Macroeconomics I

Josep Pijoan-Mas

CEMFI, 2020-2021

Schedule. Tuesday 11:30-13:00, Thursday 15:30-17:00, and Thursday 17:30-19:00.

Structure. The course lasts for 10 weeks with 3 sessions per week. We will normally have 2 sessions of theory and 1 to go through your homework every week, but there may be a few exceptions according to the course needs.

Contents.
1. Neoclassical Growth Model
2. Multi-Sector Models
3. OG Models
4. Firms
5. Households
6. Money

Previous knowledge. The students are assumed to be familiarized with the basic concepts of macroeconomics. In this sense, material in Burda and Wyplosz (1997, chapters 1, 2 and 3) will be assumed as known. During the course we will meet systems of differential equations and dynamic optimization problems to be solved by use of optimal control theory. If you need to review these things, Chiang (1984) and Chiang (1992) are good help. The mathematical appendix in Barro and Sala-i-Martin (1999) is also a good reference.

Homework. There will be 8 problem sets for you to work at home. Of those, 7 will be paper-and-pencil style and 1 will be computational. For the 7 paper-and-pencil problem sets, every student will have to submit their own solutions individually. Only a few exercises will be graded (they will be specified in advance) and failure to submit will penalize the homework grade. For the computational problem set, solutions will be submitted by teams of two, and they will be graded. We will discuss the solution to this problem set in week 4.

Exam. There will be a 3-hours final exam at the end of the course.

Teaching assistants. Tomás Budí-Ors and Javier López-Segovia will be the TAs for the course. They will take care of most of the problem set sessions and will run office hours.

Grading. The final exam counts 85% of the final mark, homework grade counts 10%, and class participation counts 5%.

Part I. Neoclassical Growth Model.

- Duration: 5 theory sessions and 3 homework sessions.

- Program:

    - Introduction: stylized facts of growth

    - The Solow Model

    - The AK Model

    - The Ramsey Model

    - Growth and Development Accounting

- References. The class notes for *Solow* and *Ramsey* will follow quite closely Barro and Sala-i-Martin (1999, chapters 1 and 2). For the *Solow Model*, additional references are Romer (1996, chapter 1) and Acemoglu (2009, chapter 2). For the *Ramsey Model*, additional references are Blanchard and Fischer (1991, chapter 2), Romer (1996, chapter 2) and Acemoglu (2009, chapter 8). For *Growth Accounting* you can have a look at Barro and Sala-i-Martin (1999, chapter 10) and for *Development Accounting* at Caselli (2005). The empirical performance of the Solow and Ramsey models is discussed in Acemoglu (2009, chapter 3) and Barro and Sala-i-Martin (1999, chapters 11 and 12). Several empirical facts discussed in class come from Jones (2015).

Part II. Multi-Sector Models.

- Duration: 3 theory sessions and 1 homework session.

- Program:

    - The Multi-Sector Ramsey Model

    - Different Productivity Growth across Sectors

    - Non-Homothetic Preferences

- References. The class lectures do not follow any textbook, but you can find a good survey of structural change with data and a review of models in Herrendorf, Rogerson, and Valentinyi (2014). The part on *Different Productivity Growth* follows Ngai and Pissarides (2007). The part on *Non-Homothetic Preferences* follows Kongsamut, Rebelo, and Xie (2001). This part can also be followed in Acemoglu (2009, chapter 20).

Part III. OG Models.

- Duration: 3 theory sessions and 1 homework sessions.

- Program:

    - The basic OG model

    - Optimality

    - Altruism

    - Social Security

- References. The class lectures will somewhat follow Blanchard and Fischer (1991, chapter 3), but with very different notation. You can also have a slightly different approach with good intuitions in Romer (1996, chapter 2) and a very formal (and short) exposition in Barro and Sala-i-Martin (1999, chapter 3).

Part IV. Firms.

- Duration: 4 theory sessions 1 homework session.

- Program:

    - Firm Heterogeneity

    - The q Theory of Investment

    - An Equilibrium Open Economy

- References. For the *Firm Heterogeneity* part, a very helpful survey is Hopenhayn (2014). The class set up is based on Guner, Ventura, and Yi (2008). The basic model of the *q Theory* can be easily followed in Romer (1996, chapter 8), Acemoglu (2009, chapter 7) or in Adda and Cooper (2003, chapter 8). The *Open Economy* case follows Blanchard and Fischer (1991, chapter 2), although in the book they solve for the social planner problem. You can also look at Barro and Sala-i-Martin (1999, chapter 3).

Part V. Households.

- Duration: 5 theory sessions and 2 homework sessions.

- Program:

    - The Permanent Income Hypothesis

    - The Ricardian Equivalence

    - Uncertainty and the Random Walk Result

    - Uncertainty and Precautionary Savings

    - Life Cycle

    - A Note on Habit Formation and Recursive Preferences

- References. A very good summary for the permanent income hypothesis and the uncertainty parts can be followed at Jappelli and Pistaferri (2010). We will discuss the empirical results in Hall (1978), Hansen and Singleton (1983), Mehra and Prescott (1985), and Attanasio and Weber (1993). The simple model to study precautionary savings is based on Barsky, Mankiw, and Zeldes (1986). For the Ricardian Equivalence part, Elmendorf and Mankiw (1999) and Ljungqvist and Sargent (2000, chapters 9 and 10) or Ljungqvist and Sargent (2004, chapters 10 and 13) contain textbook material. The main reference for the data in the life cycle part is Attanasio (1999) and the more recent Attanasio and Weber (2010). We also talk about some other papers, among them Gourinchas and Parker (2002). The Beckerian model of life cycle allocation of consumption and expenditure can be followed in Ghez and Becker (1975) and its empirical application in Aguiar and Hurst (2007).

Part VI. Money.

- Duration: 2 theory sessions.

- Program:

    - A demand for money: Sidrauski

- References. Undergraduate material on money supply and behavior of the central bank can be found at Burda and Wyplosz (1997, chapter 9). In the introduction we will review some empirical facts from Cooley and Hansen (1995), Lucas (1980) and McCandless and Weber (1995). A detailed survey of empirical work documenting the relationship between real and nominal variables can be found in Walsh (1998, chapter 1). The exposition of the *Sidrauski Model* follows (freely) McCallum (1990). You can also have a different exposition in Walsh (1998, chapter 2).

Key words.

Balanced Growth Path, Transitional Dynamics, Saddle Path Stability, Speed of Convergence, Diminishing Returns to Capital Accumulation, Neoclassical Production Function, Golden Rule, Modified Golden Rule, Dynamic Inefficiency, Structural Change, CES Aggregator, Homothetic Demand, Baumol Cost Disease, PAYG Social Security, Fully Funded Social Security, Roy's model of Self-Selection, Tobin's Q, General Equilibrium, Small Open Economy, Horioka-Feldstein Puzzle, Natural Borrowing Limit, Permanent Income Theory, Ricardian Equivalence, Certainty Equivalence, Precautionary Savings, Marginal Propensity to Consume, Excess Sensitivity Puzzle, Excess Smoothness Puzzle, Equity Premium Puzzle, Life Cycle, Neoclassical Dichotomy, Money Neutrality and Superneutrality, Friedman Rule.

References

ACEMOGLU, D. (2009): *Introduction to Modern Economic Growth.* Princeton University Press.

ADDA, J., AND R. COOPER (2003): *Dynamic Economics.* The MIT Press, Cambridge, Massachusetts.

AGUIAR, M., AND E. HURST (2007): "Deconstructing Life Cycle Expenditure," Unpublished manuscript.

ATTANASIO, O. (1999): "Consumption," in *Handbook of Macroeconomics, Vol I*, ed. by J. B. Taylor, and M. Woodford, chap. 11. North Holland, Amsterdam.

ATTANASIO, O., AND G. WEBER (1993): "Consumption Growth, the Interest Rate and Aggregation," *Review of Economic Studies*, 60(3), 631–649.

———— (2010): "Consumption and Saving: Models of Intertemporal Allocation and Their Implications for Public Policy," *Journal of Economic Literature*, 48, 693–751.

BARRO, R., AND X. SALA-I-MARTIN (1999): *Economic Growth.* The MIT Press, Cambridge, Massachusetts.

BARSKY, R. B., N. G. MANKIW, AND S. P. ZELDES (1986): "Ricardian Consumers with Keynesian Propensities," *American Economic Review*, 76(4), 676–691.

BLANCHARD, O. J., AND S. FISCHER (1991): *Lectures on Macroeconomics.* The MIT Press, Cambridge, Massachusetts.

BURDA, M., AND C. WYPLOSZ (1997): *Macroeconomics, a European Text.* Oxford University Press.

CASELLI, F. (2005): "Accounting for Cross-Country Income Differences," in *Handbook of Economic Growth*, ed. by P. Aghion, and S. Durlauf, vol. 1, chap. 9. Elsevier Science Publishers.

CHIANG, A. (1984): *Fundamental Methods Of Mathematical Economics.* McGraw-Hill.

———— (1992): *Elements Of Dynamic Optimization.* McGraw-Hill.

COOLEY, T. F., AND G. D. HANSEN (1995): "Money and the Business Cycle," in *Frontiers of Business Cycle Research*, ed. by T. F. Cooley, chap. 7. Princeton University Press, Princeton.

ELMENDORF, D. W., AND N. G. MANKIW (1999): "Government Debt," in *Handbook of Macroeconomics, Vol III*, ed. by J. B. Taylor, and M. Woodford, chap. 25. North Holland, Amsterdam.

GHEZ, G., AND G. S. BECKER (1975): *The Allocation of Time and Goods Over the Life Cycle.* Columbia University Press, New York.

GOURINCHAS, P. O., AND J. A. PARKER (2002): "Consumption Over the Life-Cycle," *Econometrica*, 70, 47–89.

GUNER, N., G. VENTURA, AND X. YI (2008): "Macroeconomic Implications of Size-Dependent Policies," *Review of Economic Dynamics*, 11(4), 724–744.

HALL, R. (1978): "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy*, 86(6), 971–987.

HANSEN, L. P., AND K. SINGLETON (1983): "Stochastic Consumption, Risk Aversion, and the Temporal Behavior of Asset Returns," *Journal of Political Economy*, 91(2), 249–268.

HERRENDORF, B., R. ROGERSON, AND A. VALENTINYI (2014): "Growth and Structural Transformation," in *Handbook of Economic Growth*, ed. by P. Aghion, and S. Durlauf, vol. 2, chap. 6, pp. 855–941. Elsevier Science Publishers.

HOPENHAYN, H. (2014): "On the Measure of Distortions," NBER Working Paper 20404.

JAPPELLI, T., AND L. PISTAFERRI (2010): "The Consumption Response to Consumption Changes," *American Economic Review*, 2, 479–506.

JONES, C. (2015): "The Facts of Economic Growth," NBER Working Paper No. 21142.

KONGSAMUT, P., S. REBELO, AND D. XIE (2001): "Beyond Balanced Growth," *Review of Economic Studies*, 68(4), 869–882.

LJUNGQVIST, L., AND T. SARGENT (2000): *Recursive Macroeconomic Theory*. The MIT Press, Cambridge, Massachusetts.

———— (2004): *Recursive Macroeconomic Theory*. The MIT Press, Cambridge, Massachusetts, Second Edition.

LUCAS, R. E. (1980): "Two Illustrations of the Quantity Theory of Money," *American Economic Review*, 70(5), 1005–1014.

MCCALLUM, B. (1990): "Inflation: Theory and Evidence," in *Handbook of Monetary Economics, Vol II*, ed. by B. M. Friedman, and F. H. Hahn, chap. 18. North Holland, Amsterdam.

MCCANDLESS, G., AND W. WEBER (1995): "Some Monetary Facts," *Federal Reserve Bank of Minneapolis Quarterly Review*, 19(3), 2–11.

MEHRA, R., AND E. PRESCOTT (1985): "The Equity Premium: A Puzzle," *Journal of Monetary Economics*, 15, 145–61.

NGAI, R., AND C. PISSARIDES (2007): "Structural Change in a Multisector Model of Growth," *American Economic Review*, 97, 429–443.

Romer, D. (1996): *Advanced Macroeconomics.* McGraw-Hill.

Walsh, C. E. (1998): *Monetary Theory and Policy.* The MIT Press, Cambridge, Massachusetts.