13

Conducting empirical research or doing a project or dissertation in finance

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Learning Outcomes

In this chapter, you will learn how to

- Choose a suitable topic for an empirical research project in finance
- Draft a research proposal
- Find appropriate sources of literature and data
- Determine a sensible structure for the dissertation

13.1 What is an empirical research project and what is it for?

Many courses, at both the undergraduate and postgraduate levels, require or allow the student to conduct a project. This may vary from being effectively an extended essay to a full-scale dissertation or thesis of 10,000 words or more.

Students often approach this part of their degree with much trepidation, although in fact doing a project gives students a unique opportunity to select a topic of interest and to specify the whole project themselves from start to finish. The purpose of a project is usually to determine whether students can define and execute a piece of fairly original research within given time, resource and report-length constraints. In terms of econometrics, conducting empirical research is one of the best ways to get to grips with the theoretical material, and to find out what practical difficulties econometricians encounter when conducting research. Conducting the research gives the investigator the opportunity to solve a puzzle and potentially to uncover something that nobody else has; it can be a highly rewarding experience. In addition, the project allows students to

select a topic of direct interest or relevance to them, and is often useful in helping students to develop time-management and report-writing skills. The final document can in many cases provide a platform for discussion at job interviews, or act as a springboard to further study at the taught postgraduate or doctoral level.

This chapter seeks to give suggestions on how to go about the process of conducting empirical research in finance. Only general guidance is given, and following this advice cannot necessarily guarantee high marks, for the objectives and required level of the project will vary from one institution to another.

13.2 Selecting the topic

Following the decision or requirement to do a project, the first stage is to determine an appropriate *subject area*. This is, in many respects, one of the most difficult and most crucial parts of the whole exercise. Some students are immediately able to think of a precise topic, but for most, it is a process that starts with specifying a very general and very broad subject area, and subsequently narrowing it down to a much smaller and manageable problem.

Inspiration for the choice of topic may come from a number of sources. A good approach is to think rationally about your own interests and areas of expertise. For example, you may have worked in the financial markets in some capacity, or you may have been particularly interested in one aspect of a course unit that you have studied. It is worth spending time talking to some of your instructors in order to gain their advice on what are interesting and plausible topics in their subject areas. At the same time, you may feel very confident at the quantitative end of finance, pricing assets or estimating models for example, but you may not feel comfortable with qualitative analysis where you are asked to give an opinion on particular issues (e.g. 'should financial markets be more regulated?'). In that case, a highly technical piece of work may be appropriate. Equally, many students find econometrics both difficult and uninteresting. Such students may be better suited to more qualitative topics, or topics that involve only elementary statistics, but where the rigour and value added comes from some other aspect of the problem. A case-study approach that is not based on any quantitative analysis may be entirely acceptable and indeed an examination of a set of carefully selected case studies may be more appropriate for addressing particular problems, especially in situations where hard data are not readily available, or where each entity is

distinct so that generalising from a model estimated on one set of data may be inadvisable. Highly mathematical work that has little relevance and which has been applied inappropriately may be much weaker than a well constructed and carefully analysed case study.

Combining all of these inputs to the choice of topic should enable you at the least to determine whether to conduct quantitative or non-quantitative work, and to select a general subject area (e.g. pricing securities, market microstructure, risk management, asset selection, operational issues, international finance, financial econometrics, etc.).

The project may take one of a number of forms, for example:

- An empirical piece of work involving quantitative analysis of data
- A survey of business practice in the context of a financial firm
- A new method for pricing a security, or the theoretical development of a new method for hedging an exposure
- A critical review of an area of literature
- An analysis of a new market or new asset class.

Each of these types of project requires a slightly different approach, and is conducted with varying degrees of success. The remainder of this chapter focuses upon the type of study which involves the formulation of an empirical model using the tools developed in this book. This type of project seems to be the one most commonly selected. It also seems to be a lower risk strategy than others. For example, projects which have the bold ambition to develop a new financial theory, or a whole new model for pricing options, are likely to be unsuccessful and to leave the student with little to write about. Also, critical reviews often lack rigour and are not critical enough, so that an empirical application involving estimating an econometric model appears to be a less risky approach, since the results can be written up whether they are 'good' or not.

A good project or dissertation must have an element of *originality*. It should add, probably a very small piece, to the overall picture in that subject area, so that the body of knowledge is larger at the end than before the project was started. This statement often scares students, for they are unsure from where the originality will arise. In empirically based projects, this usually arises naturally. For example, a project may employ standard techniques on data from a different country or a new market or asset, or a project may develop a new technique or apply an existing technique to a different area. A good project will also contain an in-depth analysis of the issues at hand, rather than a superficial, purely descriptive presentation, as well as an individual contribution. A good project will be interesting, and it will have relevance for one or more user groups (although the user

group may be other academic researchers and not necessarily practitioners); it may or may not be on a currently fashionable and newsworthy topic. The best research challenges prior beliefs and changes the way that the reader thinks about the problem under investigation.

The next stage is to transform this broad direction into a workably sized topic that can be tackled within the constraints laid down by the institution. It is important to ensure that the aims of the research are not so broad or substantive that the questions cannot be addressed within the constraints on available time and word limits. The objective of the project is usually not to solve the entire world's financial puzzles, but rather to form and address a small problem.

It is often advisable at this stage to browse through recent issues of the main journals relevant to the subject area. This will show which ideas are relatively fashionable, and how existing research has tackled particular problems. A list of relevant journals is presented in table 13.1. They can be broadly divided into two categories: practitioner-oriented and academic journals. Practitioner-oriented journals are usually very focused in a particular area, and articles in these often centre on very practical problems, and are typically less mathematical in nature and less theory-based, than are those in academic journals. Of course, the divide between practitioner and academic journals is not a total one, for many articles in practitioner journals are written by academics and vice versa! The list given in table 13.1 is by no means exhaustive and, particularly in finance, new journals appear on a monthly basis.

Many web sites contain lists of journals in finance or links to finance journals. Some useful ones are:

- http://www.cob.ohio-state.edu/dept/fin/overview.htm – the Virtual Finance Library, with good links and a list of finance journals
- http://www.helsinki.fi/WebEc/journals.html – provides a list of journals in the economics area, including finance, plus a number of finance-related resources
- http://www.people.hbs.edu/pgompers/finjourn.htm – provides a list of links to finance journals
- http://www.stuart.iit.edu/fmtreview/journal.htm – provides a list of links to finance journals
- http://www.numa.com/ref/journals.htm – the Numa directory of derivatives journals – lots of useful links and contacts for academic and especially practitioner journals on derivatives
- http://www.econlit.org/journal_list.html – provides a comprehensive list of journals in the economics area, including finance

Table 13.1 Journals in finance and econometrics

Journals in finance	Journals in econometrics and related areas
Applied Financial Economics	Biometrika
Applied Mathematical Finance	Econometrica
European Financial Management	Econometric Reviews
European Journal of Finance	Econometric Theory
Finance and Stochastics	Econometrics Journal
Financial Analysts Journal	International Journal of Forecasting
Financial Management	Journal of Applied Econometrics
Financial Review	Journal of Business and Economic Statistics
Global Finance Journal	Journal of Econometrics
International Journal of Finance and Economics	Journal of Forecasting
	Journal of the American Statistical Association
International Journal of Theoretical and Applied Finance	Journal of Financial Econometrics
	Journal of the Royal Statistical Society (Series A to C)
Journal of Applied Corporate Finance	Journal of Time Series Analysis
International Review of Financial Analysis	Society for Nonlinear Dynamics and Econometrics
Journal of Applied Finance	
Journal of Asset Management	
Journal of Banking and Finance	
Journal of Business	
Journal of Business Finance and Accounting	
Journal of Computational Finance	
Journal of Derivatives	
Journal of Empirical Finance	
Journal of Finance	
Journal of Financial and Quantitative Analysis	
Journal of Financial Economics	
Journal of Financial Markets	
Journal of Financial Research	
Journal of Fixed Income	
Journal of Futures Markets	
Journal of International Financial Markets, Institutions and Money	
Journal of International Money and Finance	
Journal of Money, Credit, and Banking	
Journal of Portfolio Management	
Journal of Risk	
Journal of Risk and Insurance	
Journal of Risk and Uncertainty	
Mathematical Finance	
Pacific Basin Finance Journal	
Quarterly Review of Economics and Finance	
Review of Financial Studies	
Risk	

13.3 Sponsored or independent research?

Some business schools are sufficiently well connected with industry that they are able to offer students the opportunity to work on a specific research project with a 'sponsor'. The sponsor may choose the topic and offer additional expert guidance from a practical perspective. Sponsorship may give the student an insight into the kind of research problems that are of interest to practitioners, and will probably ensure that the work is practically focused and of direct relevance in the private sector. The sponsor may be able to provide access to proprietary or confidential data, which will broaden the range of topics that could be tackled. Most importantly, many students hope that if they impress the firm that they are working with, a permanent job offer will follow. The chance to work on a sponsored project is usually much sought after by students but it is very much a double-edged sword, so that there are also a number of disadvantages. First, most schools are not able to offer such sponsorships, and even those that can are usually able to provide them to only a fraction of the class. Second, the disappointing reality is that the problems of most interest and relevance to practitioners are often (although admittedly not always) of less interest to an academic audience – fundamentally, the objectives of the sponsor and of a university may be divergent. For example, a stereotypical investment bank might like to see a project that compares a number of technical trading rules and evaluates their profitability; but many academics would argue that this area has been well researched before and that finding a highly profitable rule does not constitute a contribution to knowledge and is therefore weak as a research project. So if you have the opportunity to undertake a sponsored project, ensure that your research is of academic as well as practical value – after all, it will almost certainly be the academic who grades the work.

13.4 The research proposal

Some schools will require the submission of a research proposal which will be evaluated and used to determine the appropriateness of the ideas and to select a suitable supervisor. While the requirements for the proposal are likely to differ widely from one institution to another, there are some general points that may be universally useful. In some ways, the proposal should be structured as a miniature version of the final report, but without the results or conclusions!

● The required length of the proposal will vary, but will usually be between one and six sides of A4, typed with page numbering.

- The proposal should start by briefly motivating the topic – why is it interesting or useful?
- There should be a **brief** review of the relevant literature, but this should not cover more than around a third to one half of the total length of the proposal.
- The research questions or hypotheses to be tested should then be clearly stated.
- There should be a discussion of the data and methodology that you intend to use.
- Some proposals also include a time-scale – i.e. which parts of the project do you expect to have completed by what dates?

13.5 Working papers and literature on the internet

Unfortunately, the lag between a paper being written and it actually being published in a journal is often 2–3 years (and increasing fast), so that research in even the most recent issues of the published journals will be somewhat dated. Additionally, many securities firms, banks and central banks across the world, produce high quality research output in report form, which they often do not bother to try to publish. Much of this is now available on the internet, so it is worth conducting searches with keywords using readily available web search engines. A few suggestions for places to start are given in table 13.2.

13.6 Getting the data

Although there is more work to be done before the data are analysed, it is important to think prior to doing anything further about *what data are required* to complete the project. Many interesting and sensible ideas for projects fall flat owing to a lack of availability of relevant data. For example, the data required may be confidential, they may be available only at great financial cost, they may be too time-consuming to collect from a number of different paper sources, and so on. So before finally deciding on a particular topic, make sure that the data are going to be available.

The data may be available at your institution, either in paper form (for example, from the IMF or World Bank reports), or preferably electronically. Many universities have access to Reuters, Datastream or the Bloomberg. Many of the URLs listed above include extensive databases and furthermore, many markets and exchanges have their own web pages detailing data availability. One needs to be slightly careful, however, in ensuring

Table 13.2 Useful internet sites for financial literature

Universities

Almost all universities around the world now make copies of their discussion papers available electronically.

A few examples from finance departments are:

http://w4.stern.nyu.edu/finance/research.cfm?doc_id=1216 – Department of Finance, Stern School, New York University

http://http://fic.wharton.upenn.edu/fic/papers.html – Wharton Financial Institutions Center

http://haas.berkeley.edu/finance/WP/rpf.html – University of California at Berkeley

http://www.icmacentre.ac.uk/research_and_publications/discussion_papers – ICMA Centre, University of Reading, of course!

US Federal Reserve Banks and the Bank of England

http://www.bankofengland.co.uk/index.htm – Bank of England – containing their working papers, news and discussion

http://www.frbatlanta.org/ – Federal Reserve Bank of Atlanta – including information on economic and research data and publications

http://www.stls.frb.org/fred/data/wkly.html – Federal Reserve Bank of St. Louis – a great deal of useful US data, including monetary, interest rate, and financial data, available daily, weekly, or monthly, including long time histories of data

http://www.chicagofed.org/ – Federal Reserve Bank of Chicago – including interest data and useful links

http://www.dallasfed.org/ – Federal Reserve Bank of Dallas – including macroeconomic, interest rate, monetary and bank data

http://www.federalreserve.gov/pubs/ifdp/ – Federal Reserve Board of Governors International Finance Discussion Papers

http://www.ny.frb.org/research/ – Federal Reserve Bank of New York

International bodies

http://dsbb.imf.org/ – the International Monetary Fund (IMF) – including working papers, forecasts, and IMF primary commodity price series

http://www.worldbank.org/html/dec/Publications/Workpapers/domfincapmkts.html – World Bank working papers in finance

http://www.oecd.org/eco/wp/onlinewp.htm – Organisation for Economic Cooperation and Development (OECD) working paper series, searchable

Miscellaneous

http://www.devinit.org/findev/papers.htm – Finance and Development Research Program – interesting research output and links on various issues in finance, but especially relating to developing countries, such as banking crises, regulation, etc.

http://www.nber.org – National Bureau of Economic Research (NBER) – huge database of discussion papers and links including data sources

http://econpapers.repec.org/ – Econpapers (formerly WoPEc) – huge database of working papers in areas of economics, including finance

http://ideas.uqam.ca/ – IDEAS – a bibliographic database for economics, reportedly including over 500,000 searchable items

http://www.ssrn.com – The Social Science Research Network – a huge and rapidly growing searchable database of working papers and the abstracts of published papers

Table 13.2 (*cont.*)

The free data sources used in this book

http://www.nationwide.co.uk/default.htm – UK house price index, quarterly back to 1952, plus house prices by region and by property type

http://www.oanda.com/convert/fxhistory – historical exchange rate series for an incredible range of currency pairs

http://www.bls.gov/ – US Bureau of Labor Statistics – US macroeconomic series

http://www.federalreserve.gov/econresdata/default.htm – US Federal Reserve Board – more US macroeconomic series, interest rates, etc. and working papers

http://research.stlouisfed.org/fred2/ – a vast array of US macroeconomic series

http://www.fin-rus.com/analysis/export/_eng_/default.asp – various financial time series, including stock indices, futures, available at high frequency

http://finance.yahoo.com/ – Yahoo! Finance – an incredible range of free financial data, information, research and commentary

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the accuracy of freely available data; 'free' data also sometimes turn out not to be!

13.7 Choice of computer software

Clearly, the choice of computer software will depend on the tasks at hand. Projects that seek to offer opinions, to synthesise the literature and to provide a review, may not require any specialist software at all. However, even for those conducting highly technical research, project students rarely have the time to learn a completely new programming language from scratch while conducting the research. Therefore, it is usually advisable, if possible, to use a standard software package. It is also worth stating that marks will hardly ever be awarded for students who 'reinvent the wheel'. Therefore, learning to program a multivariate GARCH model estimation routine in C++ may be a valuable exercise for career development for those who wish to be quantitative researchers, but is unlikely to attract high marks as part of a research project unless there is some other value added. The best approach is usually to conduct the estimation as quickly and accurately as possible to leave time free for other parts of the work.

13.8 How might the finished project look?

Different projects will of course require different structures, but it is worth outlining at the outset the form that a good project or dissertation will take. Unless there are good reasons for doing otherwise (for example, because of the nature of the subject), it is advisable to follow the format

Table 13.3 Suggested structure for a
typical dissertation or project

Title page
Abstract or executive summary
Acknowledgements
Table of contents
Section 1: Introduction
Section 2: Literature review
Section 3: Data
Section 4: Methodology
Section 5: Results
Section 6: Conclusions
References
Appendices

and structure of a full-length article in a scholarly journal. In fact, many journal articles are, at approximately 5,000 words long, roughly the same length as a student research project. A suggested outline for an empirical research project in finance is presented in table 13.3. We shall examine each component in table 13.3 in turn.

- The *Title page* is usually not numbered, and will contain only the title of the project, the name of the author, and the name of the Department, Faculty, or Centre in which the research is being undertaken.
- The *Abstract* is usually a short summary of the problem being addressed and of the main results and conclusions of the research. The maximum permissible length of the abstract will vary, but as a general guide, it should not be more than 300 words in total. The abstract should usually not contain any references or quotations, and should not be unduly technical, even if the subject matter of the project is.
- The *Acknowledgements* page is a list of people whose help you would like to note. For example, it is courteous to thank your instructor or project supervisor (even if he/she was useless and didn't help at all), any agency that gave you the data, friends who read and checked or commented upon the work, etc. It is also 'academic etiquette' to put a disclaimer after the acknowledgements, worded something like 'Responsibility for any remaining errors lies with the author(s) alone'. This also seems appropriate for a dissertation, for it symbolises that the student is completely responsible for the topic chosen, and for the contents and the structure of the project. It is your project, so you cannot blame anyone else, either deliberately or inadvertently, for anything wrong with it!

The disclaimer should also remind project authors that it is not valid to take the work of others and to pass it off as one's own. Any ideas taken from other papers should be adequately referenced as such, and any sentences lifted directly from other research should be placed in quotations and attributed to their original author(s).

- The *Table of contents* should list the sections and sub-sections contained in the report. The section and sub-section headings should reflect accurately and concisely the subject matter that is contained within those sections. It should also list the page number of the first page of each section, including the references and any appendices.

  The abstract, acknowledgements and table of contents pages are usually numbered with lower case Roman numerals (e.g. i, ii, iii, iv, etc.), and the introduction then starts on page 1 (reverting back to Arabic numbers), with page numbering being consecutive thereafter for the whole document, including references and any appendices.

- The *Introduction* should give some very general background information on the problem considered, and why it is an important area for research. A good introductory section will also give a description of what is *original* in the study – in other words, how does this study help to advance the literature on this topic or how does it address a new problem, or an old problem in a new way? What are the aims and objectives of the research? If these can be clearly and concisely expressed, it usually demonstrates that the project is well defined. The introduction should be sufficiently non-technical that the intelligent non-specialist should be able to understand what the study is about, and it should finish with an outline of the remainder of the report.

- Before commencing any empirical work, it is essential to thoroughly review the existing literature, and the relevant articles that are found can be summarised in the *Literature review* section. This will not only help to put the proposed research in a relevant context, but also may highlight potential problem areas, and will ensure that up-to-date techniques are used and that the project is not a direct (even if unintentional) copy of an already existing work. The literature review should follow the style of an extended literature review in a scholarly journal, and should always be *critical in nature*. It should comment on the relevance, value, advantages and shortcomings of the cited articles.

- The *Data* section should describe the data in detail – the source, the format, the features of the data, and any limitations which are relevant for later analysis (for example, are there missing observations? Is the sample period short? Does the sample include large potential structural

breaks, e.g. caused by a stock market crash?). If there are a small number of series which are being primarily investigated, it is common to plot the series, noting any interesting features, and to supply summary statistics – such as the mean, variance, skewness, kurtosis, minimum, and maximum values of each series, tests for non-stationarity, measures of autocorrelation, etc.

- '*Methodology*' should describe the estimation technique(s) used to compute estimates of the parameters of the model or models. The models should be outlined and explained, using equations where appropriate. Again, this description should be written *critically*, noting any potential weaknesses in the approach and, if relevant, why more robust or up-to-date techniques were not employed. If the methodology employed does not require detailed descriptions, this section may usefully be combined with the Data section.

- The *Results* will usually be tabulated or graphed, and each table or figure should be described, noting any interesting features – whether expected or unexpected, and in particular, inferences should relate to the original aims and objectives of the research outlined in the Introduction. Results should be *discussed and analysed*, not simply presented blandly. Comparisons should also be drawn with the results of similar existing studies if relevant – do your results confirm or contradict those of previous research? Each table or figure should be mentioned explicitly in the text (e.g. 'Results from estimation of equation (11) are presented in Table 4'). Do not include in the project any tables or figures which are not discussed in the text. It is also worth trying to present the results in as interesting and varied a way as possible – for example, including figures and charts as well as just tables.

- The *Conclusions* section should re-state the original aim of the dissertation and outline the most important results. Any weaknesses of the study as a whole should be highlighted, and finally some suggestions for further research in the area should be presented.

- A list of *References* should be provided, in alphabetical order by author. Note that a list of *references* (a list of all the papers, books or web pages referred to in the study, irrespective of whether you read them, or found them cited in other studies), as opposed to a bibliography (a list of items that you read, irrespective of whether you referred to them in the study), is usually required.

  Although there are many ways to show citations and to list references, one possible style is the following. The citations given in the text can be given as 'Brooks (1999) demonstrated that . . . ' or 'A number of authors have concluded that . . . (see, for example, Brooks, 1999).'

All works cited can be listed in the references section using the following style:

Books
Harvey, A.C. (1993) *Time Series Models*, second edition, Harvester Wheatsheaf, Hemel Hempstead, England
Published articles
Hinich, M.J. (1982) Testing for Gaussianity and Linearity of a Stationary Time Series, *Journal of Time Series Analysis* 3(3), 169–176
Unpublished articles or theses
Bera, A.K. and Jarque, C.M. (1981) An Efficient Large-Sample Test for Normality of Observations and Regression Residuals,
Australian National University Working Papers in Econometrics 40, Canberra

- Finally, an *Appendix* or *Appendices* can be used to improve the structure of the study as a whole when placing a specific item in the text would interrupt the flow of the document. For example, if you want to outline how a particular variable was constructed, or you had to write some computer code to estimate the models, and you think this could be interesting to readers, then it can be placed in an appendix. The appendices should not be used as a dumping ground for irrelevant material, or for padding, and should not be filled with printouts of raw output from computer packages!

13.9 Presentational issues

There is little sense in making the final report longer than it needs to be. Even if you are not in danger of exceeding the word limit, superfluous material will generate no additional credit and may be penalised. Assessors are likely to take into account the presentation of the document, as well as its content. Hence students should ensure that the structure of their report is orderly and logical, that equations are correctly specified, and that there are no spelling or other typographical mistakes, or grammatical errors.

It is definitely worth reserving a week at the end of the allocated project time if possible to read the draft paper carefully at least twice. Also, your supervisor or advisor may be willing to read through the draft and to offer comments upon it prior to final submission. If not, maybe friends who have done similar courses can give suggestions. All comments are useful – after all, any that you do not like or agree with can be ignored!