Daniel Stockemer

Quantitative Methods for the Social Sciences

A Practical Introduction with Examples in SPSS and Stata

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Contents

1 Introduction 1

2 The Nuts and Bolts of Empirical Social Science 5
2.1 What Is Empirical Research in the Social Sciences? 5
2.2 Qualitative and Quantitative Research 8
2.3 Theories, Concepts, Variables, and Hypothesis 10
2.3.1 Theories 10
2.3.2 Concepts 12
2.3.3 Variables 13
2.3.4 Hypotheses 16
2.4 The Quantitative Research Process 18
References 20

3 A Short Introduction to Survey Research 23
3.1 What Is Survey Research? 23
3.2 A Short History of Survey Research 24
3.3 The Importance of Survey Research in the Social Sciences and Beyond 26
3.4 Overview of Some of the Most Widely Used Surveys in the Social Sciences 27
3.4.1 The Comparative Study of Electoral Systems (CSES) . . . 28
3.4.2 The World Values Survey (WVS) 29
3.4.3 The European Social Survey (ESS) 30
3.5 Different Types of Surveys 30
3.5.1 Cross-sectional Survey 31
3.5.2 Longitudinal Survey 32
References 34

4 Constructing a Survey 37
4.1 Question Design 37
4.2 Ordering of Questions 38
4.3 Number of Questions 38
4.4 Getting the Questions Right 38
4.4.1 Vague Questions 39
4.4.2 Biased or Value-Laden Questions 39

4.4.3 Threatening Questions . . . 39
4.4.4 Complex Questions . . . 40
4.4.5 Negative Questions . . . 40
4.4.6 Pointless Questions . . . 40
4.5 Social Desirability . . . 41
4.6 Open-Ended and Closed-Ended Questions . . . 42
4.7 Types of Closed-Ended Survey Questions . . . 44
4.7.1 Scales . . . 44
4.7.2 Dichotomous Survey Questions . . . 47
4.7.3 Multiple-Choice Questions . . . 47
4.7.4 Numerical Continuous Questions . . . 48
4.7.5 Categorical Survey Questions . . . 48
4.7.6 Rank-Order Questions . . . 49
4.7.7 Matrix Table Questions . . . 49
4.8 Different Variables . . . 50
4.9 Coding of Different Variables in a Dataset . . . 51
4.9.1 Coding of Nominal Variables . . . 51
4.10 Drafting a Questionnaire: General Information . . . 52
4.10.1 Drafting a Questionnaire: A Step-by-Step Approach . . . 53
4.11 Background Information About the Questionnaire . . . 54
References . . . 55

5 Conducting a Survey . . . 57
5.1 Population and Sample . . . 57
5.2 Representative, Random, and Biased Samples . . . 58
5.3 Sampling Error . . . 62
5.4 Non-random Sampling Techniques . . . 62
5.5 Different Types of Surveys . . . 64
5.6 Which Type of Survey Should Researchers Use? . . . 67
5.7 Pre-tests . . . 67
5.7.1 What Is a Pre-test? . . . 67
5.7.2 How to Conduct a Pre-test? . . . 69
References . . . 69

6 Univariate Statistics . . . 73
6.1 SPSS and Stata . . . 73
6.2 Putting Data into an SPSS Spreadsheet . . . 73
6.3 Putting Data into a Stata Spreadsheet . . . 75
6.4 Frequency Tables . . . 76
6.4.1 Constructing a Frequency Table in SPSS . . . 77
6.4.2 Constructing a Frequency Table in Stata . . . 78
6.5 The Measures of Central Tendency: Mean, Median, Mode, and Range . . . 79
6.6 Displaying Data Graphically: Pie Charts, Boxplots, and Histograms . . . 80

6.6.1 Pie Charts . . . 80
6.6.2 Doing a Pie Chart in SPSS . . . 82
6.6.3 Doing a Pie Chart in Stata . . . 83
6.7 Boxplots . . . 84
6.7.1 Doing a Boxplot in SPSS . . . 86
6.7.2 Doing a Boxplot in Stata . . . 86
6.8 Histograms . . . 87
6.8.1 Doing a Histogram in SPSS . . . 88
6.8.2 Doing a Histogram in Stata . . . 90
6.9 Deviation, Variance, Standard Deviation, Standard Error, Sampling Error, and Confidence Interval . . . 91
6.9.1 Calculating the Confidence Interval in SPSS . . . 95
6.9.2 Calculating the Confidence Interval in Stata . . . 96
Further Reading . . . 98

7 Bivariate Statistics with Categorical Variables . . . 101
7.1 Independent Sample *t*-Test . . . 101
7.1.1 Doing an Independent Samples *t*-Test in SPSS . . . 104
7.1.2 Interpreting an Independent Samples *t*-Test SPSS Output . . . 106
7.1.3 Reading an SPSS Independent Samples *t*-Test Output Column by Column . . . 107
7.1.4 Doing an Independent Samples *t*-Test in Stata . . . 108
7.1.5 Interpreting an Independent Samples *t*-Test Stata Output . . . 109
7.1.6 Reporting the Results of an Independent Samples *t*-Test . . . 111
7.2 *F*-Test or One-Way ANOVA . . . 111
7.2.1 Doing an *f*-Test in SPSS . . . 113
7.2.2 Interpreting an SPSS ANOVA Output . . . 115
7.2.3 Doing a Post hoc or Multiple Comparison Test in SPSS . . . 116
7.2.4 Doing an *f*-Test in Stata . . . 119
7.2.5 Interpreting an *f*-Test in Stata . . . 120
7.2.6 Doing a Post hoc or Multiple Comparison Test with Unequal Variance in Stata . . . 121
7.2.7 Reporting the Results of an *f*-Test . . . 124
7.3 Cross-tabulation Table and Chi-Square Test . . . 125
7.3.1 Cross-tabulation Table . . . 125
7.3.2 Chi-Square Test . . . 126
7.3.3 Doing a Chi-Square Test in SPSS . . . 127
7.3.4 Interpreting an SPSS Chi-Square Test . . . 128
7.3.5 Doing a Chi-Square Test in Stata . . . 130
7.3.6 Reporting a Chi-Square Test Result . . . 131
Reference . . . 131

8 Bivariate Relationships Featuring Two Continuous Variables 133
8.1 What Is a Bivariate Relationship Between Two Continuous Variables? 133
8.1.1 Positive and Negative Relationships 133
8.2 Scatterplots 134
8.2.1 Positive Relationships Displayed in a Scatterplot 134
8.2.2 Negative Relationships Displayed in a Scatterplot 134
8.2.3 No Relationship Displayed in a Scatterplot 135
8.3 Drawing the Line in a Scatterplot 136
8.4 Doing Scatterplots in SPSS 136
8.5 Doing Scatterplots in Stata 139
8.6 Correlation Analysis 142
8.6.1 Doing a Correlation Analysis in SPSS 144
8.6.2 Interpreting an SPSS Correlation Output 145
8.6.3 Doing a Correlation Analysis in Stata 147
8.7 Bivariate Regression Analysis 148
8.7.1 Gauging the Steepness of a Regression Line 148
8.7.2 Gauging the Error Term 150
8.8 Doing a Bivariate Regression Analysis in SPSS 152
8.9 Interpreting an SPSS (Bivariate) Regression Output 153
8.9.1 The Model Summary Table 153
8.9.2 The Regression ANOVA Table 154
8.9.3 The Regression Coefficient Table 155
8.10 Doing a (Bivariate) Regression Analysis in Stata 156
8.10.1 Interpreting a Stata (Bivariate) Regression Output 157
8.10.2 Reporting and Interpreting the Results of a Bivariate Regression Model 160
Further Reading 161

9 Multivariate Regression Analysis 163
9.1 The Logic Behind Multivariate Regression Analysis 163
9.2 The Functional Forms of Independent Variables to Include in a Multivariate Regression Model 165
9.3 Interpretation Help for a Multivariate Regression Model 166
9.4 Doing a Multiple Regression Model in SPSS 166
9.5 Interpreting a Multiple Regression Model in SPSS 166
9.6 Doing a Multiple Regression Model in Stata 168
9.7 Interpreting a Multiple Regression Model in Stata 168
9.8 Reporting the Results of a Multiple Regression Analysis 170
9.9 Finding the Best Model 170
9.10 Assumptions of the Classical Linear Regression Model or Ordinary Least Square Regression Model (OLS) 171
Reference 174

political scientists to both conduct their own research and judge and evaluate other peoples' work. This book will provide a first simple toolkit in the area of quantitative methods, survey research, and statistics.

There is one caveat in methods training: research methods can hardly be learnt by just reading articles and books. Rather, they need to be learnt in an applied fashion. Similar to the mixture of theoretical and practical training a mason acquires during her apprenticeship, political science students should be introduced to methods' training in a practical manner. In particular, this applies to quantitative methods and survey research. Aware that methods learning can only be fruitful if students learn to apply their theoretical skills in real-world scenarios, I have constructed this book on survey research and quantitative methods in a very practical fashion.

Through my own experience as a professor of introductory courses into quantitative method, I have learnt over and over again that students only enjoy these classes if they see the applicability of the techniques they learn. This book follows the structure as laid down in Fig. 1.1; it is structured so that students learn various statistical techniques while using their own data. It does not require students to have taken prior methods classes. To lay some theoretical groundwork, the first chapter starts with an introduction into the nuts and bolts of empirical social sciences (see Chap. 2). The book then shortly introduces students to the nuts and bolts of survey research (see Chap. 3). The following chapter then very briefly teaches students how they can construct and administer their own survey. At the end of Chap. 4, students also learn how to construct their own questionnaire. The fifth chapter, entitled "Conducting a Survey," instructs students on how to conduct a survey in the field. During this chapter, groups of students test their survey in an empirical setting by soliciting answers from peers. Chapters 6 to 9 are then dedicated to analyzing the survey. In more detail, students learn how to input their responses into either an SPSS or STATA dataset in the first part of Chap. 6. The second part covers univariate statistics and graphical representations of the data. In Chap. 7, I introduce different forms of means testing, and Chap. 8 is then dedicated to bivariate correlation and regression analysis. Finally, Chap. 9 covers multivariate regression analysis).

The book can be used as a self-teaching device. In this case, students should redo the exercises with the data provided. In a second step, they should conduct all the tests with other data they have at their disposal. The book is also the perfect accompanying textbook for an introductory class to survey research and statistics. In the latter case, there is a built-in semester-long group exercise, which enhances the learning process. In the semester-long group work that follows the sequence of the book, students are asked to conceive, conduct, and analyze survey. The survey that is analyzed throughout is a colloquial survey that measures the amount of money students spend partying. Actually, the survey is an original survey including the original data, which one of my student groups collected during their semester-long project. Using this "colloquial" survey, the students in this study group had lots of fun collecting and analyzing their data, showing that learning statistics can (and should) be fun. I hope that the readers and users of this book experience the same joy in their first encounter with quantitative methods.

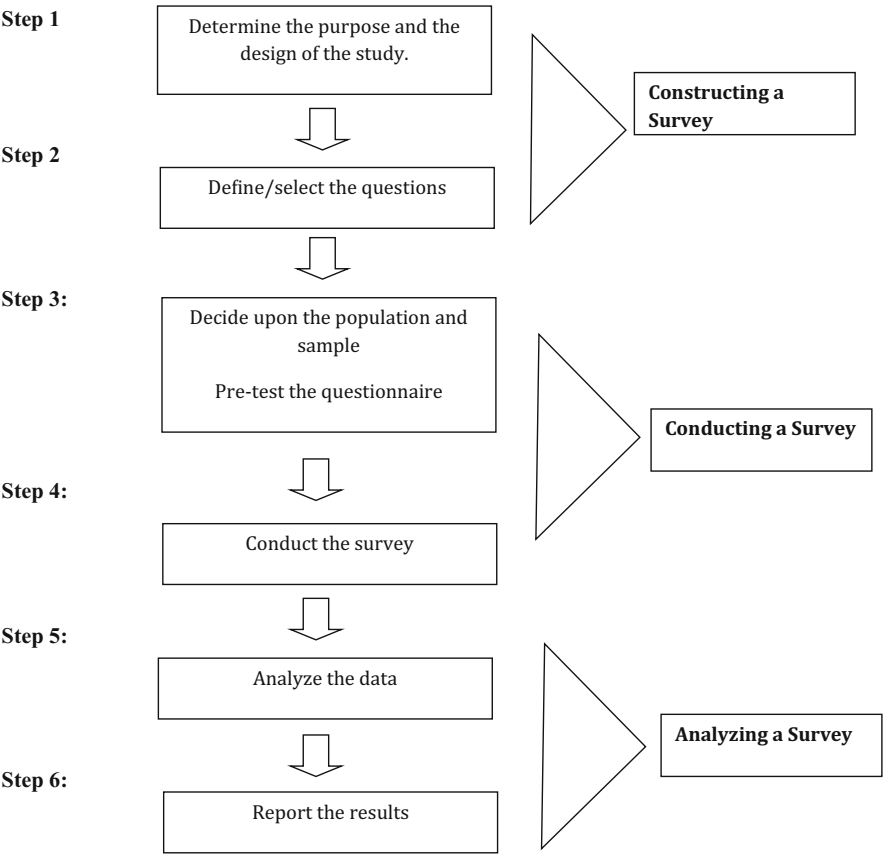

Fig. 1.1 Different steps in survey research

The Nuts and Bolts of Empirical Social Science

2

Abstract

This chapter covers the nuts and bolts of empirical political science. It gives an introduction into empirical research in the social sciences and statistics; explains the notion of concepts, theories, and hypotheses; as well as introduces students to the different steps in the quantitative research process.

2.1 What Is Empirical Research in the Social Sciences?

Regardless of the social science sub-discipline, empirical research in the social sciences tries to decipher how the world works around us. Be it development studies, economics, sociology, political science, or geography, just to name a few disciplines, researchers try to explain how some part of how the world is structured. For example, political scientists try to answer why some people vote, while others abstain from casting a ballot. Scholars in developmental studies might look at the influence of foreign aid on economic growth in the receiving country. Researchers in the field of education studies might examine how the size of a school class impacts the learning outcomes of high school students, and economists might be interested in the effect of raising the minimum wage on job growth. Regardless of the discipline they are in, social science researchers try to explain the behavior of individuals such as voters, protesters, and students; the behavior of groups such as political parties, companies, or social movement organizations; or the behavior of macro-level units such as countries.

While the tools taught in this book are applicable to all social science disciplines, I mainly cover examples from empirical political science, because this is the discipline in which I teach and research. In all social sciences and in political science, more generally, knowledge acquisition can be both normative and empirical. Normative political science asks the question of how the world ought to be. For example, normative democratic theorists quibble with the question of what a democracy ought

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to be. Is it an entity that allows free, fair, and regular elections, which, in the democracy literature, is referred to as the "minimum definition of democracy" (Bogaards 2007)? Or must a country, in addition to having a fair electoral process, grant a variety of political rights (e.g., freedom of religion, freedom of assembly), social rights (e.g., the right to health care and housing), and economic rights (e.g., the right to education or housing) to be "truly" democratic? This more encompassing definition is currently referred to in the literature as the "maximum definition of democracy" (Beetham 1999). While normative and empirically oriented research have fundamentally different goals, they are nevertheless complementary. To highlight, an empirical democracy researcher must have a benchmark when she defines and codes a country as a democracy or nondemocracy. This benchmark can only be established through normative means. Normative political science must establish the "gold standard" against which empirically oriented political scientists can empirically test whether a country is a democracy or not.

As such, empirical political science is less interested in what a democracy should be, but rather how a democracy behaves in the real world. For instance, an empirical researcher could ask the following questions: Do democracies have more women's representation in parliament than nondemocracies? Do democracies have less military spending than autocracies or hybrid regimes? Is the history curriculum in high schools different in democracies than in other regimes? Does a democracy spend more on social services than an autocracy? Answering these questions requires observation and empirical data. Whether it is collected at the individual level through interviews or surveys, at the meso-level through, for example, membership data of parties or social movements, or at the macro level through government/international agencies or statistical offices, the collected data should be of high quality. Ideally, the measurement and data collection process of any study should be clearly laid down by the researcher, so that others can replicate the same study. After all, it is our goal to gain intersubjective knowledge. Intersubjective means that if two individuals would engage in the same data collection process and would conduct the same empirical study, their results would be analogous. To be as intersubjective or "facts based" as possible, empirical political science should abide by the following criteria:

Falsifiability The falsifiability paradigm implies that statements or hypotheses can be proven or refuted. For example, the statement that democracies do not go to war with each other can be tested empirically. After defining what war and democracy is, we can get data that fits our definition for a country's regime type from a trusted source like the *Polity IV* data verse and data for conflict/war from another high-quality source such as the *UCDP/PRIO Armed Conflict* dataset. In second stop, we

can then use statistics to test whether the statement that democracies refrain from engaging in warfare with each other is true or not.[1,2]

Transmissibility The process through which the transmissibility of research findings is achieved is called replication. Replication refers to the process by which prior findings can be retested. Retesting can involve either the same data or new data from the same empirical referents. For instance, the "law-like" statement that democracies do not go to war with each other could be retested every 5 years with the most recent data from *Polity IV* and the *UCDP/PRIO Armed Conflict* dataset covering these 5 years to see if it still holds. Replication involves high scientific standards; it is only possible to replicate a study if the data collection, the data source, and the analytical tools are clearly explained and laid down in any piece of research. The replicator should then also use these same data and methods for her replication study.

Cumulative Nature of Knowledge Empirical scientific knowledge is cumulative. This entails that substantive findings and research methods are based upon prior knowledge. In short, researchers do not start from scratch or intuition when engaging in a research project. Rather, they try to confirm, amend, broaden, or build upon prior research and knowledge. For example, the statement that democracies avoid war with each other had been confirmed and reconfirmed many times in the 1980s, 1990s, and 2000s (see Russett 1994; De Mesquita et al. 1999). After confirming that the *Democratic Peace Theory* in its initial form is solid, researchers tried to broaden the democratic peace paradigm and examined, for example, if countries that share the same economic system (e.g., neoliberalism) also do not go to war with each other. Yet, for the latter relationship, tests and retests have shown that the empirical linkage for the economic system's peace is less strong than the democratic peace statement (Chandler 2010). The same applies to another possible expansion, which looks at if democracies, in general, are less likely to go to war than nondemocracies. Here again the empirical evidence is negative or inconclusive at best (Daase 2006; Mansfield and Snyder 2007).

Generalizability In empirical social science, we are interested in general rather than specific explanations; we are interested in boundaries or limitations of empirical statements. Does an empirical statement only apply to a single case (e.g., does it only explain why the United States and Canada have never gone to war), or can it be generalized to explain many cases (e.g., does it explain why all pairs of democracies don't go to war?) In other words, if it can be generalized, does the democratic peace

[1]The Polity IV database adheres to rather minimal definition of democracy. In essence, the database gauges the fairness and competitiveness of the elections and the electoral process on a scale from −10 to +10. −10 describes the "worst" autocracy, while 10 describes a country that fully respects free, fair, and competitive elections (Marshall et al. 2011).

[2]The UCDP/PRIO Armed Conflict Dataset defines minor wars by a death toll between 25 and 1000 people and major wars by a death toll of 1000 people and above (see Gleditsch 2002).

paradigm apply to all democracies, or only to neoliberal democracies, and does it apply across all (normative) definitions of democracies, as well as all time periods?). Stated differently, we are interested in the number of cases in which the statement is applicable. Of course, the broader the applicability of an explanation, the more weight it carries. In political science the Democratic Peace Theory is among the theories with the broadest applicability. While there are some questionable cases of conflict between states such as the conflict between Turkey and Greece over Cyprus in 1974, there has, so far, been no case that clearly disproves the Democratic Peace Theory. In fact, the Democratic Peace Theory is one of the few law-like rules in political science.

2.2 Qualitative and Quantitative Research

In the social sciences, we distinguish two large strands of research: quantitative and qualitative research. The major difference between these two research traditions is the number of observations. Research that involves few observations (e.g., one, two, or three individuals or countries) is generally referred to as qualitative. Such research requires an in-depth examination of the cases at hand. In contrast, work that includes hundreds, thousands, or even hundred thousand observations is generally called quantitative research. Quantitative research works with statistics or numbers that allow researchers to quantify the world. In the twenty-first century, statistics are nearly everywhere. In our daily lives, we encounter statistics in approval ratings of TV shows, the measurement of consumer preferences, weather forecasts, and betting odds, just to name a few examples. In social and political science research, statistics are the bread and butter of much scientific inquiry; statistics help us make sense of the world around us. For instance, in the political realm, we might gauge turnout rates as a measurement of the percentage of citizens that turned out during an election. In economics, some of the most important indicators about the state of the economy are monthly growth rates and consumer price indexes. In the field of education, the average grade of a student from a specific school gives an indication of the school's quality.

By using statistics, quantitative methods not only allow us to numerically describe phenomena, they also help us determine relationships between two or more variables. Examples of these relationships are multifold. For example, in the field of political science, statistics and quantitative methods have allowed us to detect that citizens who have a higher socioeconomic status (SES) are more likely to vote than individuals with a lower socioeconomic status (Milligan et al. 2004). In the field of economics, researchers have established with the help of quantitative analysis that low levels of corruption foster economic growth (Mo 2001). And in education research, there is near consensus in the quantitative research tradition that students from racially segregated areas and poor inner-city schools, on average, perform less strongly in college entry exams than students from rich, white neighborhoods (Rumberger and Palardy 2005).