

How to Write a Master Thesis

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The purpose of this note is to give you some hints about writing a thesis in Corporate Finance. The note does not intend to be comprehensive. However, some theses have received low marks because of avoidable mistakes. If you would like a comprehensive guide about how to conduct research and write a thesis, please consult the relevant literature.¹ Learning from best practice, such as scientific papers published in leading finance journals, is also recommended.

General Purpose

When you write, please have in mind the “informed reader” who is familiar with standard methods and has a reasonable background knowledge in business administration. As a guideline, you can assume knowledge of standard textbooks you have used in your coursework. Equivalently, assume the typical knowledge of one of your classmates. Hence, you do not need to be very detailed about describing methods like discounted cash flow analysis or research original sources about the capital asset pricing model. On the other hand, you should discuss methods that are idiosyncratic, e.g., methods used by some analysts. The whole thesis should read as one self-contained piece and should be accessible.

Structure

Please keep in mind the following when structuring your thesis:

¹ If you read German, please consult: Walter Krämer, *Wie schreibe ich eine Seminar- oder Examensarbeit?*, 2. Aufl., Frankfurt a. M. 1999. There you will find more detailed comments about how to do research, find data, structure the writing process, and compose the final text. Some of the formal hints about readability, organizing a table of contents, etc. are very useful.

- **Structure follows content**, not the other way around! In particular, do not aim for a detailed table of contents and then proceed to fill little boxes. Rather, write an essay with a clear, *logical* structure. As you revise your argument, you will probably also want to change the way you arrange your argument into sections and subsections. Avoid a structure with many section headings and an elaborate hierarchy of subsections. On the other hand, having more than five pages without a (sub)section heading will make the text inaccessible and difficult to read. Within each section, follow the one thought – one paragraph rule.
- **Introduction.** The introduction should typically be in the range between 1.5 and three pages and should tell the reader the main structure of the argument (hence, write it at the end!). It should also contain a summary of the results and the main conclusion of your argument. Do not try to give a long summary. The reader needs to know what to expect and where to find what in your document. Do not try to write a thriller where the plot is kept secret until the end. It is much easier to read a long document when you already know what the punch line is.
- **Background information.** If you write a case study, you probably need one or two chapters at the beginning where you provide the reader with the required background information. These background chapters should not be an opportunity to fill many pages with everything you know. The purpose is not to entertain the reader. However, everything that is required to understand the argument and the points you are trying to make should be here. Presentation of company information should reflect your own thinking and not just summarize press releases or reproduce financial statements.
- **Conclusion.** The purpose of the conclusion is twofold. Firstly, you want to bring all the threads of your argument together. There should not be too many of these (more than three gives the impression that you do not focus). Secondly, put your work into perspective. What are the limitations of your argument? Which questions did you not address? Are there additional comments that did not quite fit in any of the chapters because they cut across chapters and sections? However, a conclusion should never be long (say, more than three pages). Otherwise, you probably need an additional chapter.

- **Appendix and Data Archive.** The thesis should be complete in that it does not rely on materials or arguments outside of the thesis that cannot be checked by the reader based on publicly available information. The reader should have access to all documents, so you have to provide access to those that are not publicly available. Similarly, spreadsheet models, computer programs, or data need to be available, either from a public source, in the appendix, or in the data archive that you have to include (see below for details). The ultimate standard of what you should include is reproducibility: with your written guidelines and the materials included, the reader should be able to follow your argument and reproduce your results. However, the appendix should not contain tables with a significant amount of text, flow-charts, diagrams and similar information. These form an integral part of the text and count towards the page limit (see below).

- **Tables, figures, index.** Tables and figures must have short captions that tell the reader what the content is. Figures and tables should be self-contained so the reader can absorb the information they provide without having to scan the text for necessary information, like what is on the axis of a graph, or what are the units of measurement. There should be a table of contents *in the front*, an index to all the tables and figures (use titles here, not just “table 1,” “figure 3,” etc., otherwise the reader does not know how to find information in your text). The formatting of tables, figures, and indexes should adhere to the standards of good scientific writing.

- **Length, format.** All formatting should aim at generating clarity and transparency. The reader has only a limited amount of time to spend on your document, and should not spend it on searching for information because of a poor organization of your text. The page limit is 50 pages of text on A4, 1.5-spaced, 12pt proportional width fonts (e.g., Times New Roman, Arial, but not Arial Narrow), with at least 2.5-centimetre margins on all sides. The page count does not include the title page, appendix, index, and the table of contents. From experience, most theses could be improved not by lengthening but by shortening redundant parts even when within the page limit. However, in very few instances, a very good thesis may need to exceed 50 pages because it includes many analyses. Before you decide to write more than 50 pages, you should

evaluate whether this is more appropriate than shortening other parts. You may add up to 20 pages of numerical tables (spreadsheet calculations, balance sheets, profit and loss accounts, manual for the content of the data archive, etc., see the section “Appendix” below). The appendix may not be used for information that belongs into the text to circumvent the page limit. You can overrun the page limit for good reasons. If you exceed the page limit without justifying this with the inclusion of relevant content, then you will receive a lower grade, so you do this at your own risk. Also, you may not reduce the length of the thesis by shifting more material to the data archive. All appendices and tables to which you refer in your text must be contained in the printed text of the thesis. In general, format and structure of your thesis should adhere to the standards of good scientific writing. Top academic journals in finance can provide a valuable reference point.

Case-studies

The majority of theses will be case studies.² These should take some additional aspects into account.

- **Theory.** You do not need to reproduce standard textbook methods. However, more often than not you will need to refer to some theory to explain your analysis. It is often useful to tie this in with the background material (see above). For example, when you describe the main industry and characterize product markets, you can easily miss an opportunity to excel by reproducing facts and collating descriptive materials (e.g., “This company operates in an industry characterized by large advertising budgets.”). You may just as well earn some extra points by also providing additional structure and understanding (like “This industry is characterized by high barriers to entry as all companies in this industry run high advertising budgets.”).

² If you wish to conduct an empirical study like an event study and undertake more extensive data analysis, some of these comments apply as well, but you should seek more detailed guidance for this type of project.

- **Analysis.** Aim for a concise, in-depth analysis. In particular, do not just reproduce facts and figures. The difference between a mediocre thesis and a good or even an excellent thesis rests ultimately on the quality of your original contribution. It is easy to be overly impressed with glossy brochures, analyst reports, company websites, and annual reports. However, you receive for *your* analysis. You should see through these veils and show independent judgment. Hence, while you read, you should be alert to conflicts of interest and reporting biases that may influence the quality of your sources.
- **Format.** Please do *not* aim for the format of teaching cases. Teaching cases separate the information of the case from the instructor's note, which also contains a model solution. Your thesis should not separate these parts.
- **Materials.** You probably have access to some materials that are either not publicly available or at least not known to the hypothetical "knowledgeable reader." You want to make your thesis self-contained, so you need to cite these and give meaningful summaries (see "background information" above). In some cases, you may want to include extensive summaries or even reproduce some of this in the appendix (see below). Also, please make clear where you rely on materials available to you, and where your own analysis starts. Separate facts and comments.
- **Structure.** A fair amount of your work should be to structure the materials, and you should spend some time thinking about how you want to organize the content of your thesis. Ask yourself what belongs together and which parts naturally relate to each other. Weak theses typically try to organize the material into subheadings and then lose sight of the relationships between different parts of the thesis. If related discussions appear in separate parts of the thesis, then this is often a case of poor structure.
- **Style.** All general comments in the note on case-study write-ups also apply to theses.

The grade of a case study-thesis will largely depend on how well you have researched the case, and how well you have structured and analyzed the material.

Data Archive

You need to submit a data archive with your thesis on a data CD/DVD or USB stick.

The data archive should contain:

- **Your thesis.** You should include the thesis as a Word document and Excel-files for the appendix. If you do not use Microsoft Word, then please provide the text file in rtf-format, which can be generated by all word processors.
- **Materials downloaded from the internet.** Experience shows that companies frequently change the location of electronic documents, so any document that you refer to should be cited and an electronic copy should be included in your data archive.
- **Spreadsheet models.** The computations in your spreadsheet model should be included and need to be transparent. Failure to do so is often a weak point of the thesis as spreadsheet models start out simple and then grow and authors become oblivious to their structure. It is typically not easy to understand somebody else's spreadsheet model if it contains a lot of direct cell-references, possibly across several tables, so you have to make use of as many structuring devices to ensure readability as possible. Typically, your spreadsheet should contain a "control"-section where you collect inputs (your main assumptions) and an output section (your main results). Names for variables are often easier to follow than direct cell references. In any case, the spreadsheet model needs to be well-documented in the thesis. If the model is central to your argument, this discussion (including choice of assumptions, interpretation of main results) should be in the main text and not hidden in some appendix. However, an additional appendix may be useful as a manual to understand some details of the structure the reader may need to work with your model. The quality and usability of your spreadsheet work count towards your grade, so you should pay attention to this aspect.
- **Data.** If you perform a statistical analysis (event study) or perform valuations based on multiples, then you need data. These data should also be included in your archive with a clear identification of variables and observations. The

method of data collection and definitions of the main variables belong into the text.

- **Computer programs.** If you need to write computer programs because you use a statistical package (Stata, SPSS, etc.) or just VBA-Macros in Excel, you should include your programs and provide a clear and complete description of the software required to run these programs. You should rely on software that is publicly available at the University of Mannheim.³ Please check if you are in doubt about this point.
- **Materials that are not publicly accessible.** If materials are not publicly accessible and if they are important to your argument, then you may want to scan them to give the reader access to these materials. You need to apply some judgment here. Some of the materials may be copyrighted, and you may not have permission to scan them. In this case, you should include a statement to that effect. In some cases, shorter extracts or central documents may also be included in the appendix (see below).
- **Cited articles.** If you write a literature review, then you will discover many articles in electronic format (typically pdf) in internet-based databases. You should either provide stable links in a hyperlinked electronic document or include the pdf-files in your data archive with the following naming convention: the filename is “Lastname1 Lastname2 Lastname3 Keywords (Year).pdf”. Here, *Lastname#* refers to the last names of the authors (up to 3) and *Keywords* are the main words that make the title easily identifiable from the filename. Year refers to the year of publication with this naming convention; it is easy to sort articles in a directory by author and relate them to the references in the text.

Whenever you ask yourself whether you should include something (in the data archive or the main text), then ask yourself a simple question: Is this item (spreadsheet,

³ Presently, this would include all Microsoft Office XP packages, including some Excel add-ins, Maple 10, Matlab version 7, SAS V9.

document, etc.) necessary for the reader to be able to follow and check your argument. If in doubt, the test is always the “reproducibility”-question (see above).

If you include several files and documents, then it is important that you structure the content of the data archive clearly. You need to document the content of the data archive in the paper-part of your thesis, so the reader can easily find what to find and where. At a minimum, this would have to be a commented table with the files you include.

Appendix

Just as a case write-up, your thesis is likely to include an appendix with tables and the numeric part of your analysis. Please adhere to the following guidelines:

- The appendix should be numbered consecutively using Arabic numerals, continuing the pagination of the main text. Please do not use alphanumeric numbering, even if you use multiple appendices (like A-1).
- Every part of the appendix should have a clear role in supporting the argument in the main text. The appendix should never contain the argument itself; this belongs into the main text. The role of the appendix is entirely supportive.
- Figures and graphs should be in the main text, not in the appendix.
- You may want to include documentary material that is not available or known, e.g., excerpts from analyst reports or key pages from a prospectus or business plan. The reader needs to be able to check your argument in detail if necessary. However, you need to exercise judgment here and include only documents that are required to support the points central to your argument (see also the discussion of the data archive above).

How to get a good grade

You definitely get a better grade if you adhere to all the ground rules laid down in this document, but that in itself is not enough. Your thesis needs to make a contribution and provide a well-reasoned analysis of your topic. The difference between a satisfactory

thesis (in terms of German grades, the 2.7-3.0-range) and a good thesis (1.7-2.3) range is whether your thesis has significant analytic content or not. The distinguishing feature of a very good thesis (1.0-1.3) is that you really exceed expectations. As a base rule, a thesis that is good without major errors or problems and which deals satisfactorily with all the tasks that were agreed at the beginning without going into much depths would be a 2.3 and this is the most frequently awarded grade.

Here some guidelines on where you should seek your contribution:

Case studies. Aim for some analytic content and a thoughtful quantitative analysis. This could be a valuation (DCF, multiples) of a company, an event study to analyze stock market reactions, a Monte Carlo analysis or a flow of funds in an internal capital market. A purely verbal analysis of a company's strategy and carefully collected excerpts from company reports supported by light commentary do not qualify as analysis.

Empirical studies. Try to understand your data set and carefully collect your data. Apply statistical methods thoughtfully and interpret your results. Intelligent commentary on the results is more important than having many tables.

Literature reviews. You need to cover your subject comprehensively, but the number of papers you reference is not the yardstick for evaluating your contribution. Try to understand methods, distinguish questions that were addressed successfully from those that were not and convey a new understanding of the field to the reader.

Other comments

Please use footnotes, not endnotes. Your footnotes should make clear if you are referring to another document or another location in your thesis. Try to limit the number of footnotes.

You can write your thesis either in German or English. Please do not mix both and please do not clutter your text with Anglicisms to sound professional. If you need advice on which Anglicism to avoid when writing in German, please refer to the list of the "Verein deutsche Sprache e. V." at (<http://vds-ev.de/denglisch/index.php>).

All information you have used needs to be cited. Please reference information from the internet and include the website. Include the *exact title* of the document: by the time the reader checks your sources the owner of the website may have moved the document somewhere else, so it has to be found with a search engine (or in your data archive, see above).

Please avoid old-fashioned formats for citations, e.g., the German “a. a. O.” Rather, have a table of references at the end organized by author, date, and title. Then reference by author and date (e.g., Adam Smith, 1776) in the main text. If you refer to longer works, please include page numbers or chapter numbers.