Bayesian Econometrics

Course Description and Outline

Subject Matter:

This course provides a graduate level introduction to Bayesian econometrics. We begin with a basic introduction to the Bayesian approach, and then examine how familiar estimation problems can be recast in a Bayesian light. Emphasis is practical technique, rather than philosophical questions.

GauchoSpace site:
https://gauchospace.ucsb.edu/courses/course/view.php?id=15613

Prerequisites:

You should have had the first year graduate sequence in econometrics, Economics 241A/B/C.

Instructor:

Professor Dick Startz, startz@ucsb.edu, office hours: Tuesday 2:00-3:00 or knock on door. Office: North Hall 3038.

Course Requirements:

The required text for the course is: Bayesian Econometrics, by Gary Koop, John Wiley & Sons.

There are three basic course requirements:

1. Do all the questions in the “Class Questions” document. (Some of these are easy, some are quite hard and will take considerable time.) Be prepared to teach the answer to each question, including explaining how your Matlab code works. I will call on someone randomly to present each question (unless someone is looking sheepish, in which case they’re more likely to get picked.) Bring slides and code with you to each class! After class, whoever is called on should upload slides and Matlab to GauchoSpace.
   a. I expect graduate students to work together. You may also find useful code online. At the same time, you are supposed to do each assignment yourself—not using canned code.
   b. Questions are often due on the day that we discuss the underlying material. Looking ahead in the slides may be helpful.
   c. Each question is marked as to the lecture where it will be presented, but don’t be surprised if we fall behind.
2. Write a term paper. The term paper is due March 24 at 8:00am. You can choose from three general types of topics: (1) A short research paper that uses Bayesian techniques in a meaningful way; (2) An expository paper teaching some more advanced Bayesian technique, generally with an illustrative application; or (3) A replication study, in which you reproduce a published Bayesian paper—recoding programs, etc., as part of the replication.
   a. A one paragraph proposal is due to me Friday, February 3 at 8am. Feel free to submit earlier.
   b. The term paper is due March 24 at 8:00am and must be in Microsoft Word or a pdf.
   c. Sign up for a 35 minute discussion slot in which the class will go through your rough draft on GauchoSpace.
   d. Post your “rough draft” to GauchoSpace three days before your paper is scheduled to be discussed.
   e. It is very tempting to go as late in the term as possible. But remember that you are going to get feedback from your classmates and from me that you can use to improve the final paper. Getting feedback early is an advantage.

3. Edit and discuss everyone else’s rough draft. Download the rough draft from GauchoSpace for editing and commenting. Comments should be constructive. They should not be “evaluative.” We will go around the room to give everyone a chance to make substantive comments.
   a. Provide printed copies of your comments at the class section where the paper is discussed. One copy to the author and one copy to me. Copy-editing type comments should be included in the printed copy but not discussed orally.
   b. Remember that you have a rough draft. Your goal is to be helpful to a classmate. And, of course, to impress me with how thorough and helpful you can be.
A somewhat random collection of other useful things you might want to read
(There are thousands of articles and books using or extending Bayesian techniques. Rather than providing a reading list, I’m just mentioning a few items to get you started. They are in no particular order. Pick a few that you think will be useful to you.)

John Geweke, Gary Koop, and Herman Van Dijk, Oxford Handbook of Bayesian Econometrics, Oxford University Press.
Gary Koop, Dale J. Poirier, and Justin L. Tobias, Bayesian Econometric Methods, Cambridge University Press.
Gabriella Conti, Sylvia Frühwirth-Schnatter, James J. Heckman, Rémi Piatek, Bayesian exploratory factor analysis, Journal of Econometrics, Available online 27 June 2014
Mingliang Li, Justin L. Tobias, Bayesian inference in a correlated random coefficients model: Modeling causal effect heterogeneity with an application to heterogeneous returns to schooling, Journal of Econometrics, Volume 162, Issue 2, June 2011, Pages 345-361
Ulrich K. Müller, Measuring prior sensitivity and prior informativeness in large Bayesian models, Journal of Monetary Economics, Volume 59, Issue 6, October 2012, Pages 581-597


Several authors, several articles, The American Statistician, Volume 67, Issue 1, 2013.


Approximate Lecture Schedule

Note that the “schedule” lists all “lectures” first and then student discussions at the end. The expectation is that in many of the classes after the first few weeks the class will be half lecture and half discussion, so we’ll probably get to much of the material later than indicated.

<table>
<thead>
<tr>
<th>#</th>
<th>Day</th>
<th>Date</th>
<th>Lecture</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>T</td>
<td>Jan 10</td>
<td>Introduction</td>
<td>Chap. 1, Appendix A, B.1, B.2.</td>
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<td>2</td>
<td>Th</td>
<td>Jan 12</td>
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<td>3</td>
<td>T</td>
<td>Jan 17</td>
<td>Introduction to Bayesian Regression</td>
<td>Chap. 2, 3.1-3.6</td>
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<td>4</td>
<td>Th</td>
<td>Jan 19</td>
<td>Multiple regression</td>
<td>Chap. 3</td>
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<td>Jan 24</td>
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<td>6</td>
<td>Th</td>
<td>Jan 26</td>
<td>Large Sample Properties, numerical methods</td>
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<td>7</td>
<td>T</td>
<td>Jan 31</td>
<td>Gibbs sampling</td>
<td>Chap 4.1-4.2.4</td>
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<td>Th</td>
<td>Feb 2</td>
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<td>9</td>
<td>T</td>
<td>Feb 7</td>
<td>Model comparison</td>
<td>Chap. 4.2.5, 7.5</td>
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<td>10</td>
<td>Th</td>
<td>Feb 9</td>
<td>Metropolis-Hastings</td>
<td>Chap. 5</td>
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<td>11</td>
<td>T</td>
<td>Feb 14</td>
<td>SUR, Limited dependent variables</td>
<td>Chap. 6.6, Chap 9.1-9.4</td>
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<td>12</td>
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<td>Feb 16</td>
<td>Kalman Filter</td>
<td>Chap. 8.</td>
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<td>Feb 21</td>
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<td>14</td>
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<td>Feb 23</td>
<td>Rough draft discussions</td>
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<td>Rough draft discussions</td>
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<td>16</td>
<td>Th</td>
<td>Mar 2</td>
<td>Rough draft discussions</td>
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<td>17</td>
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<td>Mar 7</td>
<td>Class cancelled</td>
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<td>18</td>
<td>Th</td>
<td>Mar 9</td>
<td>Rough draft discussions</td>
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<td>19</td>
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<td>Student presentation</td>
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<td>20</td>
<td>Th</td>
<td>Mar 16</td>
<td>Rough draft discussions or “The Next Hundred Years of Growth”</td>
<td>Paper on my website</td>
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