

Some Advice for Writing a Report or Thesis*

Erik Kole

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Writing a report or a thesis is not easy. Many students (and researchers!) struggle to write texts that are easy and fun to read. In this document I give some general advice to help you on your way. More of these kind of documents are available on the internet, for example the writing tips by John Cochrane.¹

1 Structure

1. Relate the results to your research question.

You study literature, propose methods, and derive results to answer your research question. The structure of your report or thesis improves when you make explicit how the literature, methods and results relate to it. In particular, when you have finished discussing a part of the results, it can be beneficial to indicate to what extent you have answered the research question, and which (sub)questions remain. This approach automatically creates a bridge to the next part of the results.

2. Discuss tables and figures.

Explain what is in tables and figures. Sentences like “The results are in table XX” without further explanations do not help the reader in any way. A table or figure should help in some way to answer the research question, so explain. If it does not (a figure of a return series may not say that much), consider dropping the table or figure.

3. Start with what is most important.

Start a discussion with general findings, results and conclusions. Do not start the discussion of results as follows “The estimates are in Table XX. For France / unemployment / the Yen-Euro exchange rate, we find some strange results. We think that these results can be explained by...” Instead, start with something like this “The estimates are in Table XX. We generally find that the results indicate a strong

*I thank Michel van der Wel and Dick van Dijk for helpful comments.

¹See http://faculty.chicagobooth.edu/john.cochrane/research/papers/phd_paper_writing.pdf

relation between... [Some more explanation may follow here.] A notable exception is France / unemployment / the Yen-Euro...”

4. Avoid footnotes.

Footnotes are a nuisance, as they force a reader to move to the bottom of the page and back. Footnotes should only be there to give some additional information, typically in the form of references or web sites. For all other footnotes, ask yourself whether they can be removed or are necessary in the main text.

5. Start with what you do, not with what you do not do.

Starting with what you do not or cannot do is very defensive. It sounds like excusing yourself beforehand. That is not necessary. Simply start with what you do. When you have fully explained that, argue why you do or cannot apply a different kind of analysis.

6. Be critical on what you need.

Some methods or analyses seem standard in econometrics, for example an (adjusted) Dickey-Fuller test for a unit root, or a Jarque-Bera test for normality. While you can do these tests for any time-series, it may not always be relevant. Also not all graphs may be necessary. If these methods do not add to answering your research question, nor have consequences for subsequent steps in your analyses, you can probably leave them out.

7. A thesis or report is not a progress report.

You should not structure your text by the sequence in which you did the analyses. Some analyses done at the end may actually come first. Start with the analysis that is most important.

2 The Introduction

The introduction is the most difficult and important part of a report or thesis. It introduces the reader to the research question and positions the research. With positioning we mean discussing how the research contributes to our understanding of a particular problem. A proper introduction gives the complete skeleton of the paper, which means that the other sections or chapters simply fill in the details. It contains the following elements, mostly in this order.

1. The problem field: what is your research about?

The problem field is typically mentioned in the title. With problem field I mean a broad indication of what you study, for example bull and bear markets, option prices, or the term structure of interest rates.

2. Relevance: who cares and why?

Explain why and for whom your research is important. Who would suffer without

exactly this piece of research (other than yourself because of failing a course or failing to graduate). You can generally discuss the relevance in one or two paragraphs.

3. Research question: what do you want to know?

Write clearly what you investigate. In academic papers, this is generally the second or third paragraph, often starting with a sentence like “In this paper, we investigate whether...” Generally one paragraph.

4. Data: what data do you use to answer your research question?

If your data is special, the introduction of the data deserves a paragraph, otherwise a sentence.

5. Methods: what methods (models, estimation techniques, analyses) do you need to answer your research question?

Introduce your methods in an understandable way. It should be clear what kind of methods you use (for example a time-series analysis, Fama-MacBeth regressions, copulas, continuous time techniques), but the amount of details should be limited. Again, one or two paragraphs.

6. Motivation: why do you use exactly these data and methods?

Something is new about your research: it may be the question, the data, the methods, or (unlikely) all of them. Why is this novelty in your research interesting? How does it differ from what other people do? This part may be discussed in a separate paragraph, but it can also be discussed jointly with the data and/or methods.

7. Main findings: what are your most important results?

Discuss the two or three main results of your research. Explain their meaning in economic terms, for example that you can use a particular variable in a trading strategy yielding 3% per year. Generally, each finding takes up one paragraph.

8. Contribution: what do we learn from your research?

If you zoom out from the results of your particular study, what do we learn? Which conclusions are valid or apply more generally than just the particular case you researched. If you find that a particular variable X yields 3% per year, do you expect that it holds for all variables related to X lead to outperformance? How does your research and conclusions relate to other literature? Here you can typically link to economic theory (e.g., market efficiency) or broader research field (e.g., predictability). One or two paragraphs.

An introduction does not contain a separate paragraph on related literature. Literature is used to put the paper into perspective, i.e., in the motivation and contribution part.

As you can see, an academic text is quite different from a novel. In academic texts, the outcome does not eventually become clear in the last chapter. You discuss the main results directly in the introduction. This structure allows readers to judge whether they find the research interesting and want to know more about it. Every additional sentence

that you need before you have convinced the reader that he wants to learn about your research increases the probability that he stops reading.

3 Mathematics

1. Explain

Carefully explain how variables, parameters or coefficients are defined, how formulas are derived, and what they mean. Be critical here: the formula for the variance in a GARCH-model does not need much explanation as it can be considered common knowledge, while a formula for a particular portfolio allocation that contains a myopic and a hedging demand may not be that standard and requires a more elaborate discussion.

2. Be consistent in notation

Use the same notation throughout your text. If you use models or methods from different sources, you do not have to follow the notation of these sources (though that may help the understanding of the reader) as they can be conflicting. Choose what suits your text best.

3. Be consistent in style

Use the same style for variables (small letter, capital letters, italics). Variables are in italics, i.e. y . Standard mathematical functions are not in italics, i.e. \min , \max , \log , \exp , \sin . Super- and subscripts that refer to a variable are in italics y_t (we can have y_1 , y_2 and so on). If they do not refer to a variable, but indicate something else, they are not in italics, for example, $y^{\min} = \min\{y_t : t = 1, \dots, T\}$. For a further discussion of notation in econometrics, see Abadir and Magnus (2002).

4. Don't overdo it

We use mathematics to make precise statements, not to overwhelm the reader with our brilliance. So don't make your mathematical writing overly complicated.

5. Equations are part of the running text. Consider the following example:

The portfolio return r_t^P can be calculated as

$$r_t^P = \mathbf{w}'\mathbf{r}_t, \tag{1}$$

where \mathbf{w} is the vector with portfolio weights, and \mathbf{r}_t contains the asset returns at time t .

There is no colon after as, there is a comma after \mathbf{r}_t in the equation, and “where” starts with a small letter.

4 Tables

1. Lay-out

A table should present a clear picture of the results. Put the parts that should be compared close to each other. This ordering may deviate from the sequence in which you did the analysis. Ehrenberg (1977) provides a good discussion with some nice examples of how to build tables.

2. Precision

Computer software can give you estimates with up to 16 digits. When an estimate equals 1.567384567 with a standard error of 0.15678, you cannot claim that the last 7 digits of the estimate add anything sensible, so report 1.57 for the estimate, and 0.16 for the standard error. Typically, two or three digits are fine (excluding leading zeros).

3. Less is more.

Avoid repetition in tables: do not add a percentage sign after every number, but report in the column or row heading that the number is in percentages, e.g. mean (in %). When all number in a column or row are of magnitude 0.001, consider multiplying them with 1,000. Also try to avoid scientific notation e.g. 1.76e06 or 1.38e-10. Include it in the column heading, e.g. ($\times 10^6$).

4. Decimal separation

In Dutch, decimals are separated by a comma (0,10, een kommagetal), in English by a point, so 0.10.

5 Writing

1. Write to the point.

Avoid lengthy sentences like “When we look at Table XX, we see that...”. Simply write “Table XX shows that...”. Also be critical on unnecessary additions. If you analyze an effect for several countries, you probably do not need “for each country” in “The results for each country in Table XX indicate...”. If you can remove such additions without making the statement unclear, remove them.

2. No imperatives.

Avoid starting sentences like “Note that”, “Bear in mind that”. You can simply remove the imperative. The same can hold for sentences like “One should note that...”

3. Avoid passive forms.

Do not write “Regressions have been conducted.” but “We conduct a regression”, or even shorter “We regress”

4. Use the present tense.

When possible, write in present tense. This also applies to references, even though a publication always relates to the past.

5. Be careful with the continuous tense.

The (present) continuous tense stresses that an activity is going on. “Firms are minimizing costs” puts emphasis on cost minimization as an on-going process. While managers may actually like to see that employees are continuously aware of costs, we generally want to indicate a fact or attitude. In that case it is better to write “Firms minimize costs”. For Dutch speakers, you can check whether a continuous tense is correct by translating it by “zijn aan het...”. In the example, “Bedrijven zijn kosten aan het minimaliseren” sounds silly.

6. Be critical on your writing.

Read carefully what you write. Some common mistakes and pitfalls.

- Avoid mixing up plural and singular. For example, you can talk about a single investor, who allocates her wealth. If that is your choice, don't switch to multiple investors or to a male investor. Make sure that all verbs and pronouns agree.
- Assess whether adjectives and adverbs make sense. A solution is optimal or not, but there are no degrees of optimality, i.e. more or most optimal solutions do not exist. The same holds for ideal, unique and similar.
- Don't write a relative clause without a main clause. In this example “We conduct a regression. Which shows that the relation is positive”, the second sentence is not a proper sentence, because it is a relative clause that belongs to the main clause in the first sentence. So the example should be “We conduct a regression, which shows that the relation is positive.” or “We conduct a regression. It shows that the relation is positive.”
- Intuitive has a nice ring, but it means that it gives you a good feeling without really knowing why. That's hardly scientific!
- Relationships are between persons. Concepts, theories, methods, variables, and so on can have a relation.

References

- Abadir, K. M. and Magnus, J. R. (2002). Notation in econometrics: A proposal for a standard. *The Econometrics Journal*, 5(1):76–90.
- Ehrenberg, A. (1977). Rudiments of numeracy. *Journal of the Royal Statistical Society, Series A (General)*, 140(3):277–297.