SYSTAT Application Notes

Empirical Political Analysis Using SYSTAT

Introduction

Curiosity and necessity are the primary motives underlying human inquiry. Either we seek to understand the world around us for the sake of knowledge, or we seek to understand it so that we may protect or better our lot in it.

Whichever is the case, our knowledge often brings with it, at least potentially, a recognition of certain ways to improve upon things as they are. To put that another way, the more we learn about our environment, social as well as physical, the better equipped we are to manipulate, or adapt to, it.

This is as true of our knowledge of politics as it is of other fields. The key to understanding and altering our political environment is, most simply, knowing more about it (Manheim et al. (2002)).

Often in political science research, tables and charts alone do not tell us enough about our data to permit a satisfactory answer to our research question. Therefore political scientists employ statistical techniques that call for highly sophisticated analysis.

Statistical methods are a form of mathematical shorthand capable of telling us at a glance and with great precision what our data show (or, in many cases, what they do not show).What is the political philosophy of the typical college student? Do Hispanic voters differ systematically in their party preferences from blacks?

What kinds of actions or situations in the world community are most likely to give rise to armed conflict? If the proper data are applied for analysis, then these can answer the above questions and many more. To deal with this problem and to increase the ease, accuracy, and sophistication of our analysis, SYSTAT is used for performing statistical analysis.

Applications

Schneider et al. (2003) examine the causes of the retreat of the state from infrastructural sectors (privatization) as well as the content of various theoretical approaches to explain institutional reform in this context.

They first describe changes in state ownership in formerly public monopoly enterprises in the three classical infrastructure sectors telecommunications, electricity, and aviation between 1970 and 2000 in 26 OECD (Organization for Economic Co-operation and Development) countries.

The dynamics of these changes are mapped by Partial Order Scalogram Analysis with Coordinates (POSAC) using SYSTAT and visually depicted on the basis of country-specific development trajectories. Along with this purely descriptive presentation of the development of privatization, they have tested the capacity of a number of political and economic theories to explain the emergence and pattern of privatization processes.

Using regression analysis they aim to pinpoint which of the pertinent theories and hypotheses on the state's capacity to act best explains the factors behind privatization in the western industrial nations.

Also it has been shown that the party difference hypothesis holds great predictive power for the early phase of privatization in the 1980's. In the 19901s, however, party influence disappears rapidly. For this period the liberalization of capital markets (globalization hypothesis) serves to explain the variance in the provision of infrastructure services between the OECD countries in the most plausible fashion.

The image of the electorate that emerges from the bulk of the empirical evidence presented by political scientists is an extreme one. One gets the impression that the modern citizen relies heavily on his or her own beliefs and attitudes, and only marginally on the advice of others when making political choices.

Of course, few would agree that this "social vacuum" model of political choice accurately represents reality for most Americans. The question Levine (2002) has attempted to answer, therefore, is to what extent do modern citizens conform to the model of the socially- isolated citizen?

By shifting the focus away from the sorts of social groups typically studied in political science (i.e., demographic groups) toward social networks, Levine demonstrate that even after controlling for powerful individual-level attitudinal variables, social network members exert a direct, powerful, and consistent impact on the choices of modern citizens.

These findings provide evidence using a national sample and in a recent election year to support the notion that individual choice is fundamentally dependent on informal interactions with others, a claim originally made decades ago, but only sparingly tested since. In addition, the evidence suggests that social influence is not restricted to networks of family members or close friends; a significant amount of persuasion in fact occurs beyond the boundaries of such intimate relationships. Indeed,

Levine discovered that non-married discussants as well as non-relative discussants exert a powerful impact on political choice. What's more, intimate relationships outside the family do not appear to possess the characteristics that have been widely found to facilitate social influence, and, for six important political decisions, there is scant evidence to suggest that intimacy actually does enhance social influence.

Huckfeldt and Sprague's modification of the two-stage logit procedure using SYSTAT has been employed for analysis. Schrodt (1994) discuss a model of rule-based adaptive behavior in foreign policy based on Wright's concept of an "adaptive landscape" and Kauffman's work on the characteristics of optimization on such a surface.

The model accounts for several regularities observed in international behavior. First, behavior governed by a landscape model will show long periods of stability punctuated by periods of rapid change.

Second, the existence of stable rule regimes is virtually inevitable; in the presence of a hegemon these regimes are established more quickly but have a utility lower than that likely to occur in the absence of a hegemon.

Third, incremental strategies are rational and precedent is useful as a guide to policy. Finally, innovation occurs primarily in the context of crises. - Kauffman and Johnsen suggest that a system whose level of rule interactions optimizes utility on a landscape will exhibit a power-law distribution of changes.

This prediction is strongly supported in an examination of WEIS event data for the Middle East (1982-1992) and COPDAB data for the USA--->USSR (1948-1978). A tuned system should also show an l/f power spectrum. This spectrum is found only in dyads exhibiting protracted conflict; departures from the l/f pattern seem to be related to the degree of cooperation in the dyad. Each time series was estimated using the Fast Pourier transform (FFT) in SYSTAT.

Conclusions

The description above just gave a bird's eye view of SYSTAT's capabilities. But SYSTAT provides a powerful statistical and graphical analysis system in a graphical environment using descriptive menus and simple dialog boxes. SYSTAT's command language provides functionality not available in the dialog box interface in addition to complete coverage of menu-based functionality.

Robust algorithms from leading statisticians give meaningful results even with extreme data. Create missing value estimates using regression based point estimation or an EM algorithm.

Obtain complete distributions and standard errors using SYSTAT's bootstrapping capability implemented globally across 21 statistical procedures even when normality assumptions are violated and no model is available. Matrix procedure allows you to use matrix algebra to specify statistical analyses and perform data management tasks.

SYSTAT offers more scientific and technical graphing options than any other desktop statistics package.

Compare subgroups, overlay charts, and transform coordinates, change colors, symbols and more to create insightful presentations. Speed up your analysis by rotating your 3-D graphs to visually determine the perfect power or log transformation to normalize your data using the Dynamic Explorer to speed up your analysis. Create compelling reports by combining formatted statistical output with publication-quality graphs in SYSTAT's rich text output window.

Appendix

Crosstabulation and Loglinear models using SYSTAT

When variables are categorical, frequency tables (crosstabulations) provide useful summaries. For a report, you may need only the number or percentage of cases falling in specified categories or crossclassifications. At times, you may require a test of independence or a measure of association between two categorical variables. Or, you may want to model relationships among two or more categorical variables by fitting a loglinear model to the cell frequencies.

Both Crosstabs and Loglinear Model can make, analyze, and save frequency tables that are formed by categorical variables (or table factors). The values of the factors can be character or numeric. Both procedures form tables using data read from a cases-by-variables rectangular file or recorded as frequencies (for example, from' a table in a report) with cell indices. In Crosstabs, you can request percentages of row total, column totals, or the total sample size. Crosstabs provides three types of frequencytables:

- One-way Frequency counts, percentages, and confidence intervals on cell proportions for single table factors or categorical variables

- Two-way Frequency counts, percentages, tests, and measures of association for the crosstabulation of two factor

- Multi-way Frequency counts and percentages for series of two-way tables stratified by all combinations of values of a third, fourth, etc., table factor

Loglinear models are useful for analyzing relationships among the factors of a multiway frequency table. The loglinear procedure computes maximum likelihood estimates of the parameters of a loglinear model by using the Newton-Raphson method. For each user specified model, a test of fit of the model is provided, along with observed and expected cell frequencies, estimates of the loglinear parameters (lambdas), standard errors of the estimates, the ratio of each lambda to its standard error, and multiplicative effects (ExP(l=b)).

For each cell, you can request its contribution to the Pearson chi-square or the likelihood-ratio chi-square. Deviates, standardized deviates, Freeman-Tukey deviates, and likelihood-ratio deviates are available to characterize departures of the observed values from expected values.

When searching for the best model, you can request tests after removing each first-order effect or interaction term one at a time individually or hierarchically (when a lower-order effect is removed, so are its respective interaction terms).The models do not need to be hierarchically. You can specify cells that contain structural zeros (cells that are empty naturally or by design, not by sampling), and fit a model to the subset of cells that remain. A test of fit for such a model is often called a test of quasi-independence.

References (in order of appearance)

Jar01 B. Manheim, Richard C. Rich and Lars Willnat (2002). Empirical Political Analysis, 5th Ed. Addison
Wesley Longman, Inc., New York.

Volker Schneider, Simon Fink and Marc Tenbiicken (2003). Measuring and Explaining Institutional Reform: The Privatization of Infrastructures. Paper to be presented at the ECPR Joint Session of Workshops, Edinburgh 2003, Workshop No. 5, 'Institutional Theory: Issues of Measurement and Change: organized by Guy B. Peters and Uwe Serdiilt.

Jeffrey Levine (2002). Choosing Alone? A Return to the Network Basis of Political Choice. Revised version of a
Paper prepared for presentation at the Conference on the Social Context of Politics, Brown University, June 2-4,
2002.

Philip A. Schrodt (1994). A Landscape Model of Rule based Co-adaptation in International Behavior.

Corporate Headquarters
North, Central & South America
Systat Software, Inc.
2107 North First Street, Suite 360
San Jose, CA 95131-2026 USA
Phone : 800-797-7401
Fax : 800-797-7406
Email : info-usa@systat.com

UK and Ireland
Systat Software Inc
4th Floor, Block B, Vista Centre,
50, Salisbury Road,
Hounslow, - TW4 6JQ, London, UK.
Phone : +44-(0)208-538 0128
Fax : + 44-(0)208-538 0273
Email : info@systat.co.uk

Germany and Austria
Systat Software GmbH
Schimmelbuschstrasse 25
D-40699 Erkrath
Germany
Phone: +49.2104.9540
Fax: +49.2104.95410
E-mail: kontakt@systat.de

Asia-Pacific, AUS & NZ
Phone : +91 - 80 - 4128 1111
Fax : +91 - 80 - 4128 0203
Email : info-intl@systat.com