PROGRAMME

RCEA Growth School 2011

"Human Capital and Economic Growth"

1. Introduction

The past decade has witnessed an explosion of interest in the determinants of long-term economic growth by academic researchers and policy makers alike. Following on earlier pathbreaking work, some of this generation's most prominent economists have tackled this topic producing a plethora of academic articles and a number of notable books. Books on this subject fall broadly into three categories. First, introductions to the subject accessible to advanced undergraduate students or beginning graduate students in the form of textbooks. These include *Introduction to Economic Growth* by Charles Jones (Norton: 2002), *Principles of Economic Growth* by Thorvaldur Gylfason (Oxford: 1999), *Growth and Distribution* by Duncan Foley and Thomas Michl (Harvard: 1999) and *Economic Growth* by David Weil (Addison-Wesley: 2005). Second, general treatments of economic growth in the form of personal narratives or collected essays such as *The Elusive Quest for Growth* by William Easterly (MIT: 2001), *In Search of Prosperity* edited by Dani Rodrik (Princeton: 2003) and *The Mystery of Economic Growth* by Elhanan Helpman (Harvard: 2004). Finally, comprehensive and rigorous treatments of the subject addressed to advanced graduate students such as *Economic Growth* by Robert Barro and Xavier Sala-i-Martin (MIT: 2004), *Endogenous Growth Theory* by Philippe Aghion and Peter Howitt (MIT: 1998) and, at a somewhat lower technical level, *The Economics of Growth* by the same two authors (MIT: 2009), and finally *Introduction to Modern Economic Growth* by Daron Acemoglu, (Princeton: 2009).
What all these books share, however, is their comprehensive treatment of all aspects of economic growth. Though excellent in many ways, these books provide a general overview of each aspect of growth. What is clearly missing is an in depth treatment of individual aspects of long run economic growth. One of the most frequent topics tackled by these books is the role of human capital accumulation in economic growth. The popularity and importance of this topic is also witnessed by the large number of articles appearing in academic journals: a search revealed 20 articles published in the major international journals on human capital and growth during the 2002-2003 period alone. A relatively new but very widely respected journal (*Journal of Economic Growth*) is devoted entirely to the subject of economic growth, in general, and frequently contains articles on the human capital-growth link. At the public policy level, exhortations by officials on the importance of human capital formation in fostering economic growth appear continuously in the financial press. A course on the role of human capital in economic growth would be timely and well received by students. We plan to follow a new book that covers the main topics outlined above by Stengos and Savvides, Human Capital and Economic Growth, Stanford University Press: 2008.

2. General Overview of the Course

The course will be combining a thorough review of the literature (both theoretical and empirical) along with state-of-the-art econometric analysis of the issues. The course will include in the empirical part a self-contained

discussion of nonparametric techniques and their application to estimating nonlinearities in human capital and economic growth. The issue of nonlinearities has recently emerged as one of the most salient features of empirical work not only in the human capital-growth relationship but in the modeling of economic growth at large. We will apply nonlinear estimation techniques to a comprehensive data set on human capital and economic growth.
The course aims to target graduate students and interested faculty who would like a compherensive exposure to the theoretical and empirical aspects of the human capital-economic growth nexus. Graduate sudents are expected that they will be researching this topic as part of their degree programs.

3. Contents of the Course

The course will begin with two introductory chapters: one would serve as a general introduction to the subject matter and the other would contain a brief historical overview of the concept of human capital. The remainder of the course will be divided into two main components. The first, after reviewing the Solow and the neoclassical model of growth, will delve more deeply into the existing theoretical and empirical literature on human capital and economic growth. The second will contain our empirical investigation of the human capital-growth relationship. In that part we would introduce both linear and nonlinear estimation techniques to the students and include an introduction to the usage of nonparametric techniques in economic growth research.

Part II: Review of the Theoretical Literature

This part of the course will contain a thorough review of the theoretical and empirical literature on the link between human capital and economic growth. We will first present in detail the most important theoretical contributions to the literature. We will begin with the Solow model and its extension to consider human capital accumulation (Mankiw, Romer and Weil, *Quarterly Journal of Economics*, 1992, 407-437). Subsequently we will analyse the neoclassical growth model and various endogenous growth models with human capital accumulation. These two provide the basic approach to studying human capital and growth and the solution of these models yields the determinants of economic growth and provide the framework on which a large part of empirical analysis is based. Moreover, they give rise to a natural distinction between different types of human capital either on the basis of gender or the level of education.
The models outlined above imply a linear relationship between human capital and economic growth. In the final part of the theoretical component of the course we will present alternative models that emphasize threshold effects and multiple equilibria and are consistent with a nonlinear treatment of human capital. These include the model of economic growth with threshold externalities in human capital accumulation (Azariadis and Drazen, *Quarterly Journal of Economics*, 1990, 407-433) and also other channels through which human capital affects growth nonlinearly. Our focus in this part is in terms of providing an explanation for the existence of nonlinearities in the human capital-economic growth relationship.

Part III: Empirics

The second part of the course will review the empirical literature on human capital and growth. We will discuss both the linear and nonlinear approaches to the empirical literature. While in general we will treat human capital in aggregate form, our discussion will also touch on why different types of human capital may have differential effects on growth. For example we will look at differences by gender (male vs. female human capital) or level of education (primary vs. secondary vs. tertiary human capital). We will place emphasis on the data used, the econometric techniques, the specification of the models employed and the results obtained. We will review studies that examine the effect of human capital on the growth of per capita income as well as the growth of total factor productivity.

3.2.1 Data Sources

The empirical part of the course will review alternative methods researchers have proposed to measure human capital with a view to studying its effect on economic growth. We begin with the earlier attempts focusing on flow measures of education such as primary or secondary school enrollment rates. Subsequently we will discuss the development of stock measures of human capital, culminating in the mean years of schooling in the working-age

population measure of human capital. While these measures focus only on one type of human capital (formal education) and measure only the quantity of human capital, recent work has attempted to measure the quality of human capital and assess its impact on economic growth We will provide a review of these new avenues of research in economic growth.

3.2.2 Empirical Analysis

In this part we will present and discuss in detail the main econometric methods that can handle nonlinearities (parametric and nonparametric) in applied econometric work. The style chosen will be such that the techniques are made accessible to the nonspecialist. Where possible, we will present simple graphical and other tools to simplify exposition of the techniques. More rigorous and thorough treatment of the techniques will be relegated to an appendix. In the final chapter we will use these methods to estimate the effect of human capital on growth. As a benchmark we will use the methodology employed in Kalaitzidakis, Mamuneas, Savvides and Stengos (*Journal of Economic Growth*, 2001, 229-254) and Mamuneas, Savvides and Stengos (*Journal of Applied Econometrics*, 2006, 111-132).

4. Duration of the Course and Basic Outline

The course will be based on 30 (thirty) hours of instruction, over a week equlally spread between theory and empirics. There will be5 hours of instruction each day forsix days for a total of thirty hours. Each day there will be three hours of morning and two of aftrenoon instruction.. In the morning section, the intention is to cover the empirical parts of the course, whereas in the afternoon section the theoretical parts. The empirical parts will also involve computer lab work and the use of real data to carry out estimation of a growth model.
The exact timetable is as follows:

May 13 (Friday) Empirics (2 hours, morning) Theory (3 hours, afternoon)
May 14 (Saturday) Empirics (2 hours, morning) Theory (3 hours, afternoon)
May 16 (Monday) Empirics (2 hours, morning) Theory (3 hours, afternoon)
May 17 (Tuesday) Empirics (3 hours, morning) Theory (2 hours, 2 hours afternoon)
May 18 (Wednesday) Empirics (3 hours, morning) Theory (2 hours, afternoon)
May 19 (Thursday) Empirics (2 hours morning) Theory (2 hours, afternoon)

May 21 (Saturday) Attendace of Workshop

The list of proposed topics to be covered is as follows:

Part I**: **Introduction
1. Introduction to Human Capital and Economic Growth
2. The Concept of Human Capital: A Brief Historical Overview
Part II**: **Theoretical and Empirical Research on Human Capital and Economic Growth
3. Theoretical Models of Human Capital and Economic Growth
4. Human Capital and Economic Growth: The Empirical Literature
Part III**: **The Empirics of Human Capital and Economic Growth
5. Measuring Human Capital and Data Sources
6. Human Capital and Economic Growth: Linear Specifications
7. A Primer on Nonparametric Methods and their Application to Research in Human Capital and Economic Growth
8. Human Capital and Economic Growth: Nonlinear Specifications
9. Conclusion