

Contents

Macroeconomics - Week 1	2
What is Economics	2
The Market Mechanism	3
Micro vs Macro	3
Fundamental Welfare Theorems	4
Macroeconomic Themes	4
Indicators and Performance	4
Models	5
Public Policy	5
Links	6
Gross Domestic Product	6
Definition	6
What is Economic Activity?	6
Flow of Production	6
Flow of Expenditure	7
Assumptions	8
Flow of Income	8
Firms	8
Households	8
Government	8

National Income Accounting	9
Expenditure Form	9
Income Form	9
Result	9
Refinements	10
National GDP - A Potential Problem	10
Unsold Inventory	11
National Income Accounting Identity	11
The economics of happiness	12
Long Run Economic Growth	12
GDP per Capita	12
The Nature of Exponential Growth	12
Fundamental Sources of Economic Growth	13
The Production Function	13
Basic Concepts	13
Production Table	13

Macroeconomics - Week 1

Professor Nilss Olekalns

What is Economics

Macroeconomics is the study the economics of the aggregate, including monetary & fiscal policy, national output, exchange rates, rates of employment and inflation, etc. These are Issues of first order importance, having real economic effects on people and governments. Understanding the modern world requires an understanding of macroeconomics.

Modern economics goes back to “General Theory of Employment, Interest and Money” written by John Maynard Keynes in 1936. This was during the Great Depression and sought to provide a new toolset to understand and analyze the macro economy.

Economics is the science and art of decision making. In general, the needs and wants of a society are *infinite*, yet the resources required to fulfill these wants and needs are *finite*. This requires a certain allocation of resources to best meet society's needs. Economists study how these choices are made and the effects of these choices, as well as whether these choices will require public policy in order to improve the outcomes.

The Market Mechanism

societies have used different mechanisms to allocate their resources.

Command economies (Russia) are where the government planning agencies made decisions as to where scarce resources will be put. Market economies allow for a decentralized approach, one where the price system is used for resource allocation decision making. Consumers and producers try to optimize their interests, by reacting to the demand and supply produced by the other, reaching an *equilibrium*. This is called the *magic of markets*. This is a highly efficient way of dealing with the allocation of scarce resources.

Micro vs Macro

Most economists see themselves as working in one of the two disciplines, though the precise definition of each are a little fuzzy.

Microeconomic analysis emphasizes individual units of the markets and the decisions each player makes in response to the market.

Example micro questions:

- * With a limited budget, how should members of an individual household organize spending across goods and services to make best use of limited resources?
- * Given market conditions, how does a firm choose how much to produce?
- * Will prices coordinate household spending and firms production in a way that best allocates society's limited resources across competing uses?

Macroeconomics shifts the focus to the larger aggregate.

Example Macro questions:

- * What factors determine how much output a nation produces?
- * Why do recessions occur?
- * Why do different economies have different rates of inflation?
- * What roles do monetary and fiscal policy play in managing the economy?

Fundamental Welfare Theorems

There are two fundamental welfare theorems. These place the study of macroeconomics in context.

The first fundamental theorem states that under ideal conditions, decentralized decision making conducted through the mean of the market will lead to an optimal allocation of resources. Optimal outcome is a situation where there exists no possible reallocation of resources which will make any one person better off without harming at least one other person. This outcome is often known as Pareto optimality.

The second states that there exists a market determined outcome that will support any Pareto efficient allocation.

These are important intellectual foundations in the economists view that undermine the view that market based allocations produce highly desirable outcomes.

A great deal of ME deals with market based economies that do not allocate resources at an optimal level, where the theorems break down. There is not complete consensus amongst scholars. There are many additional models which seek to attribute these departures.

Some analysis attempts to view “new-classical economics” or “real business cycle theory”.

Keynes saw much of macroeconomic outcomes being a result of market failure. The traditional theory was only a special case of the actual world. The key is careful management of the economy, recognizing there are limits of what governments can achieve.

Macroeconomic Themes

Indicators and Performance

What indicators of performance are there?

1. Gross Domestic Product - a measure of goods and services produced in an economy over a specified time period

Looking at GDP data, there is a long term trend upward. Much exciting research has been recently done in this area known as “growth economics”. There is also occasional interruptions in the long run growth, known as recessions. These interruptions are addressed in business cycle theory and by Keynesian theory.

2. Rate of inflation - a measure of how much the economy is changing Looking at GDP data, there is a long term trend upward. Much exciting research

has been recently done in this area known as “growth economics”. There is also occasional interruptions in the long run growth, known as recessions. These interruptions are addressed in business cycle theory and by Keynesian theory.

There is a correlation between an economies GDP and its rate of inflation

3. Rate of unemployment - increases rapidly during recessions. Human cost to the business cycle. Avoiding recessions, is something governments can do to avoid the large scale human loss during economic recessions, as the human cost to unemployment can be huge.

Models

Models provide a key way to provide testable hypotheses which can be applied to real world data to give us an insight as to the validity of a model. models can simplify abstract concepts and allow us to

Public Policy

A central tenant of economics is that markets under ideal conditions allocate resources efficiently. Where the markets don't allocate efficiently, there is a place for policy to adjust the market such as an optimal allocation is achieved.

Central banks are responsible for the monetary policy of an economy.

Types of Policy:

- Monetary Policy: The setting or influencing of financial variables by a nations central bank to manage aggregate demand over the short to medium term
- Fiscal Policy: The setting of government budgetary variables - expenditure, taxation and public debt

The aims of macroeconomic policy:

- Rising living standards
- Avoiding extremes of macroeconomic performance
- Maintaining the real value of currency
- Ensuring sustainable levels of public and private debt
- Balancing current expenditure against the need to provide resources for the future
- Providing employment for all individuals seeking work

Links

<http://databank.worldbank.org/data/home.aspx>

Gross Domestic Product

An important metric economists use to quantify the size of an economy. Many aspects of the macro economy can be described using GDP

Definition

Measures the flow of economic activity in a geographic region (usually a country) over a particular period of time

Flow: A quantity which is changing, transient. Ex: income earned each week.

Stock: a variable defined at a particular point in time. Ex: savings in a bank account

- Flows build up stock.

What is Economic Activity?

Not a simple question, there are 3 distinct way to think about economic activity.

1. Production The flow of goods and services produced in and economy over a time period
2. Expenditure The flow of spending undertaken in the economy over a given time period
3. Income The flow of income earned in an economy over a time period

Amazingly, all 3 forms turn out to be identical. Measuring economic activity from any of the 3 forms results in an identical result.

Flow of Production

Taking a simple 2 stage production. 2 firms. Firm 1 produces an intermediate good.

The factors of production for Firm 1 is labour and capital.

Labour: The workers producing the good
Capital: All money needed to keep production running

Firm 2 has its own factors of production; labour, capital, and intermediate good
1. Firm 2 produces a final good.

If all flows were measured at all stages, there will be a double counting problem with any intermediate goods. The price of the final good already reflects the cost of the intermediate good.

Ex: Production of loaf of bread

	Stage of Value of Value of Value Added		
	Production	Sales Int Goods (\$)	at the Stage
wheat	1.80	0	1.80
flour	3.00	1.80	1.20
dough	4.00	3.00	1.00
bread	4.40	4.00	0.40
		Total	4.40

GDP is the sum of the value added. It is also the value of sales of the final good.

Flow of Expenditure

Must be precise as to the type of expenditure. There are 2 types of expenditure;

1. Consumption - Expenditures on final goods and services. Made to meet an immediate need. Known as consumption
 - Households - Consumption expenditure on nondurables
 - domestic
 - import
 - Government
 - domestic
 - imports
 - Foreigners
 - Exports

2. Investment - expenditure made on durable goods and services.

- Households
 - domestic
 - imports
- Firms
 - Plant and equipment
 - Inventory of unsold stock
 - domestic
 - imports
- Government
 - domestic
 - imports

Assumptions

Assumptions made in models are not intended to reflect reality. They are intended to aid in working with the model.

1. Firms are the only sector that engages in investment
2. Households are the only sector that purchases imports

Flow of Income

Firms

Firms pay out a proportion of sales as wages, interest, rent, dividends and tax. The rest is retained earnings + allowance for depreciation. This is known as business saving.

Households

Receives wages interest rent dividends. A proportion of household income is used for consumption, the rest is household savings and to pay taxes.

Government

Receives tax from firms and households. Spends via government expenditure. Government savings = Taxes - Expenditure If government savings > 0 , then there is a budget surplus. If < 0 then budget deficit.

National Income Accounting

Keeping track of economic flow in an economy.

The value of production over a period can be domestic or sold as exports

Expenditure Form

- Y is the GDP of the economy
- C^d is the household consumption
- G is the government expenditure
- I is the firm investment
- X is the exports to other economies

$$Y = C^d + G + I + X$$

Income Form

- S^b is business saving
- M is the imports purchased by households
- S^h is the household saving
- T is the tax payments

$$Y = S^b + C^d + M + S^h + T = C + M + S + T$$

Result

As all forms of GDP are equivalent, the equations can be rearranged

$$C^d + G + I + X = C^d + M + S + T$$

$$I = (M - X) + (T - G) + S$$

This relates the total investment to the difference between imports and exports and the budget surplus/deficit.

Define National Saving, NS :

$$NS = S + (T - G)$$

investment becomes

$$I = (M - X) + NS$$

This relates the import surplus/deficit and the amount of national saving to the investment. Interesting to note that when there is a trade deficit, then investment is higher than national savings. This correlates well with data.

Refinements

There are some refinements to the concept of GDP which need to be discussed. First refinement has to do with measurement issue. This is an important issue in economics.

Example. Assume there are only 2 commodities: cheese and wine. Taking the expenditure GDP

Commodity	Variable	2009	2010	2011	2012
Cheese	q p (val) q p	100 15	105 16	108 18	112 20
Cheese (kilos)	(val) □	1500 25	1680 30	1944 38	2240 50
Wine Wine		22 550	20 600	16 608	12 600
(L) Total		2050	2280	2552	2840
GDP					

In this way, the total GDP is called the *nominal GDP*. This is the sum of the current price times the current quantity. We are using the current prices to weight the commodities each year. This price based weighting can also be thought of as the *social value* of the good, if the economy is in a market economy. Resources that are valued highly in a society, receive a high price, and thus are weighted heavier the calculation of GDP. This is a core belief in market economies.

National GDP - A Potential Problem

In many cases, in time, the quantity sold of a good goes up and the price goes down. This trends the nominal GDP in an unpredictable way. If the prices are falling faster than the increase in quantity, then the nom. GDP decreases in time. If the nom. GDP is falling in time, one cannot infer that it is because of the quantity increasing or the price decreasing. Thus, it is useful to use a different concept for GDP, the *Real GDP*.

1. Declare a base period, usually a year
2. Value the quantity of goods in relation to the fixed base price.

3. Future quantities are multiplied by this base price to get a new measure of GDP.

Thus, prices are fixed at this beginning period, and the time dependant quantity are tracked.

One problem with real GDP. When we use this base period prices, and we use the prices to value the goods and services those periods, we are freezing those weights at the base price. This assumes a fixed social value for the good in time. This, in particular, does not happen. Solution to this is what is called a *chain volume index*. This moves the base price forward each year. Thus the real GDP is in reference to last years prices.

Unsold Inventory

There is a dependance between production and sales. This does not always happen, there is often unsold goods, stored as inventory. This is not as big as problem as one may think. We can look at the unsold inventories as a firm investment, to meet an increase in demand in the future.

Change in inventories is the difference between production and expenditure, this gets added to a firms investment, I .

Now, the relation still holds:

$$P = E + I$$

National Income Accounting Identitiy

That is, production, expenditure, and income are all equal measures of the GDP.

There are distinct sectors in an economy.

1. Household
 - $C^d + M$
2. Firms
 - I : plant,equipment, inventory investment
3. Government
 - G : gov. expenditure
4. Foreign Sector
 - X : exports

The financial crisis in 2009 was characterized by a sharp drop in GDP growth.

The economics of happiness

There is a large amount of research being done on the economics of people's happiness. There is data supporting the evidence that there is little to no correlation in a nation's GDP and the overall happiness of the citizens. In some cases, such as East Germany just after the fall of the wall, there was a correlation between real income and overall well-being as polled from citizens.

Long Run Economic Growth

Going to look at key characteristics of economies in long run growth and why it is that different countries have different experiences with long run economic growth. A very big area in macroeconomics, one of the oldest disciplines.

There have been many exciting recent developments, they build on the concepts covered in this course.

GDP per Capita

For the US, per capita GDP has risen dramatically. There is an exponential growth. It is not smooth, there was the Great Depression in the 30's, other business cycles are evident as well. (Source of graph?)

The Nature of Exponential Growth

Exponential curves have the following forms:

$$G_t = G_0(1 + \alpha)^t$$

where α is the growth rate for the economy under question. This results in the following:

$$\ln G_t = \ln G_0 + t * \ln(1 + \alpha)$$

if α is small ($\alpha \ll 1$), then $\ln(1 + \alpha) = \alpha$,

Now we can get a nice relationship for the year on year change:

$$\ln G_t / G_{t-1} = \alpha$$

We call α the growth rate. When the US GDP per capita is plotted against a log scale, there is a clear trend upwards.

Interesting to note that there could be long term periodic fluctuations in a modern industrialized economy that we are only able to recently measure.

Fundamental Sources of Economic Growth

The real GDP per capita is the total flow of income / population

- Notation: N is the total labour force produced in the economy.

It is interesting to break up the income / population into

$$\frac{G}{P} = \frac{G}{N} * \frac{N}{P}$$

The first term is defined as the average productivity, and is an important economic factor, the second term is the proportion of population actively in the labour force, and is more of a demographic factor. Both are important but the first will be focused on more than the second in these notes.

The Production Function

Basic Concepts

How do firms bring together factors of production to produce output.

A firm is an organization that exists to bring together the factors of production and together, produce output. Here, more simple production functions will be studied.

Very simple PF consists of two levels of production, labour and capital.

Capital is used sometimes differently. Here, it is the physical tangible equipment, buildings tools and raw materials. These are often known as the *primary* factors of production.

They are not the only factors that firms use to produce output. They are called secondary production, examples are technology, skills, and everything that is not a primary factor of production.

Production Table

A way of representing this idea of a production function. It is an experiment to vary the amounts of labour and capital while holding secondary factors unchanged and record the level of output that can be produced. Labour is denoted as L and capital K .

Capital/Labour	1	2	3	4
1	2.00	2.83	3.46	4.00
2	2.83	4.00	4.90	5.66
3	3.46	4.90	6.00	6.93
4	4.00	5.66	6.93	8.00
5	4.47	6.32	7.75	8.94
6	4.90	6.93	8.49	9.80

If we look at the labour columns, we see what is known as diminishing marginal productivity of capital, ie it costs more and more capital to achieve the same gains as previously attained. This is often called the *marginal product of capital*, denoted by MPK . The change in GDP from a change in capital. Another characteristic of production is a diminishing marginal productivity of labour.

A third characteristic of the production function is a constant relationship in the product of labour and capital.

$$L * K = const$$

This is known as *constant returns to scale* of production, denoted by CRP . Thus if we scale the amount of labour and capital by the same factor, we get the same scaling in production. This scaling is denoted with λ .

The production function is also denoted by a summarizing equation

$$y = Af(k, l)$$

where y is the production output, k is capital, and l is labour. The variable A are the secondary factors of production.

By taking slices of the 3D surface represented by y , one can hold one variable fixed and plot the relationship of y versus the other variables. The production function can also be scaled to the aggregate of production per person in an economy. This representation is a plot of the GDP/person y/l and the capital labour ratio k/l . Note this assumes that everybody in the economy is a member of the workforce. This also has similar characteristics, with a DRS relationship, the rate of the DRS is a measure of A .

The important fact to remember is that for different levels of k/l , the strategy to maximize production output can change. Usually for a lower k/l , as in new economies, it is more effective to increase k/l versus trying to raise total factors

of production, A . As the diminishing returns applies, there is a point at which a marginal gain in A will produce a larger gain in y versus a comparable marginal gain in k/l . This hints that more developed economies would be better served focusing on improving the secondary factors of production versus the primary, i.e. technology, specialised skills than reallocating more capital to labour.