



Communicating the Results of a Research Project

*"Science is an instance of writing with
intent, the intent to persuade other
scientists, such as economic scientists."*

D. McCLOSKEY

A research project is not complete until its findings are communicated to a larger audience, namely, the scientific community. This is how knowledge progresses. This communication is performed in three steps. First, the researcher drafts a written report summarizing the results of his or her research. Second, the researcher presents the report orally at professional workshops or conferences. Finally, the researcher submits the research report for publication in the form of an article or book.

Note that each of these three steps may be done more than once. The report goes through multiple drafts as the author attempts to perfect his or her argument. The primary purpose of giving a research presentation is to gain feedback from experts in the field. After the presentation the researcher is likely to revise the research report again, based on the questions and comments he or she received. The researcher may then give the revised report in another research presentation. It is common for papers submitted for publication to be rejected. The author does not give up, however; rather, he or she looks for a new journal or new publisher until publication is assured.

This chapter explains the nut and bolts of this research communication process. The first half spells out how to write a research report, and the

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Venues for Undergraduate Research

A growing number of conferences offer opportunities for undergraduate economics students to present their research. Examples of these include:

- the annual meetings of the Virginia Social Science Association (<http://www.vssa.net>)
- the Eastern Economic Association (<http://www.iona.edu/eea/>), and
- the National Conference on Undergraduate Research (<http://www.ncur.org/>).

Additionally, several journals exist that publish undergraduate economics research. Among these are the following:

- *Issues in Political Economy* (<http://www.elon.edu/ipe>)
- *University Avenue Undergraduate Journal of Economics* (<http://www.econ.ilstu.edu/UAUJE/default.html>)
- *The Student Economic Review* (<http://econserv2.bess.tcd.ie/SER/>)
- *SOAS Economic Digest* (<http://www.soas.ac.uk/SED/home.html>)
- *The Visible Hand* (<http://www.rso.cornell.edu/ces/publications.html>) and
- *Opus 1* (<http://www.opus1.org>)

second half describes how to prepare and give a research presentation. Since the report summarizes the process the researcher has undertaken, we will make numerous references back to earlier chapters.

Writing the Research Report

In Chapter 5, we introduced the idea that writing is a product of an intellectual endeavor. In this chapter, we present an in-depth example of that process: how the written research report becomes an outcome of the research process. Research reports come in several varieties. They include research papers (both undergraduate and graduate), under-

Figure 12.1 Components of an Empirical Research Paper in Economics

Title
[Abstract]
[Table of Contents]
[Acknowledgments]
Introduction and Literature Survey
Theoretical Analysis
Empirical Testing
Conclusions
References
[Data and Other Appendices]

graduate and masters' theses, doctoral dissertations, scholarly journal articles, monographs, and books. What we present here applies to all types of research reports, though what comprises a section of a research paper or journal article likely takes up a chapter or more in a book-length report. Journal articles tend to be the most condensed. Theses and dissertations tend to be longer since the author needs to demonstrate his or her command of material that would be assumed in a journal article or even a book.

The purpose of the written report is to present the results of your research, but more importantly to provide a persuasive argument to readers of what you have found. Recall from our earlier study of critical reading (Chapter 6) that there are two ways to think about the form of scholarly work. The first is format, and the second is argument. Format is more explicit, but argument is more important. The purpose of research is to advance knowledge in a field by providing a convincing argument supported by logic and empirical evidence. That is what your research report should be.

Your paper should be organized according to the format shown in Figure 12.1, which we first introduced in Chapter 6. The optional parts of the report are listed in brackets. Feel free to use section headings, as they will make the paper more readable.

As you draft your paper, keep in mind that the objective is to build a convincing case for your conclusions, namely, that the hypothesis is confirmed (hopefully!) or rejected based on the logic of your analysis and your empirical evidence. You may find it useful to review Chapter 4 on how to construct arguments.

Introduction

The purpose of the introduction to the research report is to provide the rationale for the research. This rationale should address four issues: What is the nature of the issue or problem the research investigates? Why is it worthy of investigation? What have previous researchers discovered about this issue or problem? What does your research attempt to prove? In other words, what is the contribution that your research will make to the literature?

The introduction is a critical part of the research report because it is often here that readers decide whether or not to continue reading the rest of the report. As the author you need to think of a way to persuade the reader to continue.

Start the introduction by sketching out the problem that the research addresses. What evidence can you offer to describe the issue? Why is it a problem? Is it a public policy issue, a social problem? Is it purely an intellectual puzzle? Who would be interested in the problem? It is often helpful to cite appropriate statistics to illustrate the magnitude of the problem or, better yet, use a figure or chart. The following paragraphs, which begin the introduction of a typical research paper, provide an admirable example of how to frame the problem:

Researchers are unsure of when and where the human immunodeficiency virus that causes the Acquired Immune Deficiency Syndrome originated. What is certain, though, is that HIV/AIDS has become a pandemic disease since its widespread recognition as a major global health crisis in the late 1980s and early 1990s.

This disease represents a severe development crisis in sub-Saharan Africa, the most afflicted region in the world. More than 29.4 million people are living with HIV/AIDS in sub-Saharan Africa, including 3.5 million new infections in 2002. Sadly, an estimated 2.4 million Africans died from complications with HIV/AIDS in the past year. National adult HIV prevalence has reached astronomical proportions, exceeding 30% of the adult population in four southern African countries: Botswana, Zimbabwe, Swaziland, and Lesotho. Even South Africa, widely considered the most developed country in Africa, has been touched by the far-reaching socioeconomic consequences of HIV/AIDS. It has become the most afflicted country in the world, with 4.9 million people living with HIV/AIDS.

Though it is not yet clear where this introduction is going, the reader should have no doubt that the HIV/AIDS epidemic in southern Africa is a substantial social problem.

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Using Figures Effectively

The purpose of charts, tables, and other graphics is to summarize and illustrate the argument in the text. Every figure should be designed to be easily understood independent of the text. Each figure should have a clear explanatory title. Each title should include two parts: a reference number (e.g., "Figure 12.1") and a description of the figure (e.g., "Components of an Empirical Research Paper in Economics"). The description should be as precise as possible, rather than vague. If the figure shows a graph, axes should be clearly labeled, with the units clearly identified. If more than one concept is being graphed, make sure the reader can clearly tell which is which (e.g., by using diamond symbols, dots, and/or x's for each element). If the figure shows a table, the numerical values in the columns should be aligned with the decimal points. In addition, each numerical value should have the same number of digits to the right of the decimal point.

Figures are best located in the text rather than as appendices. An exception is if you are running numerous regressions. In this case, you should summarize your results with a table in the text, but put the complete regression results in an appendix.

Make sure you refer the reader to each figure in the text of the report. Otherwise, they may not read the figure, which means it is not serving its purpose. This is especially true for figures that are relegated to appendices.

Next, explain to the reader why the topic is interesting and significant. We discussed what makes a research question interesting and significant in Chapter 2. Is it, for example, a hot topic among experts in the field? A research question is interesting if it addresses a problem that hasn't been entirely sorted out by the experts; in other words, some aspects of the problem have yet to be understood. A research question is significant if it deals with a substantial problem, one that has major impacts on the field.

The next step in the introduction is to summarize what has been done already to study the problem. This is the literature survey, which will be discussed in the next section of this chapter. Use that as a springboard to explain what your research is designed to accomplish.

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Write the Introduction Last!

Many experts think that you should write the introduction to your paper last rather than first. This makes sense since you want to hook your reader with the introduction, so you'll want to know what your paper says before you write its beginning. Alternatively, you may draft the introduction first but revise it last. Note also that if you have written a research proposal, much of the proposal itself can form the basis for the introduction to your report.

The Written Literature Review

An important component of a research report is the literature review or survey. We discussed the process of reviewing the literature in Chapter 3. In a thesis or longer work, the written literature review may be a part or chapter separate from the introduction, but in research papers or journal articles it is usually included as part of the introduction.

A literature review is a summary of the major studies that have been published on a research topic. The literature review should accomplish three goals. First, it should identify the major findings on a topic up to the present. Second, it should point out the principal deficiencies of these studies or provide a sense of what is lacking in the literature. Last, it should conclude by leading into your research question, by explaining how your research proposes to contribute to the literature or address some shortcoming of a previous study. Thus, the primary purpose of the literature survey in a written report is to provide a justification or rationale for your research.

Writing the Literature Review

Novice researchers tend to write excessively long literature surveys. This is understandable since they are likely to have a lot of notes on the studies they have read but perhaps fewer notes on and less confidence in their own original work. After all, summary is easier than analysis. It is important, however, not to allow the literature survey to “*dominate your paper*,” as Booth et al. (1995, 163) put it. For most research papers, the literature survey should be brief.

Students sometimes ask how many sources should be included in the literature survey. The answer depends on how many major studies have been

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What a Literature Survey Is and Is Not

Novice researchers sometimes seem confused about what exactly should be included in a literature review. The literature survey is not

- a list of potential sources of information about your topic, or
- a list of sources that you reviewed, or even
- a list of summaries of the sources you reviewed.

Rather, the literature survey should be a summary of the major research done on the topic you are working with, where the objective is to give the reader only the background that will be necessary for them to understand your research. In other words, you shouldn't summarize the studies you discuss in their entirety; rather, you should only highlight the parts that shed light on your research question. Nor should you discuss studies you read but decided weren't directly related to your research. Note also that the literature survey should not include popular publications, only scholarly ones.

completed on the topic. If you only report one or two sources, readers may suspect that you haven't put enough effort into searching the literature. You don't want to miss a major study, since at best it will make you look careless and at worst it may weaken the rationale for your research.

If you have cast your net wide enough to find all the significant studies pertaining to your research question, you will undoubtedly read studies that you discover aren't really germane to your topic. These should be omitted from both the literature survey and the reference list at the end of the paper. Indeed, if you haven't found irrelevant studies you probably haven't surveyed widely enough. If you have doubts about whether or not to include a source, see if you can write a brief one-line description of its relevance to your study. If you have trouble doing this, you should probably leave it out. Never include in your report discussion of any source that provided only background information.

For each study that you include in your survey, you should give complete citation information. You should use the appropriate style for citations in the text of your survey (e.g., “Anderson (2003)”) and in the references. (If you need to refresh your memory on citation styles, review Appendix 3A in Chapter 3.) You should also indicate the question that the

author examined, the author's findings, and anything about the methodology he or she used that might be appropriate to your study—for example, data sources or the type of empirical testing employed. Remember to focus your commentary on those aspects that shed light on your research question:

Armstrong (1991) was able to accurately predict the incredible socioeconomic consequences of the HIV/AIDS epidemic, theorizing that HIV/AIDS would alter the quality and size of the labor force and impede human capital formation. As soon as adequate data became available, formal data analyses were conducted. Over (1992) found the net effect of the AIDS epidemic on the growth of Gross Domestic Product (GDP) per capita to be a reduction of a third of a percentage point in the ten most afflicted sub-Saharan African countries. Bloom and Mahal (1997) concluded the opposite, reporting that the impact of AIDS was statistically insignificant, by using a data analysis examining the effects of AIDS on GDP growth per capita in 51 industrial and developing countries. Still, recent reports such as the World Health Organization (WHO) report by the Commission on Macroeconomics and Health predict a decline in economic growth due to the HIV/AIDS epidemic.

Some studies can be summarized with a sentence. Others, for example, a paper whose model you are going to base your own research on, will need more detail. You want to be as concise as possible, while getting the important points across.

Booth et al. (1995) suggest that if a source is an important one for your research, you should name it directly in your summarizing sentence:

Ruhm (2002) has found that the adverse effect of parental work hours on children's cognitive development is statistically significant.

If the source is less important, however, cite it parenthetically at the end of the sentence:

Previous studies have found a mix of results, with little or no statistical significance. (Blau, 1999; Barling & MacEwen, 1988.)

You should conclude the literature survey by leading the reader back to your research project, explaining how your research will contribute to the literature:

Since few studies on the subject exist, research on the impact of HIV/AIDS on productivity and the labor supply must continue to be conducted using accurate and more recent data on the prevalence of HIV/AIDS. This study improves upon the existing research by using actual AIDS data collected by each country, rather than predictions,

in attempting to discover the extent of the impact of AIDS on the labor supply in Botswana, Zimbabwe, Swaziland, and Lesotho; the four most afflicted countries in sub-Saharan Africa.

Theoretical Analysis

The purpose of this part of the research report is to present the theoretical analysis of the issue or problem you are investigating. This is also described as presenting your theoretical model. We discussed how to develop this analysis in Chapter 7. Recall that the objective of research is to advance knowledge in a field by providing a convincing argument that is supported by logic and empirical evidence. This section of the research report presents the logical evidence as a deductive argument; the empirical evidence is presented in the next section of the report.

So, how does one explain the theoretical analysis? There are several ways to do this, so let's explain them from simplest to most complex, using examples from student papers. The basic approach is straightforward: you must clearly describe the theory you are applying to your research problem, explain in detail why it is relevant, and then sketch out how it diagnoses the problem. This diagnosis is the research hypothesis.

If you are applying a common economic theory, such as the theory of demand, you should explain how your problem is an application of that theory and what the major elements of your analysis are. What plays the role of price, income, tastes, prices of related goods, and the like in your analysis? Note that since you are applying a common theory you should assume that your readers will be familiar with it. There is no need to derive the law of demand or any other results that all students of economics know. Indeed, doing so will detract from your report.¹

In order to demonstrate that consumers prefer financing incentives, the theory of demand will be applied to the sale of new automobiles in the United States. According to the theory of demand, the demand for a certain good is a function of changes in the price of that good, the disposable income of consumers, and consumers' preferences. . . . Because a change in the interest rate on a loan used to pay for a good is effectively equal to a change in the price of a good, the two variables should have [a comparable] impact on the sale of new automobiles. . . . I hypothesize that the interest rate elasticity of demand for automobiles will be larger than the price elasticity of demand. . . . [I]n accordance with the theory of demand, I predict that the price and rate elasticit[ies] . . . will be negative and that the income and measure of consumer sentiment elasticit[ies] . . . will be positive. (Beck, 2003)

If you are modifying an existing applied theory, you should first restate that theory in enough detail so readers can fully understand what the earlier researcher did. You should not assume that they will be familiar with the previous theory. Next, you need to explain how your research is an application or extension of that applied theory. Often, you need only indicate that the earlier theory was from the literature on your problem and that you have made a potential improvement.

The author of the following quotation modifies a model by Ehrenberg et al. (2001), which she indicates provides “a solid framework for the studies of the executive compensation in higher education.” After explaining the model in some detail, and observing that its empirical results were weak, she brings in additional factors that she hopes will improve the model:

I use an empirical model similar to Ehrenberg et al. (2001) to analyze the factors influencing the salaries of liberal arts college presidents. In addition to college performance variables and human capital variables [used by Ehrenberg et al.], I include social capital variables that trustees may value in a president—leadership skills, social capital, academic and managerial reputation. (Sorokina, 2003)

As you sketch out the logic of your theoretical analysis it is helpful to remember that you are trying to develop a deductive argument that culminates in the research hypothesis, which is often expressed in the form of an equation of the model. Recall that deductive reasoning starts from one or more assumptions and derives a specific prediction from them.

If your analysis includes formal mathematical reasoning, either an optimizing approach or ad hoc, explain it here. What are the assumptions from which you start your analysis? What mathematical manipulations did you perform on the assumptions in order to obtain your research hypothesis as the result?

In an empirical research paper, emphasis tends to be less on the theoretical analysis than on the empirical analysis. This is as it should be. At the same time, you still need to do a complete job of explaining your theoretical analysis. Even if you are merely applying a common economic theory or modifying an existing applied theory, the theoretical analysis is more important than you may think. This is because the validity of empirical testing *always* depends on the underlying theoretical model. Empirical testing without theory only shows correlation rather than the causation that researchers seek. The causal inferences must come from the theoretical analysis!

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The Importance of Explaining the Theoretical Analysis

The purpose of empirical testing is to validate your hypothesis. Most undergraduates can successfully apply statistical software to a data set to perform a statistical analysis. The underlying question for any statistical analysis, however, is what does it mean? The results of the statistical analysis have no economic meaning unless they are interpreted in the context of an economic theory. The theory always has to come first. The theory explains where the hypothesis came from. The hypothesis is a proposition about cause and effect. If the statistical results are consistent with the hypothesis, then and only then do they support a causal interpretation.

Empirical Testing of the Analysis

The purpose of the empirical testing part of the research report is to provide the empirical evidence for your research argument. The theme of this section of the paper can be summarized as: Given your hypothesis, how did you test it and what were your findings?

Your discussion should include a number of elements, including the data used, the empirical model and type of statistical analysis you employed, the results you hypothesized, your actual results, and your interpretation of the results. We discussed developing an empirical testing methodology in Chapters 10 and 11 and finding data and constructing a data set in Chapters 8 and 9. If you don't feel comfortable with this material yet, you might want to revisit those chapters.

You're not merely explaining what you did, but rather trying to persuade the reader that your approach was a fair and accurate test of the hypothesis. For that reason, you need to think about, if not explicitly address, questions such as: Does your empirical model adequately represent your theoretical one? Are the data good enough to accurately test your hypothesis? Does your statistical methodology discriminate well enough to get at the question you're asking and rule out alternatives? Does it adequately control for outside factors? Ultimately, you need to ask: if the empirical test obtains the best possible results, how confident can you be that the hypothesis is correct? Let's discuss each of these issues.

Testing Methodology Early in this part of the research report, it is helpful to have a clear statement of the testing methodology, including the type of statistical analysis employed and a brief description of the scope of the test:

This research uses a pooled Ordinary Least Squares regression analysis from 1990 to 1998 for Botswana, Zimbabwe, Swaziland, and Lesotho.

In order to test the hypothesis, this research performed an ordinary least squares regression using monthly data over the time period between 1996:1 and 2001:12.

You may wish to explain why the statistical methodology is an appropriate method for testing the hypothesis. Ordinary least squares may be considered the default statistical technique, though it may occasionally be adequate to use something less sophisticated like a statistical test of means. If you use any technique other than ordinary least squares, such as pooled OLS, generalized least squares, probit, and the like, you should explain why that is appropriate.

Empirical Model This section of the report should include an equation for the empirical model. The empirical model is the actual version of your theoretical model that you test empirically. (Note that if you use a statistical test that is less sophisticated than regression, there may be no empirical model per se.) As such, there should be a clear correspondence between the variables identified in the theoretical model and those employed in the empirical model. It is common that data for one or more variables in the theoretical model are not obtainable. Indeed, this is perhaps the principal difference between the theoretical model and the empirical model. There are two solutions to this difficulty. The first is to find data to serve as a proxy for the theoretical variable. The second is to omit the theoretical variable. Whatever approach you take should be explained. You should also explain how you obtained the empirical model from the theoretical model, in terms of functional form, mathematical manipulation, and so on.

The empirical model is this:

$$Q_D = a_0 + b_1 P_d + b_2 M + b_3 Y_D + b_4 A + e$$

where P_d is the average diamond price, M is the number of marriages, Y_D is the disposable income of the consumer, A is the event of advertising, and e is the error term.

Data Explain the sources and methods of the data used to test the hypothesis.² What is the data set, and where did you obtain it? What data

transformations, if any, did you perform? If this discussion is complex, briefly summarize it in this section, and then refer the reader to a more extension discussion in the data appendix. This section of the paper should be explained in enough detail to persuade the reader that the data are adequate to fairly test the hypothesis.

I compiled data from the Trade DataWeb at the U.S. International Trade Commission website on the quantity of diamonds imported, the average price of a diamond for each month, personal disposable income, and the number of marriages occurring each month. I also constructed a dummy variable to indicate when new advertising campaigns began. I found seventy-two data points for each variable, one for each month over a period of six years. This data is located in the appendix at the end of this paper.

Hypothesized Results Before you present your actual results, it is critical for the validity of your test to identify the results that are predicted by and thus would support your hypothesis. For example, you should state the algebraic sign and magnitude (if this is predicted by the theory) for each variable in a regression equation:

I expect certain relationships between these economic factors. I predict that as advertising (my measure of tastes and preferences) increases, demand for diamonds will also increase. Likewise, as consumers' personal disposable income increases, so will the demand for diamonds. There should also be a positive correlation between marriages and number of diamonds demanded. Finally, I predict that as the price of diamonds increases, the quantity of diamonds demanded will decline, although I do not expect this correspondence to be as strong as the other relationships.

Actual Results Display your empirical results in a table or figure that is clearly visible in the text. (Only if there are many regressions should you put the results in the appendix; even then, summarize the key results in a table in the text.) A sample is shown in Figure 12.2. The table should include the sample size, estimated coefficients for each explanatory variable, some measure of statistical significance (e.g., p value, t statistic, or standard error) for each variable, and goodness of fit information (e.g., Adjusted R -squared). It should also include any relevant test statistics for possible econometric problems (e.g., Durbin-Watson statistic). Like all figures, this one should be clearly labeled and titled. Finally, you should refer readers to the table, not simply assume or hope they will find it.

Interpretation of the Results Once you have presented the empirical results, you need to interpret them for the reader. We noted in Chapter 2

Figure 12.2 Regression Results

Dependent Variable: Q				
Method: Ordinary Least Squares				
Sample: 1996:01 2001:12				
Included observations: 72				
Variable	Coefficient	t Statistic	P Value	
C	-2881179.000	-5.976	0.000	
P	-2231.395	-7.726	0.000	
M	1.469	2.311	0.024	
DI	585.034	6.947	0.000	
ADS	-25958.720	-0.263	0.793	
	R-Squared	0.692	Durbin-Watson	2.385
	Adjusted R-Squared	0.668	F-Statistic	29.695

that this is the part of the research process that novice researchers seem to most overlook, and yet it is here that your research hypothesis stands or fails.

How do the estimated coefficients compare with the predictions of the hypothesis? Were the estimated coefficients statistically significant? Were they economically significant? How do the results compare with those of previous studies? What can you conclude about the results from the goodness-of-fit statistics? Were there any statistical problems that need to be corrected in order to obtain valid results? If so, make clear that these are the corrected results.

It is unlikely that you will obtain perfect results—for example, where every estimated coefficient has the correct sign and is economically and statistically significant. Discuss any anomalous results and suggest explanations, where possible.

The results of my regression were fairly strong. My R-squared value indicates that I explained approximately 69% of the data with my model. All of my variables were significant except for advertising. Price was highly statistically significant which I did not expect. I was under the impression that De Beers kept prices fairly constant, but this is apparently not the case. The price coefficient was negative, which agrees with the theory of demand, in that price has a negative effect on the quantity demanded. Marriages were positively correlated with diamond demand, which also agreed with my hypothesis. This variable was not as statistically strong as some of my other factors. I believe that this is due to the effect of substitutes; diamonds

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Presenting Statistical Results

Never cut and paste regression results from your statistical software into your paper. Rather, choose the results that you wish to present. It's good practice to identify the dependent variable in a regression as well as the sample size. Omit anything from the regression results that you don't understand, since you could be asked to explain it. (Hopefully, this doesn't include any of the important results described earlier.) Finally, don't show more than a few significant digits for most entries in the table.

are not the only stone presented in engagement rings, and not every bride receives an engagement ring. Disposable income was also a very strong variable. It is positively related to the demand for diamonds, which indicates that as consumers' disposable incomes increase, the quantity of diamonds demanded will increase as well. On balance, my regression results seem to support my hypothesis. The majority of my variables were significant, and the coefficients had the signs that I expected. The advertising variable was not very satisfactory. I was expecting it to be positively correlated with diamond demand, and highly significant. Unfortunately, the regression showed that it was in fact negatively correlated with diamond demand and not very significant at all. I believe that this may be the result of poor data. I could not find a definitive source for advertising data on the Internet, so I used the few press releases that I could find to construct the dummy variable. If I could run the regression again, I would like to find empirical data for advertising. Empirical data would result in a more scientific evaluation of the advertising variable. I would also like to find data on substitutes for diamonds, such as prices and quantities of sapphires. I believe that these additions will allow my model to explain a large proportion of the data, improving its accuracy.

Conclusions

The purpose of this part of the research report is to summarize your findings, that is, to restate your argument and conclude whether or not it is valid. You should note that conclusions are inductive: in light of the

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A Failed Hypothesis Does Not Mean a Failed Project

Note that it is perfectly appropriate to conclude that, based on the empirical testing, the hypothesis fails. This does not mean your research is a failure or that you will obtain a poor grade. Nor should you reverse your hypothesis so that it is confirmed by the testing—this is bad science.

statistical results, what can you infer about your hypothesis? To what extent did your empirical testing confirm your analysis?

If the results confirm the hypothesis, before you congratulate yourself recall that those results may also be consistent with alternative hypotheses! In other words, a weak empirical testing design may not rule out plausible alternatives. Based on your empirical tests and results can you rule any alternatives out? If not, you should admit this in your concluding remarks. By admitting to the weaknesses of your argument, you actually make it stronger.

If the testing did not confirm the hypothesis, can you suggest reasons why it didn't? Were the data or testing methodology flawed? What do you know now that you wish you had known when you began the project? What could be done to improve the results, given additional time and effort?

Finally, what can be concluded about the research question more broadly?³ What have you learned from the project that might help other researchers in the field? For example, the literature on the relation between parental employment hours and children's cognitive development lacks consensus about whether the effects are permanent or temporary. This suggests that something fundamental is missing from the studies to date. A recent study concluded by proposing that what is missing in past studies is controlling for the *quality* of child-care, data for which has not been available in the past. Thus, rather than continuing to test with existing data, a more promising approach could be to develop data for child-care quality.

Other Components of the Paper

Research reports include several other components, some of which are optional. These include a title, an abstract, a table of contents, acknowledgments, references, and data and other appendices.

Title All research reports should have a carefully composed title. A good title, like a good introduction, is designed to capture the reader's interest. One way to capture interest is to pose your research question in the title, especially if it raises an angle that hasn't been thought of before. An example might be *Is Divorce Indebting Our Children?* Another way is to highlight counterintuitive findings of your research.

A good title will have an enigmatic quality; it will identify the research topic but leave enough unsaid to draw the reader in. One way to do this is by developing a two-part title, where the first part raises the general topic, and the second part poses a more specific question. Examples of this include:

Intergenerational Mobility: Do First-generation Immigrants Lag Behind?

All Men Created Unequal: Trends and Factors of Income Inequality in the United States

Wage Discrimination in the NBA, Does It Exist for Foreign-Born Players?

Because online searches often used titles as targets, it is good practice to specify the key concepts of the research in your title. You should be particularly careful about avoiding vague titles that don't make clear what the paper is about, such as

Aggregate Reflections of Brand Loyalty or Unraveling the Size Effect

If the reader can't figure out what the paper is about, he or she is unlikely to decide to read it, however good the research may be.

It is common to begin a research report with a title page. In addition to the report's title, the title page should include the author's name and affiliation and the date of the report. For a term paper, the affiliation would list the course the research is for and possibly the instructor's name. For a thesis or journal article, it would indicate the author's academic department and institution.

Abstract It is good practice to write an abstract of your research report. Refer to Chapter 6 for how to do this. Remember that in this age of electronic databases the abstract is likely to be searched for keywords. The abstract should be placed either on the title page or with the first page of text.

Table of Contents Any book-length research report or thesis will benefit from a table of contents. Make this a separate page. A table of contents is not usually included in a journal article.

Acknowledgments It is considered good form to acknowledge any substantial assistance you received in a research project. Acknowledgments in an article are usually positioned as an initial footnote under the title. For

theses and other book-length reports, acknowledgments are put on a separate page or pages.

Reference List All scholarly works should include a reference list or bibliography. Indeed, the inclusion of references is one feature that distinguishes scholarly from popular publications. The reference list should provide complete bibliographic information for those sources that you cite in your paper, using the appropriate bibliographic style. Refer back to Appendix 3A in Chapter 3 for detailed information on bibliographic styles. In general, it is not good practice to include references for “background information” or any sources that you did not mention in the text. Such references are usually an indication of padding.

Data and Other Appendices Research reports occasionally include appendices. Appendices contain details that are not essential to grasp the re-

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Style Suggestions

What follows are suggestions regarding the style of a research report. Style is a matter of taste and common practice, so feel free to deviate from these if you have a good reason to.

It is common practice to put the abstract on the title page of the paper, after the title, author, and other information. The abstract should be single-spaced. Some authors use narrower margins for the abstract vis-à-vis the rest of the text, while still visually centering the abstract on the page. That's fine, but make sure you align the text of the abstract with the left margin or both left and right margins.

Don't center-align the text in an abstract.

It will make
each line have a different length, which looks funny and
unprofessional.

The body of the paper should be double-spaced. Footnotes and references should be single-spaced. Include page numbers in the document for all pages after the title page. Always refer in the text to any figures that you provided to support your argument; you shouldn't assume that readers will find and make sense of them on their own.

Before you begin drafting your paper, you may wish to review Chapter 5 on economic writing. Start writing the report early enough

that you will have sufficient time for revisions. You don't need to wait until your results are finalized to begin writing. It's not uncommon for researchers to draft the report, except for the results and conclusions, before completing their empirical work. You want to craft your argument to maximize its impact on your readers. For example, page-long paragraphs suggest insufficiently deep thinking about the story you are telling. Remember, a paragraph is supposed to explain a single thought.

Don't begin your literature survey by indicating that no previous research has been done on your exact topic. That is actually a quite normal occurrence. Rather, think of a way to lead into the literature that you have found useful in formulating your own research. Refer to the authors of a study as people; don't treat the study as if it were making the argument. Don't say “Francos and Schairer (2003) notes”; say “Francos and Schairer (2003) note.”

Don't discuss the data or other empirical issues in the theoretical section of your paper. Remember, the theory section is supposed to develop your hypothesis, not test it.

Always state the empirical results predicted by the theory before you present the empirical results. If you performed multiple iterations of the empirical test, minimize discussion of the *process* that you went through to obtain the results. Don't say: I did this; then I did this; then I corrected for that. Rather, summarize the problems you ran into and what you did to address them; then present and discuss the final results. Don't begin presenting your results by discussing R-squared, since this is not the most important aspect of testing hypotheses. Estimated coefficients, which are not statistically significant, are considered zero, so don't overemphasize their sign or magnitude. Similarly, don't discuss the estimated coefficients independently of their statistical significance. If you present your regression results in the form of an equation, be sure that under each estimated coefficient you include the standard error, *t* score or *p* value so the reader can assess the statistical significance of each estimated coefficient.

Don't change your hypothesis after obtaining your results. It doesn't make the paper stronger, and it violates the scientific method. Rather, stick with your original hypothesis, but report that it fails. The paper will be stronger, and you will get a better grade. (Failure of the hypothesis does not cause a lower grade! A low grade is given for a poorly argued paper.)

searcher's argument, but that some readers may wish to have easy access to. A data appendix includes all the data you used in the empirical testing of the research project, along with complete information about your sources and methods. Refer to Chapter 9 for more detailed discussion of how to construct a data appendix. Other appendices might include survey questions used to develop data or empirical results from multiple tests that would distract readers from your argument if their details were included in the text of the report.