

Research Report Guidelines

1 Overview

The research project that you undertake will use the regression techniques presented in this course. These techniques are employed to answer a specific question posed at the outset. It is an end-to-end modeling exercise, from the formulation of the question, to the identification and collection of the data, to the empirical analysis and the interpretation of the results. No empirical research report is complete without diagnostic tests and a thorough sensitivity analysis to ensure that the results are reliable.

The body of your report should consist of no more than 6 pages. Think of your report as the written component of what you would cover with a V.P.-level executive in a single half-hour meeting. They are busy people and want to quickly digest the recommendation from your report, understand the methods you used and be confident that you have carefully scrutinized the data and analysis.

2 Research Proposal

As a first step, you must submit a proposal for your research project. In this proposal, you will describe your research question and the data with which you plan to answer this question. You must be specific about the source of the data and your proposed strategy for obtaining it. The feasibility of your project depends on your ability to collect the data. This includes having the legal right to use the data for this project. Some of you may want to answer a question inspired by your employer and this is fine as long as data protection procedures are followed, including anonymizing the data as necessary, and obtaining any required permissions to share it with your teammates and your instructor.

Title : A title that states what you did is only adequate. A title that highlights what you found is much better.

Research question : Precisely state the question that you will seek to answer. Documenting the relationship between Y and X_1 is too vague without the proper motivation. Referencing a conversation that takes as given the sign of a relationship between Y and X_1 is a more precise starting point.

Unit of observation : i.e., individuals, corporations, countries, or time periods such as monthly or quarterly.

Time period covered : i.e., start and end dates for your sample.

Number of observations : This should at least be in the hundreds or more if possible.

Dependent variable : This must include a precise definition of the variable, including the units in which it is measured.

Independent variables : Similarly, and will include multiple variables.

Data sources : This could be a website address or the name of a database, or could be a description of a data-gathering process, such as the downloading of prices from an online retailer.

The proposal is not directly graded but will be assigned one of three possible outcomes. Either it will be approved as is, or it can be approved upon agreement of suggested adjustments, or it will require a brief meeting to discuss any modifications. If there are no changes to the plan laid out in your proposal, then this proposal should serve as an early outline for your introduction and data sections of the research report.

3 Report Sections

Your report must contain these sections. The grading of your report will depend on the quality of each.

3.1 Executive Summary

This brief summary should include the basic message you want to communicate to your audience. It should be no longer than 1 (one) page and preferably not longer than a paragraph or two (and does not take up space allocated to the 6 page count). Write this section as if this were the only section an executive will read (which often happens). If they wish to dig deeper into the contents of your report, they can skip to the parts that interest them.

In this summary, you should briefly describe the question you set out to answer. Then outline the methodology that you followed, including a description of the data sources that you employed to answer this question. You should not forget to communicate the result of the analysis (you'd be surprised how often this happens). "In this report we analyze sales of grocery items..." is a weak introduction, which describes your actions rather than your results. Compare this to the headline "In this report we find that sales of strawberry Pop Tarts rise 700% before a hurricane," which communicates your newfound knowledge to the reader. Your report should not be a diary of your research activities, and neither should the summary. It should feature an early description of the main result before gradually drilling down into the details.

To achieve this, this report is best written in triangular fashion, as in a newspaper article. This is in contrast to a joke or mystery novel, in which the reader is surprised at either the punch line or the guilty party revealed at the ending. Good newspaper articles start with an informative title. The first paragraph is a quick overview of the focal piece of information. Further sections may include a synopsis of the events leading up to the main story and the actions of the central characters involved. If your executive summary is written like the beginning of a good newspaper article, readers will be eager to move on through the body of the report.

3.2 Introduction

Add more content to the main question you aim to answer. This description should be slightly more thorough than that for the Executive Summary and will fill in any omitted details. In particular, you will provide more context for the data and methodology, including the reasons that you chose these to answer the main question.

Supplement this with a discussion of the methods and results of other similar analyses. These could be from academic research articles but could also be from the popular press or news articles. If your question is relevant to any ongoing conversation, you should reference that here. Include any other background information that would better motivate or clarify the question you address.

3.3 Data

Describe the unit of observation used in your study, e.g., persons or firms or cities or states or units of time, if it is aggregated into time periods. State the time period covered, including the beginning and end dates of the sample. Give a precise definition of your dependent variable, which is the target of your analysis. Follow this with your independent variables. In a course such as this, every project should include multiple variables in the analysis. Describe your data sources in detail. If this section is well-written, the reader should be able to use your description to obtain a copy of the exact same dataset and replicate your results. The best data sections justify the dataset and included variables as deliberately chosen to address the question posed in the introduction.

3.4 Regression Results

- **Estimation results:** Show the regression results for the main model or top contenders, including the original specification. All others estimated for sensitivity should appear in the Appendix and be referenced only in passing. Any table should include a caption that describes (briefly) the variables in the regression and the sample. In good articles, an experienced reader can glance at the main table of results and get the main idea.
- **Interpretation:** Provide a description of the *statistically significant* coefficients in the model. For each such variable, there should be a statement like “when X_1 changes by this number of units (state the unit), Y rises or falls by ...” One or more of these statements might be your main result.
- **Figures:** Present line graphs of the data or scattergraphs of the explanatory variables as is necessary for the reader to understand your data. Plots of the raw data might also fit within your Data section. These figures can also inform and justify your choice of model. Finally, if

your main result can be shown in the form of the graph, then it would complement the above two subsections.

- **Checks for multicollinearity:** Present and examine a correlation matrix and calculate variance inflation factors for each of your explanatory variables. This will help readers understand the variability in your estimates and the relationships between them.
- **Diagnostic tests:** Test for heteroskedasticity and serial correlation, since these are common problems in regressions.
- **Corrective measures:** Make adjustments to the estimation that address any problems detected in the diagnostic tests.
- **Model evaluation:** Measure and discuss the quality of fit of your model and compare the quality of any competing models. Out-of-sample testing would be particularly convincing.

3.5 Summary

Summarize the main finding and the approach used to determine the main result. Consider any next steps that might be undertaken to follow this work. For instance, if you can identify multiple explanations for a similar result, you can outline additional data sources and investigations that would further clarify the finding. Conclude with any recommendations for any relevant decision or any implications for an ongoing conversation involving your research topic.

3.6 Appendices

Include all other supporting information here that is not included in the report. You can include computer code, sensitivity analysis, the data source and the dataset itself, if practical to do so. With an appendix to the report, you can also use this as a psychological tool to give yourself permission to leave some of the hard work on the cutting room floor. The reader can look through it if necessary but you should write your report to read as a complete document without it.

4 General Advice

Successful research reports can be helped along with the following advice.

- Pick a topic that interests you or in which you have expertise. Your project is more likely to be successful if you are better informed or if you are motivated to become better informed. Good empirical research stands on a tripod of subject matter expertise, statistical analysis and reliable data. An understanding of the question or business problem is central for the other two to be of value.
- Make sure that data will be available. This also includes the provision that you are legally permitted to obtain and use the data. This applies especially if you use proprietary data from your employer and are under an obligation to preserve private information or intellectual property. If these conditions are satisfied, your familiarity with the data will only serve to further your expertise on the matter, as mentioned in the above point.

- Set yourself up for success. Choose a research question that would be interesting regardless of the empirical result. Whether the coefficient is positive or negative, or statistically insignificant, your analysis should contribute to an ongoing conversation or decision.
- Let your curiosity lead you. The main point of this exercise is to learn something that you don't already know and to show to others what you have found. Take this opportunity to embrace the spirit of discovery.