

# Productivity Statistics: 1978–2011

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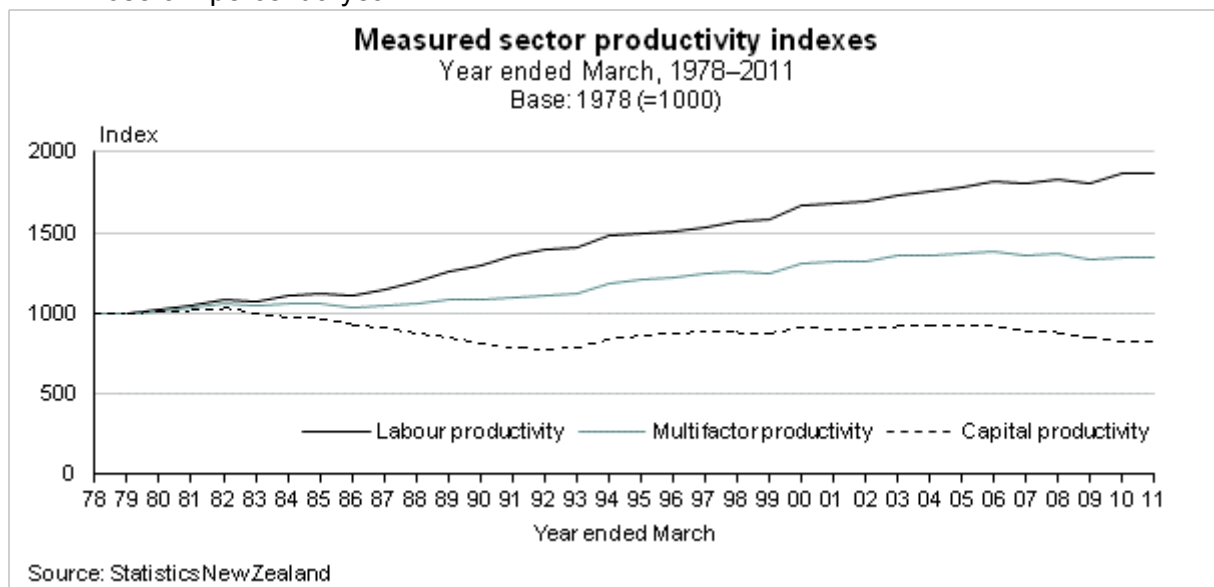
## Key facts

For 2011.

- Growth in labour productivity decreased 0.1 percent.
- This was a result of growth in labour input (up 0.9 percent) increasing more than for output (up 0.8 percent).
- Multifactor productivity (MFP) recorded no growth.

Over the growth cycle from 2006 to 2011, annual changes were as follows.

- Labour productivity rose 0.5 percent a year (compared with annual growth of 1.9 percent from 1978–2011).
- Capital productivity fell 1.9 percent a year (compared with annual growth of 0.6 percent from 1978–2011).
- MFP fell 0.6 percent a year (compared with annual growth of 0.9 percent from 1978–2011).
- After accounting for differences in the skill composition of workers, labour productivity rose 0.2 percent a year.



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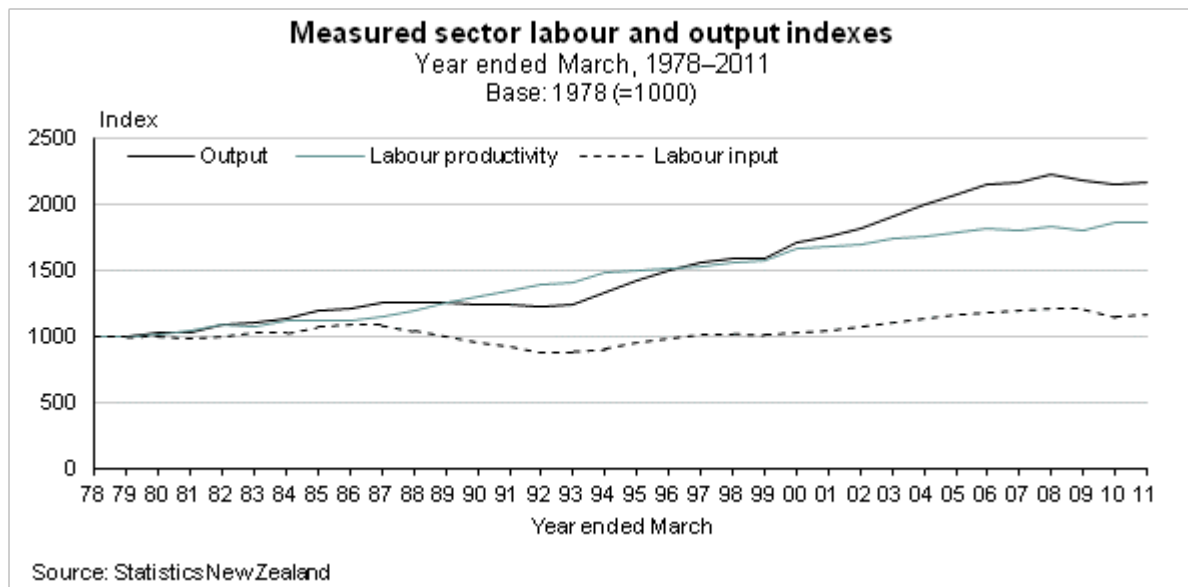
## Commentary

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For explanations of terms used in this commentary, see the [definitions section](#).

### Labour productivity declines slightly

In the year ended March 2011, growth in labour productivity fell slightly, down 0.1 percent. This was due to stronger growth in labour input (up 0.9 percent) compared with growth in output (up 0.8 percent). The increase in labour input growth in the March 2011 year was the first increase in three years, and was largely due to rising labour hours in the business services industry. The manufacturing sector continued its decline in terms of labour hours in 2011.



[Household Labour Force Survey \(HLFS\)](#) figures provide a similar picture. In the March 2011 year the actual hours worked increased by 2.1 percent in the total economy. This follows a decline of 2.7 percent in the previous year.

The average annual growth in labour productivity between 2006 and 2011 was 0.5 percent, which was lower than for any previous growth cycle. Growth cycles have been identified as 'peak to peak', determined where output or MFP growth are at their highest deviation from trend. The final growth cycles selected also take into account economic events throughout the time period.

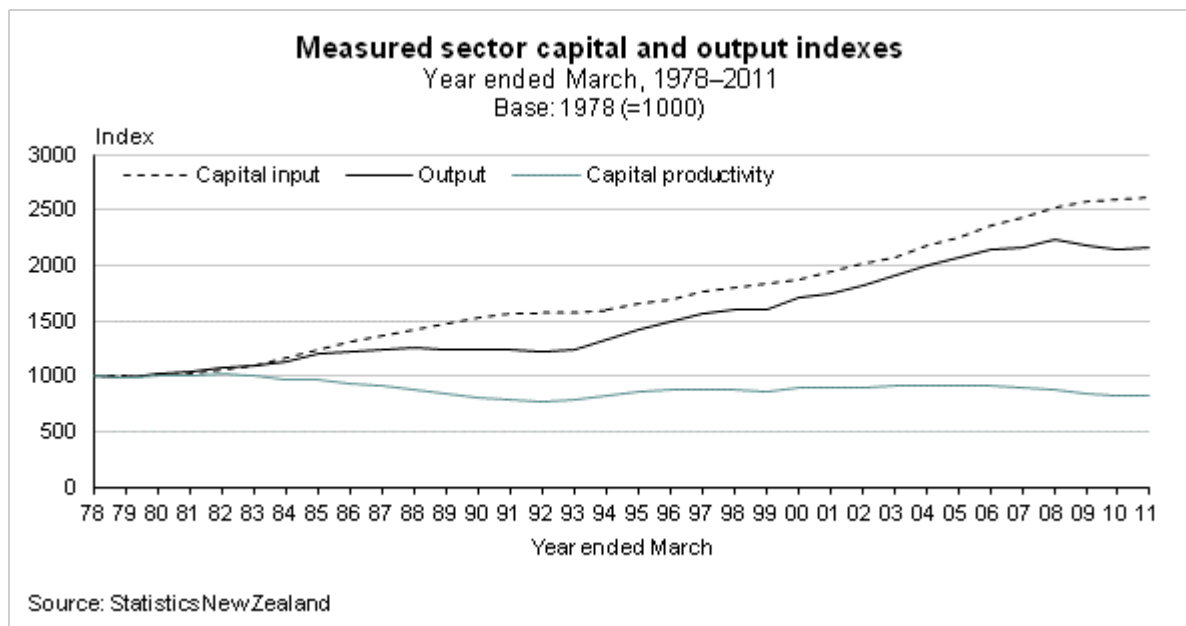
The following table presents the average annual growth in labour productivity by growth cycles.

<b>Labour productivity average annual growth rates<sup>(1)(2)</sup></b>			
Year ended 31 March			
Cycle	Output	Labour input	Labour productivity
	Percent <sup>(3)</sup>		
1978–82	2.1	0.1	2.1
1982–85	3.4	2.2	1.2
1985–90	0.7	-2.2	3.0
1990–97	3.3	0.9	2.4
1997–2000	3.0	0.2	2.8
2000–06	3.9	2.4	1.5
2006–11	0.1	0.4	0.5
<b>1978–2011</b>	<b>2.4</b>	<b>0.4</b>	<b>1.9</b>

1. Does not include the movement for the first year of each cycle (eg the 1978–82 average annual growth rate does not include 1978).  
2. Property services, business services, and personal and other community services are included in the measured sector from 1996 onwards.  
3. Percentage changes are calculated on unrounded index numbers.

## Capital productivity positive for the first time in eight years

In the year ended March 2011, growth in capital productivity rose 0.1 percent, as capital input grew by 0.7 percent compared with an increase of 0.8 percent in outputs. This was the first increase in capital productivity growth since the March 2003 year.



The 1.9 percent a year decline in the growth of capital productivity between 2006 and 2011 reflects stronger growth in capital input (2.1 percent per year) compared with growth in output (0.1 percent per year).

Productivity statistics do not account for changes in capacity utilisation of capital, as capital assets are assumed to be used at a constant rate throughout the growth cycle and over their life. Because of this, growth in capital input may be understated when capacity utilisation is increasing and capital productivity may be overstated.

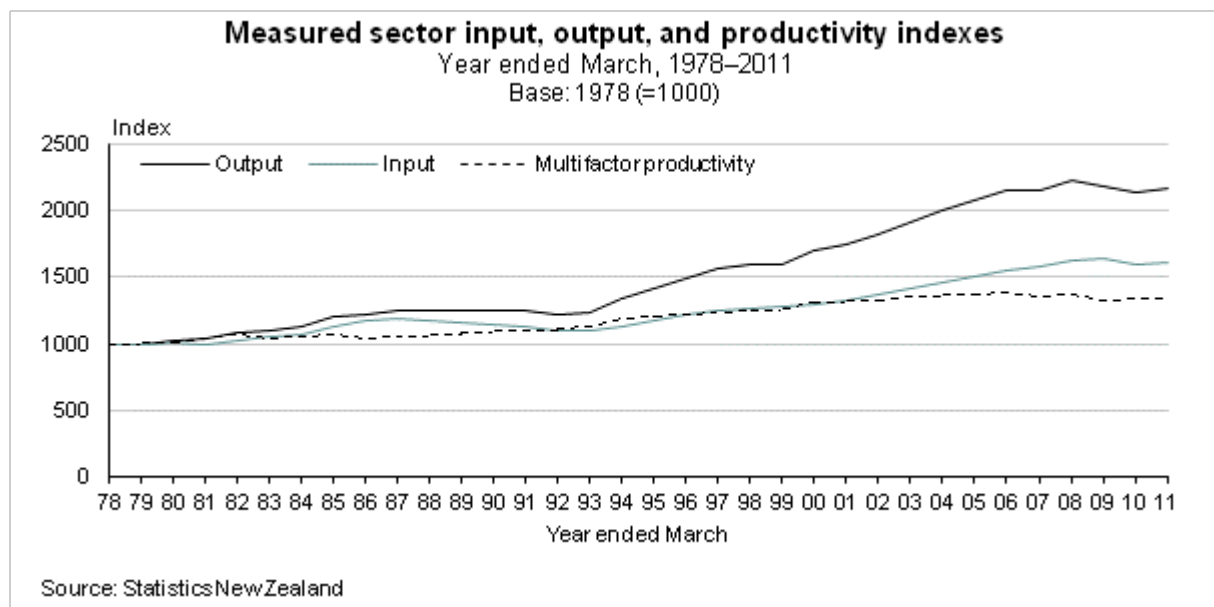
The following table presents the growth in capital productivity.

<b>Capital productivity average annual growth rates<sup>(1)(2)</sup></b>			
Year ended 31 March			
Cycle	Output	Capital input	Capital productivity
	Percent <sup>(3)</sup>		
1978–82	2.1	1.3	0.8
1982–85	3.4	5.4	-1.9
1985–90	0.7	4.3	-3.5
1990–97	3.3	2.1	1.2
1997–2000	3.0	2.2	0.8
2000–06	3.9	3.8	0.1
2006–11	0.1	2.1	-1.9
<b>1978–2011</b>	<b>2.4</b>	<b>2.9</b>	<b>-0.6</b>

1. Does not include the movement for the first year of each cycle (eg the 1978–82 average annual growth rate does not include 1978).
2. Property services, business services, and personal and other community services are included in the measured sector from 1996 onwards.
3. Percentage changes are calculated on unrounded index numbers.

## Growth in MFP flat

MFP is measured as a ratio of output to combined capital and labour inputs. It reflects growth that cannot be attributed to capital or labour, such as technological change or improvements in knowledge, methods, and processes.



In the March 2011 year growth in MFP was flat – output growth was the same as growth in total inputs (up 0.8 percent).

In the latest period (2006–11) MFP declined, with an average annual decrease of 0.6 percent. Output rose 0.1 percent annually while total inputs rose 0.7 percent a year. Growth in MFP has increased at an average of 0.9 percent a year since the series began in 1978. Since then, both output and total inputs have increased (up 2.4 percent and 1.4 percent a year, respectively).

The following table presents the average annual growth in MFP.

<b>Multifactor productivity average annual growth rates<sup>(1)(2)</sup></b>			
Year ended 31 March			
Cycle	Output	Total inputs	Multifactor productivity
	Percent <sup>(3)</sup>		
1978–82	2.1	0.5	1.6
1982–85	3.4	3.5	-0.1
1985–90	0.7	0.3	0.4
1990–97	3.3	1.3	1.9
1997–2000	3.0	1.1	1.9
2000–06	3.9	3.0	0.9
2006–11	0.1	0.7	-0.6
<b>1978–2011</b>	<b>2.4</b>	<b>1.4</b>	<b>0.9</b>

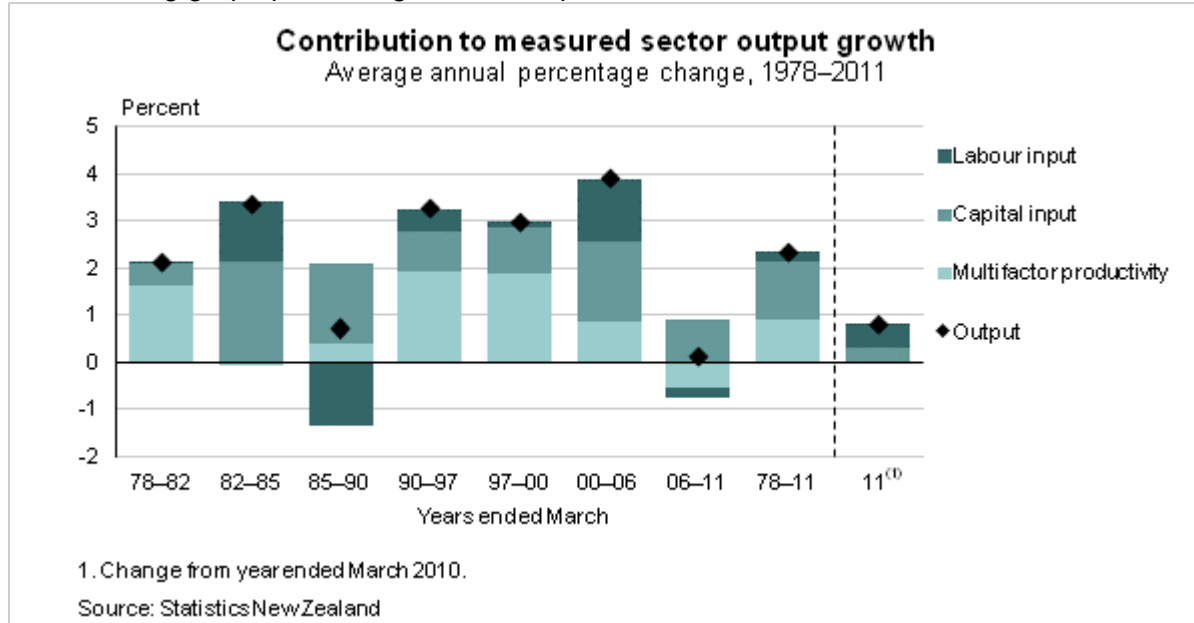
1. Does not include the movement for the first year of each cycle (eg the 1978–82 average annual growth rate does not include 1978).  
2. Property services, business services, and personal and other community services are included in the measured sector from 1996 onwards.  
3. Percentage changes are calculated on unrounded index numbers.

## **Growth accounting for output**

Growth accounting examines how much of the economy’s growth in output can be explained by one or more of the following:

- contribution of labour input
- contribution of capital input
- MFP.

The following graph presents growth in output between 1978 and 2011.



In the year ended March 2011, output grew 0.8 percent. This increase was driven by the contributions of labour input (up 0.5 percent), and capital input (up 0.3 percent). MFP had no growth in 2011.

The following table presents the average annual growth in output and its contributing factors.

<b>Contribution to measured sector output growth</b>				
Average annual growth rates <sup>(1)(2)</sup>				
Year ended 31 March				
Cycle	Output	Contribution of capital input <sup>(3)</sup>	Contribution of labour input <sup>(4)</sup>	Multifactor productivity
	Percent <sup>(5)</sup>			
1978–82	2.1	0.5	0.0	1.6
1982–85	3.4	2.1	1.3	-0.1
1985–90	0.7	1.7	-1.4	0.4
1990–97	3.3	0.9	0.5	1.9
1997–2000	3.0	0.9	0.1	1.9
2000–06	3.9	1.7	1.3	0.9
2006–11	0.1	0.9	-0.2	-0.6
<b>1978–2011</b>	<b>2.4</b>	<b>1.2</b>	<b>0.2</b>	<b>0.9</b>

1. Does not include the movement for the first year of each cycle (eg the 1978–82 average annual growth rate does not include 1978).  
2. Property services, business services, and personal and other community services are included in the measured sector from 1996 onwards.  
3. Equal to the growth rate in capital input weighted by capital's share of total income.  
4. Equal to the growth rate of labour input weighted by labour's share of total income.  
5. Percentage changes are calculated on unrounded index numbers.

The average output growth rate from 2006–11 was the lowest when compared with the cycles since the series began in 1978. Industries with the largest negative output growth over the latest period were:

- construction
- manufacturing.

This was partly offset by growth from:

- finance and insurance
- communication services
- business services.

The output growth slowdown is reflected in MFP, which declined 0.6 percent a year during the 2006–11 period compared with growth of 0.9 percent a year for 1978–2011.

Labour input also declined in the latest period, contributing -0.2 percent to annual output growth, compared with an average of 0.2 percent over the series.

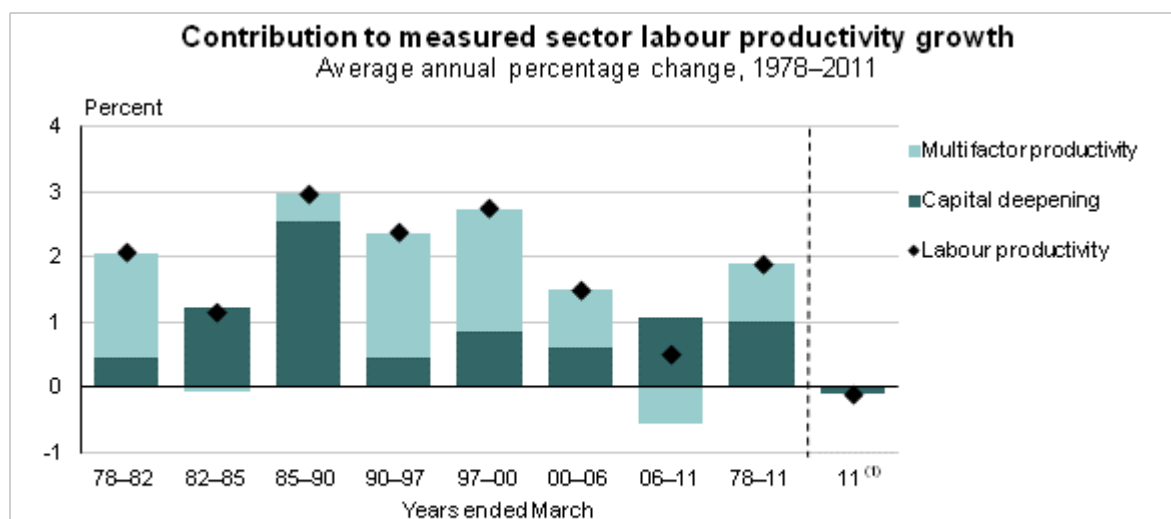
The contribution of capital input remained positive from 2006–11 at 0.9 percent annually, slightly below the long-run average of 1.2 percent.

## Growth accounting for labour productivity

Growth in labour productivity can also be broken down into components. A change in labour productivity can come from two possible sources:

- a change in the weighted capital-to-labour ratio (ie capital deepening or capital shallowing)
- a change in MFP.

The following graph presents the contributions to labour productivity.



1. Change from year ended March 2010.

Source: Statistics New Zealand

In the year ended March 2011, labour productivity decreased 0.1 percent. This was due to no growth in MFP and a small decline in the amount of capital available per worker (capital shallowing). Capital shallowing has only occurred six times in the 33-year series.

In 2011, capital shallowing was due to labour input growth (up 0.9 percent) being marginally higher than capital input growth (up 0.7 percent). Capital input growth was the fifth-lowest it has been over the series.

The capital-to-labour ratio decreased 0.2 percent in 2011, the first time it has been negative since 2003. Over the 33 years, both capital and labour input rose (annually by 2.9 percent and 0.4 percent, respectively). This resulted in a 2.5 percent rise in the capital-to-labour ratio. These figures represent the growth of capital input relative to labour input, while the level of capital relative to labour is unknown.

The following table presents the annual average growth in labour productivity and its contributing factors.

<b>Contribution to measured sector labour productivity growth</b>			
Average annual growth rates <sup>(1)(2)</sup>			
Year ended 31 March			
Cycle	Labour productivity	Contribution of capital deepening <sup>(3)</sup>	Multifactor productivity
	Percent <sup>(4)</sup>		
1978–82	2.1	0.4	1.6
1982–85	1.2	1.2	-0.1
1985–90	3.0	2.5	0.4
1990–97	2.4	0.4	1.9
1997–2000	2.8	0.8	1.9
2000–06	1.5	0.6	0.9
2006–11	0.5	1.1	-0.6
<b>1978–2011</b>	<b>1.9</b>	<b>1.0</b>	<b>0.9</b>

1. Does not include the movement for the first year of each cycle (eg the 1978–82 average annual growth rate does not include 1978).  
2. Property services, business services, and personal and other services are included in the measured sector from 1996 onwards.  
3. Equal to the growth rate in the capital-to-labour ratio weighted by capital's share of total income.  
4. Percentage changes are calculated on unrounded index numbers.

During the 2006–11 period, labour productivity growth was at its lowest, averaging 0.5 percent annually. Capital deepening contributed positively but the performance of MFP (down 0.6 percent annually) pulled labour productivity down.

Over the entire 1978–2011 series, labour productivity growth averaged 1.9 percent annually. The average annual contributions were 1.0 percent from capital deepening and 0.9 percent from MFP.

## Composition-adjusted productivity

The three labour input series within the suite of productivity measures are:



- the unweighted, unindexed measure of labour volume (sum of hours paid)
- the headline labour input index (implicitly adjusts for quality by giving higher weight to industries with above-average wage rates)
- the composition-adjusted labour input index (explicitly accounts for quality).

The composition-adjusted input series allows us to track changes in the skill level of the workforce over time. To do this, the series is compared with the unweighted labour volume series. The difference between the two represents the change in the skill level of workers – measured using qualification and experience proxies.

In the year ended March 2011, composition-adjusted labour productivity decreased by 0.8 percent. This was because adjusted labour input increased (up 1.6 percent) more than output (up 0.8 percent). Explicitly accounting for the rising skill level means more of the MFP residual can be explained. Composition-adjusted MFP decreased 0.4 percent, as adjusted growth in total inputs (up 1.2 percent) was greater than output growth.

The table below shows the annual movements for each of the three labour input series.

<b>Annual percentage change in labour input series</b>			
1998–2011			
Year	Labour volume measure	Headline measure	Composition-adjusted measure
1998	...	...	...
1999	-0.4	-0.6	0.2
2000	1.7	1.3	2.2
2001	1.8	1.6	2.4
2002	2.7	2.8	2.7
2003	2.9	3.1	3.2
2004	2.9	3.0	3.6
2005	1.9	2.3	2.0
2006	1.4	1.6	1.6
2007	1.2	1.5	1.0
2008	1.2	1.4	2.1
2009	-0.9	-0.8	-1.0
2010	-4.5	-4.8	-3.8
2011	1.2	0.9	1.6
<b>Average 1998–2011<sup>(1)</sup></b>	<b>1.0</b>	<b>1.0</b>	<b>1.3</b>
1. The geometric mean growth rate across the period.			
<b>Symbol:</b> ... not applicable			

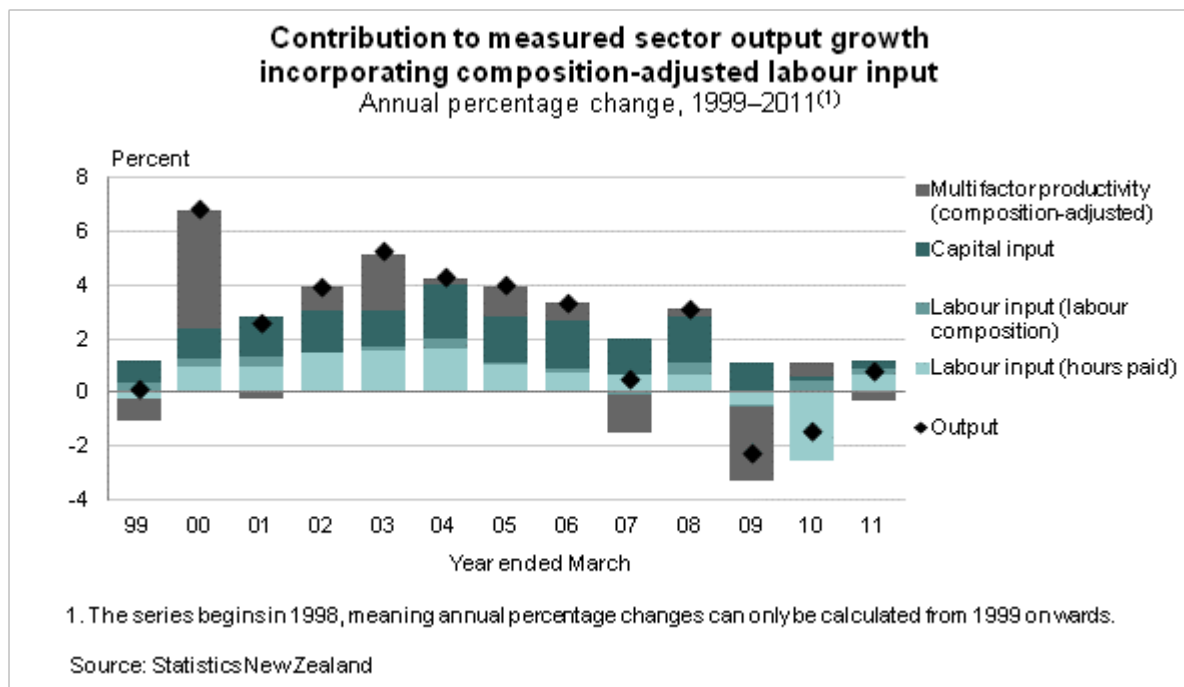
The composition-adjusted labour input series is clearly growing faster than both the unweighted labour volume series and the headline measure. This means that composition-adjusted productivity is growing slower than other productivity measures.

Compared with the labour volume measure, the composition-adjusted series grew slowly only in 2007 and 2009. In 2002, both series had the same growth rate. In all other years, the labour input of higher-skilled workers (measured using education and experience proxies), grew faster than that of lower-skilled workers. This implies the average skill level in the workforce is increasing.

For the March 2011 year, this change is reflected by a smaller proportion of younger workers being employed. The proportion of employed people with no qualifications has also dropped, while the proportion with a degree has increased. This shows a compositional shift towards an older, more experienced, and more qualified working population.

## Composition-adjusted growth accounting for output

Including a composition-adjusted labour input series allows growth in output to be decomposed into capital input, hours paid, labour composition, and composition-adjusted MFP. The following graph presents the contributions to annual growth in output for the adjusted series from 1998 to 2011. Labour composition changes were not a major driver of output increases over this time period.



In the year to March 2011, growth in output increased 0.8 percent. This increase was driven by:

- hours paid (up 0.7 percent)
- capital input (up 0.3 percent)
- labour composition (up 0.2 percent).

Adjusted MFP (down 0.4 percent) offset some of these contributions.

In most years labour composition contributed positively to growth in output. This means highly-skilled labour is growing at a faster rate, and therefore the average skill level of workers is rising. Under an unadjusted labour input approach, this positive contribution of labour skill would remain part of the MFP residual and would not be explicitly shown.

## New Zealand's productivity compared with Australia's

Official New Zealand productivity data can be compared against official Australian numbers. Previously, because both countries used the same industrial classification (Australian and New Zealand Standard Industrial Classification 1996, or ANZSIC96) comparisons were more valid.

However, the Australian Bureau of Statistics (ABS) now publishes their national accounts and productivity data under ANZSIC06. Statistics NZ will publish productivity statistics under ANZSIC06 later in 2012.

Under ANZSIC96, the ABS market sector had identical industry coverage as Statistics NZ's former measured sector. To maintain continuity for their users, the ABS publishes an ANZSIC06-based series that is as close as possible to their market sector, and therefore also close to the Statistics NZ former measured sector. Known as MFP12, this series dates back to 1974 and can be used to compare the countries.

The ABS now includes further industries in their productivity measures – MFP16 dates back to 1995. With both countries including additional industries, the ABS's MFP16 series and Statistics NZ's current measured sector can be compared.

The ABS series are available on their website [www.abs.gov.au](http://www.abs.gov.au).

In 2007, the MFP16 series covered 77 percent of the economy while the Statistics NZ measured sector covered 80 percent of the economy. The table below shows the industries included in each series.

<b>Australia's MFP16 and New Zealand's measured sector</b>	
<b>Australia (ANZSIC06-based)</b>	<b>New Zealand (ANZSIC96-based)</b>
A – Agriculture, forestry, and fishing	A – Agriculture, forestry, and fishing
B – Mining	B – Mining
C – Manufacturing	C – Manufacturing
D – Electricity, gas, water, and waste services	D – Electricity, gas, and water
E – Construction	E – Construction
F – Wholesale trade	F – Wholesale trade
G – Retail trade	G – Retail trade
H – Accommodation and food services	H – Accommodation, cafes, and restaurants
I – Transport, postal, and warehousing	I – Transport and storage
J – Information media, and telecommunications	J – Communication services
K – Financial and insurance services	K – Finance and insurance
L – Rental, hiring, and real estate services <sup>(1)</sup>	LA – Property services <sup>(2)</sup>
M – Professional, scientific, and technical services <sup>(1)</sup>	LC – Business services <sup>(2)</sup>
N – Administrative and support services <sup>(1)</sup>	P – Cultural and recreational services
R – Arts and recreation services	Q – Personal and other community services <sup>(2)</sup>
S – Other services <sup>(1)</sup>	
1. Included in MFP16 but not in MFP12.	
2. Included in the measured sector from 1996 but not included in the former measured sector.	

The main differences between the two series are:

- ABS data is based on a June year; Statistics NZ data is based on a March year
- ABS excludes private landlords; they are included in the Statistics NZ series
- ABS series is based on ANZSIC06; Statistics NZ's series is based on ANZSIC96
- financial intermediation services indirectly measured (FISIM) are included in the ABS series but not in the Statistics NZ series.

The table below compares the output, productivity, and input series for Australia and New Zealand, based on the MFP16 and measured sector series, respectively. The comparison is from 1996 as this is when property and business services and personal and other community services were included in the measured sector.

Cycles can not be compared, due to each country having slightly different peaks in their cycles.

<b>Australia and New Zealand productivity data</b>		
Australia's MFP16 and New Zealand's measured sector		
Average annual growth rates: 1996–2011		
Variable	Australia	New Zealand
	Percent	
Output	3.5	2.5
Labour productivity	2.0	1.4
Capital productivity	-1.6	-0.4
Multifactor productivity	0.4	0.6
Labour input	1.5	1.1
Capital input	5.3	2.9
Total inputs	3.1	1.9
Capital-to-labour-ratio	3.7	1.8

Based on relatively similar industry coverage, Australia's and New Zealand's productivity performances differed over the 1996–2011 period. New Zealand was slightly ahead in terms of MFP, with average growth of 0.6 percent, compared with 0.4 percent for Australia. New Zealand was also ahead in capital productivity.

Labour productivity growth was greater in Australia than New Zealand, growing an average of 2.0 percent and 1.4 percent a year, respectively. Australia's average annual output growth was significantly higher, at 3.5 percent compared with New Zealand's 2.5 percent. However, this additional output growth was fully accounted for by input growth. Both Australia and New Zealand experienced growth in capital deepening over the 15-year time span, with Australia markedly outperforming New Zealand.

The ABS's MFP12 series and Statistics NZ's former measured sector can be compared to assess relative productivity growth across a longer timeframe. New Zealand's labour productivity has slightly underperformed Australia's since 1978.

However, MFP and capital productivity growth have been higher in New Zealand than Australia. In 2007, both the MFP12 series and New Zealand's former measured sector covered 64 percent and 62 percent of the economy, respectively.

<b>Australia and New Zealand productivity data</b>		
Australia's MFP12 and New Zealand's former measured sector		
Average annual growth rates: 1978–2011		
Variable	Australia	New Zealand
	Percent	
Output	3.3	2.2
Labour productivity	2.2	2.1
Capital productivity	-1.1	-0.6
Multifactor productivity	0.8	1.0
Labour input	1.1	0.1
Capital input	4.4	2.8
Total inputs	2.5	1.2
Capital-to-labour-ratio	3.3	2.7

Putting these two comparisons together suggests that Australia's labour productivity has performed better than New Zealand's, in both the shorter and longer timeframes.

Further details on the comparisons between Australia and New Zealand's labour productivity are in [Taking on the West Island: How does New Zealand's labour productivity stack up?](#)

For more detailed data see the 'Downloads' box.

## Definitions

### About the productivity statistics

Productivity is a measure of how efficiently inputs (capital and labour) are used within the economy to produce outputs. Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input.

Growth in productivity means that a nation can, for example, produce more output from the same amount of input, or the same level of output from fewer inputs. Productivity growth is an important contributing factor to a nation's long-term material standard of living.

### More definitions

**ANZSIC 1996:** the Australian and New Zealand Standard Industrial Classification 1996, which is the industrial classification used in this information release.

**ANZSIC 2006:** the Australian and New Zealand Standard Industrial Classification 2006. In September 2012, Statistics NZ will use this industrial classification for its productivity estimates.

**Average annual growth rate:** reflects the average increase (or decrease) in a variable across a period of time. Rates are calculated as geometric means, which take account of the compounding of growth rates over time. Arithmetic averages give higher growth rates and would lead to a different index figure for the latest year when applied to the base year.

**Capacity utilisation:** the difference between the potential and actual use of an input. Capacity utilisation is high when actual output is close to potential output because the most use is being made of labour and capital. In the productivity measures produced by Statistics NZ, it is assumed that capital and labour are utilised at a constant rate over time.

**Capital-to-labour ratio:** is a measure of the capital input index divided by the labour input index.

**Capital deepening:** is a positive growth in the capital-to-labour ratio. See also 'contribution of capital deepening'.

**Capital income:** is that part of the cost of producing gross domestic product (GDP) that consists of gross payments to capital. It represents the value added by capital in production, and is equivalent to the gross operating surplus, less the labour income of working proprietors, plus the capital proportion of taxes, less subsidies on production.

**Capital productivity:** is measured as a ratio of output to capital input. The ratio is derived by dividing the index of the chain-volume measure of GDP by an index of capital services. Capital productivity reflects not only the contribution of capital to changes in production, but also the contribution by labour and other factors affecting production.

**Capital services:** reflect the amount of 'service' each asset provides during a period. For each asset, the services provided in a period are directly proportional to the asset's productive capital value in the period. As an asset ages and its efficiency declines so does the productive capital value and the services the asset provides. Capital services is the appropriate measure of capital input in production analysis.

**Capital shallowing:** a decline in the capital-to-labour ratio.

**Chain volume measures:** annually-reweighted chain Laspeyres volume indexes referenced to the current-price values in a chosen reference year (ie the year when the quarterly chain volume measures sum to the current-price annual values). Chain Laspeyres volume measures are compiled by linking together (compounding) movements in volumes, calculated using the average prices of the previous financial year, and applying the compounded movements to the current-price estimates of the reference year.

**Compensation of employees:** the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the employee during the accounting period. It has two sub-components: wages and salaries; and employers' social contributions. Compensation of employees is not payable for unpaid work undertaken voluntarily, including the work done by members of a household within an unincorporated enterprise owned by the same household. Compensation of employees excludes any taxes payable by the employer on the wage and salary bill (eg payroll tax, fringe benefits tax).

**Contribution of capital deepening:** the growth in the capital-to-labour ratio, weighted by capital's share of total income. Given that capital's share of total income is always less than 100 percent, the contribution of capital deepening is always less than the growth in capital deepening. It is used for growth accounting for labour productivity.

**Contribution of capital input:** the growth in the capital input index, weighted by capital's share of total income. Given that capital's share of total income is always less than 100 percent, the contribution of capital input is always less than the growth in capital input. It is used for growth accounting for output.

**Contribution of labour input:** the growth in the labour input index, weighted by labour's share of total income. Given that labour's share of total income is always less than 100 percent, the contribution of labour input is always less than the growth in labour input. It is used for growth accounting for output.

**Gross domestic product (GDP):** the total market value of goods and services produced in New Zealand within a given period, after deducting the cost of goods and services used up in the process of production, but before deducting allowances for the consumption of fixed capital. Thus, GDP is 'at market prices'. It is equivalent to gross national expenditure, plus exports of goods and services, less imports of goods and services.

**Gross mixed income:** the surplus due to owners of unincorporated businesses. It is often referred to as profit, although only a subset of total costs is subtracted from the output of unincorporated businesses to calculate it. Gross mixed income is split and allocated to capital and labour as factors of production.

**Growth accounting:** decomposes the growth rate of an industry's output into the part due to the increase in factors of production (labour and capital) – and that which cannot be accounted for by changes in labour and capital utilisation. This residual growth in output that can't be accounted for is known as multifactor productivity (the extent to which an industry is getting more output from the same amount of inputs).

**Growth cycle:** the span of years between the peak of one cycle and the peak of a following cycle. Peaks are determined using statistical techniques, and are chosen to represent high points in capacity utilisation of the economy. Productivity is best analysed over growth cycles, as annual movements can be volatile and don't usually represent true changes to the underlying production function.

**Index:** a simple way of expressing, in percentage terms, the change in some variable from a given point-in-time to another point-in-time.

**Inventories:** a class of produced non-financial assets consisting of: stocks of outputs that are still held by the units that produced them before being further processed, sold, delivered to other units, or used in any other ways; and stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing.

**Labour income:** the part of the cost of producing GDP that consists of gross payments to labour. It represents the value added by labour in production, and is equivalent to compensation of employees, plus the labour income of working proprietors, plus the labour proportion of taxes, less subsidies on production.

**Labour input index:** an index of the weighted number of hours paid in the measured sector. It is created by weighting together the industry-level labour volume series using labour income weights.

**Labour productivity:** measured as a ratio of output to labour input. Labour productivity estimates are indexes of real GDP per hour paid. Labour productivity reflects the contribution of labour to changes in product per labour unit, but is also influenced by the contribution of capital and other factors affecting production.

**Labour volume series (LVS):** an estimate of the total number of hours paid in paid employment per week, for the whole economy or for a given industry.

**Measured sector:** the industry coverage of the productivity statistics is defined as the 'measured sector'. It consists of industries for which estimates of inputs and outputs are independently derived in volume terms. Industries for which real value added in the national accounts is largely measured using input methods, such as number of employees, are excluded. These are mainly government non-market industries that provide services (eg administration, health, and education) free or at nominal charges.

**Multifactor productivity (MFP):** estimates are indexes of real GDP per combined unit of labour and capital. They are derived by dividing chain-volume estimates of market sector GDP by a combined measure of hours paid and capital services. An increase in value is referred to as technical change or efficiency growth. However, it is more accurately interpreted as some combination of technological progress, efficiency gain, deviation from constant returns to scale, unobserved change in capacity utilisation, or departure from economy-wide long-run equilibrium. MFP is essentially a residual, and so also captures the impact of unobserved inputs on production.

**Output:** chain-volume value added. Annual value added for the measured sector is derived following the same procedures used to derive constant-price GDP, a chained Laspeyres volume index of the constant-price value added of the industries making up the measured sector. The resulting chained volume series is re-expressed as an index with an expression base of 1000 in the March 1978 year.

**Productive capital stock:** a measure of productive capacity that forms the basis for the measure of capital services. Productive capital stock estimates are derived as the written-down value of each asset its efficiency decline due to age. This stock is measured in units of 'standardised efficiency'.

**Rental prices:** also referred to as the 'user cost of capital'. It is the unit cost for the use of an asset for one period. That is, the price for employing or obtaining one unit of capital services. The



rental price for an asset is determined by its price index when new, its rate of economic depreciation, the average tax rate on production within the industry, and an exogenous real rate of return (set at 4 percent).

**Total income:** the part of the cost of producing GDP that consists of gross payments to factors of production (labour and capital). It represents the value added by these factors in the process of production and is equivalent to current-price GDP.

## **Related links**

### **Upcoming releases**

The *Productivity Statistics: 1978–2011* will be updated to include ANZSIC06 by September 2012.

*Productivity Statistics: 1978–2012* will be released in March 2013.

The [Release calendar](#) lists all our upcoming information releases by date of release.

### **Past releases**

See [Productivity Statistics – information releases](#) for links to past releases.

### **Related information**

*Industry Productivity Statistics: 1978–2010* will be released on 20 March 2012.

An information paper *Labour hours paid for productivity statistics* will be released on 20 March 2012.

A summary of the feasibility study on further disaggregation of productivity will be released on 20 March 2012.

## Data quality

### Period-specific information

This section contains data information that has changed since the last release.

- [Expression base](#)
- [Data sources](#)

### General information

This section contains information that does not change between releases.

- [What productivity analysis does](#)
- [Output series methodology](#)
- [Labour series methodology](#)
- [Capital input series methodology](#)
- [Total input series methodology](#)
- [Calculating the productivity indexes](#)
- [Growth accounting decomposition](#)
- [Estimating growth cycles](#)
- [Industry coverage – in the measured sector](#)

## Period-specific information

### Expression base

The productivity indexes now have an expression base of the year ended March 1978=1000, consistent with the first year of the series. The composition-adjusted productivity indexes have an expression base of the year ended March 1998=1000, also the first year of the series.

The measured sector GDP data used to calculate productivity indexes from 1978 to 1988 is currently provisional.

### Data sources

Data used in this release is derived from several sources, as described below.

Productivity statistics data sources		
Data	Publication	Release date
Output	Gross Domestic Product: September 2011 quarter	22 Dec 11
Labour volume	Linked Employer-Employee Data: December 2010 quarter	24 Feb 12
	Household Labour Force Survey: December 2011 quarter	9 Feb 12
	Quarterly Employment Survey: December 2011 quarter	7 Feb 12
	Linked Employer-Employee Data: September 2010 quarter	25 Nov 11
Capital	National Accounts: Year ended March 2011	18 Nov 11
Income share	National Accounts: Year ended March 2011	18 Nov 11
User costs	National Accounts: Year ended March 2011	18 Nov 11

## General information

### What productivity analysis does

Productivity analysis aims to explain the drivers of output growth. Output growth can be attributed to either an increase in labour or capital input, more efficient use of inputs, or a combination of both.

Productivity measures can be either single factor (relating a measure of output to a single measure of input), or multifactor (relating a measure of output to total inputs). Labour and capital productivity are single- (or partial-) factor productivity measures; they show productivity growth in terms of that particular input. Multifactor productivity (MFP) takes into account substitution between labour and capital inputs, and is therefore not directly affected by a change in the mix of inputs.

The output measure chosen may be either gross output or value added. Gross output is the total value of products produced in the economy, while value added is the total value of products produced minus the value of intermediate inputs used during the production process. The official productivity series all use chain-volume value added as the output measure. Separate series are produced for labour productivity, capital productivity, and MFP.

Productivity measures cover a subset of the economy referred to as the 'measured sector'. Further detail is in 'Industry coverage – the measured sector'. Series for output, labour inputs, and capital inputs are used for deriving partial productivity estimates. The two primary inputs (labour and capital) are combined to form a composite input index, which then allows for the residual calculation of MFP. A change in MFP reflects the change in output that cannot be accounted for by changes in the measures of labour and capital inputs.

### Productivity measurement

The Statistics NZ method of estimating productivity statistics is based on OECD guidelines, as outlined in Measuring Productivity—OECD Manual Measurement of Aggregate and Industry-level Productivity Growth (OECD, 2001 – available from [OECD website](#). The approach adopted is “the index number approach in a production theoretic framework”.

### Calculating productivity

The calculation of productivity statistics begins by assuming a **production function** of the form:

$$V = A(t) \times f(L, K)$$

where V = value-added in constant prices

L = real labour inputs

K = real capital inputs

f(L, K) = a production function of L and K that defines an expected level of output

A(t) = a parameter that captures disembodied technical shifts over time, ie outward shifts of the production function allowing output to increase with a given level of inputs (= MFP).

Given the existence of index values for labour volume and value-added, it is possible to calculate **labour productivity for the measured sector** as:

$$LP = V / L$$

Where LP = an index of labour productivity. This is an index of value-added in constant prices divided by an index of labour inputs.

Similarly, a **capital productivity index** KP is calculated as:

$$KP = V / K$$

Where KP = an index of capital productivity. This is an index of value-added in constant prices divided by an index of capital inputs.

### **Caution needed with interpreting productivity measures**

Care is needed in interpreting the partial measures of productivity. For example, **labour productivity** only partly measures 'true' labour productivity (ie the personal capacities of workers or the intensity of their efforts). Labour productivity reflects the level of capital available per worker and how efficiently labour is combined with the other factors of production. Labour productivity may change due to a substitution of capital for labour (capital deepening) or due to a change in MFP, with no change occurring in the labour input itself.

**Capital productivity** measures have similar constraints. Capital services in production analysis are assumed to be proportional to the capital stock. If the relationship does not change over time, the growth rate of capital services is identical to the rate of growth of the capital stock. This is clearly an unrealistic assumption, given the variations in the rates of capacity utilisation of capital stocks. Consequently, swings in the rates of capacity utilisation are picked up by the residual productivity measure ie MFP.

**MFP** is the final productivity index that can be calculated. The technology parameter that represents disembodied technological change (or MFP) cannot be observed directly. By rearranging the production function equation, it can be shown that the technology parameter can be derived residually as the difference between the growth in an index of outputs and an index of inputs:

$$A(t) = V / f(L,K)$$

Certain assumptions must be met for MFP to be a measure of disembodied technology change. The production function is assumed to exhibit constant returns to scale and all inputs are assumed to be included in scope of the production function.

In practice, these conditions will not be met and the resulting MFP residual needs to be interpreted with caution. Given the importance of technological progress as an explanatory factor in economic growth, attention often focuses on the MFP measure as though it was a measure of technological change. However, this is not always the case. When interpreting MFP, the following should be noted.

Not all technological change translates into MFP growth. Embodied technological change, such as advances in the quality of capital or improved human capital, are captured in the measured contributions of the inputs, provided they are measured correctly (ie the volume input series includes quality change).

MFP growth is not necessarily caused by technological change. Other non-technological factors are picked up by the residual, including economies of scale, cyclical effects, inefficiencies, and measurement errors.

Calculating labour, capital, and MFP therefore relies on appropriate output indexes, and labour, capital, and total input indexes to be created. The steps taken to calculate those indexes are described below.

## Output series methodology

**Output** is defined as constant-price value added. The annual value added for the measured sector is derived by following the same procedures used to derive constant-price GDP (as a chain-volume Laspeyres volume index of the constant-price value added of the industries making up the measured sector).

## Labour series methodology

### The labour volume series

The labour volume series (LVS) is an estimate of paid hours (ordinary time plus paid overtime) for all employed people engaged in producing goods and services in the measured sector in New Zealand. The series is compiled using a number of data sources, from which the best characteristics of each are used for productivity measurement.

The **primary data sources** are the Quarterly Employment Survey (QES), Business Demography Data (BDD), and Linked Employer-Employee Data (LEED, from 2000 onwards). The first two sources are establishment-based, and are supplemented with census and Household Labour Force Survey (HLFS) data for working proprietors and for industries excluded from the QES. LEED is an administrative data source that uses data from the Statistics NZ Business Frame and administrative taxation sources.

Throughout the LVS, three components are summed to an industry level:

employees in industries covered by employment surveys  
employees in industries out of scope of employment surveys  
working proprietors.

For each of these components, the LVS is constructed by estimating:

job/worker counts  
weekly paid hours per job/worker.

These are multiplied to give total weekly paid hours for the measured sector. An annual (March year) average of the weekly paid hours is calculated at the industry level. It is aggregated to the measured-sector level, as published in tables 3, 1.3, and 2.3 of this release.

### Quality assurance of the industry labour volume series

As quality assurance for the industry productivity measures, the employee job/worker counts and weekly paid hours series that feed into the measured sector LVS, are subject to several coherency adjustments.

The main data sources used in constructing the LVS are sourced independently of the estimates of compensation of employees (CoE) from the national accounts. CoE estimates are primarily derived from the Annual Enterprise Survey, while LVS estimates are compiled using a number of different sources. Current-price CoE estimates are deflated using the QES average hourly earnings measure to provide an implicit LVS. This provides a benchmark for comparing against the LVS at an industry level.

For years in which the LVS showed a significantly different movement to the deflated CoE series, both movements were compared to alternative labour volume data sources. Adjustments were then made to the industry LVS where it was deemed appropriate.

### **Rating forward the labour volume series to calculate the latest values**

LEED employee and working-proprietor count data is unavailable for the last quarter and last year of the series, respectively. Therefore, both are rated forward. Employee counts are rated forward using QES and HLFS movements. Working-proprietor counts are rated forward using HLFS movements. Adjustments are made where necessary. Average hours worked per industry are calculated as for previous years.

### **The labour input index**

The industry volume series are aggregated to the measured-sector level by means of a chained Törnqvist index. The quantity relatives in the index are two-period ratios of industry labour volumes. Industry two-period mean shares of measured-sector nominal labour income form the exponential weights.

### **Composition-adjusted labour input**

Composition-adjusted productivity measures account for the impact of changes in the skill composition of workers. These are theoretically better measures of productivity as they allow output growth to also be explained by changes in labour composition, thereby reducing the contribution of the residual (ie MFP) to growth.

Composition-adjusted labour is calculated by adjusting the LVS using movements in a labour composition index, which estimates changes in skill composition using proxies for skill (education attainment and work experience). This index is calculated by using the HLFS to estimate the proportions of each skill category of worker, while the New Zealand Income Survey (NZIS), an annual supplement to the HLFS, is used to compile income shares for each group. Due to the availability of NZIS data, the composition-adjusted series runs from 1998. For further background on composition-adjustment, and details on the methodology see [Accounting for changes in labour composition in the measurement of labour productivity](#).

### **Capital input series methodology**

The capital services input index measures the flow of capital services generated by the use of the stock of capital assets for a given March year. The capital services measure starts with the chain-volume productive capital stock series from the national accounts, supplemented by estimates of eight other assets: inventories (which include estimates of livestock and timber before 1980), and seven different types of land (commercial, industrial, mining, agricultural, forestry, residential, and other).

Capital service flows are assumed to be proportional to the productive capital stock of each asset. These flows are aggregated to industry-level using a Törnqvist index, with weights based on asset-specific implicit rental prices (user costs). The industry-level flows are then aggregated to the measured-sector level using industry shares of the measured-sector current-price capital income as weights. No allowance is made for differences (across industry and time) in asset capacity utilisation rates.

## Capital and labour income shares

The measured-sector capital and labour nominal-income shares are calculated as the ratio of capital and labour income, respectively, to total income. Capital and labour nominal-income totals are calculated at the industry level, and are derived from the income measure of GDP within the national accounts.

The **income measure of GDP** is calculated as CoE, plus gross operating surplus, plus taxes on production and imports, less subsidies (taxes less subsidies are known as net taxes). Included within gross operating surplus is the income of working proprietors, which is termed mixed income. Mixed income is split into labour and capital components by calculating the labour income of working proprietors directly, and deriving the capital income of working proprietors residually. In calculating the labour income of working proprietors, an assumption is made that the average hourly wage rate of a working proprietor in a given industry is equivalent to that of an employee.

**Net taxes on production and imports** are split into labour and capital components according to existing industry income shares.

**Labour income** is calculated as the sum of compensation of employees, labour mixed income, net taxes on production and imports attributable to labour. Capital income is calculated as the sum of gross operating surplus, capital mixed income, net taxes on production, and imports attributable to capital.

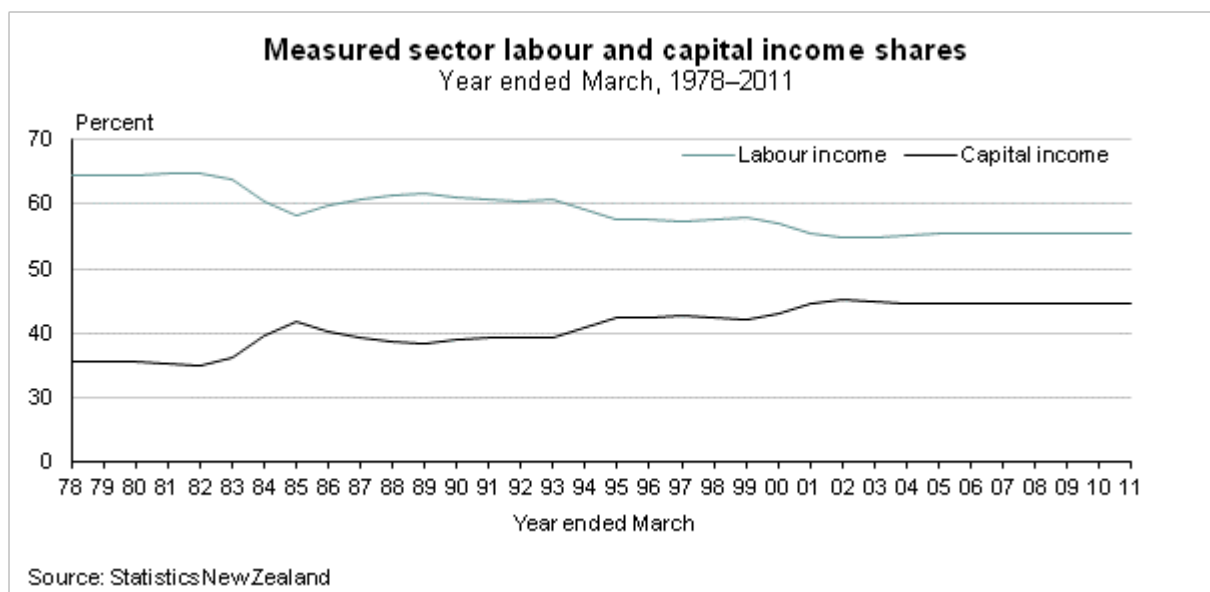
## Weights within productivity

**Capital and labour income shares** are used as weights within the productivity series. Mean two-period industry income shares are used to weight the capital and labour input indexes from the industry level to the measured-sector level. Mean two-period measured-sector income shares are then used to weight capital and labour when deriving the total inputs index, which is used in calculating MFP. Capital and labour income shares are also used to weight the contribution of capital input and labour input, respectively, within the growth accounting framework.

The capital income share is also used to weight the contribution of capital deepening within the growth accounting for labour productivity equation.

Annual current price income data are only available up to 2007, the latest year for which the national accounts supply-use balancing process has been completed. Therefore, labour and capital income shares are held constant from 2007 to 2011.





## Total input series methodology

A composite total input index is constructed by combining the labour and capital input indexes at the measured-sector level. The total inputs index is a Törnqvist index, with the industry factor income shares providing the weights.

## Calculating the productivity indexes

The construction of output, labour input, capital input, and composite total input indexes then allows for the calculation of the labour productivity, capital productivity, and MFP measures, using the formulae under 'Productivity measurement'.

## Growth accounting decomposition

The growth accounting technique examines how much of an industry's output growth can be explained by the growth rate in different inputs (labour and capital). The additional output growth – known as MFP – is determined residually. Under the composition-adjusted approach, changes in output can also come from a change in the skill composition of labour.

The growth accounting decomposition for output (ie value added, or real GDP) is presented as follows.

$$V = (L \wedge W L) \times (K \wedge W K) \times MFP$$

V = the change in value added (over one period)

L = the change in labour input (over one period)

K = the change in capital input (over one period)

MFP = the change in MFP (over one period)

W L = labour's share of total income

W K = capital's share of total income.

As can be seen, the changes in labour input and capital input are exponentially weighted by their respective shares of total income. This gives the contribution of labour input and capital input, respectively, to output growth.

Under the composition-adjusted approach, output growth is decomposed into an additional variable – the skill composition of labour. This is presented in the equation below.

$$V = (L \wedge W L) \times (S \wedge W L) \times (K \wedge W K) \times MFP$$

S = the change in skill composition (over one period).

To obtain the contribution of skill composition towards output, it also needs to be exponentially weighted by labour's share of total income.

The growth-accounting technique also examines how much of an industry's labour productivity growth can be determined by growth in the amount of capital available per worker. Again, the additional labour productivity growth is determined residually, and is termed MFP.

### **Estimating growth cycles**

This release contains productivity data presented as annual averages within growth cycles. While the productivity model assumes no differences (across industry and time) in the asset capacity utilisation rates, in reality capacity utilisation of capital varies across a cycle. The cycles are identified as 'peak to peak', determined where output growth and/or MFP growth are at their highest deviation from trend. The final growth cycles selected also take into account economic events throughout the time period.

For further detail on the methodology and associated economic commentary used for determining the growth cycles see [Extracting Growth Cycles from Productivity Indexes](#).

### **Industry coverage – the measured sector**

The productivity measures do not cover the entire economy. The statistics cover a subset of the economy termed the 'measured sector', consisting of industries for which estimates of inputs and outputs are independently derived in constant prices. Excluded are industries for which real value-added in the national accounts is largely measured using input methods, such as number of employees. These are mainly government non-market industries that provide services, such as administration, health, and education, free or at nominal charges. The measured sector is defined in the following table.

<b>Productivity industry coverage<sup>(1)</sup></b>	
<b>Measured sector</b>	<b>Omitted industries</b>
A Agriculture, forestry, and fishing	LB Ownership of owner occupied dwellings
B Mining	M Government administration and defence
C Manufacturing	N Education
D Electricity, gas and water supply	O Health and community services
E Construction	
F Wholesale trade	
G Retail trade	
H Accommodation, cafes, and restaurants	
I Transport and storage	
J Communication services	
K Finance and insurance	
LA Property services <sup>(2)</sup>	
LC Business services <sup>(2)</sup>	
P Cultural and recreational services	
Q Personal and other community services <sup>(2)</sup>	
1. Based on the Australian and New Zealand Standard Industrial Classification 1996.	
2. Included from March 1996 onwards in the measured sector.	

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## Revisions

Updates in data sources and ongoing methodology improvements have caused a number of revisions to the previously published productivity series.

Please refer to tables 7, 8, 1.7, and 1.8 in the downloadable Excel spreadsheets for the magnitude and direction of these revisions.

Regular revisions (due to updates in data sources) arose from the following:

- revised constant-price GDP data, feeding into the output series
- revised current-price national accounts data, feeding into the industry income-based weights
- revised current- and constant-price productive capital stock data, feeding into the capital input series
- revised labour data, feeding into the labour volume series
- adding linked employer-employee data, to replace survey-based data for working-proprietor counts for the March 2010 year, and employee counts for the March 2010 quarter, feeding into the labour input series.

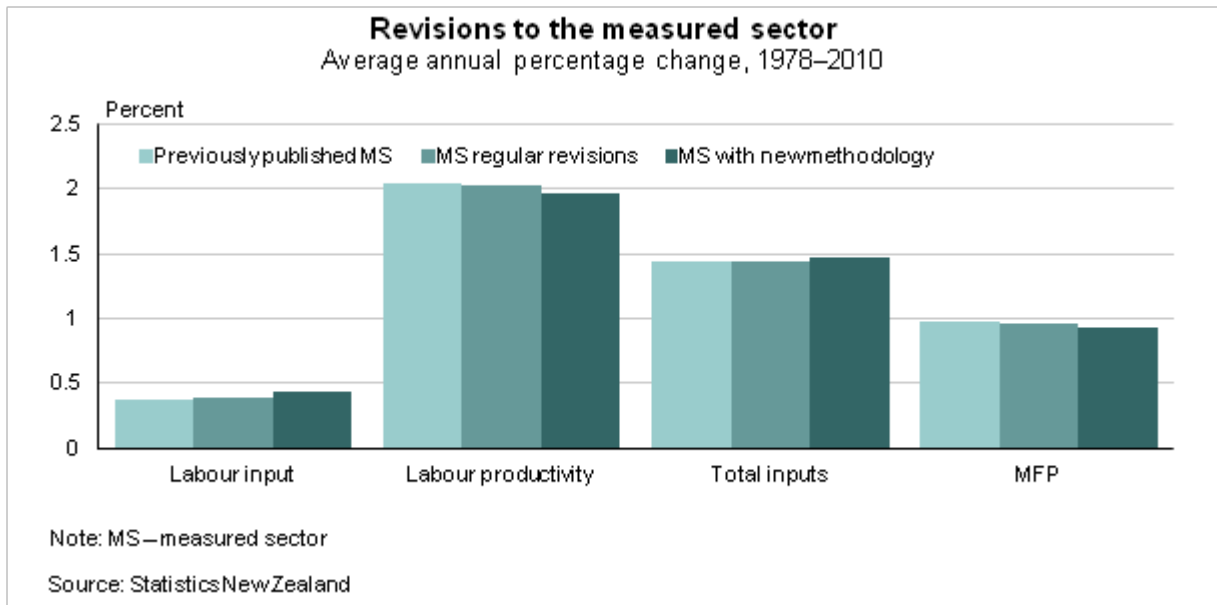
A revision resulting from new methodology involved an adjustment to the labour input.

Labour input uses information from the censuses.

The adjustment makes better use of the census information ensuring labour input is of higher quality and is more robust. Further details on the adjustment are in [Productivity Statistics: Sources and methods](#).

The following graph shows the effect of the various revisions. The percentage increase in labour input is small with both the regular revisions and the revisions due to the new methodology. The percentage increase in labour input has a negative effect on labour productivity – there is a small percentage decrease due to the regular revision and small decrease due to the new methodology.

The result of the change in labour input was a small increase in the total inputs. This accounts for the small decline in MFP after the revisions.



Due to the amount of provisional data used in productivity calculation for the most recent years, data for the last four years of the series are provisional.

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## Tables

The following tables are included with this release. They are available in Excel format from the 'Downloads' box of Productivity Statistics: 1978–2011 on the Statistics NZ website.

If you do not have access to Excel, you may use the [Excel file viewer](#) to view, print, and export the contents of the file.

1. Productivity in the measured sector, productivity indexes and output measure
2. Productivity in the measured sector, productivity indexes and output measure – annual percentage change
3. Productivity in the measured sector, input measures
4. Productivity in the measured sector, input measures – annual percentage change
5. Productivity in the measured sector, growth accounting analysis – contributions to output growth
6. Productivity in the measured sector, growth accounting analysis – contributions to labour productivity
7. Productivity in the measured sector, productivity indexes and output measure, revisions summary
8. Productivity in the measured sector, productivity indexes – annual percentage change, revisions summary

## Supplementary tables

The following tables can be downloaded from the Statistics NZ website in Excel format.

### Former measured sector

- 1.1 Productivity in the former measured sector, productivity indexes and output measure
- 1.2 Productivity in the former measured sector, productivity indexes and output measure – annual percentage change
- 1.3 Productivity in the former measured sector, input measures
- 1.4 Productivity in the former measured sector, input measures – annual percentage change
- 1.5 Productivity in the former measured sector, growth accounting analysis – contributions to growth
- 1.6 Productivity in the former measured sector, growth accounting analysis – contributions to labour productivity
- 1.7 Productivity in the former measured sector, productivity indexes and output measure, revisions summary
- 1.8 Productivity in the former measured sector, productivity indexes – annual percentage change, revisions summary

### Composition-adjusted

- 2.1 Composition-adjusted productivity in the measured sector, productivity indexes and output measure
- 2.2 Composition-adjusted productivity in the measured sector, productivity indexes and output measure – annual percentage change
- 2.3 Composition-adjusted productivity in the measured sector, input measures
- 2.4 Composition-adjusted productivity in the measured sector, input measures – annual percentage change

- 2.5 Composition-adjusted productivity in the measured sector, growth accounting analysis – contributions to growth
- 2.6 Composition-adjusted productivity in the measured sector, growth accounting analysis – contributions to labour productivity

## **Access more data on Infoshare and Table Builder**

Use [Infoshare](#), a free, online database to access time-series data specific to your needs. To access the release time series on Infoshare, select the following categories from the homepage.

Subject category: **Economic Indicators**

Group: **Productivity Statistics – PRD**

Use [Table Builder](#), a free, online tool that enables you to extract the information you want. To access the release data on Table Builder, select the following tables from the homepage:

Subject category: **Productivity Statistics**

Table title: **Productivity inputs, and outputs, Growth accounting for outputs and Growth accounting for labour productivity**



Table 1

**Productivity in the measured sector<sup>(1)</sup>**Productivity indexes and output measure<sup>(2)</sup>

Base: March 1978 year (=1000)

Series ref: PRDA	Productivity index			Output measure
	Labour <sup>(3)</sup>	Capital <sup>(4)</sup>	Multifactor <sup>(5)</sup>	GDP – measured sector <sup>(6)</sup>
	S1LMSI	S1CMSI	S1MMSI	S2OMSI
1978	1000	1000	1000	1000
1979	1001 R	992	998 R	995
1980	1018 R	1011	1016 R	1022
1981	1048 R	1012	1035 R	1034
1982	1085 R	1032	1066 R	1088
1983	1076 R	998	1047 R	1099
1984	1112 R	979	1060 R	1137
1985	1124 R	973	1064 R	1202
1986	1116 R	927	1039 R	1217
1987	1153 R	911	1053	1249
1988	1200	875	1063 R	1250
1989	1259 R	847	1081 R	1250
1990	1301 R	815	1086 R	1244
1991	1353 R	793	1100 R	1246
1992	1389 R	778 R	1110 R	1224
1993	1411 R	786	1125 R	1240
1994	1477 R	833	1184 R	1335
1995	1491 R	863 R	1208 R	1423
1996	1511 R	878 R	1226 R	1495
1997	1533 R	886	1241 R	1561
1998	1566 R	886	1256 R	1594
1999	1576 R	870 R	1252 R	1595 R
2000	1664 R	906 R	1313 R	1705 R
2001	1680 R	898 R	1316 R	1750 R
2002	1699 R	902 R	1326 R	1819 R
2003	1735 R	923 R	1355 R	1915 R
2004	1758 R	919 R	1363 R	1997 R
2005	1787 R	919 R	1375 R	2077 R
2006	1818 R	912 R	1384 R	2148 R
2007	1800 R	890 R	1361 R	2158 R
2008	1831 P	884 P	1370 P	2226 P
2009	1804 P	843 P	1331 P	2176 P
2010	1868 P	829 P	1346 P	2145 P
2011	1866 P	830 P	1346 P	2162 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.
2. Year ended 31 March.
3. Gross domestic product per unit of labour input.
4. Gross domestic product per unit of capital input.
5. Gross domestic product per unit of labour and capital.
6. Chain volume gross domestic product for the measured sector.

**Symbols:**

P provisional  
R revised

**Source:** Statistics New Zealand

Table 2

**Productivity in the measured sector<sup>(1)</sup>**Productivity indexes and output measure – annual percentage change<sup>(2)</sup>

Series ref: PRDA	Productivity index			Output measure
	Labour	Capital	Multifactor	GDP – measured sector
	S1LMSP	S1CMSP	S1MMSP	S2OMSP
<b>Percentage change from previous year<sup>(3)</sup></b>				
1978	...	...	...	...
1979	0.1 R	-0.8	-0.2 R	-0.5
1980	1.7 R	1.9	1.8 R	2.8
1981	2.9 R	0.1	1.9 R	1.2
1982	3.6 R	2.0	3.0 R	5.2
1983	-0.9 R	-3.3	-1.8 R	1.0
1984	3.3 R	-1.9	1.2 R	3.4
1985	1.1 R	-0.6	0.4 R	5.8
1986	-0.7 R	-4.7	-2.3 R	1.2
1987	3.3	-1.7	1.3	2.6
1988	4.1 R	-4.0	0.9 R	0.1
1989	4.9 R	-3.2	1.7 R	0.0
1990	3.3 R	-3.8	0.5 R	-0.4
1991	4.0 R	-2.8 R	1.3 R	0.1
1992	2.7 R	-1.8	0.9 R	-1.7
1993	1.5 R	1.0	1.3 R	1.3
1994	4.7 R	6.0	5.2 R	7.7
1995	0.9 R	3.6	2.1 R	6.6
1996	1.4 R	1.7	1.5 R	5.1
1997	1.5 R	0.8	1.2 R	4.4
1998	2.1 R	0.0	1.2 R	2.1
1999	0.7 R	-1.8 R	-0.4	0.1 R
2000	5.5 R	4.1 R	4.9 R	6.9 R
2001	1.0 R	-0.9 R	0.2 R	2.6 R
2002	1.1 R	0.4	0.8 R	4.0 R
2003	2.1 R	2.3	2.2	5.3
2004	1.3 R	-0.3 R	0.6 R	4.3
2005	1.6 R	0.0 R	0.9 R	4.0
2006	1.8	-0.8 R	0.6 R	3.4 R
2007	-1.0 R	-2.4 R	-1.7 R	0.5 R
2008	1.8 P	-0.7 P	0.7 P	3.1 P
2009	-1.5 P	-4.6 P	-2.9 P	-2.2 P
2010	3.5 P	-1.7 P	1.2 P	-1.4 P
2011	-0.1 P	0.1 P	0.0 P	0.8 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.
2. Year ended 31 March.
3. Percentage changes are calculated on unrounded numbers.

**Symbols:**

P provisional  
R revised  
... not applicable

**Source:** Statistics New Zealand

Table 3

**Productivity in the measured sector<sup>(1)</sup>**Input measures<sup>(2)</sup>

Base: March 1978 year (=1000)

Series ref: PRDA	Index				Labour volume <sup>(3)(4)</sup>
	Labour input	Capital input	Total inputs	Capital-labour ratio <sup>(5)(6)</sup>	Weekly hours paid (000)
	S3LMSI	S3CMSI	S3TMSI	S3RMSI	S3HMSG
1978	1000	1000	1000	1000	40,704 R
1979	994 R	1003	997 R	1009 R	40,368 R
1980	1004 R	1011	1007 R	1007 R	40,660 R
1981	987 R	1022	999 R	1036 R	39,936 R
1982	1002 R	1054	1020 R	1052 R	40,656 R
1983	1022 R	1101	1049 R	1078 R	41,561 R
1984	1023 R	1162	1072 R	1136 R	41,673 R
1985	1070 R	1236	1130 R	1155 R	43,411 R
1986	1091 R	1313	1171 R	1203 R	44,176 R
1987	1083 R	1370	1186	1265 R	43,690 R
1988	1042	1430 R	1177 R	1372	41,984 R
1989	993 R	1476	1156 R	1487 R	40,066 R
1990	957 R	1527 R	1146 R	1596 R	38,894 R
1991	921 R	1572 R	1132 R	1707 R	37,238 R
1992	881 R	1573	1103 R	1785 R	35,770 R
1993	879 R	1577	1102 R	1795 R	35,628 R
1994	904 R	1602	1128 R	1773 R	36,738 R
1995	955 R	1648 R	1178 R	1726 R	38,980 R
1996	989 R	1702 R	1219 R	1720 R	46,767 R
1997	1018 R	1762 R	1257 R	1731 R	47,853 R
1998	1018 R	1798	1268 R	1767 R	47,734 R
1999	1012 R	1834 R	1274 R	1812 R	47,551 R
2000	1025 R	1882	1298 R	1836 R	48,357 R
2001	1041 R	1949 R	1330 R	1871 R	49,203 R
2002	1071 R	2017	1372 R	1884 R	50,546 R
2003	1104 R	2076	1413 R	1881 R	51,994 R
2004	1136 R	2172 R	1465 R	1912 R	53,523 R
2005	1163 R	2260 R	1511 R	1943 R	54,539 R
2006	1181 R	2354	1552 R	1993 R	55,276 R
2007	1199 R	2425 R	1585 R	2022 R	55,942 R
2008	1215 P	2518 P	1625 P	2072 P	56,627 R
2009	1206 P	2580 P	1635 P	2140 P	56,140 R
2010	1148 P	2588 P	1593 P	2254 P	53,610 P
2011	1159 P	2605 P	1606 P	2248 P	54,245 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.
2. Year ended 31 March.
3. The unindexed, unweighted measure of labour volume. Note, annual movements in this series will not be the same as annual movements in the labour input index. Please refer to the data quality section of this release for further explanation.
4. Due to a small level shift in the series arising from changes made in 2000, the total paid hours before 2000 are rated down, based on the difference between the two series in 2000.
5. Ratio of the capital input index to the labour input index.
6. An increase in the capital-labour ratio is referred to as capital deepening.

**Symbols:**

P provisional  
R revised

**Source:** Statistics New Zealand

Table 4

**Productivity in the measured sector<sup>(1)</sup>****Input measures – annual percentage change<sup>(2)</sup>**

Series ref: PRDA	Index				Labour volume
	Labour input	Capital input	Total inputs	Capital-labour ratio <sup>(3)</sup>	Weekly hours paid
	S3LMSP	S3CMSP	S3TMSP	S3RMSP	S3HMSP
<b>Percentage change from previous year<sup>(4)</sup></b>					
1978	...	...	...	...	...
1979	-0.6 R	0.3	-0.3 R	0.9 R	-0.8 R
1980	1.0 R	0.8	1.0 R	-0.2 R	0.7 R
1981	-1.7 R	1.1	-0.7 R	2.9 R	-1.8 R
1982	1.6 R	3.1	2.1 R	1.6 R	1.8 R
1983	1.9 R	4.5	2.8 R	2.5 R	2.2 R
1984	0.1 R	5.5	2.2 R	5.4 R	0.3 R
1985	4.6 R	6.4	5.3 R	1.7 R	4.2 R
1986	2.0 R	6.2	3.6 R	4.2 R	1.8 R
1987	-0.7	4.4	1.3	5.1	-1.1 R
1988	-3.9 R	4.3	-0.8 R	8.5 R	-3.9 R
1989	-4.7 R	3.3 R	-1.7 R	8.4 R	-4.6 R
1990	-3.6 R	3.4	-0.9 R	7.3 R	-2.9 R
1991	-3.8 R	2.9	-1.2 R	7.0 R	-4.3 R
1992	-4.3 R	0.1	-2.6 R	4.6 R	-3.9 R
1993	-0.3 R	0.3	0.0 R	0.5 R	-0.4 R
1994	2.8 R	1.6	2.3 R	-1.2 R	3.1 R
1995	5.6 R	2.8	4.4 R	-2.6 R	6.1 R
1996	3.6 R	3.3 R	3.5 R	-0.4 R	20.0 R
1997	2.9 R	3.6	3.2 R	0.6 R	2.3
1998	0.0 R	2.0 R	0.9 R	2.1 R	-0.3 R
1999	-0.6 R	2.0	0.5 R	2.6 R	-0.4 R
2000	1.3 R	2.7	1.9 R	1.4 R	1.7 R
2001	1.6 R	3.5	2.4	1.9 R	1.8 R
2002	2.8 R	3.5	3.1 R	0.7 R	2.7 R
2003	3.1 R	2.9	3.0 R	-0.2 R	2.9 R
2004	3.0 R	4.7	3.7 R	1.6 R	2.9 R
2005	2.3 R	4.0 R	3.1 R	1.7 R	1.9 R
2006	1.6	4.2 R	2.7	2.5	1.4
2007	1.5	3.0 R	2.2	1.5	1.2
2008	1.4 P	3.9 P	2.5 P	2.5 P	1.2 R
2009	-0.8 P	2.4 P	0.6 P	3.2 P	-0.9 R
2010	-4.8 P	0.3 P	-2.6 P	5.3 P	-4.5 P
2011	0.9 P	0.7 P	0.8 P	-0.2 P	1.2 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.

2. Year ended 31 March.

3. An increase in the capital-labour ratio is referred to as capital deepening.

4. Percentage changes are calculated on unrounded numbers.

**Symbols:**

P provisional

R revised

... not applicable

**Source:** Statistics New Zealand

Table 5

**Productivity in the measured sector<sup>(1)</sup>****Growth accounting analysis – contributions to growth<sup>(2)(3)</sup>**

Series ref: PRDA	Output growth	Contribution to output growth from		
	GDP – measured sector <sup>(4)</sup>	Capital input <sup>(5)</sup>	Labour input <sup>(6)</sup>	Multifactor productivity <sup>(7)</sup>
	S2OMSP	S4CMSP	S4LMSP	S1MMSP
<b>Annual percentage contribution<sup>(8)</sup></b>				
1978	...	...	...	...
1979	-0.5	0.1	-0.4 R	-0.2 R
1980	2.8	0.3	0.7 R	1.8 R
1981	1.2	0.4	-1.1 R	1.9 R
1982	5.2	1.1	1.0 R	3.0 R
1983	1.0	1.6	1.2 R	-1.8 R
1984	3.4	2.1	0.1 R	1.2 R
1985	5.8	2.6	2.7 R	0.4 R
1986	1.2	2.5	1.2 R	-2.3 R
1987	2.6	1.7	-0.4	1.3
1988	0.1	1.6 R	-2.4 R	0.9 R
1989	0.0	1.2	-2.9 R	1.7 R
1990	-0.4	1.3	-2.2 R	0.5 R
1991	0.1	1.1	-2.3 R	1.3 R
1992	-1.7	0.0	-2.6 R	0.9 R
1993	1.3	0.1	-0.2 R	1.3 R
1994	7.7	0.6 R	1.7 R	5.2 R
1995	6.6	1.2	3.2 R	2.1 R
1996	5.1	1.4	2.1 R	1.5 R
1997	4.4	1.5	1.6	1.2 R
1998	2.1	0.9	0.0 R	1.2 R
1999	0.1 R	0.8	-0.3 R	-0.4
2000	6.9 R	1.1	0.7 R	4.9 R
2001	2.6 R	1.6	0.9 R	0.2 R
2002	4.0 R	1.6	1.5	0.8 R
2003	5.3	1.3	1.7	2.2
2004	4.3	2.1	1.6 R	0.6 R
2005	4.0	1.8	1.3	0.9 R
2006	3.4 R	1.8	0.9	0.6 R
2007	0.5 R	1.3 R	0.8	-1.7 R
2008	3.1 P	1.7 P	0.7 P	0.7 P
2009	-2.2 P	1.1 P	-0.4 P	-2.9 P
2010	-1.4 P	0.1 P	-2.7 P	1.2 P
2011	0.8 P	0.3 P	0.5 P	0.0 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.
2. Year ended 31 March.
3. Output growth is approximately equal to the sum of the contributions of capital input, labour input, and multifactor productivity.
4. Growth in chain volume gross domestic product for the measured sector.
5. Contribution of capital input is equal to the growth rate in capital input weighted by capital's share of total income.
6. Contribution of labour input is equal to the growth rate of labour input weighted by labour's share of total income.
7. Gross domestic product per unit of labour and capital.
8. Percentage contributions are calculated on unrounded numbers.

**Symbols:**

- P provisional  
R revised  
... not applicable

**Source:** Statistics New Zealand

Table 6

**Productivity in the measured sector<sup>(1)</sup>****Growth accounting analysis – contributions to labour productivity<sup>(2)(3)</sup>**

Series ref: PRDA	Labour productivity S1LMSP	Contribution to labour productivity from	
		Capital deepening <sup>(4)</sup> S4DMSP	Multifactor productivity <sup>(5)</sup> S1MMSP
<b>Annual percentage contribution<sup>(6)</sup></b>			
1978	...	...	...
1979	0.1 R	0.3 R	-0.2 R
1980	1.7 R	-0.1 R	1.8 R
1981	2.9 R	1.0 R	1.9 R
1982	3.6 R	0.5 R	3.0 R
1983	-0.9 R	0.9 R	-1.8 R
1984	3.3 R	2.1 R	1.2 R
1985	1.1 R	0.7 R	0.4 R
1986	-0.7 R	1.7 R	-2.3 R
1987	3.3	2.0	1.3
1988	4.1 R	3.2 R	0.9 R
1989	4.9 R	3.1	1.7 R
1990	3.3 R	2.8 R	0.5 R
1991	4.0 R	2.7 R	1.3 R
1992	2.7 R	1.8 R	0.9 R
1993	1.5 R	0.2 R	1.3 R
1994	4.7 R	-0.5 R	5.2 R
1995	0.9 R	-1.1 R	2.1 R
1996	1.4 R	-0.2 R	1.5 R
1997	1.5 R	0.3	1.2 R
1998	2.1 R	0.9 R	1.2 R
1999	0.7 R	1.1 R	-0.4
2000	5.5 R	0.6 R	4.9 R
2001	1.0 R	0.8 R	0.2 R
2002	1.1 R	0.3	0.8 R
2003	2.1 R	-0.1	2.2
2004	1.3 R	0.7	0.6 R
2005	1.6 R	0.7	0.9 R
2006	1.8	1.1	0.6 R
2007	-1.0 R	0.7	-1.7 R
2008	1.8 P	1.1 P	0.7 P
2009	-1.5 P	1.4 P	-2.9 P
2010	3.5 P	2.3 P	1.2 P
2011	-0.1 P	-0.1 P	0.0 P

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.

2. Year ended 31 March.

3. Labour productivity growth is approximately equal to the sum of the contribution of capital deepening and multifactor productivity.

4. Contribution to capital deepening is equal to the growth rate in the capital-labour ratio weighted by capital's share of total income.

5. Gross domestic product per unit of labour and capital.

6. Percentage contributions are calculated on unrounded numbers.

**Symbols:**

P provisional

R revised

... not applicable

**Source:** Statistics New Zealand

Table 7

**Productivity in the measured sector<sup>(1)</sup>**  
**Productivity indexes and output measure<sup>(2)</sup>**  
**Revisions summary**

Series ref: PRDA	Productivity index						Output measure GDP – measured sector <sup>(6)</sup>	
	Labour <sup>(3)</sup>		Capital <sup>(4)</sup>		Multifactor <sup>(5)</sup>		Revised	Previously published <sup>(7)</sup>
	Revised	Previously published <sup>(7)</sup>	Revised	Previously published <sup>(7)</sup>	Revised	Previously published <sup>(7)</sup>		
	S1LMSI	S1LMSI	S1CMSI	S1CMSI	S1MMSI	S1MMSI	S2OMSI	S2OMSI
Index								
1978	1000	1000	1000	1000	1000	1000	1000	1000
1979	1001	999	992	992	998	996	995	995
1980	1018	1006	1011	1011	1016	1008	1022	1022
1981	1048	1032	1012	1012	1035	1025	1034	1034
1982	1085	1071	1032	1032	1066	1057	1088	1088
1983	1076	1066	998	998	1047	1041	1099	1099
1984	1112	1106	979	979	1060	1056	1137	1137
1985	1124	1122	973	973	1064	1062	1202	1202
1986	1116	1117	927	927	1039	1040	1217	1217
1987	1153	1155	911	911	1053	1053	1249	1249
1988	1200	1200	875	875	1063	1062	1250	1250
1989	1259	1257	847	847	1081	1079	1250	1250
1990	1301	1294	815	815	1086	1082	1244	1244
1991	1353	1341	793	793	1100	1093	1246	1246
1992	1389	1379	778	779	1110	1104	1224	1224
1993	1411	1404	786	786	1125	1121	1240	1240
1994	1477	1478	833	833	1184	1183	1335	1335
1995	1491	1498	863	864	1208	1210	1423	1423
1996	1511	1525	878	879	1226	1232	1495	1495
1997	1533	1549	886	886	1241	1247	1561	1561
1998	1566	1584	886	886	1256	1264	1594	1594
1999	1576	1598	870	868	1252	1259	1595	1591
2000	1664	1687	906	901	1313	1319	1705	1696
2001	1680	1710	898	895	1316	1325	1750	1743
2002	1699	1728	902	898	1326	1334	1819	1812
2003	1735	1763	923	919	1355	1363	1915	1908
2004	1758	1784	919	916	1363	1370	1997	1989
2005	1787	1811	919	915	1375	1381	2077	2069
2006	1818	1844	912	909	1384	1391	2148	2141
2007	1800	1824	890	886	1361	1366	2158	2149
2008	1831	1855	884	881	1370	1375	2226	2216
2009	1804	1843	843	838	1331	1340	2176	2169
2010	1868	1911	829	830	1346	1361	2145	2152
2011	1866	...	830	...	1346	...	2162	...

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.
2. Year ended 31 March.
3. Gross domestic product per unit of labour input.
4. Gross domestic product per unit of capital input.
5. Gross domestic product per unit of labour and capital.
6. Chain volume gross domestic product for the measured sector.
7. Published in March 2011.

**Symbol:**

... not applicable

**Source:** Statistics New Zealand

Table 8

**Productivity in the measured sector<sup>(1)</sup>**Productivity indexes – annual percentage change<sup>(2)</sup>

Revisions summary

	Productivity index						Output measure	
	Labour		Capital		Multifactor		GDP – measured sector	
	Revised	Previously published <sup>(3)</sup>	Revised	Previously published <sup>(3)</sup>	Revised	Previously published <sup>(3)</sup>	Revised	Previously published <sup>(3)</sup>
Series ref: PRDA	S1LMSP	S1LMSP	S1CMSP	S1CMSP	S1MMSP	S1MMSP	S2OMSP	S2OMSP
<b>Percentage change from previous year<sup>(4)</sup></b>								
1978	...	...	...	...	...	...	...	...
1979	0.1	-0.1	-0.8	-0.8	-0.2	-0.4	-0.5	-0.5
1980	1.7	0.7	1.9	1.9	1.8	1.1	2.8	2.8
1981	2.9	2.6	0.1	0.1	1.9	1.7	1.2	1.2
1982	3.6	3.8	2.0	2.0	3.0	3.1	5.2	5.2
1983	-0.9	-0.5	-3.3	-3.3	-1.8	-1.5	1.0	1.0
1984	3.3	3.8	-1.9	-1.9	1.2	1.5	3.4	3.4
1985	1.1	1.5	-0.6	-0.6	0.4	0.6	5.8	5.8
1986	-0.7	-0.4	-4.7	-4.7	-2.3	-2.1	1.2	1.2
1987	3.3	3.3	-1.7	-1.7	1.3	1.3	2.6	2.6
1988	4.1	3.9	-4.0	-4.0	0.9	0.8	0.1	0.1
1989	4.9	4.7	-3.2	-3.2	1.7	1.6	0.0	0.0
1990	3.3	3.0	-3.8	-3.8	0.5	0.3	-0.4	-0.4
1991	4.0	3.6	-2.8	-2.7	1.3	1.0	0.1	0.1
1992	2.7	2.9	-1.8	-1.8	0.9	1.0	-1.7	-1.7
1993	1.5	1.8	1.0	1.0	1.3	1.5	1.3	1.3
1994	4.7	5.3	6.0	6.0	5.2	5.6	7.7	7.7
1995	0.9	1.4	3.6	3.6	2.1	2.3	6.6	6.6
1996	1.4	1.8	1.7	1.7	1.5	1.8	5.1	5.1
1997	1.5	1.6	0.8	0.8	1.2	1.3	4.4	4.4
1998	2.1	2.3	0.0	0.0	1.2	1.3	2.1	2.1
1999	0.7	0.9	-1.8	-2.1	-0.4	-0.4	0.1	-0.1
2000	5.5	5.6	4.1	3.8	4.9	4.8	6.9	6.6
2001	1.0	1.4	-0.9	-0.7	0.2	0.4	2.6	2.8
2002	1.1	1.0	0.4	0.4	0.8	0.7	4.0	3.9
2003	2.1	2.0	2.3	2.3	2.2	2.2	5.3	5.3
2004	1.3	1.2	-0.3	-0.4	0.6	0.5	4.3	4.3
2005	1.6	1.5	0.0	-0.1	0.9	0.8	4.0	4.0
2006	1.8	1.8	-0.8	-0.6	0.6	0.7	3.4	3.5
2007	-1.0	-1.1	-2.4	-2.6	-1.7	-1.8	0.5	0.4
2008	1.8	1.7	-0.7	-0.6	0.7	0.7	3.1	3.1
2009	-1.5	-0.6	-4.6	-4.8	-2.9	-2.5	-2.2	-2.1
2010	3.5	3.7	-1.7	-1.0	1.2	1.5	-1.4	-0.8
2011	-0.1	...	0.1	...	0.0	...	0.8	...

1. The measured sector is ANZSIC96 divisions A to K and P from 1978, and includes divisions LA (Property services), LC (Business services), and Q (Personal and other community services) from 1996 onwards. See the data quality section of this release for further details.

2. Year ended 31 March.

3. Published in March 2011.

4. Percentage changes are calculated on unrounded numbers.

**Symbol:**

... not applicable

**Source:** Statistics New Zealand