

ECON 564 - Topics in Macroeconomic Theory I
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Objective of the Course

The aim of the course is to give a wide-ranging survey of contemporary issues in modern macroeconomic theory with an emphasis on the mathematical tools and applications of economic growth models.

Evaluation

Grading will be based on a midterm examination (30%), paper reports (20%), class presentations (20%), and a paper proposal (30%).

A Scheme of work

Each session two related papers will be discussed according with the following guidelines:

1. Aims of the paper
2. Empirical evidence and the state of the literature
3. Contributions of the papers
4. Discussion and future research
 - Facts
 - Theory
 - Methods

Before each session, students must read the corresponding papers and write a one page report on each of them following the guidelines above.

Working Program

1. Introduction: Dynamic Systems and Methods
 - Systems of Differential and Difference equations
 - Stability methods: Linearization vs. Lyapunov methods
 - Bifurcations and dynamics

Gandolfo, G. (1995), "Economic Dynamics", 3rd. ed., Springer-Verlag, Berlin.

Brock, W. A. and A.G. Malliaris (1989), "Differential Equations, stability and chaos in Dynamic Economics", North-Holland.

de la Croix, D. and P. Michel (2002), "A Theory of Economic Growth", Cambridge University Press.

2. Introduction : Dynamic Optimization and Economic Analysis

- Maximum principle with a finite horizon
- Maximum principle for an infinite horizon control problem
- Sufficient conditions for overtaking optimality
- Asymptotic Stability and the Turnpike property in Some simple Economic Growth problems

Hartl, R., Sethi, S. and R. G. Vickson (1995), "A Survey of the maximum principles for optimal control problems with state constraints", *SIAM Review* 37(2), 181-208.

Aseev, S. and A. Kryazhinskii (2003), "The Pontryagin Maximum Principle for Infinite Horizon Optimal Controls", *IIASA Interim Report* IR-03-013.

Dana, R-A. and C. Le Van (2001), "Optimal Control in Infinite Horizon", manuscript.

Michel, P. (1977), "Une démonstration Élémentaire du Principe du Maximum de Pontryagin", *Bulletin de Mathématiques Economiques* 14, 9-23.

Michel, P. (1982), "On the transversality condition in Infinite Horizon Optimal Problems", *Econometrica* 50(4), 975-985.

Kamihigashi, T. (2001), "Necessity of transversality conditions for infinite horizon ", *Econometrica* 69(4), 995-1012.

Kamien, M. and N. Schwartz (1991), "Dynamic Optimization: the calculus of variations and optimal control in economics and management", Amsterdam:North-Holland.

Chiang, A. (1992), "Elements of Dynamic Optimization", McGraw-Hill.

Carlson, D. A., Haurie, A. and A. Leizarowitz (1991), "Infinite Horizon Optimal Control: deterministic and stochastic systems", 2nd ed., Springer-verlag, Heidelberg.

Aghion, P. and P. Howitt (1998), "Endogenous Growth Theory", MIT Press.

3. Technological Progress and the Embodiment Controversy

- Empirical evidence and theoretical implications

Greenwood, J., Hercowitz, Z. and P. Krussel (1997), "Long-Run Implications of Investment-Specific Technological Change", *American Economic Review* 87, 342-362.

- Solow, R. (1960), "Investment and technological progress", in Kenneth J. Arrow, Samuel Karlin and Patrick Suppes, EDS., *Mathematical methods in the Social Sciences 1959*, Stanford University Press, 89-104.
- Greenwood, J. and B. Jovanovic (1998), "Accounting for growth", *NBER 6647, New Directions in Productivity Analysis*, edited by Edwin Dean, Michael Harper and Charles Hulten.
- Hulten, C. (1992), "Groth accounting when technical change is embodied in capital", *American Economic Review* 82(4), 964-980.
- The productivity slowdown

David, P. (1990), "The Dynamo and the Computer: An historical perspective on the modern productivity paradox", *American Economic Review* 80, 355-361.

Atkenson, A. and P. Kehoe (2001), "The transition to a new economy after the second industrial revolution", *NBER* 8676.

Greenwood, J. and M. Yorukoglu (1997), "1974", *Carnegie-Rochester Conference Series on Public Policies* 46, 49-95.

Boucekkine, R., del Río, F. and O. Licandro (2002), "Embodied technical change, learning and the productivity slowdown", *The Scandinavian Journal of Economics* 105(1), 87-97.
 - Embodied technological progress and endogenous growth

Hsieh, C. (1999), "Endogenous growth and obsolescence", *Journal of Development Economics* 66, 153-171.

Krusell, P. (1998), "Investment-specific R&D and the decline of the relative price of capital", *Journal of Economic Growth* 3(2), 131-142.
4. Dynamic optimization of Heterogenous systems: Vintage capital models
- DDE vs. PDE approach

Boucekkine, R., de la Croix, D. and O. Licandro (2004), "Modelling vintage structures with DDEs: Principles and applications", *Mathematical Population Studies*.

Feichtinger, G., Tragler, G., and V. Veliov (2003), "Optimality conditions for Age-Structured Control Systems", *Journal of Mathematical Analysis and Applications* 228, 47-68.
 - Creative destruction and Obsolescence

Cabellaro, R. and A. Jaffe (1993), "How high are the giant's shoulders? An empirical assessment of knowledge spillovers and creative destruction in a model of economic growth", *NBER Macroeconomics Annual*, 15-74.

Benhabib, J. and A. Rustichini (1991), "Vintage capital, investment and growth", *Journal of Economic Theory* 55, 323-339.

Boucekkine, R., Germain, M., Licandro, O., and A. Magnus (1998), "Creative destruction, investment volatility and the average age of capital", *Journal of Economic Growth* 3, 361-384.

- The cleansing effect of recessions

Cabellaro, R. and M. Hammour (1994), "The cleansing effect of recessions", *American Economic Review* 84(5), 1350-1368.

Boucekkine, R., del Río, F. and O. Licandro (2001), "Obsolescence and modernization in the growth process", *Journal of Development Economics*.

- Replacement Echoes and Anticipation effects

Boucekkine, R., Germain, M. and O. Licandro (1998), "Replacement Echoes in the vintage capital growth model", *Journal of Economic Theory* 74, 333-348.

Feichtinger, G., Hartl, R. F., Kort, P. M. and V. Veliov (2003), "Anticipation effects of technological progress on capital accumulation: a vintage capital approach".

5. Miscellaneous Applications

- Human capital, Demography and Growth

Lucas, R. (1988), "On the mechanics of development planning", *Journal of Monetary Economics* 22, 3-42.

Chari, V. V. and H. Hopenhayn (1991), "Vintage human capital, growth and the diffusion of new technologies", *Journal of Political Economy* 99, 1142-1165.

Boucekkine, R., de la Croix, D. and O. Licandro (2002), "Human vintage capital, demographic trends and Endogenous growth", *Journal of Economic Theory* 104, 340-375.

- Inequality and Unemployment

Hornstein, A., Krussel, P. and G. Violante (2000), Technology policy and the inequality-unemployment trade-off, manuscript.

Greenwood, J. (1999), "The third industrial revolution: technology, productivity and income inequality", *Economic Review*, Federal reserve Bank of Cleveland.

Jovanovic, B. (1998), "Vintage capital and inequality", *Review of Economic Dynamics* 1(2), 497 - 530.

- Adoption and diffusion of new technologies

Parente, S. (1994), "Technology Adoption, Learning by Doing and Economic Growth", *Journal of Economic Theory* 63, 346-369.

- Boucekkine, Saglam, C. and T. Vallée (2004), "Technology adoption under embodiment: A two-stage optimal control approach", *Macroeconomic Dynamics* 8, 250-271.
- Barucci, E. and F. Gozzi (2001), "Technology adoption and accumulation in a vintage capital model", *Journal of Economics* 74, 1-38.