

Bachelor thesis manual

Econometrics and Operations Research

2023-2024

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1. Foreword

Congratulations! The fact that you are reading this manual means you are well on your way to obtaining your bachelor's degree. A considerable part of your remaining time in the bachelor will now be devoted to writing your bachelor thesis. In this manual you will find all the information you need for a smooth start and finish to your thesis.

Read the information in this manual carefully. For further information you can visit the [Thesis Hub](#) on Canvas. All the information about writing your thesis at ESE can be found there. It contains links to online modules about writing the literature review, formulating research questions, scientific writing, creating figures and tables, referencing, and much more. Make sure to follow these modules if your skills in these areas are a bit rusty. Also have a look at the links to various useful online resources, manuals about the Thesis Workflow and avoiding fraud, and the overview of thesis related courses and events.

Communication regarding registration and supervision takes place via Sin-Online, Canvas and the new Thesis Management System. Hence, check these regularly. If you forward your student e-mail to your personal e-mail, make sure that messages from Sin-Online, Canvas and the Thesis Management System do not end up in your spam.

Best of luck with writing your bachelor thesis!

2. General

a. Goals of the thesis

In the bachelor thesis you can show the knowledge and skills you have accumulated in the past years at ESE. In the thesis you show that you can set-up, execute and report on a scientific research project.

The learning goals of the bachelor thesis are as follows:

- To formulate a research question in econometrics and operations research, based on relevant scientific concepts and theories.
- To apply concepts, theories, research techniques and methods from the field of econometrics and operations research to the research topic.
- Adequately process the data collected (if any), analyse the results of the methods and draw conclusions based on the results with respect to the research question.
- Provide a written research report in a logical and coherent manner.

Your thesis is a report based on the replication and extension of a published academic paper. The academic paper functions as the starting point of your own research. Based on this paper you formulate your own research question, which should deviate from the reference paper. It can be a follow-up question, in which you analyse a different version of the problem (a different situation, different techniques, different data) using your own creativity. To see how this difference affects the conclusions, you first replicate the part of the paper that is relevant for your research question. Next, you extend the analysis to the new research question and you draw conclusions about the differences.

Because your thesis is by construction closely related to the reference paper, you should pay special attention to the following elements:

- An adequate motivation of your extensions. Why are these extensions interesting and relevant? What additional insights do they give us?
- A discussion of the methods in your own words. You should explain the methods as you understand them. You are not allowed to copy from the article.
- A discussion of the replication. Can you replicate the results of the reference paper exactly? If not, how large are the deviations? Can you explain them?

For more information on the assessment criteria of the bachelor thesis, go to the chapter “Handing in the thesis”. Read the criteria carefully *before* you start writing your thesis.

b. Size of the bachelor thesis

Since academic year 2021-2022 the bachelor thesis is 10 EC. Students with a study delay can still write an 8 EC thesis but they will need to take part in the regular thesis process and mandatory thesis activities of the major.

c. Starting requirements

In order to start with the bachelor thesis you need to have been admitted to and successfully completed the major seminar.

d. Double degree programmes

BSc² Econometrics / Economics: Please refer to the manual for the BSc² programme.

Econometrics & Philosophy: If you follow the Philosophy programme next to your Econometrics programme you need to write two theses, one for Econometrics and Operations Research and one for Philosophy of Econometrics.

e. Combining the thesis with an internship

It is not possible to combine your bachelor thesis with an internship for credits. If you wish to do an internship in the bachelor you should do so in either Block 1 or 2 or do an extracurricular internship. More information about internships can be found on the Internship Hub on Canvas. To access it, go to FEB63017 in Osiris and register.

f. Copyright

As author of the thesis, you in principle have the copyright. This means that you have the right to make the thesis public and to reproduce it. If others would like to use your thesis, they cannot do so without your prior permission.

In some cases the supervisor may give suggestions that can be regarded as original ideas that the supervisor may wish to use for future publications. If you would like to use such ideas in your thesis, this may have consequences for the extent to which you are allowed to disclose or distribute the (preliminary) contents of your thesis. In such cases, you need to make further arrangements with your supervisor regarding disclosure and distribution.

In case the supervisor provides you with data or if you collect data in a way suggested by the supervisor, you can only use this data for the purpose of the thesis. You are not allowed to publish the data, make the data available to any third party, or let any third party inspect the data without your supervisor's approval.

g. Handling data

Ethical use of data and the General Data Protection Regulation

When working with personal data make sure that you handle it with care and comply with the regulations outlined in the General Data Protection Regulation. On the Thesis Hub you can find the guidelines you need to follow when collecting, handling and storing data.

When collecting data yourself, we highly recommend that you fill in the [ethical questionnaire](#) available on the Thesis Hub before collection or analysis starts. After filling it in, it provides you with an advice whether there might be ethical issues in your research and you can discuss these further with your supervisor.

Buying data from an external party

When you need to obtain data from an external party, always consult your supervisor first. Never enter into a contractual agreement with an external party on your own.

h. Contact persons

For all major specialisations the contact person is Dr. T.A.B. Dollevoet. Questions can be mailed to bachelorthesis-eor@ese.eur.nl.

3. Overview of activities and deadlines

a. Planning

Students write their thesis in the period April – June. The deadline to submit your final thesis is 1 July 2024. This is very well feasible, but to finish on time you need to adhere to the planning below. Supervision outside the period April to June is not possible!

Note that on the deadline for submission of the final / resit thesis, the thesis needs to have been *submitted* to the supervisor via the Thesis Management System. The assessment process does not have to be completed on that day.

Monday 25 March		Articles available
Monday 8 April	23:59h	Submit article ranking
Monday 22 April		Supervisors announced
Friday 17 May	23:59h	Hand in research proposal
Wednesday 29 May		Finish replication part
Friday 7 June		Finish extensions
Sunday 16 June	23:59h	Submit draft version of thesis
Monday 1 July	23:59h	Submit final version of thesis
Wednesday 17 July	23:59h	If thesis insufficient, submit resit version of thesis

b. Delay and failing the thesis

It is possible that you experience delay while writing your thesis. If this happens, take action immediately and discuss with your supervisor how you can get back on track. In case you experience difficulties writing your thesis, sign up for thesis coaching (see section e) or talk to the [study advisor](#) for advice.

If you fail to hand-in your thesis on the first deadline (Monday, 1 July) or if you have handed in a thesis that is of insufficient quality, you have the opportunity to hand in your (improved) thesis on the resit deadline on Wednesday 17 July. This will have consequences for your grade though, the grade of all theses handed in after 1 July will be at most 6.0.

If you also do not hand in a sufficient thesis on the resit deadline, the Examination Board will stop supervision and you will be awarded the result 'fail'. If this happens, you will need to start over with a new topic and a new supervisor in the next academic year. You can start over with your thesis once. Hence, you should only register for thesis supervision when you can devote sufficient time and energy to your thesis. If you have not finished your thesis after the second attempt and need a third attempt, you need to get in touch with a study adviser.

c. Requesting an extension of the deadline

Students who, due to personal circumstances, cannot make the deadline of 1 July, can request an extension. To do so, you need to report your personal circumstances to the study advisor at least **four weeks before** the thesis deadline of 1 July. Also let your supervisor know that you are

requesting an extension. Extension requests will only be taken into consideration when reported on time and when proof is included that the circumstances affected your ability to work on the thesis, such as a doctor's statement. An extension of one month is the default but this can be more or less depending on the circumstances. Students should also be aware that the supervisor's availability in the summer months will be less, and they will need to adapt their planning accordingly.

If you have received an extension, your grade for the bachelor thesis might not be booked in Osiris before the master application deadline of 1 August. In that case you can ask your supervisor to write a Thesis Statement. This statement declares that you will have finished your thesis successfully by 31 August at the latest. The supervisor decides whether you are eligible for a Thesis Statement.

d. Personal problems

Guidance for personal problems can be given by study advisers, student counsellors or university psychologists. For more information about guidance for personal problems you can contact the study advisers.

e. Thesis coaching

ESE offers thesis coaching. Many students face challenges with planning, setting goals, stress, procrastination, or motivation at some point in their thesis writing. If you want to get ahead of these challenges, consider signing up for thesis coaching.

With a small group of students you meet bi-weekly to discuss your progress, stumbling blocks and goals. The sessions will also cover topics such as productivity, effectiveness, motivation and balancing energy. These insights will help during your thesis writing and are also valuable in your next job. For more information and to sign-up, visit <https://my.eur.nl/en/ease/bachelor/thesis-coaching>.

4. Getting started

a. Registration

Topics for the bachelor thesis will be made available by the thesis coordinator in the form of a collection of papers. You receive a survey in which you should rank all available papers for your major. Based on the preferences of all students in a major, the bachelor thesis coordinators match each student with a paper. It is not possible to propose your own topic nor to select a particular supervisor.

When the matching of papers and students is complete, you can find in the new Thesis Management System who your supervisor is.

Once assigned, the supervisor takes over from the coordinator regarding supervision of the thesis. The supervisor will supervise you during the writing of the thesis and is the one to turn to for all questions related to the thesis. Most supervisors plan a kick-off meeting in week 1 of Block 5. Make sure you are present during this meeting.

Communication regarding registration and supervision takes place via Sin-Online, Canvas and the Thesis Management System. Hence, check these regularly. If you forward your student e-mail to your personal e-mail, make sure that messages from Sin-Online, Canvas and the Thesis Management System do not end up in your spam.

b. Thesis Management System

For guidance and assessment the supervisors use the Thesis Management System. More specifically, it is used for:

- Registration of theses.
- All communication between you and your supervisor: registration of planning, agreements and interim versions (messages and attachments), feedback from your supervisor, milestones reached and confirmed deadlines.
- Handing in of the proposal and the thesis.
- Registration of scan on plagiarism.
- Assessment of the thesis and the associated process.

More information about how to work with the Thesis Management System can be found in the *Thesis Management System Manual* on the Thesis Hub. It contains step-by-step instructions, including screenshots, regarding the activities mentioned above. **Note: This manual is currently still under development and will be published later.**

c. The thesis proposal

Writing a thesis proposal is an obligatory part of the bachelor thesis process. The aim of this proposal is to assess whether your ideas are feasible and will result in a proper academic thesis within the available time frame. In the proposal you essentially set-up the framework of your thesis. You will find that the more effort you put in your proposal, the easier it is to write your thesis.

A proposal typically consists of 3 to 5 pages and contains the following elements:

- A main research question/problem statement, followed by a sufficiently substantiated set of sub-questions.

- The relevance of the subject: Why and for whom is the research interesting and relevant? Is it purely of scientific relevance, or is it also of interest for practical applications?
- The theoretical background of the problem.
- Research methodology: Which (econometric or operations research) methods and techniques will be applied in your research? Why are the methods appropriate here?
- Required data sources and how to obtain this data.
- Motivation: Why is the research necessary? Why is the existing knowledge on this topic insufficient? How will the research address these issues?
- A summary of relevant literature: What kind of results have been obtained in previous research on this topic? How does the research relate to the existing literature?

5. Supervision

a. What to expect

In writing your bachelor thesis, you should demonstrate that you can do independent research in econometrics and operations research. The thesis supervisor will give you advice when necessary but it is your own responsibility that you formulate research ideas and meet deadlines. In contrast to the seminar you independently solve your problems as much as possible, and rely less on (the ideas of) your supervisor. Your supervisor is available about once a week for questions, and may arrange office hours where all thesis students are welcome to ask questions. The supervisor will give you detailed feedback on the proposal and the draft version of the thesis. Supervisors do not correct programming code.

b. Do's and don'ts

To ensure a fruitful and smooth cooperation with your supervisor, follow the do's and don'ts below.

Must-do's

- Make a work plan together with your supervisor. In the work plan you outline which steps you need to take and when, in order to meet all the deadlines. Also discuss during which periods you and your supervisor are not available.
- Share the work plan with your supervisor in the Thesis Workflow and ask for his or her approval. This is a mandatory part of the thesis process.
- Send your work to your supervisor several working days in advance of a meeting.
- Address all comments of your supervisor before you ask for new feedback.
- Take the full responsibility for writing your thesis. You are expected to take the initiative in all steps of the process.
- Carefully read this thesis manual and follow the described procedures and guidelines.

Recommended do's

- Use the first meeting to determine what you can expect from your supervisor and what your supervisor can expect of you. For example agree upon how and how often you will stay in touch and when you can expect feedback on your work. This can prevent misunderstandings and delays.
- Make a short summary of all agreements that you made during your conversations with your supervisor and send it to your supervisor using the Thesis Workflow.
- Ask for a meeting with your supervisor or go to his or her office hours if you have many or complex questions. You are entitled to 3 meetings. During a(n) (online) face-to-face conversation you will often get the most valuable feedback.
- Always send the best work you can do. The better the quality of your work, the more high-level the feedback will be.
- Be explicit about the questions you have and the parts of your work on which you want feedback.
- You may expect timely feedback on your work. If feedback takes longer than normal or longer than the agreed upon feedback period, get in touch with your supervisor. Be polite.

Don'ts

- Do not send e-mails to your supervisor. All written communication needs to be through the Thesis Workflow.
- Do not constantly ask small questions to your supervisor. Save them up and ask them all at once.
- Do not ask questions about practical matters to which the answers can be found in this manual or on the Thesis Hub. Check the manual and Thesis Hub first before contacting your supervisor.
- Do not ask / expect your supervisor to do part of the work for you. For example, your supervisor will not correct programming code, nor correct all your typos, nor provide you with the set-up of your research.
- Do not ask your supervisor to give a preliminary indication of your grade. Do also not ask what you need to do to reach a certain grade. This is against ESE policy and the supervisor will not answer these questions.
- Do not expect your supervisor to work nights or weekends just so you can finish your thesis on time. If you hand in your work late, you run the risk that you will not get your feedback in time, and you will have to accept the consequences of missing the deadline.

c. Second assessor

The second assessor judges your thesis once it is ready. The main task of the second assessor is to ensure that your thesis is assessed independently and fairly. For the bachelor thesis, you do not have contact with the second assessor. The bachelor thesis coordinator will assign the second assessor. The grade is determined jointly by the supervisor and second assessor.

d. Problems with your supervisor

You may encounter problems with your thesis supervisor. Discuss these issues with your supervisor and try to resolve your differences. If you cannot find a solution together, you can go to the bachelor thesis coordinator or to the study adviser.

6. Writing the thesis

a. Language

In the Dutch programme you can write your thesis either in Dutch or English. If you decide to write your bachelor thesis in English, this will be good practice for your master thesis.

In the International Econometrics and Operational Research programme the bachelor's thesis must be written in English.

b. Title page

The front page should at least contain the following information:

ERASMUS UNIVERSITY ROTTERDAM Erasmus School of Economics Bachelor Thesis [programme xxx] Title thesis Name student: xxx Student ID number: xxx Supervisor: xxx Second assessor: xxx Date final version: xxx The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.	ERASMUS UNIVERSITEIT ROTTERDAM Erasmus School of Economics Bachelorscriptie [programma xxx] Titel scriptie Naam student: xxx Studentnummer: xxx Begeleider: xxx Tweede beoordelaar: xxx Datum definitieve versie: xxx Het geschrevene in deze scriptie is de opvatting van de auteur en niet noodzakelijk die van de begeleider, tweede beoordelaar, Erasmus School of Economics of Erasmus Universiteit Rotterdam.
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c. Referencing

Good referencing is essential. The reader of your thesis must always be able to find out where you got the information. That is why you always need to indicate in your text when you use the work of others. The reader can then consult the bibliography to find the source. It is not allowed to simply copy something from someone else. This is plagiarism which is fraud.

In the Skill classes in bachelor 1 and bachelor 2 you learned the APA (American Psychological Association) guidelines for referencing. The APA guidelines are widely used in Econometrics journals. You need to use this reference method in your thesis. Please refer to the Thesis Hub to review these guidelines.

d. Fraud

The supervisor needs to be able to reliably determine whether you have met the learning goals of the thesis. The thesis concludes your programme and we can only award you your diploma when we are certain that you have met the requirements. Fraud is therefore regarded as a very serious offense. Fraud is defined by the Examination Board (2022) as "any acts or omissions of a student as a result of which it is or has become reasonably impossible for the examiner and the Examination Board to make a proper assessment of the knowledge, understanding and skills acquired by the student or of the knowledge, understanding and skills of fellow-students."

There are various forms of fraud that can occur in the thesis. For a full overview of the different forms of fraud on how to prevent these, please read the "What is fraud and how to avoid it" manual on the Thesis Hub and have a look at <https://my.eur.nl/en/ese/master/fraud>. The most common forms of fraud are further described below.

Plagiarism and self-plagiarism

The final version of the proposal and thesis will be checked for plagiarism. Plagiarism is quoting or paraphrasing phrases and ideas of others and presenting it as your own work. An example of plagiarism is copying a text from the internet into your thesis without indicating this by means of quotation marks and by providing a clear reference to the source of this text. Plagiarism is a serious crime. It is fraud, even though you may not have done it intentionally.

If you copy-paste a piece of text from an assignment or paper you wrote earlier in your thesis, without inserting a reference to this previous work, it is called self-plagiarism. Just as "regular" plagiarism, this is not allowed. If you want to refer to work you have done in the past, you should use the regular referencing method you also use for other resources.

Letting someone or something else do work on your thesis

We cannot determine whether you have met the learning goals of the thesis, when *someone* or *something* else has done work on your thesis and you present this as your own work. Hence, using text, code or output generated by someone else or by artificial intelligence (such as ChatGPT) in your thesis and NOT properly referencing its use, is fraud.

Consequences of fraud

If someone finds out that you have committed fraud, you will be reported to the ESE Examination Board. The sanction depends on how serious the committed fraud is.

e. Formatting + Number of pages

When writing and formatting your text, please keep in mind the following:

- Include page numbers.
- Use a professionally looking font-type that is easy to read. Use font size 11 or 12. The font size can be slightly smaller (10) for table contents, table notes, and footnotes.
- Format your tables and figures according to academic standards. Do not copy – paste output from statistical programmes! The book *Academic Writing Skills for Economics and Business Administration* (Karreman et al., 2017) contains guidelines for formatting your tables and figures.
- The length of the thesis is at most 20 pages (margins 2.5 cm, font size 11pt, line spacing 1.5), including tables and figures, but excluding the title page, references and appendices. Note that all relevant information has to be included in the main text.
- In case you use uncommon abbreviations, include an overview of the abbreviations used and their meaning. Generally, prevent the use of abbreviations as much as possible. The first time you use an abbreviation in the text, always write it out in full.

f. Programming Code and Appendices

You should submit the code of all programs you have written for your thesis: Upload a ZIP-file with all your programming code in Sin-Online. Also make sure to include a short description of the code in your thesis. Please stick to the conventions discussed in the programming courses with respect to programming style and the placement of comments and explanations. To ensure reproducibility, you must also provide a description of your code and of the runs you have performed in the ZIP-file, explaining in detail how all results have been obtained.

You can also add appendices with supplementary material, such as additional tables and figures. However, if you discuss these tables and figures in detail in your main text, they should be part of the main text.

7. Handing in the thesis

a. Procedure for handing in the thesis

For detailed step-by-step instructions on how to hand in your thesis in the Thesis Management System please consult the *Thesis Management System Manual* on the Thesis Hub. **Note: This manual is currently still under development and will be published later.**

More detailed information will follow later.

b. Graduation

Your bachelor diploma is **not** automatically requested after you finish your thesis and have completed your coursework. You need to do this yourself. For more information, see:

<https://www.eur.nl/en/education/practical-matters/graduation>

This also means that you can hand-in your final thesis before you have finished all your coursework.

If you want to graduate within the academic year, you have to request your diploma latest 31 August. If you request it later, you need to re-enrol as a bachelor student for the new academic year. In addition, if you would like to participate in the [Bachelor Graduation Day](#) in November, you also need to request your diploma latest 31 August.

Note that your enrolment is **not** automatically terminated when you graduate. You need to terminate your enrolment yourself. More information and the procedure to terminate enrolment can be found here: <https://www.eur.nl/en/education/practical-matters/registration/terminating-enrolment>.

c. Thesis Repository

All approved ESE theses are entered in the EUR Thesis Repository (<http://thesis.eur.nl/>), the digital thesis repository of the Erasmus University. You can choose whether your thesis should remain private, meaning it cannot be accessed by others, or if it can be made public.

d. Establishment of the grade

The bachelor thesis will be independently assessed by the thesis supervisor as well as a second assessor using the assessment criteria below. Both are academic staff members. A satisfactory result (grade 5.5 or up) must be obtained for the bachelor thesis.

e. Assessment criteria for the thesis

These criteria are the characteristics of a good thesis. Note that they do not form a calculation instrument for the final grade.

Objective and main question

- There is a clearly formulated research question.
- The research question is based on the reference paper.
- The extension is supported by relevant and up to date literature/research.
- The contribution of the extension is clear and relevant.

Methodology

Replication

- The replication of the reference paper is well executed.

Extension

- The research method is appropriate for answering the research question.
- The research method is clearly described and repeatable.
- If applicable: A relevant method was chosen for the collection and processing of data.
-
- The description of the research method shows an understanding of methodological issues.

Analysis and results

- The results reflect the steps of the analysis.
- The results are presented concisely, accurately, and in a systematic way.
- Alternative explanations for the results are discussed.
- Non-textual elements (figures, charts etc.) are relevant and supportive to the results
- The analysis and interpretation of the data are sufficiently profound.

Conclusions

- Conclusions are consistent with findings.
- The research question is answered thoroughly.
- The conclusions show the contribution of the extension in relation to the reference paper.
- Suitable implications and recommendations to the research field and/or society are described.
- Suggestions for further research are described and are in line with findings.

Structure and language

- The thesis is well-written (grammar, spelling and style).
- Academic use of language.
- Terminology is used consistently.
- The mathematical notation is correct and clear.
- There is a logical and relevant structure.
- Literature references comply with applicable academic standards.
- Literature references are complete, consistent, and correct.

Process

The thesis supervisor will assess the student's research and writing process on the following criteria:

- Work rate
- Independence
- Attitude and dedication

8. References

Karreman, B., Werner, G., van der Molen, H., Osseweijer, E., Ackermann, M., Schmidt, H., & van der Wal, E. (2017). Academic Writing Skills for Economics and Business Administration. Amsterdam: Boom|Lemma.