Economic Growth and Development
Professor Olivier de La Grandville

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Other references, as well as handouts, will be given during the course.
Grading: problem set: 20%, project: 40%; final exam: 40%.

The aim of this course is twofold: first to show how economic growth results from a dynamic process that can be simply defined and analysed. A fundamental question is then asked: among many possible growth paths, is there an optimal one? How should it be chosen? Answering these questions rests upon dynamic optimisation. Its fascinating methods, the calculus of variations and optimal control theory will be presented, together with their economic interpretation. In particular, it will be shown how their fundamental results (the Euler and the Pontryagin equations) can be derived from economic reasoning.

The second aim of this course is to present many novel results, spanning both descriptive and optimal growth theory. For instance, we will be able to develop a formula for the optimal savings of an economy that always gives very reachable, reasonable results. Also, we will demonstrate the famous "Invisible Hand" conjecture by Adam Smith(1776), which was anticipated by the great Arab historian Ibn Khaldun (1377). We will show that if society allocates its capital in competitive equilibrium conditions, society maximizes two magnitudes. First, the sum of discounted consumption flows from now to infinity; secondly, at any time \( t \) it maximizes the value of its activity defined as consumption obtained at time \( t \) plus the rate of increase in the value of its capital stock.

Applications will be made by analyzing the problems of formerly planned economies, the problems of poverty, as well as the causes and the consequences of the present crisis in the developed world. We will also deal with some particular cases of considerable interest: we will explain the remarkable performance of South Korea and Switzerland; we will compare the growth of China and India; we will also examine what lessons France could take from Germany, the only large European country whose unemployment rate decreased between 2006 and 2012.

In our conclusion we will present the fundamental causes of economic growth. We will then be led to ask whether, in the last millennia, we have witnessed a convergence of ideas and values among civilizations. Our answer will carry a message of hope for our future.
Contents

Part I. Positive Growth Theory
1. The welfare of society and economic growth.
2. The fundamental differential equations governing the motion of an economy.
3. A production function of central importance.
4. The CES function as a general mean.
5. Capital-labour substitution and economic growth.
6. The long-term growth rate as a random variable; its expected average and variance derived from yearly data; applications of the properties of the lognormal distribution and the moment generating function.

Part II. Optimal Growth Theory
1. Optimising functionals: an introduction to the calculus of variations. The Euler equation and its properties.
2. Other major tools for optimal growth theory: the Pontryagin maximum principle and the Dorfmanian.
3. Deriving the Euler equation and the Pontryagin principle from economic reasoning.
5. Solving numerically the systems of non-linear differential equations describing the optimal growth process.
6. Optimal growth and the optimal savings rate.

Part III. A Unified Approach
1. Preliminaries: interest rates and capital valuation.
2. From arbitrage to equilibrium.
3. The equation of interest theory; proper and wrong evaluation of financial assets; financial crises and their consequences.
4. Optimal savings: a general approach; new results. The consequences for society of allocating capital under competitive equilibrium conditions.

Part IV: Applications
1. Problems in growth: common traits between planned economies and poor countries.
2. Some success stories: the cases of South Korea and Switzerland.
3. A comparison of China and India.
4. The recent economic crisis. France and Germany: how each fared; why Germany’s unemployment rate is significantly lower than France’s.

Conclusion.
The fundamental factors of economic growth.
Lessons from 14th century historian Ibn Khaldun; lessons for the future.
On the convergence of ideas and values among civilizations.

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