Overview
(/study/ap
186-
cid-
754025/c

Table of
contents

Notebook

Glossary

Reading
assistance

3.1   Teacher view

Measuring economic activity and illustrating its variations

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

The big picture

| Section | Student... (0/0) | 📢 Feedback | 🖨 Print (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29927/print/) | Assign |

Student view

Most countries have predominantly market-based economies where income is generated from the production of goods and services. Firms produce output using the factors of production, and consumers use their incomes to purchase that output. It is in a government's interest to measure the size of this output and its consumption to direct decision making on whether they should intervene in the free market and to analyse policy successes and failures. As you will see in the investigation section (/study/app/pp/sid-186-cid-754025/book/investigation-id-31052/), opinions on success and failure may differ.

During the Great Depression, the US Congress commissioned economist Simon Kuznets to develop the first comprehensive set of national income data, a huge and difficult task. There are countless problems faced by statisticians when trying to account for gross output, such as:

- the decrease in value of certain goods once they are produced (like cars once they have been bought)
- how to account for the changes in prices over time
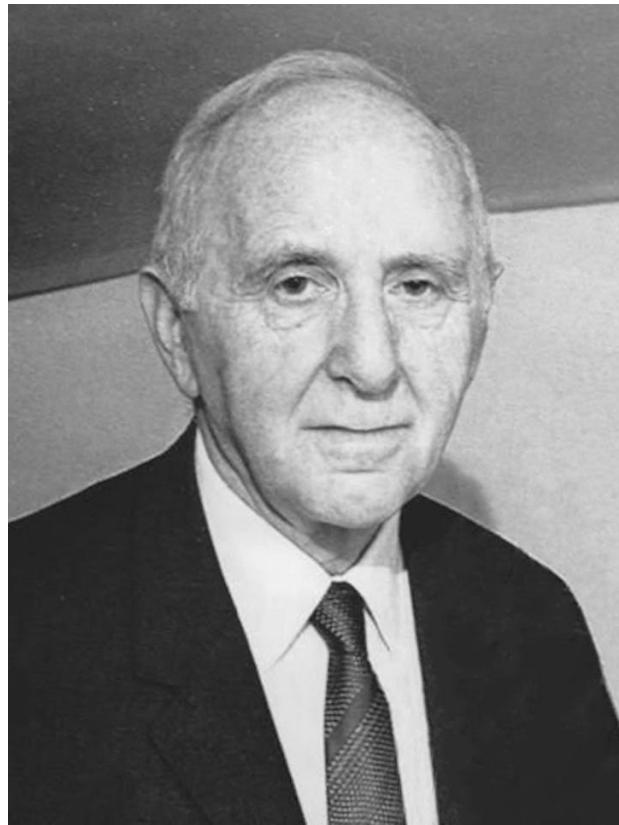- who to survey to gather the relevant information

Figure 1. Simon Kuznets (1901—1985).

Source: "Simon Kuznets ↗ (https://commons.wikimedia.org/wiki/File:Simon_Kuznets_1971b.jpg)" is licensed under Public Domain ↗ (https://commons.wikimedia.org/wiki/Category:PD_US_no_notice)

Kuznets eventually published a report in 1934 in which he outlined the main methodology for measuring gross domestic product (GDP) (see section 2.1.2 (/study/app/pp/sid-186-cid-754025/book/the-law-of-demand-id-29856/)). So successful were his contributions to economics and national income accounting that he was awarded a Nobel Prize in Economics in 1971, but Kuznets was always mindful of the inaccuracies of GDP, reminding us in 1962 that:

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.

Diane Coyle, an economist ↗ (https://en.wikipedia.org/wiki/Economist)and former advisor to the UK Treasury ↗ (https://en.wikipedia.org/wiki/UK_Treasury), in her most recent book *GDP: A Brief but Affectionate History,* tells us much about the history of GDP, the problems or shortfalls of the measurement, and what ways we may want to change what we measure in future. You can hear some of Coyle's criticisms and suggestions in the following video.

Time to fix GDP?

🔑 **Concept**

Sustainability
Well-being

In this section, we will be looking at the cycles of economies and how economic growth and well-being can be measured. For much of the 20th century, countries used GDP and gross national income (GNI) to measure the size and composition of their economic output. These measures are still used today, but there is an increasing shift to also focus on people's well-being.

With that in mind, we can begin to explore not only these traditional measures but new ones that are beginning to be developed, like the OECD Better Life Index, the World Happiness Index, and the Happy Planet Index.

These composite indices aim to address the questions that GDP alone cannot answer. For example:

How does our economic activity impact the environment?

Do we have equal access to opportunities in education?

Are we satisfied with our position in our society, and if not, are there opportunities for social mobility?

Student
view

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

National income accounting as a measure of economic activity

Section   Student... (0/0)   Feedback   Print   (/study/app/pp/sid-186-cid-754025/book/national-income-accounting-as-a-measure-id-31053/print/)   Assign

Overview
(/study/ap
186-
cid-
754025/c

Circular flow of income in an open economy

A very simple relationship exists between firms and households which forms much of the basis of economic thought today and drives national income. In topic 1 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29919/), you learned about this in the circular flow of income model.

The interdependence of firms and households suggests that if one stops spending, the other will stop too. The opposite is also true: if households increase spending, firms will be able to expand, produce more goods and services and pay higher incomes to their workers and owners. This cyclical nature of economic activity is important for economists to understand whether they want to try to influence it. This activity can be seen in the circular flow of income.

If we consider an open economy and include the government, financial and foreign markets, the circular flow of income model starts to more accurately represent a real economy, where we can see some of the causes of the cyclical nature of growth in action.

It is not only consumers who spend money in an economy. It is also:

- the government, which spends when it builds schools, roads and other infrastructure
- the financial industry, which lends to businesses so that they can invest capital and expand
- other countries, which demand the goods and services they do not produce themselves.

These are the injections into the circular flow. If these grow in size, the total income in the economy should increase.

However, the size of the economy can also shrink when something causes spending in the economy to fall. In times of economic difficulty, firms will delay investment projects and tend to save instead. The government can also decide to increase taxes, which will reduce disposable income for consumers. Domestic consumers may also buy products from foreign countries. These are known as leakages from the economy.
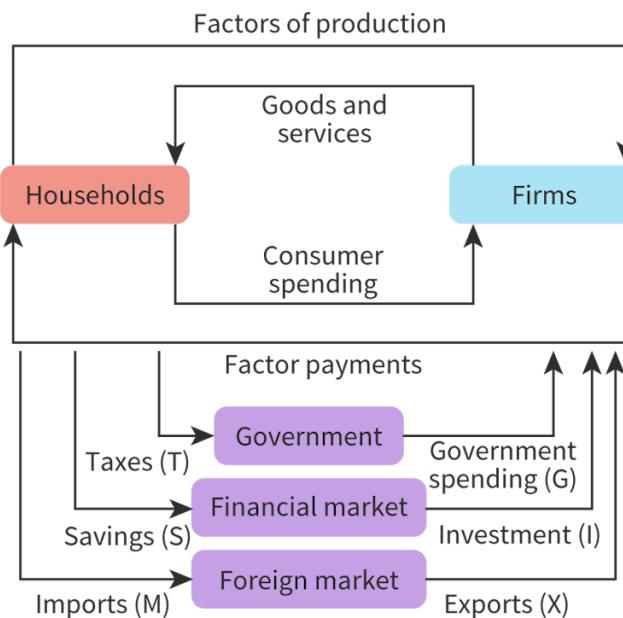
Figure 1. The circular flow of income for an open economy.

🚫 More information for figure 1

The diagram illustrates the circular flow of income in an open economy. It contains several elements organized in cycles to show the interaction between different economic agents. At the top of the diagram, there are two main sections labeled 'Households' and 'Firms,' signifying the two primary economic agents. Arrows between them indicate the exchange of 'Goods and Services' and 'Consumer Spending.'

Below these sections are labeled paths indicating the role of 'Factors of Production' and 'Factor Payments.' At the center, three additional entities are depicted: 'Government,' 'Financial Market,' and 'Foreign Market,' each with paths indicating economic flows.

'Government' is linked to 'Taxes (T),' 'Savings (S)' to 'Financial Market,' and 'Imports (M)' to 'Foreign Market.' Each of these has corresponding arrow paths for 'Government Spending (G),' 'Investment (I),' and 'Exports (X),' respectively. The interconnected arrows illustrate the flow of money and products within and outside the domestic economy.

[Generated by AI]

⊗
Student
view

These injections and leakages in the circular flow are tracked and compiled as national income data. When governments publish national income data, these statistics are more commonly referred to as gross domestic product (GDP). GDP tries to measure the value of everything produced in a country in a specific time period.

Domestic and national product

In our increasingly globalised world, we must consider the effect of the ownership of resources on national income.

Economists are usually only interested in what goes on within the borders of a country, so they pay close attention to the GDP. However, according to the United Nations Conference on Trade and Development (UNCTAD), there are approximately 63 000 multinational corporations (MNCs), which together produce approximately 25% of the world's output.

The GDP of countries with many MNCs is likely to be much lower than if income earned from abroad were included. Since an MNC is driving consumption in a foreign country, rather than where the headquarters is located, it means that much of the GDP belongs to those foreign countries. When we factor in net income earned from abroad, GDP becomes the gross national product (GNP) or gross national income (GNI).

🔗 **Making connections**

> The issue of climate change is increasingly attracting the attention of politics and science, but economics can also offer solutions. Plans to mitigate the damaging impacts of climate change include encouraging people and businesses (https://www.theguardian.com/environment/2019/oct/14/how-rein-in-fossil-fuel-industry-eight-ideas)to change the way they consume fossil fuels and alternatives. Carbon taxes, ending fossil fuel subsidies, encouraging investment into alternatives and carbon trading schemes can all be part of the solution.

Evaluation of GDP and national income statistics

GDP provides valuable insights into a nation's economy. We spent most of the 20th century looking for ways to improve the methods of national income accounting procedures, and have come up with as comprehensive a method as possible. However, the extent to which GDP is an effective tool for economic analysis depends a little on what information we are looking for, and as such it may not always live up to expectations.

Table 1. Advantages and disadvantages of GDP as a measure of growth and well-being.

Advantages of GDP	Disadvantages of GDP
Allows comparison across countries: Having an internationally-agreed method of measuring GDP allows governments to compare the relative strength of their own economy with others. In 1992, the United Nations adopted the 'Fundamental Principles of Official Statistics (https://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx)', subsequently endorsed as a global standard by the United Nations Statistical Commission. In an increasingly globalised world, it is important to know the health of economies belonging to your trading partners, neighbouring countries and political allies, both close and sometimes even distant.	**Overestimates the quality of life:** The calculation of GDP accounts for all economic activity that takes place in a country. This includes activity that should have been internalised previously or merely restores what has been destroyed. For example, spending on cleaning up environmental degradation and pollution is also positively credited to GDP calculations (this relates to Green GDP (/study/app/pp/sid-186-cid-754025/book/alternative-measures-of-wellbeing-id-31058/)). There have been various attempts in recent history to correct GDP statistics for negative economic output in order to restore this issue.
Informs policy makers: Achieving economic growth is one of the primary objectives of government. Economic growth is measured by calculating the percentage change in economic output measured by GDP. It is published every quarter (a three-month period), and its announcement is most likely featured in the national press approximately three weeks into January, April, July and October.	**Does not account for disparity in income distribution:** GDP cannot tell us about income distribution in a country. The lack of social mobility is a problem that most countries experience, with large concentrations of wealth distributed among only a very small proportion of the population and transferred from generation to generation. Equally, those who are financially less wealthy can get stuck in a poverty trap. A priority for many governments is to reduce the barriers preventing social mobility by introducing policies such as free education, health care and using transfer payments to try to close the gap between the rich and the poor.

Advantages of GDP	Disadvantages of GDP
Gives an indication of average income: When GDP is divided by the population size, we get the average national income or GDP per capita. This should be able to tell us the likely income earned by a citizen of the country. However, it is just an average, and in the case of some nations it may not provide us with a fully accurate result.	**Contains inaccuracies:** It is very difficult to gather the large volumes of data necessary to accurately calculate GDP. Depending on the efficiency and resources of the agency in charge of gathering data in a country (such as Statistics South Africa (http://www.statssa.gov.za), the National Bureau of Statistics China 🔗 (http://www.stats.gov.cn/english/) or the National Institute of Statistics and Economic Studies (http://insee.fr/fr/)in France), how can we guarantee that the information published by agencies is always accurate? Is it in a country's interest to publish negative data?
	Does not account for improvements in quality of output: Companies are constantly trying to improve their products or services, but prices often remain relatively unchanged or sometimes even fall over time as productivity improves. For example, laptop computers have improved greatly in the past couple of decades, but the price of laptops has remained largely the same.

For fun, check out this interactive graph from Gapminder 🔗 (https://www.gapminder.org/tools/#$state$time$value=1800;;&chart-type=bubbles). You can see the presets have 'Life expectancy' as the y -axis label on the left and 'Income' on the x -axis on the bottom, but you can replace either of these with other factors such as GDP in the 'options'. Have a look to see how different countries compare on numerous factors when accounting for income or GDP.

Life expectancy

80

40

2024

500   8000   128k

GDP per capita

⚠ DATA DOUBTS

▶ ━━━━━●

🔍   🖌   ⚙   ⤢
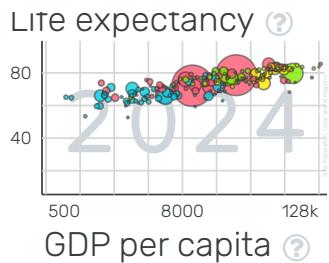FIND   COLOR   OPTIONS   EXPAND

Figure 2. Interactive comparison of countries.

🚫 More information for figure 2

An interactive bubble chart allows users to explore the relationship between life expectancy and Gross Domestic

Product (GDP) per capita over time for different countries. The x-axis represents GDP per capita (inflation-adjusted,

PPP$2017), which indicates economic prosperity. The y-axis represents life expectancy at birth, a measure of health

and quality of life. Each country is represented as a bubble, with the size of the bubble corresponding to population

size. Users can interact with the graph by selecting specific countries, adjusting the size of bubbles to represent

population, and filtering data based on regions. The tool also enables users to animate the graph to observe trends

over time.

Higher-income countries, typically in North America, Europe, and parts of Asia, cluster towards the right with higher

GDP per capita and longer life expectancy. Lower-income countries, particularly in Africa and parts of Asia, are

positioned towards the left with lower GDP per capita and shorter life expectancy. Larger bubbles indicate populous

nations like China and India, while smaller bubbles represent countries with lower populations. Some regions, such as

Europe, show a relatively high life expectancy even with variations in GDP, while others, like sub-Saharan Africa, tend

to have both lower GDP and shorter life expectancy.

The right-side panel allows users to categorize countries by region (for example, Asia, Americas). A search bar

enables selection of specific countries. With the help of zoom and Playback Controls, users can zoom in/out and play

an animated timeline to observe historical trends. Users can analyze how GDP per capita influences life expectancy

and compare different regions or income levels. By using the time slider, users can examine historical economic and

health progress for different countries. The size of bubbles visually represents demographic weight, helping users

❌
Student
view

comprehend the significance of large-population countries.

This interactive chart effectively provides an engaging way to understand global development trends through data

visualization.

To conclude this section, consider the following quote from Robert F. Kennedy's (1925–1968) speech at Kansas University in 1968 ⬀ (https://youtu.be/3FAmr1la6w0).

Figure 3. Robert Kennedy speaking to crowds during his 1968 presidential campaign.

Getty Images Harry Benson / Stringer

'The gross national product ... measures everything ... except that which makes life worthwhile.'

3 section questions ⌄

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

Approaches to national income accounting

Section   Student... (0/0)   📢 Feedback   🖶 Print (/study/app/pp/sid-186-cid-754025/book/approaches-to-national-income-accounting-id-31054/print/)   Assign

When you studied microeconomics, you studied various markets using supply and demand analysis, and learned that there are two exchanges that exist between firms and households:

1. Consumption expenditure in exchange for goods and services
2. Factor payments (rent, wages, interest and profit) in exchange for the factors of production (land, labour, capital and entrepreneurship)

In previous subtopics, you also studied the various factors that can cause the behaviour of firms and households to change. While it is important to recognise that not all markets are the same and that the government should try to understand each market individually, it is also necessary to consider the economy as a whole, being made up of all productive markets. We need to be able to understand how the economy experiences growth and decline. In the previous section, 3.1.1 (/study/app/pp/sid-186-cid-754025/book/national-income-accounting-as-a-measure-id-31053/), we used the circular flow to illustrate the factors that can contribute to the increasing or decreasing amount of economic activity within an economy. The circular flow of income enables us to see how the accounting of national income in a country is determined. There are three approaches to measuring national income:

1. The output method
2. The income method
3. The expenditure method

If you were to visit any government statistics website, such as Eurostat (http://ec.europa.eu/eurostat)for the Eurozone or Data.gov ⧉ (http://Data.gov)for the US, and looked for national income data, you would find data for all three methods. We will now explore these different approaches in turn.

The output method

Using this method of accounting, firms are surveyed for their output during a given period. It is important to note that only the value that is added at each stage of production is counted and not the full value of the output; otherwise, economic output would be counted twice.

It is very difficult to measure output in a country where large amounts of informal economic activities take place. For example, if a person cooks food at home and sells it without registering their business, their economic activity will not be included in GDP statistics,

Overview
(/study/app
186-
cid-
754025/(

Student
view

unless the government includes an estimated calculation of these statistics.

Measuring economic data using this method is valuable because it gives a progress report for different sectors of the economy. During the financial crisis of 2008, the sectors that fared particularly badly were the construction and banking industries, because that was where the crisis originated. You can link explanations of how industrial sectors perform during positive and negative economic growth to income elasticity of demand (YED).

The income method

This method of accounting involves adding up all the income earned by groups when the factors of production are sold in resource markets. Owners of the factors of production are paid wages, rent, interest and profits.

As with the output method of accounting, measuring national income in this way is only effective if economic activity is registered. Countries with high levels of corruption or where it is easy to hide economic activity will find it very difficult to measure GDP in this way. In other words, income from criminal activities (such as trade in illegal drugs), but also legal yet informal work, such as babysitting or stay-at-home parents looking after their families, will not be included.

Many emerging economies struggle with this form of accounting measurement because large proportions of the population might not be formally registered in government systems; that is, they do not have birth certificates, national insurance or social security numbers, passports, registered addresses, and so on. For example, it has been difficult to explain the reasons behind India's highest unemployment rate since the 1970s [↗] (https://www.bbc.com/news/world-asia-india-47068223)as much of the economic activity in the country goes unreported. It has a large informal economy which accounts for almost three-quarters of the country's jobs, meaning that this data might be undetected or classify those in periodic work as unemployed.

The expenditure method

The final method of national income accounting involves adding up total sales receipts for goods and services sold in the economy. In a closed economy this is the measure of consumption, but in an open economy (as discussed in subtopic 3.2 (/study/app/pp/sid-186-

[cid-754025/book/the-big-picture-id-30486/](#)) this also includes government spending, investment and net exports. To construct this measure, statisticians gather sales receipts, credit card statements, utility bills (such as electricity and mobile phone bills), and so on.

In theory, it does not matter which method a government chooses to use. All three methods should result in the same value of total production.

✓ **Important**

National income accounting by governments can be made by adding up all the income categories (rent, wages, interest and profits), the added value of every output category (from primary , secondary and tertiary industries) or expenditure categories in an economy. In other words:

Income = Output = Expenditure

▯ **Case study**

The longest economics expansion in US history

Up till 2020, until the global Covid-19 pandemic began, the US economy was growing and had been growing for more than a decade: for the first time ever, the economy started and ended a decade (the 2010s) without experiencing a recession. While this was not the strongest economic expansion, it was the longest and was driven by many factors, including government spending, tax cuts, and increased consumer spending as well as rising confidence.

Watch the following video to get a better idea of what drove this growth, then consider the following questions:

- What factors in the economy contributed to such a long expansion?

- Which components of GDP contributed most to this rise?

- What role did the government play, if any, in this expansion?

How The U.S. Avoided A Recession For A Decade

3 section questions ⌄

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

Nominal gross domestic product (GDP) and nominal gross national income (GNI)

Section   Student... (0/0)   📢 Feedback   🖨 Print   (/study/app/pp/sid-186-cid-754025/book/nominal-gross-domestic-product-gdp-id-31055/print/)   Assign

When governments publish national income data, these statistics are more commonly referred to as gross domestic product (GDP). GDP tries to measure everything produced in a country in a specific time period. It exists in a variety of forms and each reveals something a little different about the economy in question.

Nominal and real GDP

When we measure output we measure the monetary value of that output. This means that all goods and services consumed in a country in a given year are added up to reach a sum total (in terms of the country's own currency). However, this can be problematic when considering price changes over time.

When inflation is high, GDP growth would be overestimated or seem higher than if only the output were considered. It might appear as if the country is producing more, as the sum total increases due to rising prices, but the amount of goods and services might be the same or even less than before! To overcome this problem, economists hold the prices constant to negate the impact of potential price rises. This is called real GDP. When we measure GDP growth in current prices and without accounting for inflation, it is called nominal GDP.
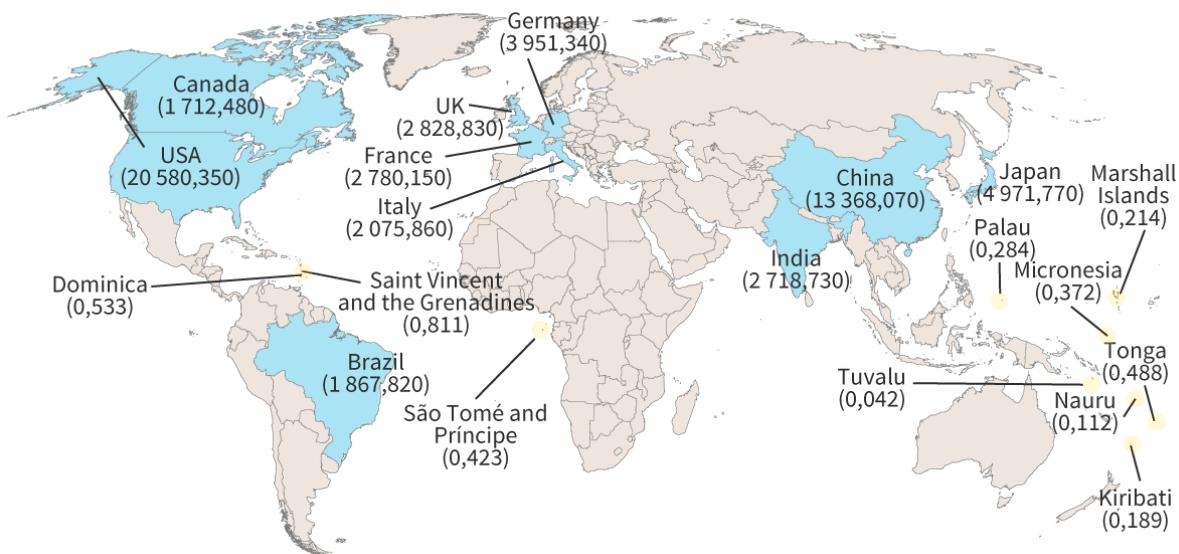

Figure 1. This map shows countries with the largest and smallest GDPs measured in USD.
Source: WorldBank (https://data.worldbank.org/indicator/NY.GDP.MKTP.CD)

More information for figure 1

The image is a world map highlighting countries with the largest and smallest GDPs in USD. Countries with larger GDPs like the USA (20,580,350), China (13,368,070), and Japan (4,971,770) are marked with light blue highlights. Other countries with significant GDPs include Germany (3,951,340), UK (2,828,830), France (2,780,150), India (2,718,730), Brazil (1,867,820), Italy (2,075,860), and Canada (1,712,480). Smaller economies are denoted by yellow dots and include countries like Tuvalu (0,042), Nauru (0,11), and Kiribati (0,189). The map visually represents disparities in GDP across the world, with numeric GDP data provided next to each country's name.

[Generated by AI]

Student view

Calculating nominal GDP

The circular flow of income provides us with an essential fact about GDP: it does not matter whether you measure income, output or expenditure, you will get the same result. That is because, in theory, we *spend* all our income on *goods and services* . Even in an open

economy with leakages, saved money is lent out to people to spend.

Using the expenditure method

The expenditure method is used when considering all the spending in an economy. This involves measuring consumption, investment, government expenditure and net export spending in the economy. Total expenditure is also known as aggregate demand (AD). It is useful to do this because it is important to know how different groups in society (especially households, whose spending makes up most of the GDP) respond in a growing, stagnant or declining economy. The expenditure method is given by:

$$GDP = C + I + G + (X - M)$$

where C is consumption expenditure, I stands for planned investment spending, G is government expenditure, and X – M represents the trade balance (X represents exports expenditure and M imports spending).

Worked example 1

Table 1 provides various national income data for Canada in 2018. Calculate GDP using the expenditure method.

Table 1. National income data for Canada in 2018 (Source: Statistics Canada [↗]
(https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610022201)).

Category	Value in Canadian dollars (CAD) in millions
Consumption	1 161 173
Investment	439 842
Government spending	417 433
Imports	664 754
Exports	662 381

To find nominal GDP using the expenditure method, you must use the equation:

$$GDP = C + I + G + (X - M)$$

$$GDP =$$

$$1\,161\,173 + 439\,842 + 417\,433 + (662\,381 – 664\,754) = 2\,016\,075 \text{ CAD (in millions}$$

Using the output method

The output method takes into account the volume of production from different industries. Economists will only consider the value added to a good from the sectors that produced it. Consider a loaf of bread. There are many different steps in the supply chain when producing the bread: the farmed wheat, the ground flour, the bakery and finally the supermarket. Each step of the way, value is being added to the product. The output method would not count the end transaction, but rather the final value minus the value added at each intermediate step. This is used to avoid double counting.

We could consider the broad categories of primary, secondary or tertiary sectors or look at specific industries in more detail. It is interesting to do this because industries respond differently to economic stimulus. As discussed in subtopic 2.5 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29882/), this will largely be due to differences in elasticity of demand. For example, recessions will affect industries differently depending on how essential they are or how much income is usually spent on them, with large purchases being delayed during this time.

Table 2 shows the output data for Australia. If we look closely at the value of output for each industry we will see that the output of the manufacturing industry experienced a substantial decrease in the years 2014 and 2015. The other major sectors of the Australian economy were actually producing output with higher value during the same period, which is especially significant in the financial services industry. From the data available in the table we can speculate that Australian citizens and firms postponed their purchases of cars and other manufactured goods during that period, probably due to high PED for those goods. At the same time, the value of output for agricultural goods increased, as these are essential goods. The value of financial services also increased, which shows that those services have lower PED than manufactured goods, which means they are considered essential by consumers and firms.

Table 2. Output data for selected industries in Australia, in millions of Australian dollars (AUD) (Sou
OECD ⬈ (http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1)).

Industry	2012	2013	2014	2015	2016	2017
Agriculture	35 011	35 427	38 547	39 685	47 868	47 987
Manufacturing	262 646	278 274	251 654	239 341	280 277	304 52
Financial services	122 782	128 483	138 430	146 733	153 106	163 35
Total	1 258 074	1 295 727	1 407 865	1 488 028	1 520 944	1 583 5

Using the income method

The income method considers the incomes from the factors of production or factor payments. These are wages, rent, interest and profits.

Table 3. Income data for Israel, in millions of new Israeli shekels (ILS) (Source: OECD ⬀ (http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1)).

	2014	2015	2016	2017	2018
Compensation of employees	488 739	513 021	541 650	574 463	607 797
Profit	461 821	490 878	515 460	530 496	549 515
Taxes less subsidies	157 015	161 424	167 840	166 595	173 304
Total	1 107 575	1 165 323	1 224 950	1 271 554	1 330 616

GNI and calculating GNI

Gross national income (GNI) is a measure that includes a sum total of consumption, investment, government spending, and net exports, just like GDP does. However, GNI also factors in the citizens of a country earning an income abroad and the incomes earned from foreign citizens within the country's borders. The difference is that the incomes of citizens abroad are added to the national total income, while the incomes of foreign citizens earning within the country's borders are subtracted. It can be summarised by:

GNI = GDP + incomes flowing in from other countries − incomes flowing out to other countries

This measure is important as it shows the economic activity of a country both on an international scale (of its citizens abroad) and a domestic scale (of its foreign citizens).

Worked example 2

Table 4 provides various national income data for Canada in 2018. Calculate the GNI from the data below.

Table 4. National income data for Canada in 2018 (Source: Statistics Canada 🗗 (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610022201)).

Category	Value in Canadian dollars (CAD) in millions
Consumption	1161173
Investment	439842
Government spending	417433
Imports	664754
Exports	662381
Incomes flowing outward	548312
Incomes flowing inward	226291

To find GNI using the expenditure method, you must use the equation:

GNI = GDP + income flowing inward − income flowing outward

$$GDP =$$
$$1\,161\,173 + 439\,842 + 417\,433 + (662\,381 - 664\,754) = 2\,016\,075 \text{ CAD (in millions}$$

$$GNI = 2\,016\,075 + 226\,291 - 548\,312 = 1\,694\,054 \text{ CAD (in millions)}$$

Overview
(/study/app
186-
cid-
754025/

Student
view

3 section questions ⌄

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

Real GDP and real GNI

Section Student... (0/0) 📣 Feedback 🖨 Print (/study/app/pp/sid-186-cid-754025/book/real-gdp-and-real-gni-id-31056/print/) ☐ Assign

Real GDP and GNI can be calculated using a deflator. This essentially reduces their nominal values using a price index for inflation. In other words, GDP and GNI can be 'deflated' to take into account how much prices inflated by that year. Real GDP is given by using the following formula:

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{Price deflator}} \times 100$$

Real GNI, similarly, will be calculated by the same formula with nominal GNI instead of nominal GDP:

$$\text{Real GNI} = \frac{\text{Nominal GNI}}{\text{Price deflator}} \times 100$$

Worked example 1

Table 1 provides data for Bulgaria from 2015 to 2018.

1. Calculate the real GDP of Bulgaria for each year.
2. Comment on the real GDP trend for Bulgaria.

❌
Student
view

Table 1. GDP data for Bulgaria.

Year	2014	2015	2016	2017	2018
Nominal GDP	56.8	50.2	53.2	58.2	65.1
Price deflator	100	103	109	106	103

a)

For each year, we must carry out the following calculation:

2014: Real GDP $= \dfrac{56.8}{100} \times 100 = 56.8$

2015: Real GDP $= \dfrac{50.2}{103} \times 100 = 48.7$

2016: Real GDP $= \dfrac{53.2}{109} \times 100 = 48.8$

2017: Real GDP $= \dfrac{58.2}{106} \times 100 = 54.9$

2018: Real GDP $= \dfrac{65.1}{103} \times 100 = 63.2$

b)

Bulgaria's real GDP dropped from 56.8 to 48.7 between 2014 and 2015, where it then began to increase again in 2016, 2017 and 2018. In real terms, Bulgaria was worse off in 2015, 2016, and 2017 compared with 2014, but it was better off in 2018.

Total GDP and GDP per capita

If GDP can indicate the total output of a country, then it should also be able to indicate how much national income an average domestic citizen is producing. By dividing the total GDP by the population, we get an average output or GDP per capita. **Table 2** gives the total GDP and GDP per capita statistics for a number of different countries. GDP per capita can provide us with a better picture of how much economic activity each individual is generating in an economy. It can provide a clearer account of well-being other than just a nation's total GDP. For example, countries with a larger population, such as India, will drive a lot of economic activity due to their population size, but that total does not give us an indicator of individual

activity. As of 2019, India ranks 5th in the world by total national GDP, but 139th in the world by GDP per capita. When trying to make comparisons between countries to determine living standards, the GDP per capita measurement provides us a clearer view.

Real GNI per capita is another statistic used in national income accounting which actually indicates the income per person in the country. It is calculated by the formula:

$$\text{Real GNI per capita} = \frac{\text{Real GNI}}{\text{Population}}$$

✓ **Important**

Real GDP growth = nominal GDP growth adjusted for inflation

GDP per capita = (Total GDP/Population)

GNI = GDP + Net property income from abroad

Table 2. Total GDP and GDP per capita for various countries in 2019 (Source: IMF World Economic Outlook, December 2019).

Country	Total GDP (billions of US dollars)	Per capita GDP (US dollars)
Australia	1 376 255	52 373.46
Belgium	517 609	48 244.66
Dominican Republic	89 475	18 424.61
Qatar	191 849	130 475.07
South Africa	358 839	13 675.34

❌
Student
view

GDP/GNI by purchasing power

While GDP and GNI can be more precise when measuring per capita (or by real versus nominal value), there is another way to find a more accurate measure of GDP or GNI. For this, we rely on purchasing power parity (PPP). This indicator will tell us the size of an economy by its power to purchase goods and services within that country.

Purchasing power parity refers to measuring the prices for goods and services in different locations. Assuming a world in which there are no barriers to trade and no transaction costs, we could assume that goods and services would be the same price in all locations. However, there exists a difference in how much a given income can purchase in different countries because some domestic sectors are not largely open to world trade, like the markets for labour, real estate, or health services: this is the purchasing power parity.

You might experience this when you travel abroad, by being aware that the cost of things is higher or lower compared to your home country. A good example that demonstrates this is the 'Big Mac Index': an interactive currency tool developed by *The Economist*. It illustrates what the PPP cost is of a McDonald's Big Mac hamburger in different countries, providing readers with a relative benchmark by which to compare PPP. By accounting for the differences brought by trade barriers and transaction costs, we can see the differences in the price of a well-known product (such as the Big Mac) that is standardised and available in many countries. For more information, you can visit the interactive currency tool here (https://www.economist.com/news/2019/07/10/the-big-mac-index)and adjust the variables, such as the base currency and year, to see the relative purchasing power of your country compared to others.

💼 Case study

The largest economy in the world?

The US economy has been the largest economy in the world for more than a century since the productivity of the country shot up during the Second Industrial Revolution. However, China's economy is catching up. Its nominal and real GDP have begun to close the gap between itself and the US over the past three decades. As of 2019, China's nominal GDP is roughly two-thirds that of the US. However, as you have just learned, nominal GDP is a relative figure and sometimes other measures such as PPP can provide us with a better idea of the true extent of an economy's strength.

In what ways do you think this will change the outlook of the US and Chinese economies? What will this mean for future development?

For more information, have a look at this blog post
(https://blogs.worldbank.org/opendata/tracking-gdp-ppp-terms-shows-rapid-rise-
china-and-india)published by the World Bank.

To get a better idea of what the future of the largest economies may look like by
GDP PPP, have a look at this video and consider the following questions:

- What is driving economies like Indonesia and Egypt to make such large leaps
  in the relative GDP PPP rankings?

- How is the measure of GDP PPP more meaningful than nominal GDP when
  comparing different countries' economies?

The World's Largest 10 Economies in 2030

3 section questions ⌄

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

The business cycle

| Section | Student... (0/0) | 📢 Feedback | 🖨 Print (/study/app/pp/sid-186-cid-754025/book/the-business-cycle-id-31057/print/) | Assign |

We tend to see fluctuations in economic output activity over time. These fluctuations are
illustrated in a diagram known as the business cycle. This might also be called the economic
or trade cycle. The business cycle is broken down into four phases:

1. an expansionary phase

2. a peak phase

3. a contractionary phase

4. a trough

Video 1. Exploring key phases and dynamics of the business cycle.

👁 More information for video 1

Student
view
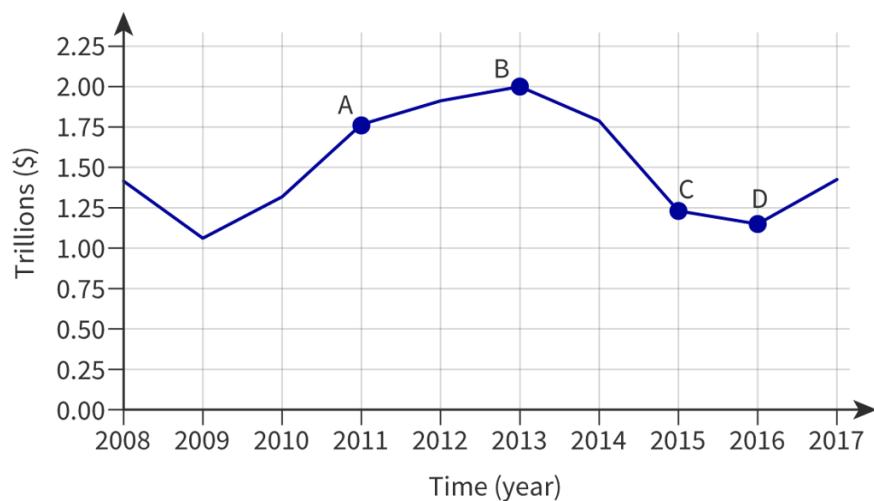
Figure 1. GDP for Russia (in trillions of USD).

Source: "**World Bank Data** (https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=RU)"

More information for figure 1

The line graph shows Russia's GDP in trillions of USD from 2008 to 2017. The X-axis represents time in years, ranging from 2008 to 2017, while the Y-axis represents GDP in trillions of dollars, ranging from 0 to 2.25 trillion USD. The graph contains four key points labeled A, B, C, and D.

From 2008 to 2010, the GDP fell from approximately 1.5 trillion to 1.25 trillion USD, marking a contractionary phase. Between 2010 and 2013, the GDP rose, reaching a peak at 2.075 trillion USD in 2013 (point B). After 2013, GDP began to decline, reaching around 1.25 trillion USD in 2015 (point C), and slightly lower in 2016 (point D). By 2017, the GDP rose slightly to around 1.5 trillion USD, indicating a recovery period. Overall, the graph illustrates the phases of expansion, peak, contraction, and trough of Russia's GDP over the displayed timeframe.

[Generated by AI]

Looking at the business cycle for Russia in **Figure 1**, the phases are labelled A (expansionary), B (peak), C (contractionary) and D (trough). Economic growth took place from 2010 to 2013, reaching its peak during 2013. GDP then started to fall and economic growth turned negative until 2016. The economy was mainly slowed by a change in the value of the Russian currency, the ruble, and low oil prices that hurt Russian export revenue.

Economies can start to recover either with the help of government intervention or on their own. Either way, confidence will return, firms will rehire unemployed workers, and there will be an uptick in demand for goods and services. Exactly what starts this process will depend on the nature of the recession.
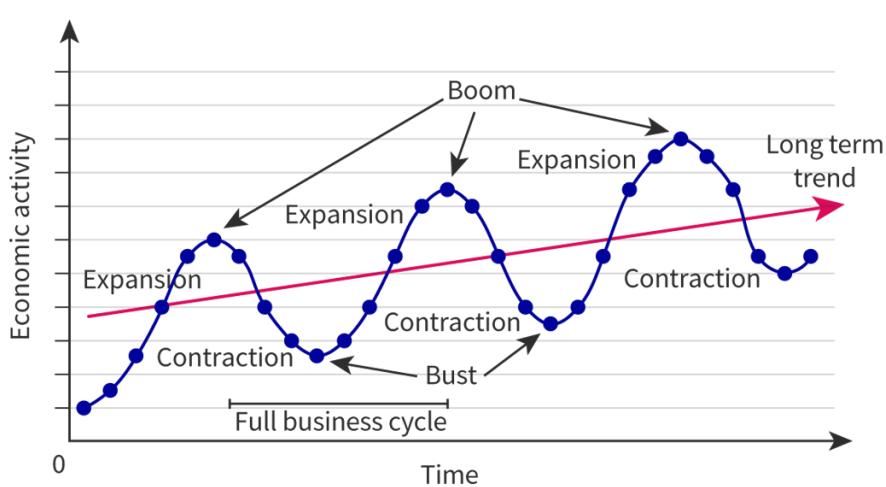
Student
view

Figure 2. The business cycle.

🚫 More information for figure 2

The graph represents the business cycle, displaying the fluctuations in economic activity over time. The Y-axis is labeled 'Economic activity' and does not have specific numerical values, suggesting a qualitative representation. The X-axis is labeled 'Time' showing progression over an unspecified period. The graph illustrates a wavy line with phases marked as 'Expansion', 'Boom', 'Contraction', and 'Bust'. The curve indicates periods of economic growth and decline, transitioning through these phases multiple times. A red trend line indicates the long-term growth trend, suggesting an upward trajectory of potential output over time. This line demonstrates that despite economic ups and downs, the overall trajectory is positive. Key points such as 'Full business cycle' and 'Long term trend' are labeled to help understand different phases and the overarching growth pattern.

[Generated by AI]

We can also use the business cycle to learn about the long-term prospects or potential for growth in an economy. Looking at **Figure 2**, we can see that, despite significant upheaval for the economy during the period shown, the trend line or potential output is sloping upwards and this line indicates the long-term trend of the business cycle of the economy. It is helpful to see that at times GDP can rise above or fall below potential, creating a positive **or** negative output gap.

However, the concept of potential output is also a difficult one because we cannot clearly measure economic potential. It would be like trying to calculate the potential adult height of a child – it would be an educated guess. In addition, can we refer to economic recovery as

Student view

the moment when growth returns, when economic potential is reached again, or when GDP reaches its previous peak?

The final point to learn about the business cycle is how to distinguish between a decrease in GDP and a decrease in GDP growth rate. A decrease in GDP is a fall in economic output, or a **recession** if occurring for longer than two quarters. A decrease in GDP growth rate means that there is an increase in GDP but at a slower rate than previous quarters or years.

⊙ **Exam tip**

You might be presented with a similar graph in an exam and asked to identify at what stage of the business cycle the economy is in during a given year.

The data in **Table 1** shows GDP growth for Russia between 2010 and 2017. From 2011 to 2014, the economic growth rate fell for Russia, but GDP was still increasing, only at a slower rate. It is only in 2015 and 2016 that GDP actually fell, indicated by the negative growth rate.

Table 1. GDP growth for Russia between 2010 and 2017 (Source: IMF).

Year	2010	2011	2012	2013	2014	2015	2016	2017
GDP growth (%)	4.5	5.28	3.66	1.79	0.74	−2.83	−0.22	1.55

GDP and GNI as a measure of economic well-being

Comparisons over time

To make comparisons of living standards over time, real values of GDP and GNI need to be used. Nominal values are unsuitable. Even using real GDP and real GNI can overestimate or underestimate the population's economic well-being, as even the real values do not reflect changes in factors such as improved product quality, increases in leisure activities, improvements in education and health care and other factors which affect people's living standards.

Comparisons between countries

The use of GDP and GNI in comparing economic well-being between countries is limited. For example, one country may have a high GDP per capita but the concentration of income is only among a small percentage of the population, while another country might have a lower GDP per capita but more equally distributed. GDP and GNI measures will not make this distinction and might be misleading on this and other factors related to economic well-being.

⚠ **Be aware**

It is very important to remember that a fall in output is not the same as a fall in the growth rate. This is a common mistake that students make in all elements of the assessment.

Similarly, an increase in growth is not the same as the growth rate.

🧩 **Theory of Knowledge**

Prakash Loungani, an economist from the IMF, researched the accuracy of economic forecasts. Loungani concluded: 'The record of failure to predict recessions is virtually unblemished.'

The natural sciences grounded in the scientific method strive to describe nature and to explain our natural world. Their most rigorous test lies in their predictive ability. While the natural sciences have predictive power, economics does not.

Should economists be able to forecast recessions and respond with practical solutions when they arise? Examining this topic from a TOK lens, what are the limitations to certainty in human sciences?

Should economists fix problems when they occur rather than trying to predict the future?

Knowledge question: To what extent can economics be certain?

3 section questions ⌄

3. Macroeconomics / 3.1 Measuring economic activity and illustrating its variations

Alternative measures of well-being

Section   Student... (0/0)   📢 Feedback   🖨 Print   (/study/app/pp/sid-186-cid-754025/book/alternative-measures-of-wellbeing-id-31058/print/)   [Assign]

GDP or GNI

Whilst GDP helps us to measure a country's economic growth, it does not take into account other factors, such as the economic impact on the environment or people's well-being. There are many other alternative indicators that have been developed to address this issue, such as Gross National Happiness, the Better Life Index, the Happy Planet Index, and Green GDP. As you read through the section, consider the ways in which these indicators might be more effective at measuring the economy compared to GDP.

World Happiness Report

In 2011, the UN General Assembly passed a resolution to include an indicator of people's happiness in the measures of economic development. This indicator has been published each year in the World Happiness Report (https://worldhappiness.report/ed/2020/#read)to give us an idea of how much happiness plays a role in human and economic development, allowing countries to address any shortfalls, if appropriate. The indicator is measured using the Cantril ladder. It is used to ask citizens of member countries to self-identify their current levels of happiness. Participants are asked to imagine a ladder where the top rung represents their happiest life and the bottom rung is their least happy. They must then measure which rung they are currently on based on that thought experiment. From this, and other measures, a general indicator can be generated.
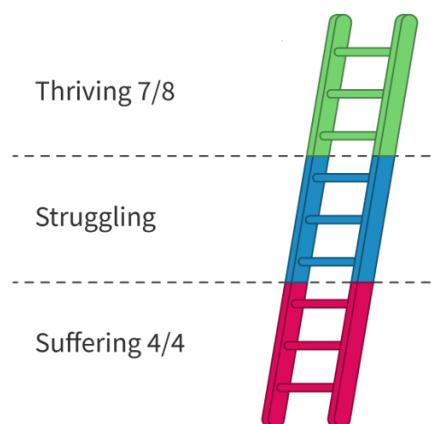
Figure 1. The Cantril Ladder is used to have people self identify levels of happiness in their current lives.

The image is an illustration of the Cantril Ladder, a visual tool used to help individuals rate their level of happiness. The ladder is divided into three distinct sections. At the top, labeled 'Thriving,' represents happiness levels 7 and 8, indicated by green-colored rungs. The middle section, labeled 'Struggling,' covers intermediate happiness levels and is colored blue. The bottom section, labeled 'Suffering,' represents the lowest levels of happiness, marked as 4/4, and is colored in red. The ladder is positioned vertically, with dashed lines demarcating each section. Next to each section, textual labels provide context for each happiness level, showing how individuals categorize their current status on this figurative scale.

[Generated by AI]

OECD Better Life Index

Another alternative to GDP is the OECD Better Life Index (BLI). The BLI measures 11 indicators across 38 countries which are members of the Organisation for Economic Cooperation and Development (https://www.oecd.org/about/), or OECD. These variables are:

- housing
- income
- jobs
- community
- education
- environment
- civic engagement
- health
- life satisfaction
- safety
- work–life balance.

The data mostly comes from official sources such as the OECD (which already collects most of this data), National Accounts, United Nations Statistics, and National Statistics Offices. From a statistical point of view, the BLI relies on best practices for building composite indicators.

However, the BLI has been criticised as it focuses on a rather narrow set of indicators. It ignores others such as community involvement and degradation of the environment. It is also criticised because the criteria are influenced by the personal preferences of the participant. It is possible to give certain factors more 'weight' than others so different criteria can be ranked accordingly. For example, if you wanted to measure Canada versus Belgium in the BLI, you could choose to emphasise the importance of civic engagement and give it more 'weight', thereby changing the ranking.

⊕ International Mindedness

Why is GDP still used as a measure for a country's economic well-being? Considering that GDP has shortcomings when measuring our well-being, why do countries keep using it? The answer may vary, but at its core, it is mostly to do with the history of using GDP to measure economies and its familiarity across many countries. All market economies have been using this measurement for some time, across borders, languages, and cultures, to come to an agreed general number to measure the economy. To reach a cross-cultural consensus with composite indices, such as the Gross National Happiness or the Happy Planet Index, might not be as easy due to their subjectivity.

Gross National Happiness

Have you heard of the Gross National Happiness ⧉ (https://bhutanstudies.org.bt/gross-national-happiness/)(GNH) indicator? It was developed in the 1970s in Bhutan, and aims to take a more holistic approach in defining what growth and development really mean. It focuses on other factors of progress that are seen to be just as important as economic aspects. It has invited much discussion and further economic research.
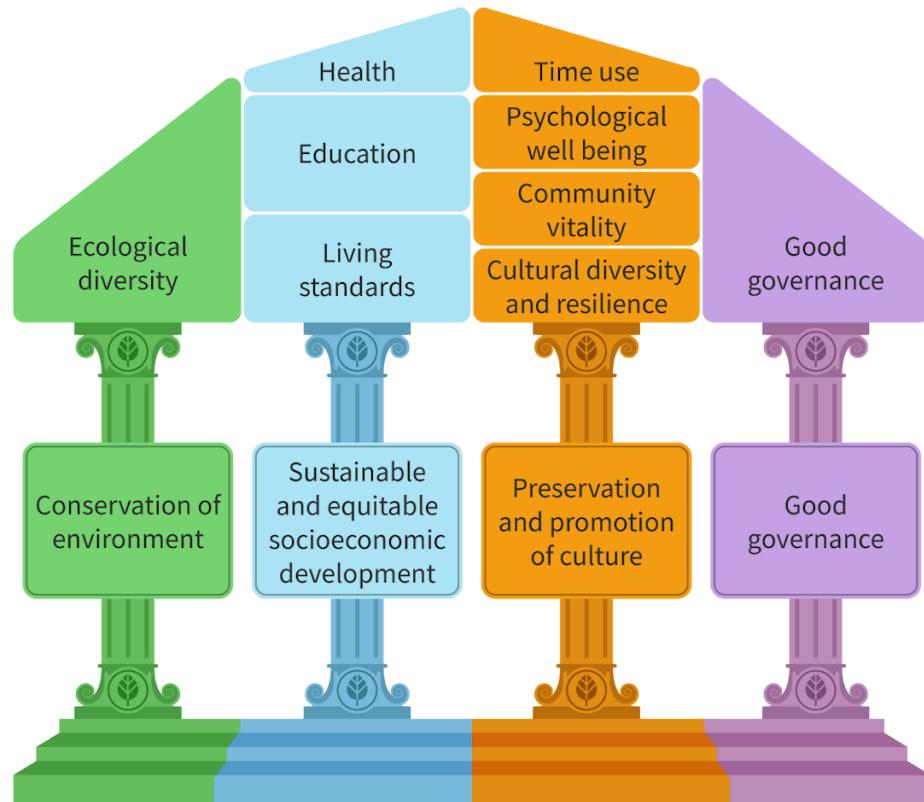
Figure 2. The four pillars of GNH guide the implementation of the nine domains.

👁️‍🗨️ More information for figure 2

The image is a diagram illustrating the concept of Gross National Happiness (GNH) using the metaphor of a temple structure. This diagram consists of four columns or pillars, each labeled at the base with a key principle: "Conservation of environment," "Sustainable and equitable socioeconomic development," "Preservation and promotion of culture," and "Good governance." Each pillar supports a roof composed of individual blocks, which represent different domains of GNH. From left to right:

1. The green pillar labeled "Conservation of environment" supports a roof labeled "Ecological diversity."

2. The blue pillar labeled "Sustainable and equitable socioeconomic development" supports three blocks, representing "Health," "Education," and "Living standards."

3. The orange pillar labeled "Preservation and promotion of culture" supports three blocks, representing "Time use," "Psychological well-being," and "Community vitality."

4. The purple pillar labeled "Good governance" supports a roof labeled "Good governance."

The diagram visually connects principles of development and governance with elements of well-being, illustrating how these elements work together to uphold the structure of the GNH philosophy. Each component contributes to an overall holistic view of happiness and development.

[Generated by AI]

⚙️ **Activity**

Either in a group or individually, investigate the criticisms that have been levelled at the GNH index. How has the GNH index been used outside of Bhutan and what obstacles has it faced? Does it share similar criticisms and obstacles with those of other indicators, such as the Happy Planet Index or the OECD Better Life Index?

Happy Planet Index

The Happy Planet Index (HPI) uses four indicators to demonstrate how efficiently residents of different countries are using environmental resources to lead long, happy lives. These indicators are:

- well-being, which is how satisfied people are with the quality of their lives
- life expectancy, which is how long people are expected to live for
- inequality of outcomes, which measures the inequalities among people within a country and is expressed as a percentage
- ecological footprint, which is the average impact that people make on the environment

Unlike the Happiness Index and the OECD Better Life Index, the HPI uses a mathematical equation to determine a country's score on the index, rather than having weighted composite indicators. That equation is:

Happy Planet Index (approximate) ≈

$$\frac{\text{life expectancy} \times \text{experienced well-being} \times \text{inequality of outcomes}}{\text{ecological footprint}}$$

You can explore the interactive HPI map and compare countries' data here (http://happyplanetindex.org/). Interestingly, because of the ecological footprint, you may find that many of the wealthier nations of the world do not score highly. In other words, they have large ecological footprints (denominator) compared to the other factors (numerator).

Therefore, the equation results in a smaller number as a bigger footprint is created in gaining the desired outcomes. The precise formula used to calculate HPI scores requires some technical adjustments to be made beyond this but this is generally how it works.

Table 1. GDP, HPI and the ecological impact element of HPI for a selection of countries.

Countries	GDP value (2016; trillion USD)	HPI (2016)	Ecological impact in HPI (2016)
United States	16.9	20.7	8.2
Vanuatu	0.08	40.6	1.9
Luxembourg	0.63	13.2	15.8
Australia	1.35	21.2	9.3
Tanzania	0.47	22.1	1.3
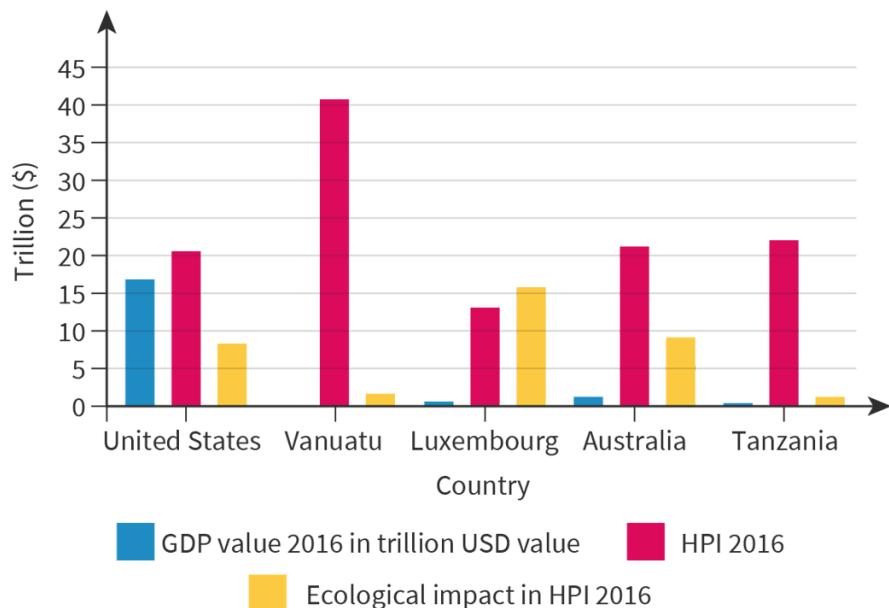
Figure 3. HPI rankings by overall indicator, ecological footprint and GDP.

Source: "Happy Planet Index (http://happyplanetindex.org/)"

👁 More information for figure 3

The bar chart displays data for five countries: United States, Vanuatu, Luxembourg, Australia, and Tanzania. The Y-axis represents GDP in trillions of USD, ecological footprint, and HPI (Happy Planet Index) for 2016, with a range from 0 to 45 trillion dollars. Each country has three bars representing GDP in 2016 (blue), HPI 2016 (pink), and Ecological impact in HPI 2016 (yellow).

- United States: The GDP value is around 18 trillion USD, HPI is 20, and ecological impact is approximately 8.

- Vanuatu: GDP is very low, HPI is about 38, and ecological impact is around 10.

- Luxembourg: GDP is nearly 40 trillion USD, HPI is low, and ecological impact is minimal.

- Australia: GDP value is around 20 trillion USD, HPI is approximately 28, and ecological impact is nearly 20.

- Tanzania: GDP value is very low, HPI is high, close to 40, and ecological impact is around 8.

The chart visually compares the economic and environmental indicators through the diverse bar heights for each country.

[Generated by AI]

However, just as with other composite indices, there are criticisms of the HPI. One example is the subjective nature of experienced well-being. In the HPI, this is based on a Gallup Poll in which respondents are asked:

'Please imagine a ladder with steps numbered from zero at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you; and the bottom of the ladder represents the worst possible life for you. On which step of the ladder do you feel you personally stand at the present time?'

Green GDP

Recently, there has been increasing criticism about the way modern economic activity negatively affects the environment. Economic growth today is damaging prospects for growth in the future. In subtopic 2.8 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29875/) you learned about negative externalities, or costs that are not internalised into a transaction. GDP functions in a similar way, since it counts production within the country, but not the external costs of pollution, for example. For this reason, therefore, GDP overestimates production and growth. In 1972, economists William Nordhaus and James Tobin first discussed altering GDP to account for unpaid work, household leisure and environmental degradation. Since then many economists have further discussed this measurement and some countries, like China (http://www.chinadaily.com.cn/china/2007-04/19/content_853917.htm), have notably tried to use it, but without success.