Module # 5 – Component # 1

Macroeconomic Analysis 1
Taking the Nation's Economic Pulse

This Component:

- focuses on the basics of Macro Economics.
- assumes a reasonable level of valuation theory, but attempts to add a level of practical application. We attempt to "fill the gap" between theory and practice.
- is one of several comprising the Investor Campus "Basics of Series".

Objectives

In this Module we take consider Macro Economics and begin with one of the most important Components of this subject, namely, Gross Domestic Product.

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Gross Domestic Product

A region's gross domestic product, or GDP, is one of the several measures of the size of its economy.

Definition	'GDP' is the Gross Domestic Product. It is defined as the market value of all final goods and services produced within the borders of a country during a specific period of time (usually one year).

Key elements of the definition

There are five key elements to the definition:

1. Market value
2. Final goods and services
3. Produced
4. Within the borders of a country
5. During a specific period of time

Market Value

The market value is the product of the price of each product multiplied by the quantity produced. Imagine that we have two countries, Paradise and Far Away. In one year each produces only the products shown in the table below. How is it possible to decide which country has been more productive, or put in other words, which country is the wealthiest?

We can calculate the market value of the GDP by multiplying the quantity of each product by its price, and adding the value of all products together.

Paradise	Quantity produced	Price	Faraway	Quantity produced	Price
Apple	10	$1	**Pineapple**	20	$2
Shoes	5	$40	**Jeans**	10	$30
Car	2	$10,000	**Tractor**	3	$7,000
Beer	10	$5	**Sweets**	20	$2

For Paradise GDP = 10 x $1 + 5 x $40 + 2 x $10,000 + 10 x $5
= $20,260

For Faraway GDP = 20 x $2 + 10 x $30 + 3 x $7,000 + 20 x $2
= $21,380

So Faraway has the larger GDP and is thus the wealthiest.

Final goods and services

Products can be defined either as final or intermediate products. An intermediate product is used to create a final product. For example, a car battery bought by a motor manufacturer to fit into a new car is an intermediate product. However, when someone buys the car, the battery is considered to be a final product because the buyer of the car is the final consumer of the battery. The value of intermediate goods and services should not be included when calculating GDP as this would lead to 'double-counting' and the GDP would be overvalued.

Illustrative Example
A farmer grows and sells 100 bales of wheat to a miller at $10/bale. The miller grinds this wheat into flour, and sells the flour to a baker for $2 500. The baker uses the flour to make loaves of bread, which he then sells to a shopkeeper for $3,500. The shopkeeper sells the bread to final consumers for $6,000. Only the final value of $6,000 contributes to the GDP.

Produced

The GDP only records the value of new goods produced. When the ownership of a product is simply being transferred, there is no *new* production and the GDP will be unaffected.

Thus financial transactions such as

- the sale of stocks bonds and securities,
- private and public sector transfers of income such as donations from one family member to another and
- government transfer payments such as social welfare payments are excluded from the GDP.

However, if commission is earned in any of these transactions, the commission will be included as part of the GDP as it implies a service was rendered (produced).

Within the borders of a country

The GDP measures the value of goods and services produced 'on the soil' of the country in question. Thus the income earned (which is equal to the value produced) by a foreigner working in the USA *will* be included in the GDP of the USA, while the income earned by an American living in Singapore will not be included in the America GDP (it forms part of the GDP of Singapore).

Specific period of time

The period in question is the current period. Only that which is produced in the current period contributes to the GDP. Thus, the sale of a *second-hand* car would not be recorded as part of the GDP - it was recorded many years ago when the car was first *produced*.

Two approaches to measuring GDP

There are two approaches to calculating the GDP. These will be illustrated and examples given to show how this is done. The approaches are called:

1) The expenditure approach
2) The resource cost - income approach

Each should theoretically yield the same value for the GDP, i.e.:

Gross Domestic Product		
Dollar flow of expenditure on final goods	= GDP	= Dollar flow of income and indirect costs paid in producing final goods

This equality means that the $2 you spend on a loaf of bread (the expenditure approach) should be enough to cover all resource costs incurred in the production of the bread and any incomes paid to **factors of production** that were used to produce the bread (the resource cost-income approach.)

Factors of production include labour, capital equipment, natural resources and entrepreneurship. Each of these factors of production is rewarded in some way for their involvement in production e.g. labour is paid a salary or wage and the entrepreneur earns a profit.

The expenditure approach to calculate the GDP

The GDP is the sum of all the expenditure in an economy (households, firms, the government sector and the foreign sector).

GDP = consumption + investment + government spending + (exports − imports)

or

Total Spending = **C** + **I** + **G** +(**X** − **Z**)

C = Personal **C**onsumption spending

Households are responsible for most expenditure in an economy. In the USA approximately two thirds of consumption spending is on non-durable products (products that are frequently replaced)

I = Gross Private Domestic **I**nvestment (Gross PDI).

This measures spending on capital goods (fixed investments). Capital goods are those that provide a future flow of goods or services and thus include business plants, machinery, the purchase of houses (since this provides an accommodation service into the future) and inventory investment (stock on hand). "Gross" PDI is when depreciation of capital stock is not included

An increase in inventories (i.e. more investment in stock on hand) is added to the GDP, while a depletion is subtracted from the GDP.

Net PDI is gross PDI less a provision for depreciation of the capital goods. Net PDI gives good indication of a country's ability to experience economic growth since it indicates a country's real ability to produce goods and services.

G = **G**overnment expenditure on final goods and services. (Consumption + Gross Investment)

There are three main areas of spending by Federal, State and Local Governments

1) Consumption spending (e.g. office supplies)
2) Investment spending (e.g. Roads)
3) Spending on transfer payments (e.g. health care)

Of these, only consumption and investment spending are included in GDP calculations since transfer payments do not relate to current production.

X and **Z** are the gross exports and gross imports.

(X − Z) = Net (or cumulative) Exports

By definition the GDP calculates the value of goods and services produced locally. Exports are products produced locally and sold abroad, and therefore the value of spending on a country's exports must be included in the GDP.

Imports are products produced abroad but purchased locally. Thus the value of spending by a country on imports cannot be included in the value of the GDP, and so must be subtracted.

"Net imports" refers to the value of exports less the value of imports.

The resource cost income approach to calculating the GDP

An alternative way of calculating the GDP is the cost income approach. This is a measure of the inputs that are required to create the GDP. These inputs are called 'factors of production' and include the use of natural resources, labour, real capital, investment capital and entrepreneurial skills.

Each of these factors of production is rewarded with income in some form such as employee compensation; proprietor's income; rents; corporate profits and interest income.

Adding together the incomes earned by the factors of production yields the Gross National Income (or **GNI**) that can then be used to calculate the GDP by making adjustments.

In order to calculate the GDP from the GNI we consider the process of making adjustments:

1) Calculate the Gross National Income (GNI)
2) Adjust GNI to GNP
3) Adjust the GNP to get the GDP

Calculate the GNI

Consider a very simplistic example. Imagine that the only economic activity taking place in the country of Paradise is the production and sale of MacDonald's burgers from a solitary MacDonald's store.
Now assume that to produce a MacDonald's burger, the following factors of production are used:

Labour	50c
Land	$1.00
Capital	10c
Entrepreneur	40c

The total income earned from these factors of production is $ 2.

Adjust GNI to GNP

The GNI is $2.00. Since all the factors of production have been paid for their efforts, including 40c profit for the entrepreneur, the burger should be sold for $2.00. However, when one buys the burger, the Macdonald's market price is $3.00. The price of the burger, as this is the only product in this simple example, is the GNP.

The extra $1.00 is to account for any indirect business tax and depreciation. Thus:

GNP = GNI + Indirect business taxes + depreciation

The adjustments to GNI to find the GNP are indirect taxes and depreciation.

Adjust the GNP to get the GDP

The difference between the GNP and the GDP for America, for example, lies with Americans who live outside the country and who remit income back to America and with foreigners working in America and who remit income out of America.
For example, the American GNP will include income earned by Americans abroad and sent back to America (called foreign factor receipts), and exclude income earned and remitted abroad by foreigners working in America (called foreign factor payments/net income of foreigners).

Since, by definition, the GDP records only what is produced within a country's boundaries, it must exclude foreign factor receipts and include foreign factor payments, i.e.:

GDP	
GNP - foreign factor receipts + foreign factor payments	= GDP
GNP – foreign factor receipts + income from foreigners	= GDP
GNP + net income of foreigners	= GDP

In summary, the resource cost-income approach can be calculated as follows:

GDP
GNI + Indirect business taxes + depreciation
= GNP + net income of foreigners
= GDP

Illustrative example:

National Income Accounts 200X	
Component	**Billions of Dollars**
Personal consumption	3,058
Fixed Investment	531
Rents	64
Inventories	15
Net Income of foreigners	9
Indirect Business Tax	429
Net exports	- 24
Depreciation	299
Government consumption and Investment	856
Employee compensation	2,902
Interest Income	107
Proprietors income	308
Corporate profits	**318**

Determine the GDP for this country.

Total spending = C + I + G + (X – Z)

C = 3,058
I = 531 + 15 = 546
G = 856
(X – Z) = -24 (more is imported than is exported)

Total spending = 3,058 + 546 + 856 - 24 = $4,436 billion

The GDP and the GNP

The Gross National Product (GNP), like the GDP, is a way to measure the economic performance of a country.

Definition	The GNP can be defined as the total market value of final goods and services produced by *the citizens* of a country, regardless of where they are residing.

This is unlike the GDP, which measures the value of output produced *within the borders* of a country.

The GNP *includes* the value of output produced/income received and remitted back home by its citizens working or investing abroad (foreign factor receipts) and excludes the value of output/income received and remitted abroad by foreigners working or investing domestically (foreign factor payments).

The GDP can be used to calculate the GNP:

GNP
GNP = GDP + foreign factor receipts - foreign factor payments

Inflation, Current and Constant Prices

Economists make use of the GDP to monitor changes in a country's output over time since this can then indicate changes in standards of living.

When measuring the GDP, there are two types of prices that can be used:

1)	**current prices**	we call this the nominal GDP
2)	**constant prices**	we call this the real GDP

Inflation causes the loss in the purchasing value of the dollar. In an inflationary situation you can buy less today with $100 than you could a year ago. An income of $100 a year ago and $100 today means that in terms of ***current prices***, your income has not changed. i.e. you have earned $100 in each year. However, with inflation, you are actually poorer now than you were in a year ago.

Looking at the situation in ***constant prices***, your salary can now buy less i.e. you are now earning the equivalent of less than the $100 of buying power of a year ago. In other words in ***constant prices*** you are now earning only $90 (for example). In order to compensate you, your employer should therefore increase your current salary which will not be a real increase. It will simply bring your salary back to the $100 purchasing power which you had last year. This is said to be $100 in constant prices.

When we measure GDP, we can measure it in **current prices** (nominal GDP) or **constant prices** (real GDP).

However, if we wish to use the GDP from one year to the next to measure an increase in welfare (or wealth of the nation), we need to be aware that increases in the *nominal* GDP from one year to the next could be as a result of either or both of the following:

a) an increase in output (welfare improving) (which is what we wish to compare) and / or
b) an increase in prices (since the nominal GDP is measured in current prices which includes inflation).

So, using the nominal GDP to infer changes in welfare would thus be misleading. To remove the effects of inflation, the nominal GDP is converted into the real GDP by means of a price index.

Consumer Price Index

Consumer Price Index and GDP Deflator
A price index measures the cost of buying a basket of goods at one point in time relative to some other time. The original point in time is called the base. For the Consumer Price Index (CPI) the basket of goods at each point of time is identical. For the GDP deflator the basket is allowed to change with peoples' consumption and investment patterns

Calculation of real GDP, using nominal GDP and the GDP deflator

The GDP deflator (or the implicit price deflator for GDP) is a measure of the change in prices of all new, domestically produced, final goods and services in an economy. The GDP deflator is not based on a fixed market basket of goods and services. It is allowed to change with people's consumption and investment patterns. Therefore, new expenditure patterns are allowed to show up in the deflator as people respond to changing prices. This is in contrast with the CPI where a fixed basket is used.

Real GDP
$\text{Real GDP}_{\text{current year}} = \text{Nominal GDP}_{\text{current year}} \times \frac{\text{GDP deflator base year}}{\text{GDP deflator current year}}$

In order to determine the current real GDP it is necessary to know:

1) the current nominal GDP
2) the GDP deflator for the base year
3) the GDP deflator for the current year

Illustrative Example

A state had a Nominal GDP of $2.5 billion in 1992 which is taken as the base year. In 1994 the nominal GDP was measured as $4.5 billion. The GDP deflator for 1994 is 115.

Year	Nominal GDP ($billions)	Price Index GDP Deflator 1992 = 100	Real GDP ($billions)
1992	2.5	100	
1994	4.5	115	

1) Determine the 1994 GDP in constant 1992 dollars?
2) Determine the growth rate of the real GDP between 1992 and 1994?
3) What was the inflation rate between 1992 and 1994?

1) <u>Determine the 1994 GDP in constant 1992 dollars?</u>

Since 1992 is the base year, with a GDP deflator index = 100, we can assume that the real GDP = the nominal GDP x $^{100}/_{100}$ = $2,5 billion.

Year	Nominal GDP ($billions)	Price Index GDP Deflator 1992 = 100	Real GDP ($billions)
1992	2.5	100	$2.5 billion
1994	4.5	115	

We now need to find the GDP in 1994 in constant 1992 dollars?

$$\text{Real GDP}_{1994} = \$4.5 \text{ billion}_{1994} \times \frac{100_{1992}}{115_{1994}} = \$3.913 \text{ billion}$$

Year	Nominal GDP ($billions)	Price Index GDP Deflator 1992 = 100	Real GDP ($billions)
1992	2.5	100	$2.5 billion
1994	4.5	115	$3.913 billion

2) Determine the growth rate of the real GDP between 1992 and 1994?

Since we now know the real GDP for 1992 and 1994, we can calculate the growth rate:

Growth rate for GDP from 1992 - 1994
$\frac{3.913}{2.5} - 2.5 \times 100$ $= 56.5\%$

The growth rate was therefore 56.5%, or in dollar terms
= 56.5% x $2.5 billion = $1.41 billion

3) What was the inflation rate between 1992 and 1994?

Year	Nominal GDP ($billions)	Price Index GDP Deflator 1992 = 100	Real GDP ($billions)
1992	2.5	100	$2.5 billion
1994	4.5	115	$3.913 billion

We need to assume that the rate of inflation is measured by the indexes (deflators in this case).

The rate of inflation was $\frac{115-100}{100}$ x 100 = 15% from 1992 to 1994.

The Contribution of the GDP

The limitations of the GDP relate to its use as a measure of welfare. It must be remembered that the GDP was not initially designed for this purpose. The primary purpose of the GDP is to measure a country's production and changes in production, essential information for businesses and policy-makers.
Nonetheless, despite the criticisms of the GDP as a measure of welfare, there does tend to be a strong correlation between changes in welfare and changes in GDP.

The Link Between Output and Income

It needs to be stressed that output is equal to income. This is obvious as seen in the two methods used to calculate the GDP. Thus in order to increase standards of living, or income, we need to focus on ways to increase productivity, or output.

Criticisms and Limitations of GDP.

It is important to understand that a single figure – the GDP – is unlikely to reflect an entire nation's economic pulse. GDP does not take into account the black market, where the money spent isn't registered, and the non-monetary economy, where no money comes into play at all, resulting in inaccurate or abnormally low GDP figures. For example, in countries with major business transactions occurring informally, portions of local economy are not easily registered. Bartering may be more prominent than the use of money, even extending to services (I helped you build your house ten years ago, so now you help me).

A number to criticisms and limitations are listed in the on-line free encyclopedia Wikipedia.[1]

1. This mainstream economic analysis ignores the environment, subsistence production and domestic work. The current system counts oil spills and wars as contributors to economic growth, while child-rearing and housekeeping are deemed valueless. The work of New Zealand economist, Marilyn Waring, has highlighted that if a concerted attempt to factor in unpaid work were made, then it would in part, undo the injustices of unpaid (and in some cases, slave) labour, and also provide the political transparency and accountability necessary for democracy.

2. GDP counts work that produces no net change or that results from repairing harm. For example, rebuilding after a natural disaster or war may produce a considerable amount of economic activity and thus boost GDP, but it would have been far better if the disaster had never occurred in the first place.

3. The economic value of health care is another classic example - it may raise GDP if many people are sick and they are receiving expensive treatment, but it is not a desirable situation.

1 http://en.wikipedia.org

4. It ignores volunteer, unpaid work. For example, Linux contributes nothing to GDP, but it was estimated that it would have cost more than a billion US dollars for a commercial company to develop.

5. Quality of life - human happiness - is determined by many other things than physical goods and services.

6. Cross border trade within companies distorts the GDP and is done frequently to escape high taxation. American companies that have founded holdings in Ireland to "buy" their own products cheaply from their continental factories (without shipping) and selling them for profit via Ireland - thereby reducing their taxes and increasing Irish GDP.

7. People may buy cheap, low-durability goods over and over again, or they may buy high-durability goods less often. It is possible that the monetary value of the items sold in the first case is higher than that in the second case, in which case a higher GDP is simply the result of greater inefficiency and waste. (This is not always the case; durable goods are often more difficult to produce than flimsy goods, and consumers have a financial incentive to find the cheapest long-term option. With goods that are undergoing rapid change, such as in fashion or high technology, the short lifespan may increase customer satisfaction by allowing them to have newer products.)

8. If a nation does not spend, but saves and invests overseas, its GDP will be diminished in comparison with one that spends borrowed money; thus accumulated savings and debt are not taken into account so long as adequate financing continues.

9. GDP does not measure the sustainability of growth. A country may achieve a temporarily high GDP by over-exploiting natural resources or by misallocating investment. For example, the large deposits of phosphates gave the people of Nauru one of the highest per capita incomes on earth, but since 1989 their standard of living has declined sharply as the supply has run out. Oil-rich states can sustain high GDPs without industrializing, but this high level will not be sustainable past the point when the oil runs out.

10. Economies experiencing an economic bubble, such as a housing bubble or stock bubble, or a low private-saving rate tend to appear to grow faster due to higher consumption, mortgaging their futures for present growth. Economic growth at the expense of environmental degradation can end up costing dearly to clean up; GDP does not account for this.

11. The annual growth of real GDP is adjusted by using the "GDP deflator", which tends to underestimate the objective differences in the quality of manufactured output over time. Therefore the GDP figure may underestimate the degree to which improving technology and quality-level are increasing the real standard of living.

12. GDP does not take disparity in incomes between the rich and poor into account.

13. The limits of GDP (or GNP, a slightly different notion) can be summed up in the words of two critics. Robert Kennedy said[1]:

The gross national product includes air pollution and advertising for cigarettes and ambulances to clear our highways of carnage. It counts special locks for our doors and jails for the people who break them. GNP includes the destruction of the redwoods and the death of Lake Superior. It grows with the production of napalm, and missiles and nuclear warheads... it does not allow for the health of our families, the quality of their education, or the joy of their play. It is indifferent to the decency of our factories and the safety of our streets alike. It does not include the beauty of our poetry or the strength of our marriages, or the intelligence of our public debate or the integrity of our public officials. It measures everything, in short, except that which makes life worthwhile.

The second critic, Simon Kuznets[2] the inventor of the GDP, in his very first report to the US Congress in 1934 said:

...the welfare of a nation can scarcely be inferred from a measure of national income. If the GDP is up, why is America down? Distinctions must be kept in mind between quantity and quality of growth, between costs and returns, and between the short and long run. Goals for more growth should specify more growth of what and for what.

2 http://en.wikipedia.org

Summary

1) There are various ways to measure economic performance. The GDP is the most commonly used measure.

2) The GDP measures the market value of final goods and services produced within the boundaries of a country during a certain period of time (usually one year).

3) There are two methods to calculate the GDP. The expenditure approach adds together all expenditure on final goods and services during a year.

4) The resource cost-income approach sums the total income payments to the suppliers of resources and other costs of production during the year.

5) Note that the GDP excludes the sale of second hand items financial transactions (unless commission is charged) and transfer payments (since these do not involve any new production).

6) GNP is gross national product. It is similar to the GDP but it is a measure of the productivity of the citizens of a country, whether they reside locally or abroad. To convert the GNP to GDP one must therefore subtract income earned by citizens abroad and add income earned by foreigners locally.

7) **Real** GDP is a far more accurate measure of productivity than **nominal** GDP since it has been adjusted for the effects of inflation. The real GDP deflator is a price index used to convert the nominal GDP into the real GDP. It is an index of prices of all final goods and services produced.

8) The consumer price index (CPI) is an index used to measure the impact of inflation on consumer prices. The index includes only consumer goods and services.

9) The GDP is by no means an accurate measure of production or changes in welfare and has numerous shortcomings, such as not being able to account for underground economies or the negative effects associated with production.

10) Nevertheless, of the various alternatives available, such as GNP, NI, PI and PDI, GDP remains the most popular measure of economic activity.