Resource Pack for the Economics Curriculum (Secondary 4-6)

Measurement of Economic Performance

- Inflation Rate
- Unemployment Rate
- National Income

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This Resources Pack is developed for the topic “Measurement of Economic Performance” covered in the Economics Curriculum and Assessment Guide (Secondary 4 – 6).

Topics A to E in the Curriculum focus on theories and applications of microeconomics: the analysis of individual firm’s and household’s behavior. Let the students know that we begin our study of macroeconomics, the branch of economics dealing with the whole economy, by learning the measurement of economic performance. Before going into details of the topic, it must be explained to the students the importance of developing objective measures to gauge the performance of the economy. Without such measures, it will be difficult to evaluate and analyze the performance of a macroeconomy (or national economy) and to make meaningful comparison among the performance of different countries. We can then indicate to the students that to evaluate the performance of an economy, we need objective measures of at least three variables: income level, price level and unemployment rate.

To start with, we can demonstrate how Gross Domestic Product (GDP) measures the total market value of all the final goods and services produced within an economy. After understanding the concept of GDP, students can be introduced to the concept of Gross National Income (GNI) and how it relates to GDP. With the concepts of GDP and GNI, discussion can move on how the three approaches of measuring GDP – value added approach, expenditure approach and income approach – can, in principle, yield the same result. Here, simple hypothetical examples, rather than real world data, may facilitate the illustration of all these concepts and approaches. Too much empirical data at the early stage of discussion may confuse the students. Real world data can be shown at the end of the discussion to illustrate the relevance of the learned concepts to real world figures. Before ending the discussion on measuring income, the limitations of GDP as a measure of total production and economic wellbeing can be examined.

The discussion on real and nominal GDP can be combined with the analysis of consumer price index (CPI) and implicit price deflator of GDP (or GDP deflator). Once again, hypothetical numerical examples are good way to facilitate students’ understanding, in particular when distinguishing between CPI and GDP deflator. Make sure the students understand that GDP deflator reflects the prices of all goods produced domestically, while the CPI reflects the prices of a typical basket of goods and services purchased by households.
When we come to the discussion on unemployment rate, we can draw the students’ attention to the point that the growth of GDP has direct impact on unemployment, and vice versa. Students must first understand the concepts of labour force, labour participation rate, and unemployment rate, and then their relationship. The concepts seem straightforward, but sometimes confuse students. Clear definitions followed by simple equations and numerical examples may help the students.

Before ending the whole topic, it should be highlighted to students that the three measures of income, price level and unemployment are not stand-alone concepts. They are interrelated and vital to our understanding of the macroeconomy around us. Though this topic covers only the basic concepts of measurements of macroeconomic performance, a firm and clear understanding is certainly helpful for the study of subsequent topics in macroeconomics. A good start is half success!

Charles Kwong
2015
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LEARNING OUTCOMES

After completing this topic, you should be able to:

- explain and distinguish the concepts of Gross Domestic Product (GDP) and Gross National Income (GNI)\(^1\);
- explain the three approaches in measuring GDP;
- distinguish between nominal GDP and real GDP;
- explain the concepts of GDP per capita and the growth rate of GDP;
- examine the limitations of national income statistics as an indicator of economic welfare and for international comparison;
- understand the use of Consumer Price Index and implicit price deflator to measure the change in price level;
- distinguish between unemployment rate and underemployment rate; and
- describe the recent trend of national income, general price level, and unemployment in Hong Kong.

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\(^1\) According to the NAS Medium-term Review, the term “Gross National Income” will be adopted in the Economics Curriculum starting from 2015/16 to align with the term adopted by the Census and Statistics Department, HKSAR (C&SD).
Introduction

Topics A to E in the Curriculum focus on theories and applications of microeconomics. Now we turn our discussion to the first topic of macroeconomics - measurement of economic performance. A macroeconomy (or national economy) is a complex structure with interactions among households, firms, government and foreign countries. To evaluate the performance of an economy, we need an objective measure of at least three variables: income level, price level and unemployment rate. In this unit, we will first look at why and how these three variables are measured to assess the macroeconomic performance. After that, we will examine the recent trend of national income, general price level, and unemployment rate in Hong Kong. These empirical measures are important to any economy as they form the basis for social and economic policy formulation.
Gross Domestic Product and Gross National Income

Gross domestic product (GDP)\(^2\) measures the market value of all final goods and services produced within a country in a given period of time. Several key points regarding the measurement of GDP are worth noting:

- GDP measures the *market values* of goods (tangible) and services (intangible), which are calculated by using market prices.

- GDP includes *all* items produced and sold legally in the economy. It does not include illegal activities (e.g. drug trafficking) and household production (e.g. cleaning and cooking at home).

- GDP includes only *final* goods only. Intermediate consumption is not included in GDP. The value of intermediate consumption is already included as part of the value of the final good.

- GDP measures the production that takes place within the *geographical boundaries* of a particular country (e.g. the US) or region (e.g. Hong Kong SAR).

- GDP measures the production that takes place *in a given period of time* (a quarter or a year).

Apart from measuring a country’s GDP, a government may compute other measures of income to obtain a more complete picture of the economy. One of these measures is *Gross National Income (GNI)*\(^3\) which is the total income earned by a nation’s residents. It therefore includes income that local residents earn abroad and excludes income that foreigners earn in the local economy. For instance, a Hong Kong citizen works in a financial firm in New York and his earnings are part of Hong Kong’s GNI, but the income earned by an overseas doctor coming to Hong Kong to work under a 2-month short-term employment contract is excluded from Hong Kong’s GNI. Then we can summarize the relationship between GDP and GNI as follows:

\[ \text{GNI} = \text{GDP} + \text{factor income from abroad} - \text{payments of factor income made to the rest of the world} \]

\(^2\) According to C&SD, GDP is a measure of the total value of production of all resident producing units of an economy in a specific period (typically a year or a quarter), before deducting the consumption of fixed capital.

\(^3\) According to C&SD, GNI is a measure of the total income earned by residents of an economy from engaging in various economic activities, irrespective of whether the economic activities are carried out within the economic territory of the economy or outside.
3 The Three Approaches to Measure Gross Domestic Product (GDP)

In a hypothetical economy, if we have a general price level and a common measure of all goods and services, GDP can simply be measured by the following equation:

\[ Y = P \times Q \]

where \( Y \), \( P \) and \( Q \) denote GDP, general price level and quantity of output respectively.

However, the real economy is much more complicated than we imagine. There are so many economic sectors with numerous goods and services. Therefore, we need more sophisticated approaches to measure GDP in the real world. In general, we have three approaches to measure GDP.

3.1 Value-added Approach (Production Approach)

This approach computes the value added at each stage of production. Value added is the difference between the value of output and the value of intermediate consumption (i.e. inputs) used in the production of that output. Consider the following example:

Assume that the cost of farmland is $0. A cotton farmer sells cotton to a textile factory for $10. At this stage of production, the intermediate consumption is farmland and the final good is cotton. The value added of the cotton is equal to $10 ($10 - $0).
The textile factory uses the cotton to produce cloth and it sells the cloth to a shirt manufacturer for $50. At this stage of production, the intermediate consumption is cotton and the final good is cloth. The value added of the cloth is equal to $40 (=$50 - $10).

The shirt manufacturer uses the cloth to produce a shirt and it sells the shirt to a department store for $120. At this stage of production, the intermediate consumption is cloth and the final good is a shirt. The value added of the shirt is equal to $70 (=$120 - $50).

The department store then sells the shirt to a consumer for $200. At this stage of production (that is, services provided by the department store), the intermediate consumption is the shirt and the final good is a shirt coupled with the retail services provided by the department store. The value added of the shirt is equal to $80 (=$200 - $120).

When we calculate GDP by using the value-added approach for this case, we add all the value added created at each stage of production ($10 + $40 + $70 + $80), which is equal to $200. The total value added is exactly equal to the market value of the final product (the shirt), i.e. $200.
Figure 1 illustrates how value added is created at each stage of production.

Don’t Confuse!

**Value added versus Value of Final Goods**

The above example illustrates that we can compute GDP by either adding value added created at each stage of production or counting the market value of the final product. However, don’t add the market values of the intermediate consumption and final good together when computing GDP. By doing so, you will add $10, $50, $120 and $200 together; the GDP will then be equal to $360, which overestimates the actual GDP i.e. $200. This overestimation is caused by counting the values of the immediate consumption goods more than once, which is called double counting.
3.2 Expenditure Approach

The value-added approach discussed above shows that putting the value added at each stage of production together is equal to the market value of the final product. In our example, the market value of the final product (i.e. the shirt) is $200. Suppose the shirt is finally bought by a household at a price of $200. Then we can infer that the market value of the final good must be equal to the expenditure by the household. Therefore, we can compute GDP either by measuring the market value of the final goods (value-added approach) or measuring the value of expenditures by the households and other economic sectors such as the government and the business firms (expenditure approach). In a word, the dollar value of total expenditures from all economic sectors is equal to the dollar value of final goods and services.

GDP ($Y$) in terms of expenditures can be divided into four components: consumption ($C$), gross domestic capital formation ($I$), government expenditures ($G$), and net exports ($NX$).

\[ Y = C + I + G + NX \]

Private consumption expenditure ($C$) refers to the spending by households on goods and services, with the exception of purchases of new housing.

Gross domestic capital formation ($I$) refers to the spending on capital equipment, inventories, and structures (e.g. factories), including household purchases of new housing.

The concept of inventories needs some clarification. Suppose a small bicycle factory produced 110 bicycles last year. It targeted to sell 100 bicycles and planned to keep 10 bicycles as inventories. Assume that the firms made a very accurate estimated sale last year. It finally sold 100 bicycles and kept 10 bicycles as planned inventory. Since the factory has already had 10 bicycles as planned inventory to cushion any unexpected sales, it targets to produce and sell 100 bicycles this year. Unfortunately, the sales this year are unexpectedly poor and only 80 bicycles are sold. In the end of this year, the factory keeps a planned inventory of 10 bicycles and an unplanned inventory of 20 bicycles. When we compute GDP this year, both the 80 bicycles sold and the 20 unsold bicycles (unplanned inventory) are counted towards the GDP this year. However, the planned inventory of 10 bicycles is not counted as the GDP this years as these 10 bicycles were produced last year. Instead, the 10 bicycles were counted as GDP last years. Here, we come to an important principle of computing GDP, GDP counts the year of production, not the year of sale. Therefore, in our example, last year’s GDP is the market value of 110 bicycles and this year’s GDP is the market value of 100 bicycles.
### Measurement of Economic Performance

<table>
<thead>
<tr>
<th></th>
<th>No. of bicycle produced</th>
<th>No. of bicycle sold</th>
<th>No. of inventory</th>
<th>No. of bicycle counted in GDP of that year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Last year</strong></td>
<td>110</td>
<td>100</td>
<td>10</td>
<td>110</td>
</tr>
<tr>
<td><strong>This year</strong></td>
<td>100</td>
<td>80</td>
<td>30 (20+10)</td>
<td>100</td>
</tr>
</tbody>
</table>

**Government consumption expenditure** (G) refers to the spending on goods and services by governments. For example, salaries of civil servants are counted as part of the government purchases of services (e.g. labour) from the market, which is a component of GDP. However, how about government’s expenditure on social welfare? Should it be counted as part of GDP? The answer is no. Why? It is because the welfare expenditure does not involve any production of goods and services. The expenditures only involve transfer of government income, probably from the contribution by tax payers, to the welfare recipients. Such government spending is called transfer payment. As transfer payment does not involve any production, it is not counted as part of GDP.

**Net exports** (NX) refer to spending on domestically produced goods by foreigners (exports) minus spending on foreign goods by domestic residents (imports). Simply speaking, net exports are equal to the value of domestic exports minus the value of imports.
3.3 **Income Approach**\(^4\)

As discussed in the previous section, different economic sectors spend on goods and services. Households buy goods and services from firms; firms use this money to pay for resources purchased from different resources owners: households, landlords (land owners) and capital owners. The firms (or the businessmen/entrepreneurs) pay wage to households to buy labour, pay rent to landlords to buy/rent land, and pay interest to capital owners to buy/rent capital. After these payments, the residuals go to the entrepreneurs as profits. Wage, rent, interest and profits are *factor incomes* received by the factor owners (labours, landlords, capital owners and entrepreneurs). *Money spent by one person must be money earned or received by another*. Therefore, disregarding statistical discrepancies, the expenditure on goods is equal to total factor income received by different factors owners. To measure GDP by computing the total factor income is called *income approach*.

---

4 Components of GDP compiled under the income approach are NOT required in the Curriculum.
The above example illustrates the concept behind this Approach. A consumer spends $200 to buy a shirt. The owner of the department store (the entrepreneur) receives $200. Suppose he pays $30 (wage) to the workers, $60 (rent) to the landlord, $40 (interest) to the capital owners, and the residual $70 (profits) goes to the entrepreneur. Then, we observe that:

\[
\text{Total expenditure ($200) = Total income ($30 + $60 + $40 + $70)}
\]

The simple example illustrates that calculating GDP could be done by adding up the total purchases of different economic sectors (expenditure approach) or summing total income earned by factors owners (income approach).

**Your Turn!** Suppose the cost of land is zero. A farmer sells wheat to a baker for $5. The baker uses the wheat to make bread and he sells the bread to Jack at $8. Calculate the GDP by using the value-added approach, expenditure approach and income approach.

**Check it:** Value-added approach: value added of wheat \((5 – 0)\) plus value added of bread \((8 – 5)\), which is equal to $8. Expenditure approach: GDP is equal to Jack’s expenditure on the bread (i.e. $8), which is an item of consumption. Income approach: GDP is equal to the income received by the baker, that is $8.
Nominal GDP and real GDP

Hong Kong’s GDP rose from $2,131.8 billion in 2013 to $2,245.74 billion in 2014. The two figures indicate a rise in GDP, reflecting an increase in the total purchases of different economic sectors (expenditure approach) from 2013 to 2014. Since these two GDP figures are measured in current prices (i.e. prices in 2013 and 2014 respectively), they are called *nominal GDP* or GDP at current price. There are two possible reasons for nominal GDP to rise from one year to the next.

- The economy produces a larger output of goods and services.
- The goods and services are sold at higher prices.

When studying GDP over time, economists would like to know if output has changed, but not price changes. It is because output changes, not price changes, will have real impact on the well-being of an economy. To separate the price changes from quantity changes, economists measure GDP by valuing output using a fixed set of prices (*constant prices or base-year prices*). The following numerical example illustrates how *real GDP* or GDP at constant price are computed. Suppose there are only two goods, hamburger and T-shirt, produced in the economy. Their quantities and prices are shown below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of hamburgers</th>
<th>Quantity of hamburgers</th>
<th>Price of T-shirt</th>
<th>Quantity of T-shirt</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$1</td>
<td>100</td>
<td>$2</td>
<td>50</td>
</tr>
<tr>
<td>2014</td>
<td>$2</td>
<td>150</td>
<td>$3</td>
<td>100</td>
</tr>
<tr>
<td>2015</td>
<td>$3</td>
<td>200</td>
<td>$4</td>
<td>150</td>
</tr>
</tbody>
</table>

5 According to the NAS Medium-term Review, the terms “GDP at current market price and GDP at constant market price” are revised to “nominal GDP” and “real GDP” respectively.
As mentioned above, the nominal GDP are measured by computing the value of goods and services at current prices.

**Nominal GDP for 2013 = ($1 \times 100) + ($2 \times 50) = $200**

**Nominal GDP for 2014 = ($2 \times 150) + ($3 \times 100) = $600**

**Nominal GDP for 2015 = ($3 \times 200) + ($4 \times 150) = $1,200**

Judging from the figures, nominal GDP experienced a substantial rise from 2013 to 2015. However, we are not clear whether the rise is due to a rise in price level or output level. To overcome the problem, we calculate the real GDP by computing the value of goods and services valued at the prices of 2013 (i.e. the base year is 2013).

**Real GDP for 2013 = ($1 \times 100) + ($2 \times 50) = $200**

**Real GDP for 2014 = ($1 \times 150) + ($2 \times 100) = $350**

**Real GDP for 2015 = ($1 \times 200) + ($2 \times 150) = $500**

As real GDP, measured at constant prices, is unaffected by price changes over time, changes in real GDP reflect changes in the amount of goods and services produced. Real GDP is thus a better measure of well-being in an economy.

The growth rates of GDP can be measured by the following equation:

\[ Y' = \frac{(Y_2 - Y_1)}{Y_1} \times 100\% \]

Where \(Y'\) is the growth rate of GDP, \(Y_1\) is the GDP of last year and \(Y_2\) is the GDP of current year.
Following the above equation, the growth rates of nominal and real GDP are calculated and shown below:

<table>
<thead>
<tr>
<th></th>
<th>Growth rate of nominal GDP</th>
<th>Growth rate of real GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>200%</td>
<td>75%</td>
</tr>
<tr>
<td>2015</td>
<td>100%</td>
<td>42.9%</td>
</tr>
</tbody>
</table>

The growth of nominal GDP is much higher than those of real GDP as the figures are inflated by price changes over the period. The growth rate of real GDP is much lower than those of nominal GDP as real GDP is unaffected by price changes over time.

**Remarks**

The C&SD has adopted the method of chain volume measures to compile the data of real GDP in accordance with international standards as stipulated in the System of National Accounts 2008 published by the United Nations. For details of the compilation method, teachers may refer to the related publications of C&SD.
GDP at Market Price and GDP at Factor Cost

As discussed in Section 3.3, money spent by one person must be money earned or received by another. Use the example in Section 3.3 to illustrate, a consumer spends $200 to buy a shirt. When we use the expenditure approach to calculate the GDP, it is equal to the market value (or market price) of the shirt (the final product). Therefore, GDP at market price is equal to $200 when we use the expenditure approach.

On the income side, the owner of the department store (the entrepreneur) receives $200 and he uses the money received to pay the factor income (or factor costs). He pays $30 (wage) to the labours, $60 (rent) to the landlord, $40 (interest) to the capital owners, and the residual $70 (profits) goes to the entrepreneur. The computation of GDP by the income approach obtains the GDP at factor cost.

In principle, GDP at market price (by expenditure approach) is equal to GDP at factor cost (by income approach). However, imbalance may occur when indirect taxes are imposed on goods and services by the government. Indirect taxes include sales taxes, customs duties, license fees and so on. Suppose the government imposes a 10% sales taxes on each shirt sold in the market. The market price of the shirt now becomes $220 \[=200 \times (1 + 10\%)]\]. The GDP at market price is now $220. The indirect taxes increase the GDP at market price, but the GDP at factor cost (seller’s income) remains unchanged, that is $200. Then the basic rule that everyone’s expenditure is someone else’s income is violated. To restore the balance, we must therefore add indirect taxes to GDP at factor cost.

Other than indirect taxes, it is not uncommon for the government to subsidize the producers. For example, the market price of beef is $100 per kg and the government subsidizes the beef seller by offering a 10% subsidy on each kg of beef sold in the market. Therefore, the income of the beef seller receives is $110 per kg of beef sold, but the consumer still pays the same amount of money, that is $100, to buy 1 kg of beef in the market. As a result, the GDP at market price is $100 while the GDP at factor cost is $110. Once again, the balance of the two approaches is violated. To restore the balance, we must therefore deduct subsidy from GDP at factor cost.
The above example draws the following relationship between GDP at market price and GDP at factor cost:

**GDP at market price = GDP at factor cost + indirect taxes – subsidies**

In our example, if the total output of the economy is just one shirt and one kg of beef. Then we have:

\[
\begin{align*}
\text{GDP at factor cost} &= \$200 \text{ (income of department store from selling a shirt)} + \$110 \text{ (income of beef seller from selling 1 kg of beef plus subsidy)} \\
&= \$310 \\
\text{GDP at market price} &= \$200 \text{ (income of department store from selling a shirt)} + \$110 \text{ (income of beef seller from selling 1 kg of beef plus subsidy)} + 20 \text{ (indirect taxes)} \ - \ $10 \text{ (subsidy)} \\
&= \$320
\end{align*}
\]
**6 Uses and Limitations of GDP**

GDP measures both an economy’s total income and its total expenditure on goods and services. It may not be a good indicator of living standards in an economy. For example, China and India have a much higher GDP than Switzerland, but it does not necessarily mean that an average person in China and India has a higher living standard than one in Switzerland. The main reason is that the total GDP in China and India is spread over a huge population. The GDP shared by each person in China and India remains at a relatively low level. Therefore, to better reflect the well-being for the average person, we generally use **per capita GDP** rather than total GDP.

\[
\text{Per capita GDP} = \frac{\text{A country’s GDP}}{\text{total population}}
\]

Per capita GDP tells us the income and expenditure level of the average person in the economy. Though per capita GDP may not be a very accurate measure of well-being in an economy, it does imply that a country with higher per capita GDP has more resources available to provide better education, medical services and infrastructure, which have direct bearing on the well-being of people’s life.

Table 1 shows real GDP per person, life expectancy, adult literacy rates, and Internet usage for 12 countries. In rich countries, life expectancy is higher and adult literacy and Internet usage rates are also high. In poor countries, people typically live only into their 50s, only about half of the adult population is literate, and Internet usage is very rare. The information indicates that countries with higher per capita GDP, in general, enjoy a higher living standard.
### Table 1: GDP and Quality of Life

<table>
<thead>
<tr>
<th>Country</th>
<th>Real GDP per Person (2005)</th>
<th>Life Expectancy</th>
<th>Adult Literacy (% of population)</th>
<th>Internet Usage (% of population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$41,890</td>
<td>78 years</td>
<td>99%</td>
<td>63%</td>
</tr>
<tr>
<td>Japan</td>
<td>31,267</td>
<td>82</td>
<td>99</td>
<td>67</td>
</tr>
<tr>
<td>Germany</td>
<td>29,461</td>
<td>79</td>
<td>99</td>
<td>45</td>
</tr>
<tr>
<td>Russia</td>
<td>10,845</td>
<td>65</td>
<td>99</td>
<td>15</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,751</td>
<td>76</td>
<td>92</td>
<td>18</td>
</tr>
<tr>
<td>Brazil</td>
<td>8,402</td>
<td>72</td>
<td>89</td>
<td>19</td>
</tr>
<tr>
<td>China</td>
<td>6,757</td>
<td>72</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>Indonesia</td>
<td>3,843</td>
<td>70</td>
<td>90</td>
<td>7</td>
</tr>
<tr>
<td>India</td>
<td>3,452</td>
<td>64</td>
<td>61</td>
<td>3</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2,370</td>
<td>65</td>
<td>50</td>
<td>7</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2,053</td>
<td>63</td>
<td>47</td>
<td>0.3</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1,128</td>
<td>47</td>
<td>69</td>
<td>4</td>
</tr>
</tbody>
</table>

The table shows GDP per person and three other measures of the quality of life for twelve major countries.

GDP, however, may not be a very good measure of the economic well-being of an individual. There are two major categories of limitations of GDP.

**Shortcomings in GDP as a measure of total production**

- *Household production is not included in GDP*: household production refers to goods and services produced for themselves. For example, a housewife’s cleaning of her home and preparing for a dinner, all these improve the well-being of the family members, but they are not recorded in GDP measure.

- *Activities in underground economy are not included*: The measurement of GDP misses many transactions, such as selling of drugs and running of illegal casino, that take place in the underground economy. Such activities are operated underground either because they are illegal or the operators would like to avoid government taxes. It is estimated that the size of the underground economy in the US is about 10% of the GDP of the US.

**Your Turn!** Per capita GDP in the US is about 14 times of that in India. When comparing the economic well-being of India and the US, how does the exclusion of household production make this direct comparison of GDP misleading? Explain.

**Check it:** In countries like India, people produce and consume a fair amount of food at home that is not included in GDP. Therefore the per capita GDP in India and the United States will differ by more than their comparative economic well-being. This indicates that the disparity in economic well-being in the two countries should be less than the GDP figures suggest.
Shortcomings in GDP as a measure of well-being

- *GDP omits the value of leisure*: On average, Hong Kong people work longer hours than 10 years ago. Our per capita GDP is higher than 10 years ago, but can we say definitely that our well-being is better than 10 years ago. Higher GDP does not necessarily imply higher well-being.

- *GDP is not adjusted for negative effects of production*: Production always generates negative effects such as pollution. The output of production is counted towards GDP, but the pollution it creates is not counted or adjusted in GDP computing. Similarly, we count the output value of cigarettes in GDP, but we do not count the costs of lung cancer caused by smoking.

- *GDP also says nothing about the distribution of income*: A high GDP country may have goods and services owned by a small group of people. GDP measures do not tell how the income is distributed. An uneven distribution of income may imply that the well-being of the minority is much better than the majority. Thus GDP figures may not be able to tell the economic well-being of an average person in a country.
As discussed above, price changes affect the value of nominal GDP. Therefore, in most countries, statistical departments chase the trend of price change. **Consumer price index (CPI)** and **implicit price deflator of GDP (or GDP deflator)** are two common measures to gauge price changes. The two measures are briefly examined below:

### 7.1 Consumer Price Index (CPI)

Consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer.

Statistical bureaus or departments use surveys to determine a representative bundle of goods and services purchased by a typical consumer. For example, a typical bundle includes 4 hamburgers and 2 T-shirts. Prices for each of the goods and services in the basket are surveyed in the market for each time period. Suppose the prices of the two goods are surveyed as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of Hamburgers</th>
<th>Price of T-shirt</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$1</td>
<td>$2</td>
</tr>
<tr>
<td>2014</td>
<td>$2</td>
<td>$3</td>
</tr>
<tr>
<td>2015</td>
<td>$3</td>
<td>$4</td>
</tr>
</tbody>
</table>
By keeping the basket the same, only prices are allowed to change. This allows us to isolate the effects of price changes over time. The costs of buying a typical bundle in each year are shown below:

\[
\text{Cost in 2013} = (1 \times 4) + (2 \times 2) = 8 \\
\text{Cost in 2014} = (2 \times 4) + (3 \times 2) = 14 \\
\text{Cost in 2015} = (3 \times 4) + (4 \times 2) = 20
\]

We then need to choose a base year which is the benchmark year for comparing the changes in the costs of buying the typical bundle. The formula for calculating the price index is:

\[
\text{CPI} = \left( \frac{\text{cost of basket in current year}}{\text{cost of basket in base year}} \right) \times 100
\]

For example, we use 2013 as the base year:

\[
\text{CPI for 2013} = \frac{8}{8} \times 100 = 100 \\
\text{CPI for 2014} = \frac{14}{8} \times 100 = 175 \\
\text{CPI for 2015} = \frac{20}{8} \times 100 = 250
With the above CPI, we can compute the inflation rate (i.e. the rise in general price level) by using the following formula:

\[ \text{Inflation rate} = \left( \frac{\text{CPI}_{\text{year 2}} - \text{CPI}_{\text{year 1}}}{\text{CPI}_{\text{year 1}}} \right) \times 100\% \]

By using the CPI from the above example, we have:

\textbf{Inflation rate for 2014} = \frac{(175 - 100)}{100} \times 100\% = 75\%.

\textbf{Inflation rate for 2015} = \frac{(250 - 175)}{175} \times 100\% = 43\%.

The results indicate that the general price of buying a typical bundle rises by 75% from 2013 to 2014 and 43% from 2014 to 2015.
7.2 **The Implicit Price Deflator of GDP (GDP Deflator)**

*GDP deflator* is a measure of the price level calculated as the ratio of nominal GDP to real GDP times 100.

\[
\text{GDP deflator} = \left( \frac{\text{Nominal GDP}}{\text{Real GDP}} \right) \times 100
\]

As discussed in Section 4, nominal GDP uses current price to compute the total value of goods and services while real GDP uses base year (constant) price to compute the total value of goods and services in an economy. The ratio of nominal GDP to real GDP therefore measures the changes in price level in that year. Use the figures in example in section 4, we can calculate the GDP deflator for each year.

*GDP Deflator for 2013* = \((\$200 / \$200) \times 100 = 100\)

*GDP Deflator for 2014* = \((\$600 / \$350) \times 100 = 171\)

*GDP Deflator for 2015* = \((\$1200 / \$500) \times 100 = 240\)

Use the GDP deflator to calculate the inflation rate, we have:

*Inflation rate for 2014* = \((171 – 100)/100 \times 100\% = 71\%\)

*Inflation rate for 2015* = \((240 – 171)/171 \times 100\% = 40.4\%\)

---

6 The way of compiling real GDP in this part is a simplified version for illustration purpose. The C&SD does not adopt this method of compiling real GDP.
The results indicate that the general price of all goods and services in the economy rises by 71% from 2013 to 2014 and 40.4% from 2014 to 2015. These results are slightly different from the inflation rates calculated from using CPI. The difference reflects the different methods and coverage of the two measures. There are two major differences:

- The GDP deflator reflects the prices of all goods produced domestically, while the CPI reflects the prices of a typical basket of goods and services purchased by households.

- The CPI compares the prices of a fixed basket of goods over time, while the GDP deflator compares the prices of the goods currently produced to the prices of the goods produced in the base year. This means that the group of goods and services used to compute the GDP deflator changes automatically over time as output changes.

Your Turn! Consider the following data on the GDP of Country A.

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal GDP (in billion $)</th>
<th>GDP Deflator (base year 2007)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>9,269</td>
<td>113</td>
</tr>
<tr>
<td>2011</td>
<td>9,873</td>
<td>118</td>
</tr>
</tbody>
</table>

(a) Calculate the growth rate of nominal GDP between 2010 and 2011.

(b) Calculate the growth rate of real GDP between 2010 and 2011.

Check it:

(a) The growth rate of nominal GDP is \((\frac{9,873 - 9,269}{9,269}) \times 100\% = 6.5\%\).

(b) Real GDP in 2010 (in 2007 dollars) is \(\frac{9,269}{113/100} = 8,203\) billion. Real GDP in 2011 (in 2007 dollars) is \(\frac{9,873}{118/100} = 8,367\) billion. The growth rate of real GDP is \((\frac{8,367 - 8,203}{8,203}) \times 100\% = 2.0\%\).
8 Unemployment and Underemployment Rates

8.1 Unemployment Rate

Unemployment is one of the most discussed issues in society as it directly affects the economic well-being of the workers. It is also an important indicator of the state of the economy. We compute unemployment rate to reflect the extent of unemployment in the economy. The *unemployed population* refers to the persons who are on temporary layoff and are actively looking for jobs. Unemployment rate is defined as the percentage of the labour force that is unemployed, which can be indicated as:

$$\text{Unemployment rate} = \left( \frac{\text{Number of unemployed}}{\text{Labour force}} \right) \times 100\%$$

*Labour force* is the total number of persons, including both the employed and the unemployed, who are actively looking for jobs.

$$\text{Labour force} = \text{Number of employed} + \text{Number of unemployed}$$
Another related indicator, *labor-force participation rate*, measures the percentage of the adult population (working-age population) that is in the labour force. The labour-force participation rate shows the proportion of population aged 15 and over who are willing to join the labour force.

\[
\text{Labour force participation rate} = \left( \frac{\text{Labour force}}{\text{population aged 15 and over}} \right) \times 100\%
\]

To illustrate the above measures, in 2010, the number of unemployed is 161,000 and the labour force is 3,654,000 in Hong Kong. The unemployment rate is \( \frac{161,000}{3,654,000} \times 100\% = 4.4\% \)

Labour force refers to the land-based non-institutional population aged 15 and over who satisfy the criteria for being classified as employed persons or unemployed persons. In 2010, the population aged 15 or above is 6,120,603. Therefore, the labour participation ratio is equal to \( \frac{3,654,000}{6,120,603} \times 100\% = 59.7\% \).
8.2 Underemployment Rate

The concept of underemployment has been introduced for identifying the situations of partial employment or the other way round, partial lack of work. It should be noted that the “underemployed” is a subgroup of the “employed”. According to the International Labour Organisation (ILO), the “underemployed” population refers to all persons in paid or self-employed, involuntarily working less than the normal duration of work, who were seeking or available for additional work during the survey period. The ILO suggests that a uniform conventional norm (e.g. 35-40 hours per week) be used for the normal duration of work. Such a norm is to be defined in the light of national circumstances, and to be applied to all activities and all categories of workers.

In Hong Kong, the underemployed population comprises those employed persons who have involuntarily worked less than 35 hours during the 7 days before enumeration (i.e. the date of survey) and have sought additional work during the 30 days before enumeration, or have not sought additional work but have been available for additional work during the 7 days before enumeration.

Your Turn! Country A records the following information:

Population 240,000
Employed 180,000
Unemployed 30,000

Calculate the labour force, unemployment rate and labour-force participation rate.

Check it:

Labour Force = 180,000 + 30,000 = 210,000
Unemployment rate = (30,000/210,000) × 100% = 14.3%
Labour-force participation rate = (210,000/240,000) × 100% = 87.5%
Recent Trends of National Income, General Price Level and Unemployment in Hong Kong

In the previous sections, we examine how economists measure the economic performance of an economy by using GDP, CPI and unemployment rate. Here, we will have an overview of recent trends of Hong Kong’s major macroeconomic indicators: GDP, CPI, unemployment rate and underemployment rates.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (growth rate)*</td>
<td>+8.0</td>
<td>+7.1</td>
<td>+7.0</td>
<td>+6.4</td>
<td>+2.3</td>
<td>-2.7</td>
<td>+7.0</td>
<td>+4.9</td>
</tr>
<tr>
<td>Per capita GDP (growth rate)*</td>
<td>+7.0</td>
<td>+6.6</td>
<td>+6.3</td>
<td>+5.3</td>
<td>+1.5</td>
<td>-3.0</td>
<td>+6.0</td>
<td>+4.2</td>
</tr>
<tr>
<td>CPI (growth rate)</td>
<td>-3.8</td>
<td>+1.0</td>
<td>+2.0</td>
<td>+2.0</td>
<td>+4.3</td>
<td>+0.5</td>
<td>+2.4</td>
<td>+3.8</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>4.9</td>
<td>5.6</td>
<td>4.8</td>
<td>4.0</td>
<td>3.6</td>
<td>5.4</td>
<td>4.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Underemployment rate</td>
<td>2.8</td>
<td>2.7</td>
<td>2.4</td>
<td>2.2</td>
<td>1.9</td>
<td>2.3</td>
<td>2.0</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Note: *Growth rates are calculated based on GDP and per capita GDP figures at 2009 constant prices, except the figures for 2011, which are measured in 2010 constant prices.

Sources: Census and Statistics Department (2011), Hong Kong Annual Digest of Statistics 2011, Hong Kong: Hong Kong SAR Government.
http://www.censtatd.gov.hk/hkstat/sub/sp250.jsp?subjectID=250&tableID=030&ID=0&productType=8
(Accessed on 21 Nov 2012)
It is worth noting that the GDP and per capita GDP growth rates in real terms recorded positive figures in the past decade, except the figures for 2009, the year after the outbreak of the global financial crisis. Even after the outburst of SARS in 2003, GDP growth had regained its momentum since 2005. Such steady rebound may be attributable to the implementation of individual visit scheme and the signing of the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA) in 2003. The individual visit scheme promotes Hong Kong’s tourist industry and the retail sectors while the CEPA is the first free trade agreement concluded by the mainland and Hong Kong, which provides more opportunities for Hong Kong businesses to gain greater access to the mainland market.

When compared with GDP figures, the unemployment rates are less impressive. The unemployment rate reached a historic high of 5.6% in 2005. The figures had tapered off since then, but it rebounded to 5.4% in 2009 due to the economic downturn caused by the global financial turmoil. The gradual improvement of the employment market lowered the unemployment rate to 4.4% in 2010 and a new low of 3.4% in 2011.

The price level demonstrated a stable trend before 2007, but it has experienced upward pressure since 2008, which was mainly due to the rise in food and housing rent. As the weights of food and housing rent are 27.45% and 31.66% respectively in calculating the composite CPI, any changes in food prices and housing rent would have significant effects on CPI.
REFERENCES


