2 Economic data

IB SL/HL
OCR A and AS
AQA A and AS
WJEC/EDUQAS A and
CCEA A and AS

Key points

1. Economic data are collected not only to verify or refute economic models but to provide a basis for economic decision making.
2. Data may be expressed at nominal (or current) prices or at real (or constant) prices. Data expressed in real terms take into account the effects of inflation.
3. Indices are used to simplify statistics and to express averages.
4. Data can be presented in a variety of forms such as tables or graphs.
5. All data should be interpreted with care given that data can be selected and presented in a wide variety of ways.

Starter activity

When your great grandparents started work, what did they earn? In 1950, average UK earnings were £350 per year. Is that £350 the same as £350 a year today? In 2013, average earnings were £26 500. What could you have bought with £26 500 in 1950?

In 2013, the average earnings of bar staff were £7 317, secretaries £16 384, teachers £32 547 and doctors £70 646. How many times more did a teacher earn than a secretary or a doctor more than bar staff? Is there an easy way to display the relative earnings of different workers?

Source: with information from www.ons.gov.uk.

The collection and reliability of data

Economists collect data for two main reasons.

- The scientific method requires that theories be tested. Data may be used to refute or support a theory. For instance, an economist might gather data to support or refute the hypothesis that 'Cuts in the marginal rate of income tax will increase the incentive to work', or that 'An increase in the real value of unemployment benefit will lead to an increase in the number of people unemployed'.
- Economists are often required to provide support for particular policies. Without economic data it is often difficult, if not impossible, to make policy recommendations. For instance, in his Budget each year the Chancellor of the Exchequer has to make a statement to the House of Commons outlining the state of the economy and the economic outlook for the next 12 months. Without a clear knowledge of where the economy is at the moment, it is impossible to forecast how it might change in the future and to recommend policy changes to steer the economy in a more desirable direction.

Collecting economic data is usually very difficult and sometimes impossible. Some macroeconomic data - such as the balance of payments figures or the value of national income - are collected from a wide variety of sources. The figures for the balance of payments on current account are compiled from returns made by every exporter and importer on every item exported and imported. Not surprisingly, the information is inaccurate. Some exporters and importers will conceal transactions to avoid tax. Others will not want to be bothered with the paperwork.

Other macroeconomic data such as the Consumer Prices Index (used to measure inflation) or the Labour Force Survey (used to measure employment and unemployment) are based

Question 1

How do you double the size of your economy overnight to become the largest economy in Africa? The answer is to revise your estimate of the output of the economy, called GDP (Gross Domestic Product). This is what Nigeria has done. Yesterday, it was reported that it announced its GDP for 2013 was $509 billion, 89 per cent larger than previously stated. Previous estimates were based on a way of calculating GDP set in 1990 that failed to capture many of Nigeria's growth industries. For example, under the old method, telecoms including mobiles accounted for 0.8 per cent of GDP. Under the new method, it is 8.6 per cent of GDP. Under the old method, the film industry was not even measured. Under the new method, it accounts for 1.4 per cent of GDP.

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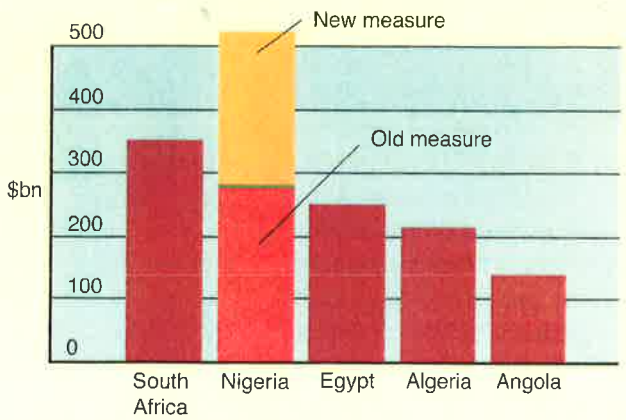
Figure 1

Top African countries by GDP, 2013



Source: adapted from IMF estimates.

(a) Explain why the estimates of GDP in 2013 using the 1990 method of calculation were unreliable.

(b) Suggest why a European company might be more prepared to invest in new facilities in Nigeria rather than South Africa in 2014 compared to 2012.

on surveys. Surveys are only reliable if there is accurate sampling and measuring and are rarely as accurate as a complete count.

Some macroeconomic data are very reliable statistically but do not necessarily provide a good measure of the relevant economic variable. In the UK, the unemployment Claimant Count is calculated each month at benefit offices throughout the country. It is extremely accurate but no economist would argue that the figure produced is an accurate measure of unemployment. There is general agreement that some people who claim benefit for being unemployed are not unemployed and conversely there are many unemployed people who are not claiming benefit.

In microeconomics use is again made of survey data, with the limitations that this implies. Economists also make use of more experimental data, gathering evidence for case studies. For instance, economists might want to look at the impact of different pricing policies on entry to sports centres. They might study a small number of sports centres in a local area. The evidence gathered would be unlikely decisively to refute or support a general hypothesis such as 'Cheap entry increases sports centre use'. But it would be possible to conclude that the evidence tended to support or refute the hypothesis.

In economics it is difficult to gather accurate data and, for that reason, academic economists mostly qualify their conclusions.

Real and nominal values

There are many different measures in use today such as tonnes, litres, kilograms and kilometres. Often, we want to be able to compare these different measures. For instance, an industrialist might wish to compare oil measured in litres, and coal measured in kilograms. One way of doing this is to convert oil and coal into therms using gross calorific values. In economics, by far the most important measure used is the value of an item measured in monetary terms, such as pounds sterling, US dollars or euros. One problem in using money as a measure is that inflation (the general change in prices in an economy) erodes the purchasing power of money.

For instance, in 1948 the value of output of the UK economy (measured by gross domestic product at market prices) was £11.6 billion. In 2013, 65 years later, it was £1 713.3 billion. It would seem that output had increased about 148 times (£1 713.3 billion ÷ £11.6 billion) - an enormous increase. In fact, output increased by only a fraction of that amount. This is because most of the measured increase was an increase not in output but in prices. Prices over the period rose about 29 fold. Stripping the inflation element out of the increase leaves us with an increase in output of 5.2 times.

Values unadjusted for inflation are called nominal values. These values are expressed at **current prices** (i.e. at the level of prices existing during the time period being measured).

If data are adjusted for inflation, then they are said to be at real values or at **constant prices**. To do this in practice involves taking one period of time as the base period. Data are then adjusted assuming that prices were the same throughout as in the base period.

For instance, a basket of goods costs £100 in year 1 and £200 in year 10. Prices have therefore doubled. If you had £1 000 to spend in year 10, then that would have been equivalent to £500 at year 1 prices because both amounts would have bought five baskets of goods. On the other hand, if you had £1 000 to spend in year 1, that would be equivalent to £2 000 in year 10 prices because both would have bought you 10 baskets of goods.

Taking another example, the real value of UK output in 1948 at 1948 prices was the same as its nominal value (i.e. £11.6 billion). The real value of output in 2013 at 1948 prices was £57.8 billion. It is much lower than the nominal 2013 value because prices were much higher in 2013.

On the other hand, at 2013 prices, the real value of output in 1948 was £320.2 billion, much higher than the nominal value because prices in 2013 were much higher than in 1948. Further examples are given in Table 2.

UK government statistics expressed in real terms are adjusted to prices three or four years previously. In 2014, figures were expressed at 2011 prices.

Question 2

Table 1 Components of final demand at current prices

	Index of prices 2010=100	£ billion at current prices		
		Households' expenditure	Government expenditure	Fixed investment
2010	100.0	953.3	336.6	250.2
2011	104.5	985.8	337.3	260.8
2012	107.4	1022.1	343.9	268.8
2013	110.1	1059.1	346.8	281.5

Source: adapted from www.ons.gov.uk.

Using a calculator or a spreadsheet, work out for the period 2010-2013 (a) at constant 2010 prices and (b) at constant 2013 prices the values of:

(i) households' expenditure;
(ii) government expenditure;
(iii) fixed investment.

Present your calculations in the form of two tables, one for 2010 prices and the other for 2013 prices.

Table 2 Nominal and real values

Nominal value	Inflation between year 1 and 2	Real values	
		Value at year 1 prices	Value at year 2 prices
Example 1 £100 in year 1	10%	£100	£110
Example 2 £500 in year 1	50%	£500	£750
Example 3 £200 in year 2	20%	£166.66	£200
Example 4 £400 in year 2	5%	£380.95	£400

Note: £100 at year 1 prices is worth £100 x 1.1 (i.e. 1+10%) in year 2 prices
£200 at year 2 prices is worth £200 ÷ 1.2 in year 1 prices.

Indices

It is often more important in economics to compare values than to know absolute values. For instance, we might want to compare the real value of output in the economy in 2003 and 2013. Knowing that the real value of output (GDP at market prices at 2013 prices) in 2003 was £1 471.1 billion and in 2013 was £1 656.5 billion is helpful, but the very large numbers make it difficult to see at a glance what, for instance, was the approximate percentage increase. Equally, many series of statistics are averages. The Retail Prices Index (the measure of the cost of living) is calculated by working out what it would cost to buy a typical cross-section or 'basket' of goods. Comparing say £458.92 in one month with £475.13 the next is not easy.

So, many series are converted into index number form. One time period is chosen as the base period and the rest of the statistics in the series are compared to the value in that base period. The value in the base period is usually 100. The figure 100 is chosen because it is easy to work with mathematically. Taking the example of output again, if 1948 were taken as the base year, then the value of real output in 1948 would be 100, and the value of real output in 2013 would be 517.3. Alternatively if 2013 were taken as the base year, the value of output would be 100 in 2013 and 19.3 in 1948. Or with 2003 as the base year, the value of output in 1948 would be 21.8 whilst in 2013 it would be 112.6. Further examples are given in Table 3.

Table 3 Converting a series into index number form

Consumption				
Year	£ millions	Index number if base year is:		
		year 1	year 2	year 3
1	500	100.0	83.3	62.5
2	600	120.0	100.0	75.0
3	800	160.0	133.3	100.0

Note: The index number for consumption in year 2, if year 1 is the base year, is (600 ÷ 500) x 100.

Question 3

Table 4 Consumers' expenditure at current prices

£ billion			
	Food & Drink	Clothing & Footwear	Restaurants & Hotels
2010	82.8	51.0	87.3
2011	86.4	54.6	93.6
2012	90.9	56.1	97.4
2013	95.2	59.7	101.5

Source: adapted from www.ons.gov.uk.

Using a calculator or a spreadsheet, convert each category of expenditure into index number form using as the base year: (a) 2010 and (b) 2013.

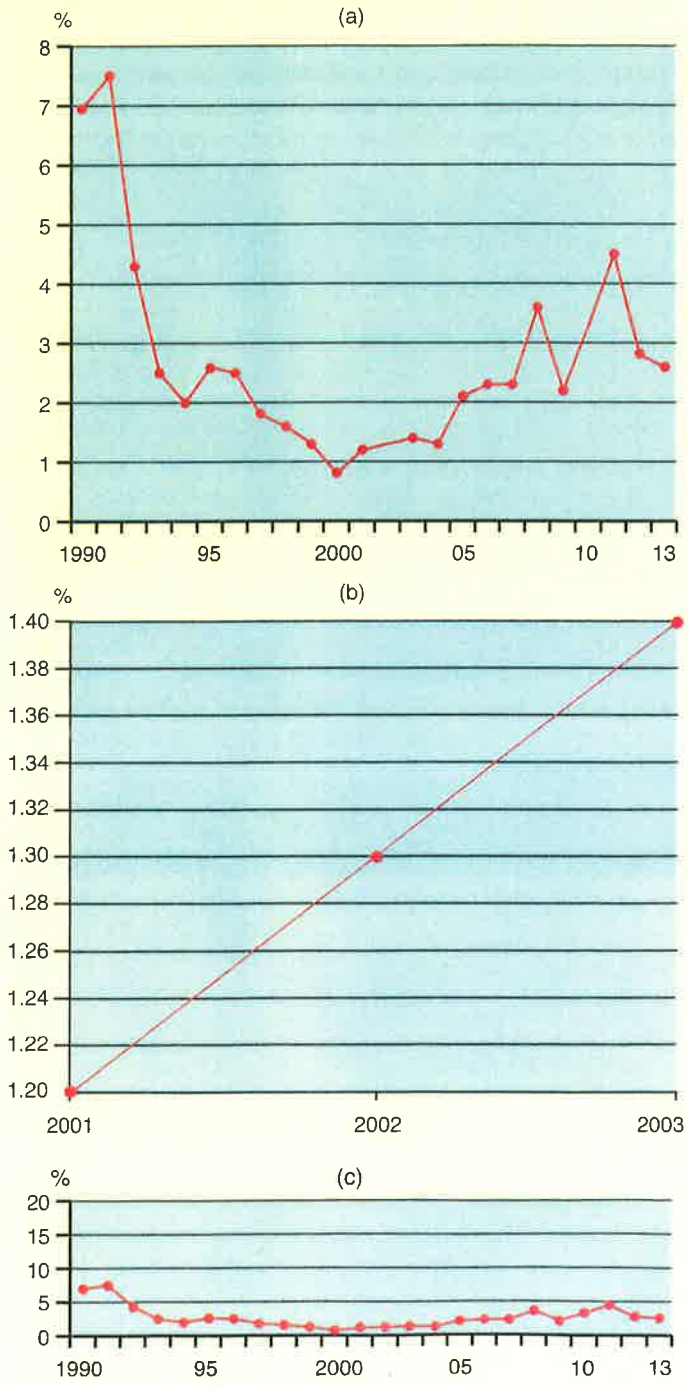
Present your calculations in the form of two tables, one for each base year.

The interpretation of data

Data can be presented in many forms and be used both to inform and mislead the reader. To illustrate these points, consider inflation figures for the UK economy. Inflation is the general rise in prices in an economy. If there has been two per cent inflation over the past year, it means that prices on average have increased by two per cent. One way in which inflation figures can be presented is in tabular form as in Table 5. The data could also be presented in graphical form as in Figure 2(a).

Figure 2

UK Inflation (CPI)



Source: adapted from www.ons.gov.uk.

Table 5 UK inflation (CPI)

Year	Inflation %	Year	Inflation %
1990	7.0	2002	1.3
1991	7.5	2003	1.4
1992	4.3	2004	1.3
1993	2.5	2005	2.1
1994	2.0	2006	2.3
1995	2.6	2007	2.3
1996	2.5	2008	3.6
1997	1.8	2009	2.2
1998	1.6	2010	3.3
1999	1.3	2011	4.5
2000	0.8	2012	2.8
2001	1.2	2013	2.6

Source: with information from www.ons.gov.uk.

Graphs must be interpreted with some care. Figure 2(b) gives a distorted view of inflation between 2001 and 2003. Figure 2(a) shows that there was almost no change in inflation over these three years. But looking at Figure 2(b), it would seem that there has been a massive change in inflation. This is because in Figure 2(b) the vertical scale starts at 1.20 per cent and ends at 1.40 per cent and on the horizontal scale, only three years are covered. Figure 2(c) distorts the data in a different way. By compressing the scale on the vertical axis in relation to the horizontal axis, it looks as though there has been hardly any change in inflation between 1990 and 2013.

Graphs are sometimes constructed using log scales for the vertical axis. This has the effect of gradually compressing values on the vertical axis as they increase. The vertical distance between 0 and 1, for instance, is larger per unit than between 999 and 1 000.

Data can also be expressed in verbal form. For example, Figure 2(a) shows that inflation was lower at 2.6 per cent at the end of the period in 2013 than at the start in 1990 when it was seven per cent. Over the period 1990-2013, inflation ranged from a high of 7.5 per cent in 1991 to a low of 0.8 per cent in 2000. When expressing data in verbal form, it can become very tedious to describe each individual change. For instance, it would be inappropriate to say 'Inflation in 1990 was seven per cent. Then it rose to 7.5 per cent in 1991 before falling to 4.2 per cent in 1992. Then in 1993 it fell again to 2.5 per cent and again in 1994 to 2.0 per cent'. When expressing data in verbal form, it is important to pick out the main trends and perhaps give a few key figures to illustrate these trends.

Key Terms

Base period - the period, such as a year or a month, with which all other values in a series are compared.
Index number - an indicator showing the relative value of one number to another from a base of 100. It is often used to present an average of a number of statistics.
Nominal values - values unadjusted for the effects of inflation (i.e. values at current prices).
Real values - values adjusted for inflation (i.e. values at constant prices).

Question 4

Figure 3

Unemployment rate, %

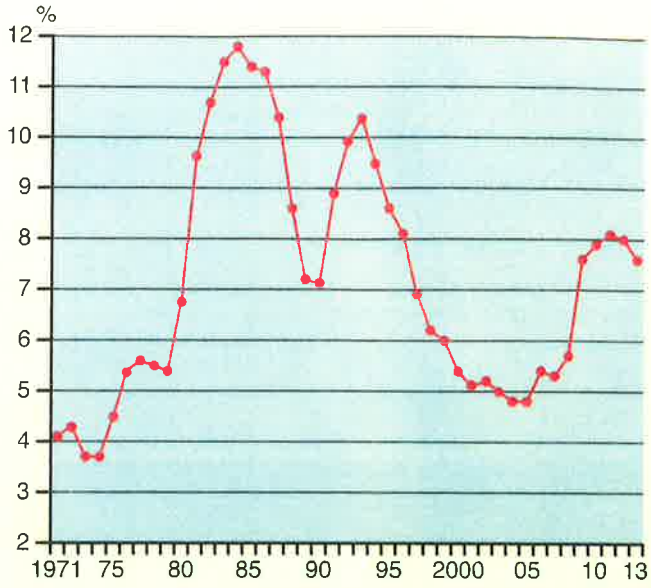
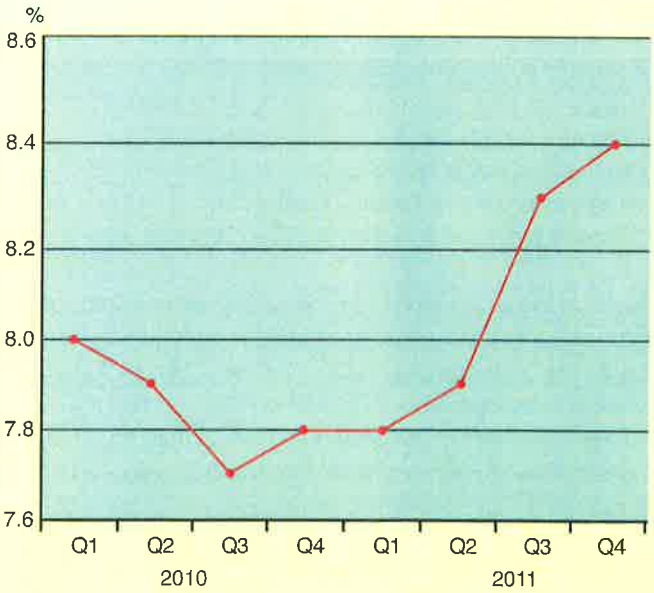


Figure 4

Unemployment rate, %



Consider each graph in turn.

(a) What does each show?

(b) Explain why each seems to give a different picture of unemployment in the UK for the period 2010-2011.

Thinking like an economist

Spending on tourism

Tourism is a major industry in the UK. Is it a growing industry? There is a number of ways in which growth can be measured but one is total spending by holidaymakers, defined as tourists, who spent at least one night away on holiday.

Table 6 shows how total spending on tourism has grown between 1989 and 2013. It divides tourists into three categories - UK tourists who take a holiday within the country, foreign tourists who come to the UK and UK tourists who take holidays abroad. The figures in Table 6 are expressed at current prices.

This means that inflation is not taken into account. If there had been very high inflation over the period 1989-2013, the volume of tourism could have declined given the data in Table 6. In fact, consumer (RPI) prices over the 24-year period rose 117 per cent. So real growth in spending is anything that is above that 117 per cent rise.

Table 7 shows the figures in Table 6 expressed at constant 2013 prices, i.e. after the inflation element has been stripped out and adjusted to the level of prices in 2013. Taking 2013 as the reference year for prices means that the 1989 and 2000 data at current prices increase as numbers when they become data at constant prices. In contrast, the 2013 data remain the same.

Table 8 shows the figures in Table 7 in index number form. This has the advantage that it is much easier to see which of the three areas of tourism has grown more quickly.

At a glance, it can be seen from the index numbers that spending on holidays by UK citizens in the UK fell by 32.9 per cent in real terms over the period 1989 to 2013. In contrast, spending on foreign holidays by UK citizens grew by 71.8 per cent. Foreign visitors to the UK spent 39.4 per cent more.

Because these are index numbers, it is not possible to say how important is the 24.7 per cent rise in spending by foreign visitors to the total domestic tourist industry. For example, if foreign holidays accounted for just one per cent of total spending, a 24.7 per cent rise would have almost no impact on tourism. This illustrates one of the disadvantages of using index numbers.

To assess the relative impact of the increase in foreign tourists, we have to look back to Table 7. Total spending on tourism in the UK by UK citizens and by foreigners at constant 2013 prices fell from £52.1 billion to £45.9 billion, a 11.9 per cent fall over the period 1989 to 2013. The data show that a very large fall in spending by UK residents on holidays in the UK has outweighed a smaller increase in spending by foreigners on UK holidays. UK citizens are spending more on holidays in 2013 than in 1989, but they have substituted foreign holidays for domestic holidays.

Table 6 Spending on tourism at current prices, £ million

	£ millions at current prices		
	Spending on holidays by UK citizens in the UK	Spending in the UK by foreign visitors	Spending on foreign holidays by UK residents
1989	17 071	6 945	9 357
2000	26 133	12 805	24 251
2013	24 861	21 011	34 900

Source: adapted from www.ons.gov.uk

Table 7 Spending on tourism at constant 2013 prices, £ million

	£ millions at constant 2013 prices		
	Spending on holidays by UK citizens in the UK	Spending in the UK by foreign visitors	Spending on foreign holidays by UK residents
1989	37 060	15 077	20 314
2000	38 383	18 807	35 618
2013	24 861	21 011	34 900

Source: adapted from www.ons.gov.uk

Table 8 Spending on tourism at constant 2013 prices, 1989=100

	1989 = 100		
	Spending on holidays by UK citizens in the UK	Spending in the UK by foreign visitors	Spending on foreign holidays by UK residents
1989	100.0	100.0	100.0
2000	103.6	124.7	175.3
2013	67.1	139.4	171.8

Source: adapted from www.ons.gov.uk

Data Response Question

Cinema data

Table 9 Cinema exhibitor statistics, UK[1]

				at current prices			at constant 2013 prices		
	Number of sites	Number of screens	Number of admissions	Gross box office takings	Revenue per admission	Revenue per screen	Gross box office takings	Revenue per admission	Revenue per screen
			millions	£millions	£	£000	£millions	£	£000
1987	492	1 035	66.8	123.8	1.85	119.6	303.9	4.54	293.6
1995	728	2 003	114.6	354.2	3.09	176.8	594.2	5.18	396.6
2006	783	3 440	156.6	762.1	4.87	221.5	962.2	6.15	279.7
2013	747	3 897	165.5	1082.1	5.84	277.7	1082.1	5.84	277.7

Source: adapted from www.ons.gov.uk; www.cinemauk.org.uk.

Table 10 Cinema exhibitor statistics, UK[1]

				at current prices			at constant 2013 prices		
	Number of sites	Number of screens	Number of admissions	Gross box office takings	Revenue per admission	Revenue per screen	Gross box office takings	Revenue per admission	Revenue per screen
1987	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1995	148.0	193.5	171.6	286.1	167.0	148.9	195.5	114.0	101.8
2006	159.1	332.4	234.4	615.6	263.2	185.2	316.6	135.5	95.3
2013	151.8	376.5	247.8	874.1	315.7	232.2	356.1	128.6	94.6

Source: adapted from www.ons.gov.uk; www.cinemauk.org.uk.

1. 1987 data are Great Britain; 1995, 2006 and 2013 data are UK.

1. Describe the main trends in cinema admissions shown in the data.
2. Explain the advantages and disadvantages of using index numbers to present data. Illustrate your answer from the data.
3. 'Revenues per screen and the number of screens cannot carry on rising.'
   (a) To what extent do the data support this statement for the period 1987-2013?
   (b) Discuss whether it is likely to be true in the future.

Evaluation

For question 3(a), look carefully at the data. What has happened to the number of screens? Then, for revenues per screen, are the data telling the same story at current prices and at constant prices? Do the data support or refute the statement at the start of the question? For 3(b), is there a limit on the number of screens there is likely to be in the future and what might set that limit? What impact could changes in technology have on cinema? What about inflation? Come to a conclusion by weighing up your arguments.