**Productivity Theory and Macroeconomic Measurement**

Instructor: Professor Harry X. Wu

Scheduled Teaching Time: Tuesday 1510-1800

Office Hours: Tuesday 0930-1230 & by appointment

**Course Description**

In the conceptual framework of the neoclassical growth economics, especially its productivity theory, this course provides economics graduate students with systematic trainings on measuring economic output, capital and labor inputs, and corresponding prices. It emphasizes the importance of theory-methodology-measurement consistency in handling macroeconomic data and uses typical problems in the Chinese official statistics as examples to guide students to gauge and thence understand China's long-run growth and productivity performance.

**Pre-course Knowledge**

This course is based on the instructor’s rich and prolonged experiences in research and teaching in related fields and aims to fill an important gap in the curriculum of the graduate schools of economics in China. It is designed for graduate students who are strongly interested in studying economic growth in emerging economies, especially in the case of China, that often encounters difficult data and measurement problems. To succeed in studying this challenging subject, students are required to have already had a good grasp of macroeconomic theory and its micro-foundations, a strong ability to independently read and understand the key references in English and to derive and interpret theoretical, empirical and computational models in the required readings, and a strong attempt to deal with a real data problem in the case of China in particular with theoretical or methodological considerations.

**Teaching and Learning Approach**

This course is taught through lectures (some lectures may be delivered in English) and in- or off-class learning activities for each topic, including critical reviews of the literature, presenting and discussing individual reports of the assigned readings, and term papers.

**Assessment and Grade**

There is no exam in this course. Students are assessed based on their reports of the assigned readings and term papers. Grading criteria for the reports and papers will be provided in lectures.

**Lecture Topics and Required Readings**

(In general, each of the topics requires three teaching units of which one is used for in-class presentation and discussion. In addition to the required readings, students are also guided to some extended readings.)

1. **Productivity Change as the Source of Growth**
   1. Angus Maddison. 1987. “Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment”. *Journal of Economic Literature*, XXV, (June): 649-698
   2. Zvi Griliches 1996. The discovery of the residual: A historical note*. Journal of Economic Literature*, vol. 34 (September): 1324–1330
   3. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “Information technology and Growth in the G7 Countries”. Chapter 3 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London
2. **Conceptualized and Measured Total Factor Productivity Growth**
   1. Charles R. Hulten. 2007. “Theory and Measurement: An Essay in Honor of Zvi Griliches”. In Ernst R. Berndt and Charles R. Hulten (eds), *Hard-to-Measure Goods and Services: Essays in Honor of Zvi Griliches*, 15-27. Chicago: University of Chicago Press.
   2. Charles R. Hulten. 2001. “Total Factor Productivity: A Short Biography”. In *New Directions in Productivity Analysis*, ed. Charles R. Hulten, Edwin R. Dean, and Michael J. Harper, 1–47. Studies in Income and Wealth, vol. 63. Chicago: University of Chicago Press.
3. **The Measurement of Output: Structure, Intermediate Inputs and Prices**
   1. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “The Changing Structure of Output and Intermediate Inputs”. Chapter 4 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London.
   2. Harry X. Wu and Keiko Ito. 2015. “Reconstructing China's Supply-Use and Input-Output Tables in Time Series”, *RIETI Discussion Papers* 15-E-004, 2015
   3. Harry X. Wu and Zhan Li. 2019. “Preferred to Chinese Official Growth Estimates? Mind Your Deflator and Deflation Approach”, presented at RIETI DP Seminar, February 26, 2019
4. **The Measurement of Capital Input: Capital Stock and Capital Services**
   1. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “Capital Services and Information Technology”. Chapter 5 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London
   2. Charles R. Hulten. 1990. “The Measurement of Capital”. In Ernst R. Berndt and Jack E. Triplett (eds.), *Fifty Years of Economic Measurement,* 119–52. Studies in Income and Wealth, vol. 54. Chicago: University of Chicago Press.
   3. Harry X. Wu. 2015. “Constructing China’s Net Capital Stock and Measuring Capital Services in China, 1980-2010”, *RIETI Discussion Papers* 15-E-006, 2015
5. **The Measurement of Labor Input: Labor Quantity and Compensation Matrices**
   1. Peter T. Chinloy. 1980. “Sources of Quality Change in Labor Input”, *American Economic Review* 70 (1), 108-19
   2. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “Labor Input and the Returns to Education”. Chapter 6 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London
   3. Harry X. Wu, Ximing Yue and George G. Zhang. 2015. “Constructing Annual Employment and Compensation Matrices and Measuring Labor Input in China”, *RIETI Discussion Papers* 15-E-005, 2015
6. **The Jorgensonian APPF Model with Doman Aggregation Scheme**
   1. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “Productivity Growth for U.S. Industries”. Chapter 7 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London
   2. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. “The Industry Origins of the American Growth Resurgence”. Chapter 8 in Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. Information Technology and the American Growth Resurgence, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London
   3. Harry X. Wu. 2016. “On China’s Strategic Move for the New Stage of Development – A Productivity Perspective”, in Dale Jorgenson, Marcel Timmer and Kyoji Fukao (eds.), *The World Economy: Growth or Stagnation*, Cambridge University Press, 2016: 199-233

**Basic and Extended Reference Books**

There is no standard textbook for this course. As introduced below, a book by Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh (2005) on the measurement of the contribution of information and communication technologies in productivity growth is used as the basic reference book because of its nearly full coverage of the major issues in productivity measurement that well serve the objectives of the course. Besides, three NBER volumes of Studies in Income and Wealth are used as extended reference books to expose students to more topics in economic measurement.

*Basic Reference*

Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh. 2005. *Information Technology and the American Growth Resurgence*, Productivity Volume 3, The MIT Press, Cambridge, Massachusetts, London.

*Extended References*

Dale W. Jorgenson, Frank Gollop, and Barbara Fraumeni. 1987. *Productivity and U.S. Economic Growth*, Harvard University Press, Cambridge, MA

Ernst R. Berndt and Jack E. Triplett. 1990. *Fifty Years of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth*. National Bureau of Economic Research, Studies in Income and Wealth Vol. 54. Chicago and London, The University of Chicago Press.

Charles R. Hulten, Edwin R. Dean, and Michael J. Harper. 2001. *New Development in Productivity Analysis*. National Bureau of Economic Research, Studies in Income and Wealth Vol. 63. Chicago and London, The University of Chicago Press.

Dale W. Jorgenson, J. Steven Laudefeld, and William D. Nordhaus. 2006. *A New Architecture for the U.S. National Accounts*. National Bureau of Economic Research, Studies in Income and Wealth Vol. 66. Chicago and London, The University of Chicago Press.

**Requirement of Assignment**

1. All graduate students enrolled in this subject must be prepared for the required readings before each lecture topic.
2. Written notes on the readings should follow the “standards” of literature review in social sciences in general.
3. Term papers should follow the norm of journal papers in economics with a simple but by no means superficial abstract of 100-150 words and the relevant JEL codes at the beginning.

**Timetable**

The lecture will be conducted on every Wednesday afternoon or evening tentatively.

**Office Hours**

Fixed office hours are tentatively set on every Wednesday and Thursday morning/afternoon or by individual appointment.