous researchers. Briefly explain what has been done in the literature, what are unresolved questions, and why they are important.

5. After introducing the problem, explain the model and main results in some detail.

6. After all of this, you can do a detailed literature review in a paragraph or a subsection.

2.3 Title

Think hard about the title: it should be concise and informative. In general, the shorter, the better. For example, "On the Existence of Equilibrium..." can be shortened to "Existence of Equilibrium...". "A Model of Income Distribution" (Champernowne, 1953) is short but uninformative because it does not say anything about what the paper does except that it's about income distributions. "Existence of an Equilibrium for a Competitive Economy" (Arrow and Debreu, 1954) is an excellent title, because it explains well what the paper is about and it is as short as it can be. On the other hand, "On Equilibrium in Graham's Model of World Trade and Other Competitive Systems" (McKenzie, 1954) is a poor title, because

1. we know that the paper is about some property of equilibrium but the title does not say whether it's about definition, existence, uniqueness, etc.,

2. nobody remembers what "Graham's Model of World Trade" is (lesson: use only well-established proper nouns like Pareto or Nash), and

3. the paper has actually little to do with world trade.

There is no wonder that Arrow and Debreu (1954) is cited about 7,000 times, while McKenzie (1954) is cited only about 500 times, even though these two papers are the first to prove the existence of equilibrium and published almost simultaneously.

2.4 Conclusion

As Cochrane suggests, I don't think a conclusion is necessary because you have already explained what you do in the paper in the abstract, introduction, and the body. When I write short papers, say 25 pages or less, I usually omit the conclusion.

2.5 References

1. Use BibTeX to compile a professionally-looking reference list.

2. I hate to be strategic, but if your paper goes to the hands of the "wrong" referees, the chance of acceptance will be quite low. Cite many papers written by people who are likely to support you. If your paper is mostly theoretical, don't bother citing many quantitative papers (and vice versa). Oftentimes theorists don't care about calibrations, and quantitative people don't care about theorems. After your paper is accepted (or received R&R), you can change the reference list to be scientifically honest.

3. People often find papers by searching for papers that cite important papers. To improve the discoverability of your work, cite important or recent papers in your field.

2.6 Appendix

The appendix is quite useful. When you write papers, think of the appendix as the temporary trash: if you find some part of the paper less important than others (or can be deferred without spoiling the flow of the paper), make that part an appendix. Examples are:

1. Unless you are a theorist, most people do not care so much about proofs (I do care a lot, though). Put most proofs in the appendix. That way you can make your paper appear shorter and satisfy the page limits imposed by journals.

2. Referees always complain that you have not done enough robustness checks. Do all robustness checks that you can think of, and dump them into the appendix. After the paper is accepted, you can make a separate online appendix.

3. If there are materials that is standard to you, but not for most people (like the definition and properties of some power law distributions), instead of just citing sources explain briefly in an appendix. The referees will find it easier to understand the paper.

References

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