The Economic Analysis of Social Issues

Introduction to the Course

1. The goals of economic analysis

Physicist Richard Feynman – Social Science really isn’t a science
Mathematician Norbert Weiner – Economics is a two digit science
Economist John Maynard Keynes – Economics is an apparatus of the mind

Scholarly economics must be useful to be convincing.

2. Economic Methodology

John Neville Keynes – Positive versus normative analysis
Alfred Marshall – Using Facts and Reason to Gain Knowledge
Samuelson versus Friedman – Do assumptions need to be realistic?
Lawrence Summers – Use stylized facts and many types of evidence

3. Theoretical Tools of Economics

Comparative Statics, Comparative Dynamics
Calculus of Variations, Optimal Control, Dynamic Programming

Examples – Simplest Examples
Equilibrium of Supply and Demand
Constrained Maximization
Static Aggregate Models like IS-LM
Dynamic Aggregate Models like the Solow Growth Model
Representative Individual General Equilibrium Models like the Overlapping Generations Model
Representative Individual General Equilibrium Models like the Ramsey Model

Problems with these models and methods
4. Empirical Tools of Economics

   Descriptive Statistics and Stylized Facts
   Regression Analysis – Cross Section, Time Series, Panel Data
   Logit Analysis
   Time Series Regression

Examples – Recent Student MA Theses

Problems with empirical models
Non-experimental data, structural change, spurious correlation,

I. Introduction to the class – 2 exams, midterm (40%) and final report (60%), essay or short answer questions, a variety of topics on social problems ranging from the social effects of the business cycle to global warming. Students are urged to practice discussing the pros and cons of each topic. Materials will be made available each week for discussion. Important readings will be assigned.

II. Software and data banks – GRETL will be used in class. Students must download GRETL and install as was discussed in class.

III. We began the lecture by noting that economic models and results come from two major sources – (1) optimization conditions and (2) equilibrium conditions. The optimization conditions occur when we maximize or minimize some objective function, possibly subject to a set of constraints. Equilibrium conditions occur when there is a balance of economic forces such as when we have accounting relations, supply and demand, or arbitrage relations. They are the result of some collective behavior and market forces.

Example of optimization: (maximizing of utility subject to a budget constraint)

In this case the representative individual maximizes $U(x_1, x_2)$ subject to a budget constraint, say $Y = P_1x_1 + P_2x_2$. From the first order conditions of this maximization model, we get the demand functions for $x_1$ and $x_2$. These can be written as

$$x_1 = x_1(Y, P_1, P_2) \quad \text{and} \quad x_2 = x_2(Y, P_1, P_2)$$

We can draw a standard downwardly sloping curve for the demand for $x_1$ is we
assume that Y and P₂ are constant. Note that the demand for x₁ will fall if the price of a substitute falls (say P₂ falling from 100 to 50)

This is all simple material which you would learn in a first year economics course. However, note that we did not say how long it takes for the demand curve for x₁ to shift. It could be a week, a month, or a year. There is nothing in the analysis about time. This is why we call it “statics”.

A second way we create models in economics is to look at equilibrium conditions.

**Example of equilibrium:** (simple macro model)

Here we consider a very simple macroeconomic model of the economy which has only two sectors (no government or trade). The national income identity is assumed to represent equilibrium by supposing that actual investment, I, is equal to planned investment. This is often done in economics. We begin with a definition or accounting relation and we transform it into an equilibrium relation by creating desired or planned variables. Our simple model is two equations
\[ Y = C + I \]
\[ C = \beta_0 + \beta_1 Y \]

and we treat the first equation as an equilibrium. On the left hand side is what we produce and on the right hand side is what we plan to consume. In equilibrium, they are equal. The second equation is the consumption function which shows that consumption depends on income linearly. We can now solve these two equations for the equilibrium values of \( Y \) and \( C \) which are

\[ Y^* = \frac{\beta_0}{1 - \beta_1} + \frac{I_0}{1 - \beta_1} \]
\[ C^* = \frac{\beta_0}{1 - \beta_1} + \frac{\beta_1 I_0}{1 - \beta_1} \]

We can now see that an increase in \( I_0 \) will raise equilibrium \( Y^* \) (if \( 0 < \beta_1 < 1 \)). This comparative static result is sometimes written \( dY^*/dI_0 > 0 \). Once again we did not mention how long any of this would take. It could be a month or a quarter or a year or even twenty years. Time is not a factor in comparative statics analysis.

In elementary macroeconomics classes we usually draw a diagram to show our comparative statics as given below.

When \( Y \) increases from \( Y_o \) to \( Y_1 \) we are certainly producing more per period, but how fast does it take to get production up to that level? What is the time path involved? This is something which comparative statics cannot tell us.
The most comprehensive models in economics are the dynamic models. They are also the most complicated since they usually involved optimization or equilibrium over time.

It turns out that the above comparative statics are related to dynamic analysis.

In comparative statics we look at the long run positions (called steady states) and compare them before and after some change in the economy. The above two graphs both show points before (A) and after (B) the shifts. The two points A & B represent steady states and we compare these before and after the shifts. We do not look at the path of change between the two points. Whenever we are concerned with how things develop over time, we are concerned with dynamic analysis.

Let’s see how comparative statics is related to dynamics.

**Example of Dynamics:**

Suppose that we have a simple economic variable called x which is related to time t. We can write this as \( x(t) \) which means that x is a function of time. We can even draw a graph of x
Note how that the slope at point P is more negative than at point Q. That is, the curve is steeper at P than at Q. In addition, the value of $x(t)$ is higher at P than at Q. We might hypothesize that for $a$ and $b$ positive

$$\frac{dx}{dt} = a - bx(t)$$

which is called a *differential equation* because it is an equation involving both $x(t)$ and $dx/dt$. In the long run $x(t)$ does not change. It is at its long run steady state value where $dx/dt = 0$. This long run value can be written as

$$x^* = \frac{a}{b}$$

This whole system can be presented in a diagram.
When $b$ increases we find that the long run steady state value of $x$ decreases. This is comparative statics. Thus, we can write

\[
\frac{\partial x^*}{\partial b} < 0.
\]

Similarly, we can show that when $a$ increases, then long run $x$ increases. This is also a comparative statics result and we can write it as

\[
\frac{\partial x^*}{\partial a} > 0.
\]

Finally, we can show what happens to $x$ over time. This is called dynamic analysis. We assume that $x(t)$ is moving along in accordance with the differential equation above. Suddenly, at time $t_o$, the value of $b$ increases. This causes first a jump or fall downwardly by $x(t)$. This is then followed by a smooth movement to long run equilibrium.
Note: at time $t_0$, the value of $b$ suddenly increases. This causes the value of $x$ to jump or fall instantly from $A_1$ to $A_2$. After that, $x(t)$ will decrease exponentially to the new long run equilibrium $x^{**}$. Students who are interested in seeing why there is a jump may ask me next time in class.