In this lecture, I review a few general ideas that are important in understanding macroeconomic theory. Many of these ideas will have been seen in Economics 101 as they derive from microeconomic principles.
Two Key Aspects of Economic Reasoning

1. A “purposeful approach” to understanding individual behavior

2. Explicit attention to the way in which individuals' decisions are interconnected and produce an aggregate (also known as general) equilibrium

Comment: There is no claim that economic approaches to individual and aggregate behavior are always correct, or are always superior to modes of reasoning in other fields.
Individual Behavior

Economic theory assumes that individual actors are purposeful. This is commonly understood as imposing rationality, but one must be careful in specifying what these terms means.

Purposeful behavior implies that observed behaviors are regarded as the outcome of a decision process.
Generally, one may think of the decision process as determined by

1. Preferences: utility functions for consumers, profit maximization by firms, etc.

2. Constraints: budget constraints for consumers, production functions for firms, etc.

3. Beliefs: expectations about the future, expectations about the behavior of others, etc.
Example: Consumption and Savings Under Uncertainty

Suppose that an agent has income \( Y \) and must decide to allocate the income between consumption today \( C_1 \) and consumption one period from now, \( C_2 \). (Assume prices are all equal to 1, so income today and tomorrow trade off 1 for 1 with consumption).

The agent derives utility from consumption in each period; an example of such a utility function is

\[
u(C_1) + \beta u(C_2)\]

Comment: \( \beta \) is a discount factor.
If the agent chooses not to save a dollar today, he can invest it in an asset that pays a nominal interest rate \( i \); however, the real interest rate, \( r \), is not known at time 1 but depends on inflation between today and tomorrow.

The idea is that you can save today and ensure a certain number of dollars next period, but you do not know what the dollars will be able to purchase.

This is an example of an optimization problem under uncertainty. It requires the economic agent to think about the future consequences of current actions. Such thinking is necessary in many macroeconomic contexts. We have just described how consumptions decisions are intertemporal.
Other examples of decisions under uncertainty include:

Capital Investment: Firms make decisions on investment in new capital (machines, structures, etc.) on the basis of the effects of these investments on the stream of future profits.

Education: Investment in education requires one to think intertemporally. Consider the factors that lead one to attend college versus get a job.

Consumption: How does your consumptions savings decision depend on expectations about future taxes, future wages, etc?
How Does The Investment Problem Match Up with the General Structure of Economic Decision Problems?

1. Preferences: the utility function embodies this.

2. Constraints: the constraints are of two types. First, there is the constraint implied by the income level $\bar{Y}$. Second, there is an intertemporal constraint that describes the tradeoffs of a dollar this period versus next period; giving up a dollar today means you will receive $1 + i$ dollars next period.

3. Beliefs: the behavior of the agent cannot be described until we specify his beliefs about inflation. This requires describing uncertainty about inflation. The language for this comes from probability theory.
Equilibrium

Once the behavior of individuals is described, it is necessary to explain how these behaviors are interrelated. The notion of an equilibrium, roughly speaking, means that the individual agents are making decisions that are mutually compatible, in the sense that the role of the decisions of others in each individual decision are consistent across individuals.

Observed data are typically thought of as equilibrium data. What this means is that the observed behaviors reflect the interdependences that are described by the individual decision problems and that the behaviors are consistent in some sense.
Market Equilibrium

Suppose that a market consists of $I$ consumers and $K$ firms.

Each consumer $i$, given a price $P$, solves a utility maximization problem. We can think of this as leading to an individual-specific demand function

$$d_i(P)$$

Why do demand functions differ across individuals? Reasons include differences in tastes (preferences), differences in income (constraints), differences on the resale value of the object (beliefs), etc.
Aggregate demand in this market may be described by the summation of the individual demand schedules

\[ D(P) = \sum_{i=1}^{J} d_i(P) \]

Notice that the aggregate demand function derives from individual decisions. This is important: it illustrates how market aggregates are determined by individual decisions.

Question (for the future): how do we link aggregate data to individual behavior?
One can think about the supply in the market in an analogous fashion.

Each firm (or producer) $k$ determines how much of the good it will make available for sale given the price. It does so by determining the level of output that will maximize profits at that price. This will depend on the costs of productive inputs and other factors. The profit maximization problem leads to individual level supply functions

$$s_k(P)$$

with associated *aggregate supply*

$$S(P) = \sum_{k=1}^{K} s_k(P)$$
Equilibrium means that aggregate demand and aggregate supply are equal. It is therefore defined as a price $p^*$ such that

$$D(P^*) = \sum_{i=1}^{I} d_i(P^*) = \sum_{k=1}^{K} s_k(P^*) = S(P^*)$$

Notice the notion of mutually consistent behavior means that supply and demand decisions are equated through a common variable: price.

Notation: aggregate output will be denoted as $Y$.

Therefore, equilibrium in the market may be denoted $(P^*, Y^*)$.
As you have studied in Economics 101, we are concerned with the effects of shifts in the aggregate demand and aggregate supply schedules.

As review, it is critical to distinguish between shifts along a schedule and shifts of a schedule.

Consider the graph of aggregate demand, Figure 1

The two points \((P_0, Y_0)\) and \((P_1, Y_1)\) are both different points on the same curve. Moving from one to the other is what is meant by a shift along the curve.
Figure 1

Shift along Aggregate Demand Curve
In contrast, one can think of a shift of the aggregate demand curve.

The easiest way to think about this is to suppose that some factor increases (or decreases) aggregate demand at each price level.

For example, the government may raise spending, say on military equipment or roads.

The curve shifts to the right, as illustrated in Figure 2.
Figure 2
Shift of Aggregate Demand Curve
Comparative Statics

Comparative statics analysis amounts to asking how the equilibrium levels of \((P^*, Y^*)\) changes with shifts in the aggregate demand and aggregate supply schedules.

The basic results of comparative statics analysis are straightforward. We typically assume that the demand schedule is downward sloping and the supply schedule is not. In macroeconomic contexts it is not always the case that the supply schedule is upwards sloping.
Comparative Statics with Aggregate Demand Downward Sloping and Aggregate Supply Upward Sloping:

If aggregate demand shifts outwards (there is higher demand at each price), then the initial equilibrium levels of price and output shift so that price is higher and output is higher.

This is illustrated in Figure 3

Intuition: Prices have to rise for suppliers to increase output in response to higher demand.
Figure 3
Aggregate Demand Shift and Equilibrium Change in \( (P, Y) \)
If aggregate supply shift outwards, so that more output is supplied at each price level, then the initial equilibrium levels of price and output shift so that price is lower and output is higher.

This is illustrated in Figure 4

Intuition: Price have to decline for demand to meet the increase in output that firms are willing to supply.
Figure 4
Aggregate Supply Shift and Equilibrium Change in \((P, Y)\)
Special Cases

If the aggregate supply schedule is horizontal, then shifts in aggregate demand will only produce output effects, not price effects.

This is illustrated in Figure 5
Figure 5

Aggregate Demand Shifts with Horizontal Aggregate Supply
If the aggregate supply schedule is vertical, then shifts in aggregate demand will only produce price effects, not output effects.

This is illustrated in Figure 6
Figure 6

Aggregate Demand Shifts with Vertical Aggregate Supply
An interesting case is that of a kinked aggregate supply schedule.

Supply that aggregate supply is horizontal up to some level of output $\bar{Y}$, but then become vertical.

In this case, the effects of aggregate demand shifts will depend on where the initial equilibrium is.

See Figure 7

The shift from $AD_0$ to $AD_1$ only affects output

The shift from $AD_2$ to $AD_3$ only affects price
Figure 7
Shifts in Aggregate Demand
with Kinked Aggregate Supply
Macroeconomic Markets

We will employ these basic comparative statics ideas throughout the course.

In essence, we wish to discuss three markets:

1. Market for output
2. Market for financial assets (money market)
3. Market for labor

The difficulties in macroeconomic analysis derive from accounting for the interconnections between these markets. This is the distinction between partial equilibrium analysis (analysis of one market in isolation) and general equilibrium analysis (simultaneous analysis of all markets)