Guidelines for master thesis in the form of academic research article

The following is a guide on how to write rather than detailed description of precise requirements. Instead, students are encouraged to follow internationally recognized standards such as journal style guides. Thus, if in doubt, do as the good journals do; only the most important requirements are outlined below.

Priot Vahter and Ott Toomet
Senior researchers of the Faculty of Economics and Business Administration

What is a Master’s Thesis and What Should You Write about

We expect you to write a research paper to be defended as your Master’s Thesis (from here on, the thesis). The thesis should include a novel contribution on a sufficiently interesting topic. Herein lies a contradiction — a research paper should include something novel, something that has not been done earlier. But obviously, this must be doable. There are plenty of interesting and unsolved questions that are too hard to solve, and plenty of suitable tasks that are either trivial, or already done. In practice, the thesis is usually empirical, addressing relevant questions with well-known methods and easily accessible data. The novelty is often related to newer data, the combination of data and methods, or the exact question to be asked. Theoretical papers are less common and may include detailed institutions and computer simulations; focusing on a novel question; or, comparison of existing theoretical papers.

Students may find it hard to come up with such topics. However, researchers have usually many suitable ideas. That’s why students have supervisors!

Your thesis should demonstrate these abilities:

- Defining and outlining a research topic
- Knowledge of the scientific literature on this particular topic
  - Including the ability to critically evaluate the prior literature
- Identifying the research gap
  - Defining a clear research question
- Finding/collecting suitable data to answer this question
- Choosing appropriate methods
- Clear and correct presentation and interpretation of the results
  - Relating your findings to the prior literature
- Organizing and presenting your work in a brief, clear and structured manner
- Oral presentation (defense)

Both writing and idea are important, but the idea is more important.
How a Thesis Should Look Like

The thesis contains 3 broad parts: the title page, the main text, and appendices. It should be printed with 12 pt font and 1.5 line spacing, paper size A4. We suggest using 3 cm on all margins. The sections should be clearly identifiable. Number the pages. All tables and figures must be inserted into the text at the appropriate place and numbered. Proofread and check spelling and punctuation thoroughly before submitting your thesis!

Title Page (see Appendix 1 and 2 in this document for layout)

The title page should contain the following items:
1. The name of the university (University of Tartu), name of faculty (Faculty of Social Sciences) and name of institute (School of Economics and Business Administration)
2. Title of the paper
3. Type of the thesis ("Master’s thesis")
4. Your name
5. Name(s) of your supervisor(s)
6. Place (Tartu) and year

The Main Text

The main part of the text contains all relevant information and must be readable separately (without title page and appendices). The length of the main text should not exceed 10,000 words.

Structure of Thesis

Good organization of your thesis is of vital importance. It enables to efficiently communicate the central contribution of your study. A badly structured paper is hard to understand and will not leave a good impression or convince your reader. Every section and every paragraph of your thesis must contribute to finding the answer to your research question and communicating your key findings to the reader.

We note that the aspects which we discuss below serve only as starting points for building the structure of your thesis. It is important that you discuss these issues also with your supervisor.

The typical structure of an empirical study:¹
- Abstract (100–150 words)
- Introduction (including your research question, importance of the topic, novelty of your own analysis)
- Literature review
- Methods and data

¹ As most students choose to write empirical papers we focus on these. If you choose a theoretical one, consult your supervisor about the appropriate structure.
• Results and analysis
• Discussion, implications for policy or business
• Conclusions
  – (Acknowledgements, statement of interest)
• (Appendices)
• References

At the end of the thesis there should be a non-exclusive licence to reproduce thesis and make thesis public, see Appendix 3.

Abstract
The abstract provides a summary of the key contribution of your thesis. It must be short and clear. Usually academic journals allow 100–150 words. Describe here what you did and what did you find. Do not discuss your proposed topics or what other authors say about it. An abstract gives you the opportunity to communicate the novelty of your own research. Remember: this is the part of your paper that is read by far the most often! Avoid redundant phrases that do not give much information, like “data are analyzed, different models are discussed.” The abstract does not include any literature review.


“We investigate the productivity effects of innovative employment practices using data from a sample of 36 homogeneous steel production lines owned by 17 companies. The productivity regressions demonstrate that lines using a set of innovative work practices, which include incentive pay, teams, flexible job assignments, employment security, and training, achieve substantially higher levels of productivity than do lines with the more traditional approach, which includes narrow job definitions, strict work rules, and hourly pay with close supervision. Our results are consistent with recent theoretical models which stress the importance of complementarities among work practices.”

Another example by Madsen (2014) “Human Capital and the World Technology Frontier”:

“This paper examines the productivity growth effects of educational attainment and its interaction with the distance to the world technology frontier, which is the percentage distance to the country with the highest total factor productivity (TFP) (the United Kingdom or United States), while allowing for the endogeneity of educational attainment in some of the estimates. For this purpose, a new annual data set for educational attainment is constructed for 21 industrialized countries over the period from 1870 to 2009. The results show that changes in educational attainment and the interaction between education and the distance to the frontier, as predicted by Schumpeterian growth theory, have been influential for productivity growth over the past 140 years.”
Normally, at the end of the abstract up to five keywords are provided by the author. Please use Estonian Subject Thesaurus (http://ems.elnet.ee/index.php?lkeel=2) to find appropriate keywords for your thesis.

Introduction

After the abstract, the introduction is the part of your paper that is read most often. The typical introduction carries a number of distinct purposes:

1. Convince the reader that the topic is interesting.
2. Give a brief literature background. Note: scientific literature!
3. Identify the research gap, the problem that is interesting but not yet addressed.
4. Explain how you fill this gap – what is your research question and contribution, what do you add to what we already know.
5. Summarize briefly your results
6. Explain the structure of the rest of your paper.

Note that not all introductions follow these rules. For instance, reporting your findings in the introduction is almost universal in economics, but many other fields do not follow this habit. Look at good journals in your field.

A good example of how to start an introduction, by Abadie and Gardeazabal (2003, American Economic Review): “Political instability is believed to have strong adverse effects on economic prosperity. However, to date, the evidence on this matter is scarce, probably because it is difficult to know how economies would have evolved in absence of political conflicts. This article investigates the economic impact of conflict, using the terrorist conflict in the Basque Country as a case study. The Basque conflict is especially interesting from an economic perspective ...”

The introduction must be brief. We recommend you to devote up to 3 pages to it for a thesis of about 30 pages. It is vital to get to the “point” – your own research contribution – as fast as possible. Avoid lengthy literature reviews and detailed policy discussions here, and put them in a separate section. Remember that your introduction has to catch the attention of the reader, who is almost always busy and impatient. If you are able to raise the curiosity of the reader at the beginning by pointing out puzzling facts about your topic, then it will make for a more engaging reading experience.

Make 100% sure that you state clearly your contribution. Some paper state what they do: “We examine whether Barack Obama underperformed ...” (Mas and Moretti, 2009). Other papers say what they intend to do: “The purpose of this paper is to examine more formally the problem of optimal design of an unemployment insurance program...” (Hopenhayn and Nicolini, 1997). In any case, make sure that you explain your contribution so that the reader can easily understand it.² Your introduction should give

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² In certain management and a number of other fields, authors often explicitly state the research hypotheses that are going to be tested. Hypotheses are specific predictions about the nature and direction of the relationship between the analyzed phenomena. This practice is not common in economics papers, these usually state only a more open-ended research aim. An example of a research hypothesis (Laursen and Salter 2005, p. 137): "The more radical the innovation, the
an overview of the structure of the thesis, what will the various chapters focus on. Mention the key theoretical frameworks, methods, datasets that you use.

**Literature Review**

A literature review summarizes and evaluates the previous literature on a particular topic. The main aim is to *motivate* your analysis, i.e. to convince the reader that the topic is interesting, and that there are important questions still unanswered. This is the typical role of literature review in research papers. For that purpose, you may need to address how accurate and complete the existing knowledge is, and what we still do not know. Second, in a thesis, you should also demonstrate your knowledge of prior work on the topic by providing a concise summary and synthesis of the key facts from previous related research. You should convince the readers that you are familiar with the most important developments, potential tensions between fields of thoughts, etc. A literature review is not a summary of what each individual paper finds. It is a synthesis of prior studies and needs to draw conclusions from the relevant literature as a whole.

Writing a summary of literature obviously does not mean that you have to provide references to every single paper that is somehow related to your study. An important aspect of a literature review in a thesis is clear focus on your research question. Therefore, the summary of literature needs to be selective. The reader must understand why you discuss some particular topic in your review and how it leads to your own research question or finding an answer to it.

Usually, you should briefly outline the “classical” important studies and authors in your field and then discuss a number of recent papers that are more closely related to your particular research question. In this way you create a context for your study and position your thesis in the current literature in the field. It is important to prioritize more influential studies (e.g. based on citations, ranking of the journal) and more recent papers and papers that are closely related to your own study. Avoid summarizing standard theoretical models you are not directly using – those belong into a textbook, not to the literature review.

Note that literature overview in a good thesis is not constrained only to the Literature Review section. Later on in the paper, in the discussion of your own (empirical) results you should discuss your findings compared to what other authors have found. This way you can also more convincingly pinpoint the contribution of your analysis to the existing literature.

**Data and Methods**

This section carries a dual role: convince the reader that you use an appropriate method, and explain it well enough for others to be able to replicate your findings.

more effective the intensity of co-operation with external partners will be in influencing innovative performance.” The corresponding open-ended research aim may be: “This paper investigates how the effects of external co-operation on innovation performance vary across different types of innovation.” Note that hypotheses are usually defined after the literature review.
Which method and data suit best to your particular research question? Are there simpler ways to answer it equally convincingly? Discuss the key advantages, assumptions and limitations of the methods that you apply.

Always provide clear details about the methods and data that you use. Describe the sample, estimation procedures, source of the dataset, level of analysis, etc. Discuss the limitations of your dataset, such as missing variables, non-random selection, short time-period or small number of observations. Explain the specific nature of your dataset: does it include only students or people living in a specific area? Define clearly the variables that you use and devote sufficient space to your most crucial variables. Explain the measurement units. Present the key descriptive statistics of the variables that you use, including the mean and number of observations. Think which statistics are the most appropriate for your task.

We acknowledge that the content of data and methods sections depends a lot on the customs in the particular research field. Consult good journals and your supervisor!

**Results, Discussion, Conclusions**

Most papers include these three sections in one form or another. The results section presents the results but includes only a superficial discussion. In a way, it resembles a textual version of your estimation tables. The discussion section debates on the most important results. This is the place for policy implications and your explanations for why your results differ from those of the previous authors. The conclusion is a short summary of your key findings (1–2 pages). However, shorter papers very often combine some of these sections. Sometimes results are discussed in the Results sections, sometimes Conclusions and Discussion are merged into one. Think about what is appropriate for you!

**Results**

The presentation of results depends on the methods you use and the customs of your field. Again, consult leading journals and your supervisor! But it is always useful to provide the key findings early in the Results section. Remember: your reader is busy and wants to get quickly to the point. The replication of others’ work and 10+ wonderful robustness tests that you did may come after the main result (or rather be placed in the Appendix).

A rather common mistake is to present every single empirical model estimated. Do not do this! This is boring to read and confusing to follow. The results section should not be a meticulous diary of your econometric analysis. Concentrate on the relevant information and make sure that the reader finds, follows and understands your key results. It is always good to discuss not only the statistical significance, but also economic significance: is the effect that you find of considerable size?

Visualize your results. Figures make your text livelier and are sometimes more efficient way to present patterns in your data. Figures are also more likely to be remembered.

**Tables, Figures and Equations**
Tables and figures should, in principle, be self-contained and include all the relevant information for understanding these without reading the paper. Therefore, insert a note below it explaining data, period of study, unit of analysis and other relevant information. However, note that tables in economics journals are typically less self-contained than in science journals. Do not forget to number each table, graph and equation. Make sure that each table and figure has a clear but simple title that explains the content.

Example of a regression table (Bongaerts et al, 2011):

### Table IV
**Benchmark GMM Estimation Results**

The theoretical asset pricing model in Theorem I is estimated by applying GMM to the moment condition (16) for 100 CDS portfolios (sorted first on credit rating, and then either on leverage, total debt, total syndicated loan amount, bid-ask spread, or quote frequency). Moment conditions are weighted by the diagonal of the optimal GMM weighting matrix. The model also includes an intercept. *t*-statistics (in square brackets) are calculated with GMM using Newey–West with 24 lags, and incorporate estimation errors in expected returns, costs and betas, following Shanken (1992); see the Internet Appendix. The table also reports a cross-sectional $R^2$, where pricing errors are weighted using the GMM weights. Finally, the table reports results for a benchmark holding period of one quarter, and for holding periods of one month and 1 year. The sample period is April 2004 until June 2008.

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>(1) Quarterly</th>
<th>(2) Quarterly</th>
<th>(3) Quarterly</th>
<th>(4) Annual</th>
<th>(5) Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.106</td>
<td>-0.113</td>
<td>-0.012</td>
<td>-0.333</td>
<td>-0.040</td>
</tr>
<tr>
<td>($\alpha_0$)</td>
<td>[-11.59]</td>
<td>[-13.18]</td>
<td>[-0.39]</td>
<td>[-10.98]</td>
<td>[-12.32]</td>
</tr>
<tr>
<td>Equity risk</td>
<td>0.224</td>
<td>0.512</td>
<td>-0.032</td>
<td>0.660</td>
<td>0.073</td>
</tr>
<tr>
<td>($\gamma$)</td>
<td>[4.46]</td>
<td>[4.38]</td>
<td>[-0.82]</td>
<td>[3.53]</td>
<td>[3.16]</td>
</tr>
<tr>
<td>Credit risk</td>
<td>0.066</td>
<td>0.226</td>
<td>0.462</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>($\lambda$)</td>
<td>[2.48]</td>
<td>[8.58]</td>
<td>[4.69]</td>
<td>[1.66]</td>
<td></td>
</tr>
<tr>
<td>Expected liquidity</td>
<td>0.694</td>
<td>0.763</td>
<td>2.050</td>
<td>0.270</td>
<td></td>
</tr>
<tr>
<td>($\epsilon_0$)</td>
<td>[13.51]</td>
<td>[14.04]</td>
<td>[12.61]</td>
<td>[14.42]</td>
<td></td>
</tr>
<tr>
<td>Liquidity risk</td>
<td>1.819</td>
<td>1.72</td>
<td>5.978</td>
<td>0.753</td>
<td></td>
</tr>
<tr>
<td>($\delta_0$)</td>
<td>[3.25]</td>
<td>[2.80]</td>
<td>[3.40]</td>
<td>[4.13]</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.899</td>
<td>0.892</td>
<td>0.203</td>
<td>0.880</td>
<td>0.652</td>
</tr>
</tbody>
</table>

We suggest that you consult a style guide of an economics journal, such as the American Economic Review Style Guide (https://www.aeaweb.org/aer/styleguide.pdf) for details about how to format tables, equations and figures.

**Conclusions**

Conclusions must be short and clear. Focus on your key result/novelty. Do not repeat every finding from the main body of your paper. Make sure that your reader can separate facts and findings from your opinion! Explain shortly how your paper contributes to the prior literature. Discuss the limitations and potential extensions of your study. The conclusion is the place where you can point out the issues that future researchers need to take into account and outline the better data needed for improved analysis. Explain shortly the implications for policymakers and businesses.
Once you have written Conclusions, it is time to re-read the Introduction and eventually rephrase your research aims, the main contribution, and the summary of the key results. You may also have to (re)write the Abstract. Check that the title, abstract, introduction, research question, results and conclusions are all aligned to each other. If you emphasize an important point about your contribution and approach in the Introduction, then also your Conclusions should refer to the same issue.

Appendices
Appendices are the place for less important results, such as full regression tables and proofs of your propositions. Be aware that hardly ever anyone reads these.

Referencing
Correct referencing is a crucial feature of scientific writing. In economics we almost exclusively use author-year type of referencing. In general, cite all results and ideas of other authors that you use in your own study. If you want to point to what Beata Javorcik found about FDI spillovers in her paper in the American Economic Review, your sentence with the reference might look something like:

The empirical results by Javorcik (2004) imply that the positive spillovers of FDI are more likely to take place in the case of ...

Note that in the text you typically do not refer to the first name (Beata), country (UK), position of the author (professor), journal (AER), nor the title of the paper (Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages). Sometimes you may want to exactly replicate an idea of others. This is a citation. An example:

The strong negative role of resistance to change in any kind of innovation is best summarized by Schumpeter (1934, p. 86): “In the breast of one who wishes to do something new, the forces of habit raise up and bear witness against the embryonic project.”

But note that citations are used very sparsely in the literature.


Examples from different journals:

A journal article (Journal of Political Economy):


A chapter from edited book, two authors (Review of Economic Studies)

A book (Journal of Political Economy)

Working paper, three authors (Quarterly Journal of Economics)

Unpublished paper (Review of Economic Studies)

NOTE: all sources in the list of references are organized in alphabetical order, based on the surname of the author or the surname of the first author in the case of co-authored papers.

Remember that your thesis is your original work. Make sure that you provide references to ALL sources that you use in your thesis. A failure to cite properly ideas and materials of other authors is plagiarism, a most serious academic offence. For a more detailed discussion refer to https://www.indiana.edu/~istd/IUcriteria.html. It is also completely unacceptable to copy parts of other authors’ work without properly quoting their text. Note that copying even just 6–7 words from another source without clearly marking this as a citation from another author is already considered plagiarism. Resist any temptation to borrow parts of someone else’s text, from journal articles, the internet, anywhere.

Supervision
You share the same goals but your thesis is your own work and effort. The role of your academic supervisor is to give advice and comment the progress that you are making. (S)he is not a co-author or language editor. (S)he will help you to choose the topic, gives general advice about the literature, and comments about the methods and data and your results. However, you as the author are fully responsible for everything you find and everything you say in the paper.

Arrange the first meeting with your advisor right when you start with your thesis in order to discuss the topic, scope, research questions, structure and potential research design. Discuss also the deadlines, how regularly you will meet, etc. You can expect comments of your supervisor to your written work (a plan of the thesis, draft sections, empirical results). It is advisable to send the current version of your paper in advance in order to enhance the productivity of the meeting.
Remember that it is your responsibility to follow the deadlines and contact your advisor. Based on the final version of your thesis, the supervisor will assess whether it can be submitted for the defense.

**Submitting the thesis and the defense**

- Hand in one printed copy and a pdf version. The printed copy must be hard-bound, 2-sided printing is OK.
- Prepare your talk and slides for the public defense. The defense has two main aims:
  - Demonstrate your oral presentation skills. Here, as above, be brief and stay focused. You only have 15 minutes for all of your presentation.
  - Demonstrate that this is your own work. In particular, understand everything you have written and be able to answer questions.

**Further Reading**

[http://www.isr.umich.edu/src/mcrdc/Economical%20Writing.pdf](http://www.isr.umich.edu/src/mcrdc/Economical%20Writing.pdf)

[http://faculty.chicagobooth.edu/john.cochrane/research/Papers/phd_paper_writing.pdf](http://faculty.chicagobooth.edu/john.cochrane/research/Papers/phd_paper_writing.pdf)

General handbooks on writing, including style:


**References**


Appendix 1. Example of the title page of the master thesis

UNIVERSITY OF TARTU
Faculty of Social Sciences
School of Economics and Business Administration

Ketevani Kapanadze

DOES TRADE OPENNESS REDUCE POVERTY? A VIEW FROM TRANSITION ECONOMIES

Master’s thesis

Supervisor: Senior Research Fellow Priit Vahter (PhD)

Tartu 2016
Appendix 2. Example of the overleaf of the title page

Name and signature of supervisor.................................................................

Allowed for defence on.................................................................

          (date)

I have written this master's thesis independently. All viewpoints of other authors, literary sources and data from elsewhere used for writing this paper have been referenced.

                        .........................

          (signature of author)
Appendix 3. Example of the non-exclusive licence to reproduce thesis and make thesis public

Non-exclusive licence to reproduce thesis and make thesis public

I, ____________________________________________________________

(date of birth: _________________________________)

1. herewith grant the University of Tartu a free permit (non-exclusive licence) to:

1.1. reproduce, for the purpose of preservation and making available to the public, including for addition to the DSpace digital archives until expiry of the term of validity of the copyright, and

1.2. make available to the public via the web environment of the University of Tartu, including via the DSpace digital archives until expiry of the term of validity of the copyright,

____________________________________________________________
____________________________________________________________

(title of thesis)

Supervised by

____________________________________________________________

(supervisor’s name)

2. I am aware of the fact that the author retains these rights.

3. I certify that granting the non-exclusive licence does not infringe the intellectual property rights or rights arising from the Personal Data Protection Act.

Tartu, dd.mm.yyyy
Appendix 4. Example of extended abstract

University of Tartu
School of Economics and Business Administration

First and last name

TITLE OF THESIS

Supervisor: ……………

EXTENDED ABSTRACT OF THE THESIS

1. Relevance of the topic

2. Aim of the thesis and research objectives
3. Theoretical background and methodology

4. Empirical part of the study

5. Structure of the thesis

6. References

Date:

Signature: