17. *Writing about Event History Analysis*

SUGGESTED COURSE EXTENSIONS

A. Reviewing

1. Find an article in your field about an application of Cox proportional hazards models. Use the guidelines in chapter 17 of *Writing about Multivariate Analysis, 2nd Edition* to evaluate whether they justified use of an event history analysis based on the following criteria:

    a. Theory for the topic;
    b. Previous literature on the topic;
    c. Data structure.

2. For the same article as in question A.1, evaluate the following aspects of their data and methods section:

    a. The units in which time is measured;
    b. The definition of the event(s) under study;
    c. Whether the event is repeatable;
        i. If so, whether they included all spells for each case, and what statistical corrections they made for multiple spells per case.
        ii. If they did not include all spells for a repeatable event, what criteria they used to select cases for their analysis.
    d. What comprises censoring in their data;
    e. The source(s) of data from which the event history was constructed;
    f. Whether they used dates of events, status at different time points, or respondent reports of time since event to calculate duration of each period at risk and the indicator of event or censoring;
    g. The maximum possible length of the follow-up and dates or intervals of follow-up;
    h. Whether any of the independent variables were specified as time-varying; if so
        i. the timing of those measures;
        ii. the sources of information for the values of that variable at different time points.
    i. Diagnostics for proportionality of hazards.

3. For the same article you used for question A.1, evaluate the following aspects of their results section, using the guidelines in chapter 17.

    a. Whether they include a graph or table of the unadjusted (univariate or stratified) temporal pattern of event occurrence;
    b. Whether they interpret the direction, magnitude, and statistical significance of hazards ratios for key independent variables;
    c. If they specify time-dependent effects, whether they convey how the hazards ratios change over time;
        i. in prose
        ii. in a chart
    d. If they included time-dependent covariates, whether they described how values of that variable changed over time.
    e. Rewrite the materials to rectify any shortcomings you identify in parts b, c, and d.

B. Applying Statistics and Writing

For the following questions, identify a data set that includes information needed to create an event history data set. Conduct the following steps, using the guidelines in chapter 17 of *Writing about Multivariate Analysis, 2nd Edition*.

1. Identify a single-decrement nonrepeatable event for which an event history can be created from your data set. Write the portion of the data and methods section that explains how you created the event history for that event from the original data source. Cover the following elements:

    a. The event under study (e.g., what type of transition is to be analyzed);
    b. Whether you used dates of events, status at different time points, or respondent reports of time since event to calculate duration of each period at risk and the indicator of event or censoring;
    c. What constitutes right censoring in your data and for your topic (type of event);
    d. Whether the data are affected by left censoring;
    e. The units of time used to measure duration;
    f. Whether you conduct a discrete time or continuous time event history analysis.

2. For the event you selected for the preceding question and a two- or three- category independent variable (e.g., gender or employment status) related to your research question to conduct these steps, using the guidelines in chapter 17

    a. Create a table to report the following descriptive statistical information, for the overall sample and for each subgroup defined based on that categorical independent variable.

   i. total number of spells observed in the sample or subgroup;
   ii. number of events observed in the sample or subgroup;
   iii. total person-time at risk in the sample or subgroup;
   iv. median time to event (if observed in your data);
   v. proportion of cases that were censored at the end of the observation period;
   vi. proportion of cases that experience the event by a specified time since baseline that is suited to your topic and data.
b. Create a chart to display the temporal pattern of event occurrence (hazard curves),
   i. overall;
   ii. stratified by the categorical independent variable.
c. Write a description of results of a bivariate statistical test of whether the pattern of event occurrence differs across categories of your key independent variable. Discuss whether the hazards curves in the chart are proportional (parallel), and if not, whether they converge, diverge, or are disordinal (see chapter 16 of *Writing about Multivariate Analysis, 2nd Edition)*, and the implications of that pattern for your multivariate hazards specification.

3. Estimate a Cox proportional hazards model of the event analyzed in the preceding question, including the categorical independent variable from question B.2 and one continuous independent variable.

   a. Create a table to report the hazards ratios, inferential statistical information, and model goodness-of-fit statistics, following the guidelines in chapters 11 and 17 of *Writing about Multivariate Analysis, 2nd Edition*.
   b. Write a sentence to interpret the direction, magnitude, and statistical significance of the hazards ratio on a categorical independent variable in your model.
   c. Write a sentence to interpret the direction, magnitude, and statistical significance of the hazards ratio on a continuous independent variable in your model.

4. Using the same data and variables as in question B.3, estimate a nonproportional hazards model by interacting time since baseline with the independent variable used in question B.2.

   a. Create a table to report the hazards ratios, inferential statistical information, and model goodness-of-fit statistics.
   b. Create a chart to convey the shape of the nonproportional hazards association between the independent variable and time.
   c. Write a sentence to interpret the direction, magnitude, and statistical significance of the time-dependent effect.
   d. Conduct and interpret results of a comparison in model goodness of fit for the proportional and nonproportional hazards specifications in questions B.3 and B.4, respectively, using the guidelines on pp. 334–35.

5. For a categorical time-varying covariate (independent variable) in your data

    a. Create a table of descriptive statistics to show how the distribution of that variable changes over time since baseline.
    b. Write a description of that pattern, following the guidelines in chapter 17.

6. For a continuous time-varying covariate (independent variable) in your data

    a. Create a chart to portray how the mean value of that variable changes over time since baseline.
    b. Write a description of that pattern.

7. Estimate a hazard model with the time-varying covariate from *either* question B.5 or B.6.

    a. Write a sentence to interpret the hazard ratio on the time-varying covariate.
    b. Conduct and interpret results of a comparison in model goodness of fit of the models with time-invariant and time-varying covariates from the specifications in questions B.3 and B.7, respectively and the guidelines on pp. 334–35.

C. Revising

1. For a paper you have written previously on an application of a Cox proportional hazards model, repeat question A.1 (on the introduction).

2. For that same paper, repeat question A.2 (on the data and methods section).

3. For that same paper, repeat question A.3 (on the results section).

4. Design a survival or hazards chart to convey the unadjusted pattern of event occurrence for a paper you have written previously about an application of event history analysis.

5. Have a peer evaluate a table of descriptive statistics you previously created for an event history analysis, using the guidelines in chapter 17. Revise it to rectify any shortcomings they identify.

6. Have a peer evaluate a table of multivariate hazards results you previously created. Revise it to rectify any shortcomings they identify.

7. Exchange revised drafts of the materials in questions C.1 through C.4 with someone writing about an application of event history analysis to a different topic or data set. Peer-edit each other's work and revise according to the feedback you receive.