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Embargoed until 10:45am – 13 March 2008

Productivity Statistics: 1978–2007

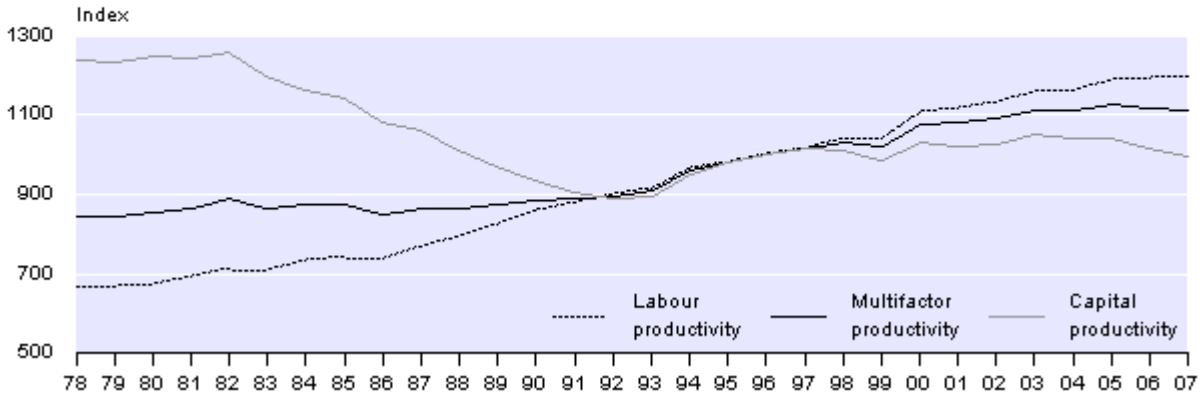
Highlights

- Annual productivity series for the measured sector from 1978–2007 are now available. The business services industry, and personal and other community services industry are now included in the measured sector from 1996 onwards.
- Annual labour productivity growth averaged 1.1 percent in the measured sector from 2000–2007.
- Average annual growth in labour productivity was 2.0 percent for the measured sector from 1978–2007.
- Capital productivity fell 0.5 percent annually in the measured sector from 2000–2007.
- Multifactor productivity grew 0.4 percent in the measured sector from 2000–2007.

Measured Sector Productivity Indexes

Year ended March, 1978–2007

Base: 1996 (=1000)



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13 March 2008
ISSN 1178-0630

There is a companion Media Release published – *Productivity Statistics: 1978–2007*.

Commentary

Annual productivity series for the measured sector from 1978–2007 have been released in this publication. The measured sector has been expanded to include the business services industry and the personal and other community services industry from 1996 onwards. In 2004 (the latest year for which current price industry value added data are available), the measured sector covered approximately 73 percent of the economy. It excludes the following industries: government administration and defence, health, education, ownership of owner-occupied dwellings and property services. Refer to the Technical notes of this release for a more detailed definition and explanation of the measured sector.

A set of supplementary tables with productivity series for the former measured sector are also available with this publication. It is intended that these supplementary tables will be available in future publications, both to maintain the previously released time series, and to maintain comparability with Australia, whose official productivity statistics have exactly the same industrial coverage as the former measured sector.

Unless otherwise stated, all references to average movements are annual geometric mean movements relating to the measured sector (including business services, and personal and other community services).

Background

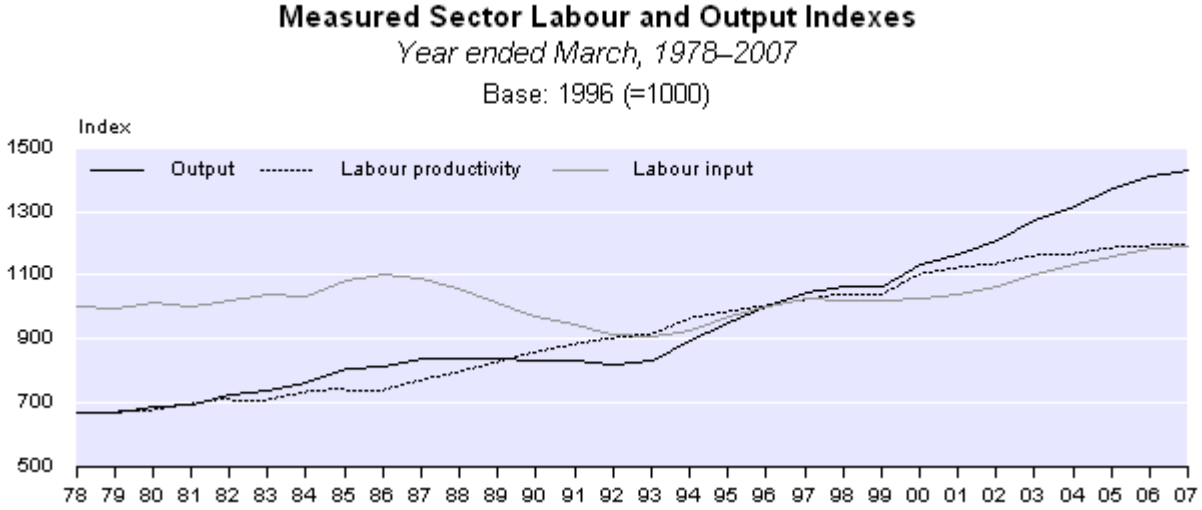
Productivity is a measure of how efficiently inputs are being used within the economy to produce outputs. Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input. Growth in productivity means that a nation can produce more output from the same amount of input. Productivity growth is an important contributing factor to a nation's long-term material standard of living.

Productivity measures can be either single factor (that is, relating a measure of output to a single measure of input), or multifactor (that is, relating a measure of output to a bundle of inputs). Labour and capital productivity are single (or partial) factor productivity measures; they show productivity growth in terms of that particular input. Hence, productivity changes shown in these indexes may be due to a change in the mix of total inputs rather than a direct productivity increase from the relevant input. For example, if additional machinery (capital input) is used to assist in production, less labour input may be required to produce the same level of output. This will increase labour productivity, simply because the mix of the inputs has altered. On the other hand, multifactor productivity takes into account substitution between labour and capital inputs, and is therefore not directly affected by a change in the mix of total inputs. The growth accounting sections of this commentary provide a breakdown of the sources of growth in real gross domestic product (GDP) and labour productivity.

Statistics New Zealand's official productivity statistics comprises series for labour productivity, capital productivity and multifactor productivity (MFP). The MFP series uses the labour and capital input indexes, which are combined and weighted appropriately to create a total inputs series. All input and output indexes measure growth in volumes and have a base year of 1996, with real GDP as the output measure. The development of these official statistics is consistent with Organisation for Economic Co-operation and Development (OECD) guidelines.

The productivity measures are for the years ended March 1978 to 2007. This period reflects the current availability of relevant source data. Statistics NZ has estimated growth cycles in the data to assist users in interpreting the results of the productivity series. There is general consensus that the productivity series are of the most interpretive value when viewed in terms of growth cycles. This is because factors such as capacity utilisation tend to vary from year to year, making interpretation of annual movements difficult. Please note that the turning point of the latest cycle is not finalised because of the provisional nature of data from 2005 onwards, thus some caution is advised when comparing with other cycles. For more information, refer to the Estimating growth cycles section in the Technical notes.

Labour productivity



Labour productivity is measured as a ratio of output to labour input. In the year ended March 2007, labour productivity increased by 0.5 percent for the measured sector. This was driven by output growth of 1.4 percent and labour input growth of 0.9 percent. The continued strength of the labour market was highlighted by a low unemployment rate of 3.7 percent for the year ended March 2007 (consistent with unemployment for the previous year) and a then-record labour force participation rate of 68.4 percent, up from the previous year's rate of 68.1 percent.

The growth in labour productivity for 2007 is largely attributable to capital deepening (ie an increase of capital input relative to labour input) of 1.1 percent, with multifactor productivity falling 0.6 percent. Refer to the Growth Accounting for Labour Productivity section for more details on these components.

This growth in labour productivity for 2007 is below the average annual growth in labour productivity since 2000. The growth over this latest cycle is lower than any of the previous cycles, however some caution is required in this comparison due to the length of the latest cycle being unfinalised.

The table below presents the average annual growth in labour productivity for the growth cycles identified within the series (see the Technical notes for more information on growth cycles).

Labour Productivity Average Annual Growth Rates (percent)[1][2][3] *Year ended 31 March*			
Cycle	Output	Labour input	Labour productivity
1978–1982	2.1	0.4	1.7
1982–1985	3.4	2.0	1.4
1985–1990	0.7	-2.1	2.9
1990–1997	3.3	0.8	2.5
1997–2000	2.9	0.1	2.8
2000–2007	3.3	2.2	1.1
1978–2007	**2.6**	**0.6**	**2.0**

[1] The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
[2] Percentage changes are calculated on unrounded index numbers.
[3] Business services, and personal and other community services are included in the measured sector from 1996 onwards.

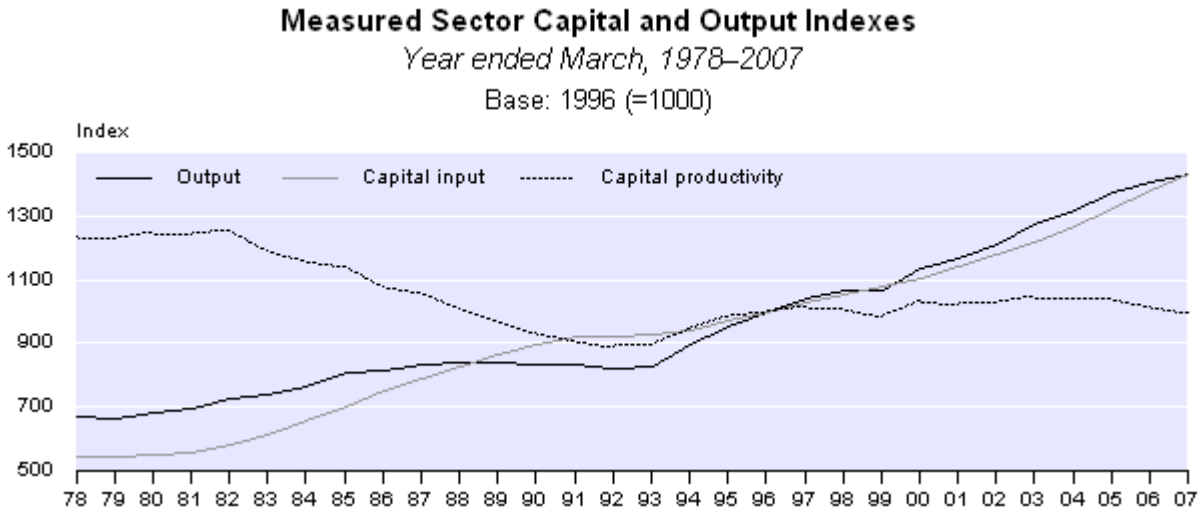
Lower growth of labour productivity, as shown in recent years, could be explained by several factors. One influence is a change in the skill composition of the employed labour force, due to skill shortages resulting from a tight labour market. The average unemployment rate over the 2000–2007 cycle was 4.5 percent, significantly lower than its average rate in previous cycles. Labour input growth, averaging 2.2 percent annually, is higher than any of the previous cycles.

From 1985–1990, there was a significant fall in the average annual rate for labour input, down 2.1 percent, while the average annual growth of output showed a relatively low increase of 0.7 percent. This led to an average annual increase of 2.9 percent in labour productivity. The fall in labour input reflects the declining employment (and rising unemployment) in the labour market during this cycle. For the year ended March 1990, the unemployment rate was 7.1 percent, compared with an unemployment rate of 4.1 percent in the year ended March 1987. Official unemployment statistics from the Household Labour Force Survey did not exist prior to the March 1986 quarter.

Labour productivity growth remained strong during the 1997–2000 cycle, with an annual rate of 2.8 percent. This was due to solid growth in output (average annual increase of 2.9 percent), and slow growth in labour input (average annual rise of 0.1 percent). The number of people employed in the measured sector was either stagnant or falling throughout the late 1990s.

From 1978–2007, average annual growth in labour productivity was 2.0 percent. This was driven by annual labour input growth of 0.6 percent and 2.6 percent annual growth in output.

Capital productivity



Capital productivity is measured as a ratio of output to capital input. In the year to March 2007, capital productivity fell 2.1 percent, due to the continued growth in capital input (up 3.6 percent), coupled with weaker output growth (up 1.4 percent). The table below presents the annual average growth in capital productivity for the growth cycles identified within the series.

Capital Productivity Average Annual Growth Rates (percent)[1][2][3]
Year ended 31 March

Cycle	Output	Capital input	Capital productivity
1978–1982	2.1	1.7	0.4
1982–1985	3.4	6.8	-3.2
1985–1990	0.7	4.9	-4.0
1990–1997	3.3	2.0	1.2
1997–2000	2.9	2.4	0.5
2000–2007	3.3	3.8	-0.5
1978–2007	**2.6**	**3.4**	**-0.7**

[1] The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
[2] Percentage changes are calculated on unrounded index numbers.
[3] Business services, and personal and other community services are included in the measured sector from 1996 onwards.

In the early 1980s, the strong growth in capital input was largely driven by significant investment in the energy sector on a number of projects collectively known as 'Think Big'. From 1982–1985, capital input grew (averaging 6.8 percent) significantly more than output growth (averaging 3.4 percent), which led to an average annual decrease of 3.2 percent in capital productivity. Strong capital input growth continued on to 1985–1990, which led to the sharpest fall in capital productivity for any of the six cycles, an average annual decrease of 4.0 percent.

From 1990–1997, capital productivity growth peaked, with an average annual growth rate of 1.2 percent. This was due to high output growth, which averaged 3.3 percent annually, while capital input was averaging 2.0 percent on an annual basis. Capital productivity continued to grow, but at a slower rate, in the following period, averaging 0.5 percent annually from 1997–2000.

The average annual growth in capital productivity fell 0.5 percent from 2000–2007. The annual capital input growth was 3.8 percent, whereas the annual growth in output was 3.3 percent. The increase in capital input was due to strong business investment in fixed assets in recent years. This was particularly evident in the construction industry, where that investment supported the strong economic activity.

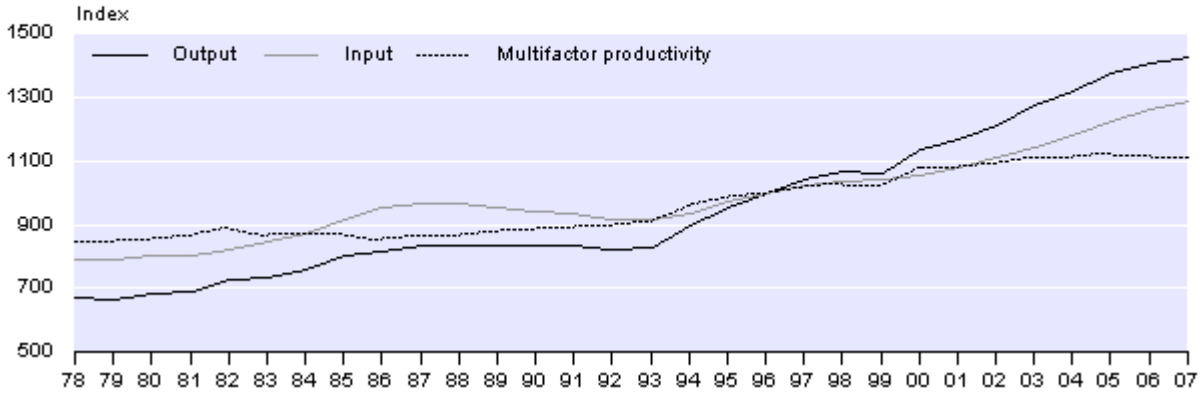
From 1978–2007, capital productivity fell 0.7 percent on an annual basis. This was driven by strong annual capital input growth of 3.4 percent and 2.6 percent annual growth in output.

Multifactor productivity

Measured Sector Input, Output and Productivity Indexes

Year ended March, 1978–2007

Base: 1996 (=1000)



Multifactor productivity (MFP) is measured as a ratio of output to total inputs. It can also be defined as growth that cannot be attributed to capital or labour, such as technological change or improvements in knowledge, methods and processes. In the year to March 2007, MFP fell 0.6 percent, due to total inputs increasing (up 2.1 percent) more than the growth in output (up 1.4 percent).

The table below presents the annual average growth in multifactor productivity within the growth cycles identified for the series.

Multifactor Productivity Average Annual Growth Rates (percent)[1][2][3] *Year ended 31 March*			
Cycle	Output	Total inputs	Multifactor productivity
1978–1982	2.1	0.9	1.2
1982–1985	3.4	3.9	-0.5
1985–1990	0.7	0.5	0.2
1990–1997	3.3	1.2	2.0
1997–2000	2.9	1.0	1.9
2000–2007	3.3	2.9	0.4
1978–2007	**2.6**	**1.7**	**0.9**

[1] The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
[2] Percentage changes are calculated on unrounded index numbers.
[3] Business services, and personal and other community services are included in the measured sector from 1996 onwards.

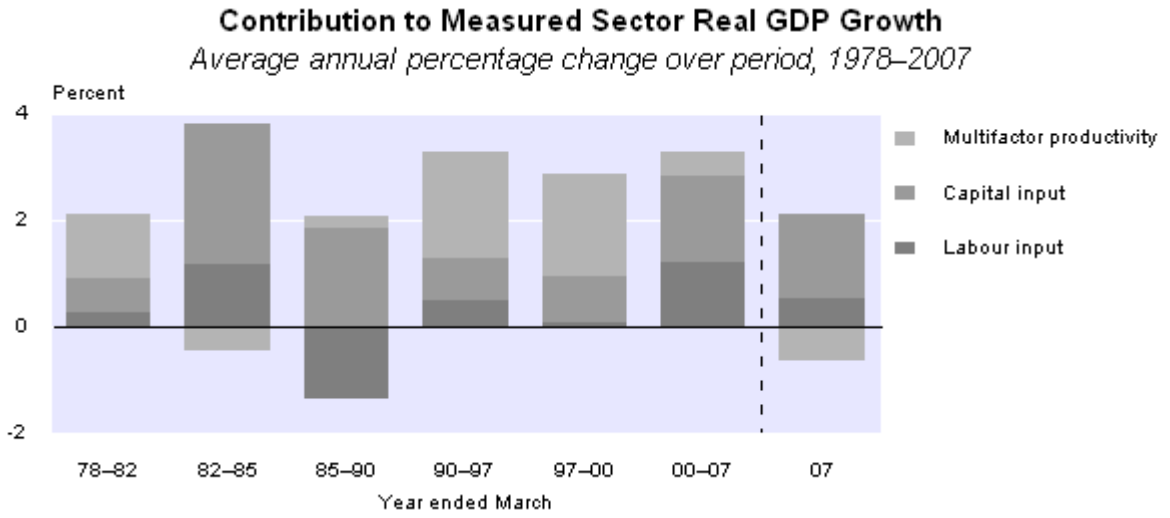
The MFP annual growth rates showed increases for five of the six cycles, with a range of 0.2 to 2.0 percent. The only cycle that showed a fall in MFP was between 1982 and 1985 (an average annual fall of 0.5 percent), due to total inputs (up 3.9 percent) increasing at a greater rate than output (up 3.4 percent) on an annual basis. Capital input was the main driver for the growth in the total inputs, with average annual growth of 6.8 percent during this cycle.

From 2000–2007, MFP has grown, but at a slower rate than two previous cycles, with an increase of 0.4 percent per annum. Output rose 3.3 percent on an average annual basis, while total inputs rose 2.9 percent. The dominant contributor to the growth in total inputs was capital input, which rose 3.8 percent on an average annual basis. Increasing investment in fixed assets and strong business activity in construction drove capital input to increase during the cycle.

The average annual increase of 0.9 percent in MFP from 1978–2007 was due to output growth (up 2.6 percent annually) rising more than input growth (up 1.7 percent annually).

Growth accounting for real GDP

Growth accounting examines how much of the economy's growth in output can be explained by the growth of combined inputs. In particular, growth in output (real GDP) can arise from three different sources: an increase in labour input, an increase in capital input, or an increase in MFP. The graph below presents growth in output between 1978 and 2007 for the growth cycles identified in the series.



The table below presents the annual average growth in output and its contributing factors for the growth cycles identified within the series.

Contribution to Measured Sector Real GDP Growth (percent) *Average annual growth rates* (1)(2)(3) Year ended 31 March				
Cycle	Real GDP	Capital input	Labour input	Multifactor productivity
1978–1982	2.1	0.7	0.3	1.2
1982–1985	3.4	2.7	1.2	-0.5
1985–1990	0.7	1.9	-1.4	0.2
1990–1997	3.3	0.8	0.5	2.0
1997–2000	2.9	0.9	0.1	1.9
2000–2007	3.3	1.6	1.2	0.4
1978–2007	**2.6**	**1.4**	**0.3**	**0.9**

(1) The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
(2) Percentage changes are calculated on unrounded index numbers.
(3) Business services, and personal and other community services are included in the measured sector from 1996 onwards.

In 2007, growth in output was 1.4 percent. This was driven by capital input (contributing 1.6 percent to the growth in output), and to a lesser extent by labour input (contributing 0.5 percent). Multifactor productivity contributed negatively to output, falling 0.6 percent.

Over the entire 1978–2007 cycle, output growth averaged 2.6 percent. Capital input was the largest contributor, averaging 1.4 percent on an annual basis. Labour input contributed 0.3 percent to this rise in output and MFP contributed 0.9 percent.

From 1978–1982, growth in output was positive, averaging 2.1 percent on an annual basis. This was driven by positive growth from all three contributors: capital input contributed 0.7 percent, labour input contributed 0.3 percent and MFP contributed 1.2 percent, on an average annual basis.

From 1982–1985, capital input was relatively strong, contributing 2.7 percent average annual growth to GDP. This, along with positive growth in labour input (averaging 1.2 percent on an annual basis) contributed to strong growth in GDP, averaging 3.4 percent on an annual basis. Output growth in 1985 was particularly high, at 5.8 percent. The positive growth in both capital and labour input from 1982–1985 was large enough to offset the negative contribution from MFP (which contributed -0.5 percent on average to annual GDP).

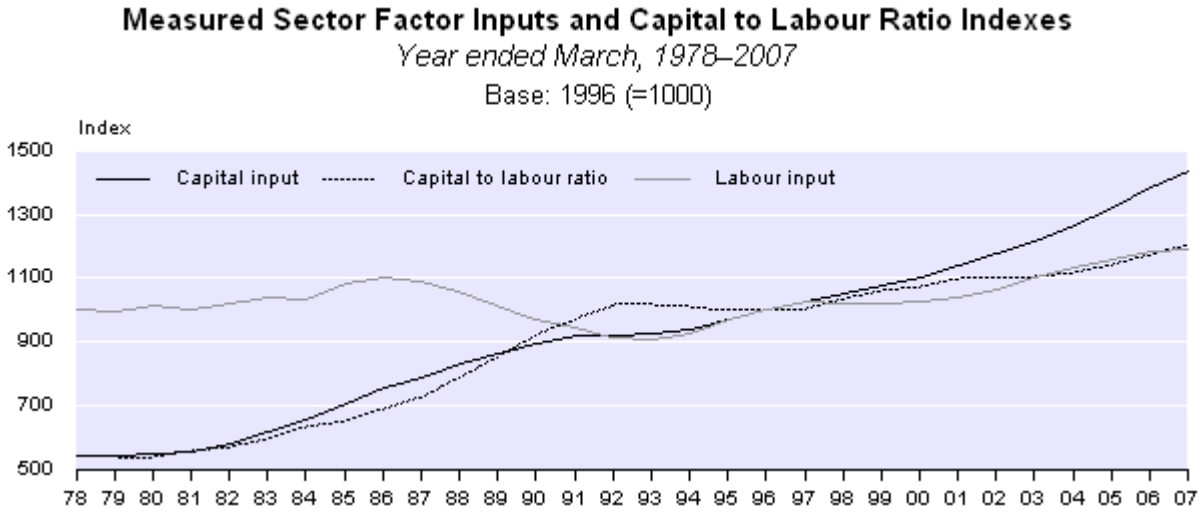
From 1985–1990, a decline in labour input contributed -1.4 percent annual growth to GDP. This negative contribution was an offsetting factor to positive capital input (which contributed 1.9 percent on average to annual GDP), and improvement in MFP (which contributed 0.2 percent to average annual GDP growth). Overall, GDP growth was low, averaging 0.7 percent annually over this cycle.

From 1990–1997, there was a marked improvement in GDP growth, averaging 3.3 percent on an annual basis. This reflected positive average annual growth from all three factors: capital input (0.8 percent), MFP (2.0 percent) and labour input (0.5 percent).

From 1997–2000, positive growth in capital input and strong growth in MFP, averaging 0.9 percent and 1.9 percent, respectively, on an annual basis, contributed to positive GDP growth (up 2.9 percent on an average annual basis) during this cycle. Output fell in the March 1999 year (down 0.2 percent), a combined result from the Asian economic crisis and two successive droughts that significantly reduced production of primary goods. However, the economic recovery following this was the main driver for the strong average growth from 1997–2000. In the year ended March 2000, output increased by 6.8 percent. There were three predominant factors contributing to the strong output growth in 2000. Firstly, a surge in export volumes (due to the combined effect of the low New Zealand dollar and growing demand from overseas) resulted in growth in prominent export-oriented industries, such as primary food manufacturing, forestry and agriculture. Secondly, sustained consumer spending was recorded throughout the year. Thirdly, business investment on fixed assets was up markedly, rising 7.4 percent in the March 2000 year.

For the latest cycle, 2000–2007, average annual growth in GDP was 3.3 percent. This was driven by growth in capital and labour inputs, averaging 1.6 and 1.2 percent respectively on an annual basis. Multifactor productivity contributed 0.4 percent to the increase in growth. Growth in output was due to a combination of factors. High world prices for export commodities, a relatively low exchange rate for much of the cycle further boosting export growth, a booming residential construction sector and a strong labour market were key drivers in strong output growth during this cycle.

Capital-labour ratio



The capital-labour ratio is simply calculated as the capital input index divided by the labour input index. An increase in the ratio is referred to as capital deepening, while a decrease is termed capital shallowing. In the year to March 2007, the capital-labour ratio rose 2.7 percent, compared with 2.6 percent in the year to March 2006.

The table below presents the average annual growth in the capital-labour ratio and capital and labour inputs for the growth cycles identified within the series.

Capital-Labour Ratio Average Annual Growth Rates (percent)[1][2][3] *Year ended 31 March*			
Cycle	Capital input	Labour input	Capital-labour ratio
1978–1982	1.7	0.4	1.3
1982–1985	6.8	2.0	4.7
1985–1990	4.9	-2.1	7.2
1990–1997	2.0	0.8	1.2
1997–2000	2.4	0.1	2.3
2000–2007	3.8	2.2	1.6
1978–2007	**3.4**	**0.6**	**2.8**

[1] The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
[2] Percentage changes are calculated on unrounded index numbers.
[3] Business services, and personal and other community services are included in the measured sector from 1996 onwards.

The New Zealand economy has experienced great capital deepening during the last 29 years. The average annual growth in the capital-labour ratio was 2.8 percent from 1978–2007, due to 3.4 percent average annual growth in capital input, compared with 0.6 percent average annual growth in labour input.

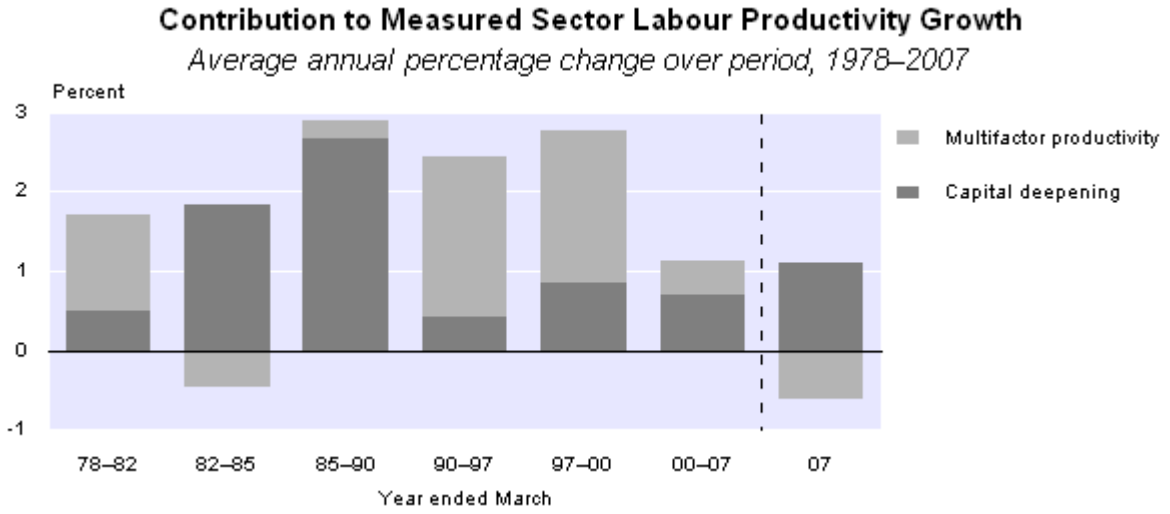
From 1985–1990, the average annual growth rate for the capital-labour ratio recorded its highest increase of 7.2 percent. This was due to a decrease in the average annual rate in labour input (down 2.1 percent), while capital input increased 4.9 percent on an average annual basis. As previously mentioned, the labour market was characterised by declining employment (and rising unemployment) during this cycle, which contributed to the fall in labour input.

From 1990 onwards, capital input has continued to increase at a higher rate than labour input. This contributed to the capital-labour ratio continuing to increase, but at a lower rate than the 1985–1990 period.

Growth accounting for labour productivity

As with growth in output, growth in labour productivity can be broken down into components. In particular, a change in labour productivity can come from two possible sources: a change in the weighted capital-labour ratio (that is, capital deepening or capital shallowing) and a change in MFP. The graph below presents the contributions to labour productivity growth between 1978 and 2007 for the growth cycles identified in the series.

In 2007, labour productivity grew by 0.5 percent. This was driven by capital deepening of 1.1 percent and a fall in multifactor productivity of 0.6 percent.



The table below presents the annual average growth in labour productivity and its contributing factors for the growth cycles identified for the series.

Contribution to Measured Sector Labour Productivity Growth
Average annual growth rates (percent)[1][2][3]
Year ended 31 March

Cycle	Labour productivity	Contribution of capital deepening[4]	Multifactor productivity
1978–1982	1.7	0.5	1.2
1982–1985	1.4	1.8	-0.5
1985–1990	2.9	2.7	0.2
1990–1997	2.5	0.4	2.0
1997–2000	2.8	0.8	1.9
2000–2007	1.1	0.7	0.4
1978–2007	**2.0**	**1.1**	**0.9**

[1] The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
[2] Percentage changes are calculated on unrounded index numbers.
[3] Business services, and personal and other services are included in the measured sector from 1996 onwards.
[4] Contribution of capital deepening is equal to the growth rate in the capital-labour ratio weighted by capital's share of total income.

Over the entire 1978–2007 period, the average annual contribution to labour productivity growth from capital deepening was 1.1 percent. The average contribution of MFP growth was 0.9 percent on an annual basis. Labour productivity growth averaged 2.0 percent annually.

In the 1980s, capital deepening was the main driver of growth in labour productivity. From 1982–1985, the contribution of capital deepening to labour productivity growth was 1.8 percent. The decline in labour productivity growth (down from 1.7 percent in the previous cycle to 1.4 percent) was due to an average annual decrease of 0.4 percent. From 1985–1990, the contribution of capital deepening to the strong labour productivity growth (which rose 2.9 percent on an average annual basis) averaged 2.7 percent on an annual basis. During the late 1980s, unemployment increased rapidly, rising from 4.0 percent in the March 1987 quarter to a high of 10.9 percent in the September 1991 quarter. This led to declining labour input, and, coupled with strong capital input growth, resulted in significant capital deepening over this cycle. Multifactor productivity contributed an average of 0.2 percent to annual labour productivity growth.

In the 1990s, a different picture emerges, as the main contributor to growth in labour productivity was MFP. From 1990–1997, labour productivity rose 2.5 percent on an average annual basis, reflecting on average contributions of 2.0 percent by MFP and 0.4 percent from capital deepening. The largest growth in labour productivity was from 1997–2000, when it averaged 2.8 percent annually. Multifactor productivity contributed 1.9 percent to labour productivity on an average annual basis during this cycle. Capital deepening contributed an average of 0.8 percent to annual labour productivity.

Labour productivity over the 2000–2007 cycle was relatively low, averaging 1.1 percent on an annual basis. Subdued capital deepening and average MFP growth (up 0.7 and 0.4 percent, respectively, on an average annual basis) contributed to this. In the latter half of this cycle, capital deepening has grown at a faster rate, whilst MFP growth has slowed.

Expansion to the measured sector

As stated above, business services and personal and other community services have been added to the measured sector, from 1996 onwards. The business services industry is very diverse and includes organisations engaged in providing professional, scientific and technical services, architecture, engineering, computer systems design, law, accountancy, advertising, market research, management, consultancy, veterinary science and professional photography. The personal and other community services industry is also diverse, and includes personal and household services such as laundry and dry cleaning, photographic and film processing, funeral directors, gardening services, hairdressers and beauty salons. Also included are private households employing staff, religious organisations, business and professional organisations, labour associations, waste disposal services, and sewerage and drainage services.

The table below summarises the average annual growth in productivity series within the growth cycles identified before and after the inclusion of business services and personal and other community services.

Comparison table: Former and Expanded Measured Sector
Productivity series and output measure (GDP)
Average annual growth rates (percent) (1)(2)(3)

	Labour productivity		Capital productivity		Multifactor productivity		Output measure (GDP)	
Cycle	Former	Expanded	Former	Expanded	Former	Expanded	Former	Expanded
1978–1982	1.7	1.7	0.4	0.4	1.2	1.2	2.1	2.1
1982–1985	1.4	1.4	-3.2	-3.2	-0.5	-0.5	3.4	3.4
1985–1990	2.9	2.9	-4.0	-4.0	0.2	0.2	0.7	0.7
1990–1997	2.6	2.5	1.2	1.2	2.1	2.0	3.2	3.3
1997–2000	3.4	2.8	0.6	0.5	2.3	1.9	2.6	2.9
2000–2007	1.2	1.1	-0.4	-0.5	0.5	0.4	3.1	3.3
1978–2007	**2.1**	**2.0**	**-0.7**	**-0.7**	**1.0**	**0.9**	**2.5**	**2.6**

(1) The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
(2) Percentage changes are calculated on unrounded index numbers.
(3) Business services, and personal and other community services are included in the measured sector from 1996 onwards.

The inclusion of business services, and personal and other community services into the measured sector has had a downward impact on productivity growth. This is especially evident in the 1997–2000 period, and is despite an upward impact on output during that time. Labour productivity dropped from averaging 3.4 percent annually, to 2.8 percent, and MFP also took a downward hit, from 2.3 percent to 1.9 percent annually. The impact on labour productivity during this period was the main contributor to the 1978–2007 annual average growth falling from 2.1 percent to 2.0 percent.

The table below presents the average annual growth in the input series and the capital-labour ratio before and after the inclusion of business services and personal and other community services.

Comparison table: Former and Expanded Measured Sector
Input series and capital-labour ratio
Average annual growth rates (percent) (1)(2)(3)

	Labour input		Capital input		Total inputs		Capital-labour ratio	
Measured sector	Former	Expanded	Former	Expanded	Former	Expanded	Former	Expanded
1978–1982	0.4	0.4	1.7	1.7	0.9	0.9	1.3	1.3
1982–1985	2.0	2.0	6.8	6.8	3.9	3.9	4.7	4.7
1985–1990	-2.1	-2.1	4.9	4.9	0.5	0.5	7.2	7.2
1990–1997	0.6	0.8	1.9	2.0	1.1	1.2	1.3	1.2
1997–2000	-0.8	0.1	2.0	2.4	0.3	1.0	2.8	2.3
2000–2007	1.9	2.2	3.5	3.8	2.6	2.9	1.6	1.6
1978–2007	**0.4**	**0.6**	**3.3**	**3.4**	**1.5**	**1.7**	**2.9**	**2.8**

(1) The average annual growth rate values do not include the movement for the first year of each cycle, eg the 1978–1982 average annual growth rate does not include the movement for 1978.
(2) Percentage changes are calculated on unrounded index numbers.
(3) Business services, and personal and other community services are included in the measured sector from 1996 onwards.

The main story in the expansion of the measured sector lies in the differences in the input growth rates. This is most evident in the labour input series, where the growth rate across the 1997–2000 period rose from -0.8 percent in the former measured sector to 0.1 percent, annually. There were also positive impacts on labour input growth rates in the adjacent periods, resulting in the overall labour input growth rate rising from 0.4 percent to 0.6 percent annually from 1978–2007. In fact, from 1996–2007, labour input grew by 19.4 percent in the expanded measured sector, compared with only 12.3 percent in the former measured sector.

Capital input growth rates have also been boosted upwards with the introduction of the new industries into the measured sector. Once again, the main impact comes during the 1997–2000 cycle, with annual average growth rates rising from 2.0 percent to 2.4 percent. Again, the adjacent periods have also experienced smaller upward changes to capital input growth.

The result of the labour input index being boosted more than the capital input index is a fall in the capital-labour ratio growth rate. This is the case in the 1997–2000 period, and to a lesser extent in the 1990–1997 period. Over the 1978–2007 period, the capital-labour ratio growth rate was revised downwards from 2.9 percent to 2.8 percent annually.

From a growth accounting perspective, the fall in labour productivity growth is therefore due to both a slower rate of capital deepening, and a fall in MFP growth (all relative to the former measured sector). The upward impact on output growth is driven by a rise in labour input, and to a lesser extent by a rise in capital input, partly offset by a fall in MFP (all relative to the former measured sector).

Revisions

Because this is the first-time release of an expanded measured sector, revisions are not applicable for those series. However, the expanded measured sector does incorporate the updated information and methodology referred to below.

As noted above, series for the former measured sector are included in a set of supplementary tables. These former measured sector series contain regular revisions arising from:

- revised constant price GDP data in the March years 2005 and 2006, feeding into the output series
- revised current and constant price productive capital stock data for selected assets and industries for March years 2005 and 2006, into the capital input series
- revisions to Linked Employer-Employee Data (LEED) for the labour volume series of employee counts from 2000 onwards.

The former measured sector series also contains revisions resulting from improved methodology. These are:

- minor improvements in the measurement of working proprietors from 2000 onwards
- improvement in the labour volume measurement in the forestry and logging industry prior to 1990.

While there have been minor revisions to some annual movements, the underlying trend of the productivity series has remained unchanged.

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Technical notes

What is productivity?

Productivity is a measure of how efficiently inputs are being used in the economy to produce outputs. Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input.

Productivity measures can be either single factor (that is, relating a measure of output to a single measure of input), or multifactor (that is, relating a measure of output to a bundle of inputs). The output measure chosen may be either gross output or value-added. The official productivity series all use constant price value-added as the output measure. Separate series are produced for labour productivity, capital productivity and multifactor productivity (MFP).

Productivity measurement

The Statistics New Zealand method of estimating productivity statistics is based on OECD guidelines, as outlined in the OECD manual *Measuring Productivity* (OECD, 2001). The approach adopted is referred to in the manual as "the index number approach in a production theoretic framework. The growth accounting technique examines how much of an observed rate of change of an industry's [or economy's] output can be explained by the rate of change of combined inputs. Thus the growth accounting approach evaluates the MFP growth residually."

In its simplest form, a production function is postulated as follows:

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

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)

or, rearranging the equation, we have:

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

As the technology parameter cannot be observed directly, MFP growth is derived residually as the difference between the growth in an index of outputs and an index of inputs. For MFP to be a measure of disembodied technology change, certain assumptions must be met, the key ones being that the production function must exhibit constant returns to scale and the coverage of the inputs needs to be complete.

In practice, these conditions will not be met and the resulting MFP residual needs to be interpreted with some 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 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, will be 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-technology factors will be picked up by the residual, including economies of scale, cyclical effects, inefficiencies and measurement errors.

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.

Care is also needed in interpreting the partial measures of productivity. For example, labour productivity only partially measures 'true' labour productivity, in the sense of capturing 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 technology, with no change occurring in the labour input itself.

Estimating growth cycles

This release contains productivity data presented as annual averages within growth cycles. A range of univariate filters used to generate cycles within the series were investigated, and ultimately the Hodrick-Prescott filter was determined to be the most appropriate filter. While the productivity model assumes no differences (across industry and time) in asset capacity utilisation rates, in reality capacity utilisation of capital will vary across a cycle. The starting points for the cycles are estimated as years where capacity utilisation is at its highest point, hence the cycles chosen are 'peak-to-peak'. 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, refer to the Statistics NZ information paper *Extracting Growth Cycles from Productivity Indexes*, available at www.stats.govt.nz.

Industry coverage – the measured sector

The productivity measures do not cover the entire economy. The industry coverage of the statistics is defined as the 'measured sector', consisting of industries for which estimates of inputs and outputs are independently derived in constant prices. Excluded are those industries for which real value-added in the national accounts is largely measured using input methods, such as number of employees. This is 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 table below with reference to the Australian New Zealand Standard Industrial Classification 1996 (ANZSIC 96).

Measured sector industries	Omitted industries
A Agriculture, forestry and fishing	LA Property services
B Mining	LB Ownership of owner occupied dwellings
C Manufacturing	M Government administration and defence
D Electricity, gas and water supply	N Education
E Construction	O Health and community services
F Wholesale trade	
G Retail trade	
H Accommodation, cafes and restaurants	
I Transport and storage	
J Communication services	
K Finance and insurance	
LC Business services	
P Cultural and recreational services	
Q Personal and other community services	

The measured sector has been expanded for this release, and now includes business services, and personal and other community services, from 1996 onwards.

Output series methodology

This is defined as constant-price value-added. The annual value-added for the measured sector is derived following the same procedures as used to derive constant price GDP, namely – as a chained Laspeyres volume index of the constant-price value-added of the industries that comprise the measured sector.

Labour series methodology

The labour volume series

The labour volume series is an estimate of paid hours for all employed persons engaged in the production of 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 utilised for productivity measurement.

Throughout the series, there are three components that 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 labour volume series is constructed by estimating:

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

These are multiplied together 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 table 3.

For the first of the three components, data from the Department of Labour (DoL) Employment Information Survey is used up to 1980, when it became the DoL Quarterly Employment Survey (QES). The DoL data was the sole source for employee counts and hours paid for this component until 1989, from which point annual Business Demography counts are rated forward by quarterly movements in employee counts from the QES. The resulting quarterly series of employee numbers is then multiplied by average weekly paid hours from the QES to achieve a quarterly series for paid hours. In 1989, Statistics NZ assumed responsibility for administering the QES. From 2000 onwards, monthly Linked Employer-Employee Dataset (LEED) has replaced Business Demography as the sole data source for employee counts, and is combined with QES data on average weekly paid hours.

The second component includes employees in the following ANZSIC industries that are omitted from the coverage of the surveys above:

- A01 – Agriculture
- A02 – Services to agriculture
- A04 – Commercial fishing
- I6301 – International sea transport
- L7711 – Residential property operators
- M813 – Foreign government representation
- Q97 – Private households employing staff.

Prior to 2000, Population of Census and Dwellings data provides benchmarks for employee counts and average weekly hours for this component. Prior to 1986, counts are interpolated using data from the Agriculture Census where appropriate. From 1986 to 2000, quarterly estimates of change from the Household Labour Force Survey (HLFS) are used to interpolate weekly hours between census benchmarks. From 2000 onwards, LEED provides monthly data on employee counts, while the average hours methodology remains unchanged.

For working proprietors, the third component, prior to 1986, census benchmarks are used to calculate both counts and average hours for almost all industries, supplemented by data from the DoL employment surveys and the Agriculture Census where appropriate. From 1986 to 2000, both hours and count data are benchmarked using totals from the census and interpolated using data from the HLFS, as in the previous component. From 2000 onwards, LEED provides annual benchmarks for working proprietor counts, supplemented by data from the HLFS and QES. Census data continues to provide average hours benchmarks during this period.

Rating forward the Labour Volume Series to calculate 2007 values

Because LEED data is unavailable for the March 2007 quarter for employees, and the entire March 2007 year for working proprietors at present, both series include rated forward data. Employee data is rated forward to calculate the March 2007 quarter value using QES movements and HLFS movements for industries outside of the scope of the QES. Working proprietors are rated forward for the four quarters using HLFS movements. Adjustments are made to the QES and HLFS data where necessary. Average hours worked per industry is calculated as previously, however the data is adjusted to account for the proportion of secondary jobs for employees in industries out of scope of the QES and working proprietors.

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.

Use of LEED

LEED is the main data source of counts of employees and working proprietors from 2000 onwards. The LEED dataset is created by linking a longitudinal dataset from the Statistics NZ Business Frame with longitudinal data from administrative taxation sources. Statistics NZ sees LEED as the best available data source for measuring labour counts for the reasons outlined below.

For measurement of employees, LEED data differs to the previous Business Demography Database (BDD) in the following ways:

- LEED employee count data is monthly, whereas under the previous approach, quarterly data was used. Therefore LEED captures the seasonality of labour volume better.
- Unlike the previous approach, LEED counts are not interpolated using survey information, reducing the effect of sample error on the series.
- LEED data includes information about secondary jobs for industries outside of the scope of the Quarterly Employment Survey (QES). These jobs were previously excluded from the series.

For measurement of working proprietors, LEED data differs to the previous Census/HLFS measurement in the following ways:

- The majority of the working proprietor data is based on LEED annual benchmarks, based on a working proprietor's main income source over the year, ie it is not a point-in-time estimate. It is modified to incorporate seasonality using the HLFS and QES, however the annual average counts remain the same.
- LEED data includes information about people with secondary jobs (based on income) as a working proprietor. These jobs were previously excluded from the series.
- Under the previous methodology, census benchmarks could be extrapolated forward for up to five years before being finalised. However, LEED provides annual benchmarks and at most, it is only the latest year which will be extrapolated forward.
- Working proprietors who pay themselves a salary can now be identified more accurately using LEED.

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. No allowance is made for differences (across industry and time) in asset capacity utilisation rates.

As capital service flows cannot be directly measured, industry level flows are modelled, based on the productive capacity of industry capital stock. The industry level flows are aggregated to the measured sector level using industry shares of the measured sector current-price capital income as weights. More specifically, the following steps occur:

- The starting point is the annual constant-price productive capital stock series. An asset's productive capital stock is its gross capital stock adjusted for the decline in its efficiency. Measured in constant prices, the productive stock represents standardised efficiency units and can be interpreted as a measure of the potential capital services that the asset can contribute to the production process. The productive capital stock series are built up using a perpetual inventory model (PIM) that generates productive capital stock estimates for 26 asset types by industry, of which only 24 are used in the capital services index. The model specifies for each asset type a mean expected useful life, a retirement function based on a distribution about this life and its pattern of (hyperbolic) efficiency decline. These parameters, and gross fixed capital formation in constant prices, are used to estimate an asset type's productive capital stock in constant prices.

- In addition to the PIM-derived fixed asset stocks, the range of capital included in the productivity measures is supplemented by estimates for three other assets, namely livestock, exotic timber grown for felling, and land in use in agriculture and forestry.

- Capital service flows are assumed to be proportional to these productive stock estimates, and are aggregated to the industry level using a Törnqvist index, with weights based on implicit rental prices (or user costs) which are a function of an endogenous rate of return, depreciation, net taxes on production and asset price changes.

The measured sector capital services index is calculated, in turn, as a Törnqvist index of the industry indexes, with mean two-period industry shares of the measured sector current-price capital income providing the weights.

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 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 multifactor productivity measures, using the formulae in the Productivity measurement section of these Technical notes.

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.

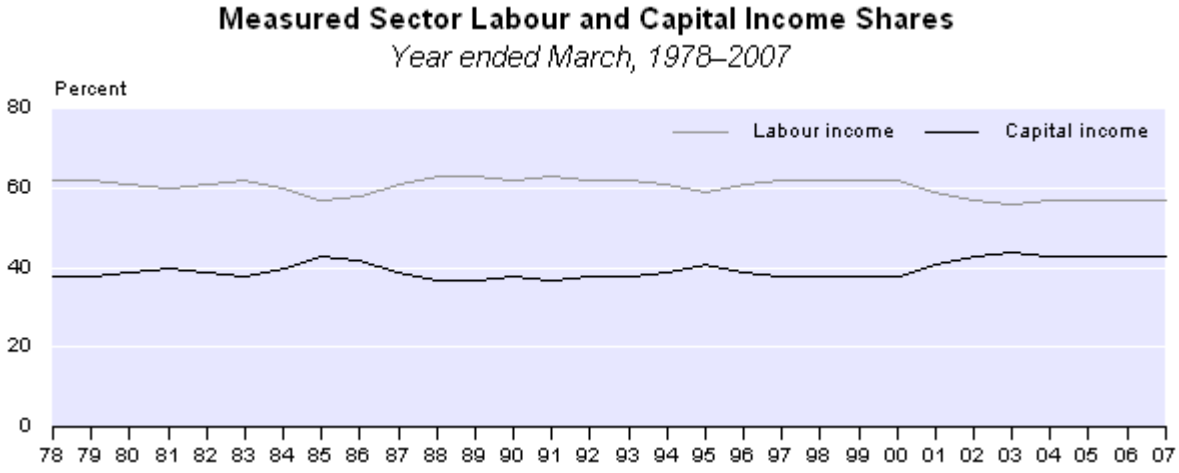
The income measure of GDP is calculated as compensation of employees plus gross operating surplus plus taxes on production and imports less subsidies (taxes less subsidies are known as net taxes). Included within gross operating surplus is the income of working proprietors, which is termed mixed income.

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.

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

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

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 the calculation of 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 average capital and labour income shares remain relatively stable over the 1978–2007 period, with the capital share at approximately 40 percent of total income and the labour share at approximately 60 percent of total income. The small level shift in the series in 1996 is due to the introduction of business services, and personal and other community services into the measured sector.

Published series

The productivity indexes have an expression base: year ended March 1996=1000, consistent with the published national accounts. The first year of the series is the March 1978 year. The measured sector GDP data used to calculate productivity indexes from 1978 to 1988 is currently provisional.

Copyright

Liability

Further information

The information paper *Productivity Statistics: 1988–2005* was released in March 2006 and provides additional material on the nature of the productivity measures, their construction, and comparisons with similar productivity statistics published by the Australian Bureau of Statistics and the OECD. Two technical papers are also available. *Productivity Statistics: Sources and Methods* details the sources and methods used to compile the series and Estimating Growth Cycles from Productivity Indexes details the methodology used to derive growth cycles for the published series from 1978–2007. Both publications are available from the Statistics New Zealand website (www.stats.govt.nz/).

Timing

Timed statistical releases are delivered using postal and electronic services provided by third parties. Delivery of these releases may be delayed by circumstances outside the control of Statistics NZ. Statistics NZ accepts no responsibility for any such delays.

Next release...

Productivity Statistics: 1978–2007 is scheduled to be re-released in July 2008 and will include quality adjusted labour productivity series.

Tables

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

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Table 1

Productivity in the Measured Sector[1][2]

Productivity indexes and output measure [3]

Base: March 1996 Year (=1000)

	Productivity indexes			Output Measure
	Labour[4]	Capital[5]	Multifactor[6]	GDP – measured sector[7]
Series ref: PRDA	*S1LMSI*	*S1CMSI*	*S1MMSI*	*S2OMSI*
		Index		
1978	668	1236	846	669
1979	668	1231	844	666
1980	673	1250	854	684
1981	691	1244	866	692
1982	715	1258	888	728
1983	709	1195	866	736
1984	734	1161	874	761
1985	745	1142	875	805
1986	740	1081	852	815
1987	768	1059	865	836
1988	793	1010	867	837
1989	824	971	876	837
1990	859	933	885	834
1991	882	907	891	834
1992	900	888	895	820
1993	916	897	909	830
1994	965	949	958	894
1995	983	982	983	953
1996	1000	1000	1000	1000
1997	1018	1016	1017	1044
1998	1043	1011	1031	1067
1999	1043	986	1021	1064
2000	1106	1032	1077	1137
2001	1119	1022	1080	1165
2002	1134	1028	1092	1211
2003	1158	1049	1114	1275
2004	1163 P	1041 P	1113 P	1318 P
2005	1186 P	1040 P	1125 P	1375 P
2006	1191 P	1018 P	1118 P	1409 P
2007	1197 P	996 P	1111 P	1429 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.
(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.
(3) Year ended 31 March.
(4) Gross domestic product per unit of labour input.
(5) Gross domestic product per unit of capital input.
(6) Gross domestic product per unit of labour and capital.
(7) Chain volume gross domestic product for the measured sector.

Symbol:
P provisional

Table 2

Productivity in the Measured Sector[1][2]

Productivity indexes – annual percentage change [3]

	Productivity indexes			Output measure
	Labour	Capital	Multifactor	GDP - measured sector
Series ref: PRDA	*S1LMSP*	*S1CMSP*	*S1MMSP*	*S2OMSP*
Percentage change from previous year[4]				
1978	..	..	..	..
1979	-0.1	-0.4	-0.2	-0.5
1980	0.8	1.6	1.1	2.8
1981	2.7	-0.5	1.4	1.2
1982	3.4	1.1	2.5	5.2
1983	-0.9	-4.9	-2.4	1.0
1984	3.6	-2.9	1.0	3.4
1985	1.4	-1.6	0.1	5.8
1986	-0.7	-5.4	-2.7	1.2
1987	3.9	-2.0	1.5	2.6
1988	3.2	-4.6	0.3	0.1
1989	3.9	-3.8	1.0	0.0
1990	4.2	-4.0	1.1	-0.4
1991	2.7	-2.8	0.6	0.0
1992	2.0	-2.1	0.4	-1.7
1993	1.9	1.0	1.6	1.2
1994	5.3	5.8	5.5	7.7
1995	1.9	3.5	2.5	6.6
1996	1.7	1.8	1.7	4.9
1997	1.8	1.6	1.7	4.4
1998	2.5	-0.5	1.3	2.2
1999	-0.1	-2.4	-1.0	-0.2
2000	6.0	4.6	5.5	6.8
2001	1.2	-1.0	0.3	2.4
2002	1.4	0.7	1.1	4.0
2003	2.0	2.1	2.0	5.3
2004	0.5 P	-0.8 P	-0.1 P	3.3 P
2005	1.9 P	-0.1 P	1.0 P	4.4 P
2006	0.5 P	-2.1 P	-0.7 P	2.4 P
2007	0.5 P	-2.1 P	-0.6 P	1.4 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.
(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.
(3) Year ended 31 March.
(4) Percentage changes are calculated on unrounded numbers.

Symbols:
P provisional
.. figures not available

Table 3

Productivity in the Measured Sector[1][2]

Input measures [3]

Base: March 1996 year (=1000)

	Index				Weekly hours paid (000s)
	Labour input	Capital input	Total inputs	Capital-labour ratio[4][5]	Labour volume[6][7]
Series ref: PRDA	*S3LMSI*	*S3CMSI*	*S3TMSI*	*S3RMSI*	*S3HMSG*
1978	1002	542	791	541	38,920
1979	997	541	789	543	38,759
1980	1017	548	802	538	39,525
1981	1002	557	800	556	38,935
1982	1018	579	820	569	39,686
1983	1038	615	849	593	40,430
1984	1036	655	870	632	40,318
1985	1081	704	919	652	41,747
1986	1101	754	956	684	42,397
1987	1088	790	966	726	41,770
1988	1056	829	965	785	40,366
1989	1016	862	955	849	38,808
1990	971	894	942	921	37,413
1991	945	920	936	973	36,130
1992	911	923	917	1013	34,840
1993	906	925	914	1021	34,571
1994	927	942	933	1017	35,446
1995	970	970	970	1001	37,341
1996	1000	1000	1000	1000	44,494
1997	1025	1028	1026	1003	45,401
1998	1023	1055	1035	1032	45,135
1999	1021	1079	1042	1057	45,104
2000	1028	1102	1056	1072	45,661
2001	1041	1140	1078	1095	46,332
2002	1067	1178	1109	1103	47,572
2003	1102	1215	1144	1103	49,051
2004	1133 P	1265 P	1183 P	1117 P	50,433
2005	1160 P	1323 P	1223 P	1140 P	51,438
2006	1183 P	1384 P	1260 P	1170 P	52,390 P
2007	1194 P	1434 P	1287 P	1202 P	52,775 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.

(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.

(3) Year ended 31 March.

(4) Ratio of the capital input index to the labour input index.

(5) An increase in the capital-labour ratio is referred to as capital deepening.

(6) The unindexed, unweighted measure of labour volume. Note, annual movements in this series will not be identical to annual movements in the corresponding indexed series for labour input. Please refer to Technical notes of this release for further explanation.

(7) Due to a small level shift in the series arising from changes made in 2000, the total paid hours prior to 2000 are rated down based on the differences between the two series in 2000, to create a continuous time series.

Symbol:

P provisional

Table 4

Productivity in the Measured Sector[1][2]

Input measures – annual percentage change [3]

	Index				Weekly hours paid
	Labour input	Capital input	Total inputs	Capital-labour ratio[4]	Labour volume
Series ref: PRDA	*S3LMSP*	*S3CMSP*	*S3TMSP*	*S3RMSP*	*S3HMSP*
Percentage change from previous year[5]					
1978	..	..	..	..	..
1979	-0.4	-0.1	-0.3	0.4	-0.4
1980	2.0	1.2	1.7	-0.8	2.0
1981	-1.5	1.7	-0.3	3.2	-1.5
1982	1.7	4.0	2.6	2.3	1.9
1983	1.9	6.3	3.5	4.3	1.9
1984	-0.1	6.5	2.4	6.6	-0.3
1985	4.3	7.5	5.6	3.1	3.5
1986	1.9	7.0	4.0	5.0	1.6
1987	-1.2	4.8	1.1	6.0	-1.5
1988	-3.0	5.0	-0.2	8.3	-3.4
1989	-3.8	4.0	-1.0	8.0	-3.9
1990	-4.4	3.7	-1.4	8.5	-3.6
1991	-2.6	2.9	-0.6	5.7	-3.4
1992	-3.6	0.4	-2.1	4.1	-3.6
1993	-0.6	0.2	-0.3	0.8	-0.8
1994	2.3	1.8	2.1	-0.5	2.5
1995	4.6	3.0	3.9	-1.6	5.3
1996	3.1	3.1	3.1	-0.1	19.2
1997	2.5	2.8	2.6	0.3	2.0
1998	-0.2	2.7	0.9	3.0	-0.6
1999	-0.2	2.3	0.7	2.5	-0.1
2000	0.8	2.1	1.3	1.4	1.2
2001	1.2	3.4	2.1	2.2	1.5
2002	2.5	3.3	2.9	0.8	2.7
2003	3.2	3.2	3.2	0.0	3.1
2004	2.9 P	4.1 P	3.4 P	1.3 P	2.8
2005	2.4 P	4.5 P	3.3 P	2.1 P	2.0
2006	1.9 P	4.6 P	3.1 P	2.6 P	1.9 P
2007	0.9 P	3.6 P	2.1 P	2.7 P	0.7 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.

(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.

(3) Year ended 31 March.

(4) An increase in the capital-labour ratio is referred to as capital deepening.

(5) Percentage changes are calculated on unrounded numbers.

Symbols:

P provisional

.. figures not available

Table 5

Productivity in the Measured Sector[1][2]

Growth accounting analysis – contributions to growth [3][4]

	Output growth	Contribution to output growth		
	GDP - measured sector[5]	Contribution of capital input[6]	Contribution of labour input[7]	Multifactor productivity[8]
Series ref: PRDA	*S2OMSP*	*S4CMSP*	*S4LMSP*	*S1MMSP*
Percentage change from previous year[9]				
1978	..	..	..	..
1979	-0.5	0.0	-0.3	-0.2
1980	2.8	0.5	1.2	1.1
1981	1.2	0.7	-0.9	1.4
1982	5.2	1.5	1.0	2.5
1983	1.0	2.3	1.2	-2.4
1984	3.4	2.5	-0.1	1.0
1985	5.8	3.2	2.4	0.1
1986	1.2	2.9	1.1	-2.7
1987	2.6	1.8	-0.7	1.5
1988	0.1	1.8	-1.9	0.3
1989	0.0	1.4	-2.4	1.0
1990	-0.4	1.4	-2.8	1.1
1991	0.0	1.1	-1.6	0.6
1992	-1.7	0.1	-2.2	0.4
1993	1.2	0.1	-0.4	1.6
1994	7.7	0.7	1.4	5.5
1995	6.6	1.2	2.7	2.5
1996	4.9	1.3	2.3	1.7
1997	4.4	1.0	1.5	1.7
1998	2.2	1.0	-0.1	1.3
1999	-0.2	0.8	-0.1	-1.0
2000	6.8	0.8	0.5	5.5
2001	2.4	1.4	0.7	0.3
2002	4.0	1.4	1.4	1.1
2003	5.3	1.4	1.8	2.0
2004	3.3 P	1.8 P	1.6 P	-0.1 P
2005	4.4 P	1.9 P	1.4 P	1.0 P
2006	2.4 P	2.0 P	1.1 P	-0.7 P
2007	1.4 P	1.6 P	0.5 P	-0.6 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.
(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.
(3) Year ended 31 March.
(4) Output growth is approximately equal to the sum of the contributions of capital input, labour input and multifactor productivity.
(5) Growth in chain volume gross domestic product for the measured sector.
(6) Contribution of capital input is equal to the growth rate in capital input weighted by capital`s share of total income.
(7) Contribution of labour input is equal to the growth rate of labour input weighted by labour`s share of total income.
(8) Gross domestic product per unit of labour and capital.
(9) Percentage changes are calculated on unrounded numbers.

Symbols:
P provisional
.. figures not available

Table 6

Productivity in the Measured Sector[1][2]

Growth accounting analysis – contributions to labour productivity [3][4]

		Contribution to labour productivity	
	Labour productivity	Contribution of capital deepening[5]	Multifactor productivity[6]
Series ref: PRDA	*S1LMSP*	*S4DMSP*	*S1MMSP*
Percentage change from previous year[7]			
1978	..	..	..
1979	-0.1	0.1	-0.2
1980	0.8	-0.3	1.1
1981	2.7	1.3	1.4
1982	3.4	0.9	2.5
1983	-0.9	1.6	-2.4
1984	3.6	2.6	1.0
1985	1.4	1.3	0.1
1986	-0.7	2.1	-2.7
1987	3.9	2.3	1.5
1988	3.2	2.9	0.3
1989	3.9	2.9	1.0
1990	4.2	3.1	1.1
1991	2.7	2.1	0.6
1992	2.0	1.5	0.4
1993	1.9	0.3	1.6
1994	5.3	-0.2	5.5
1995	1.9	-0.6	2.5
1996	1.7	-0.1	1.7
1997	1.8	0.1	1.7
1998	2.5	1.1	1.3
1999	-0.1	0.9	-1.0
2000	6.0	0.5	5.5
2001	1.2	0.9	0.3
2002	1.4	0.3	1.1
2003	2.0	0.0	2.0
2004	0.5 P	0.5 P	-0.1 P
2005	1.9 P	0.9 P	1.0 P
2006	0.5 P	1.1 P	-0.7 P
2007	0.5 P	1.1 P	-0.6 P

(1) The measured sector is ANZSIC divisions A to K and P from 1978, and includes divisions LC (Business services) and Q (Personal and other community services) from 1996 onwards. See the Technical notes of this release for further details.
(2) Since the industry coverage of the measured sector has changed for this release, revisions are not applicable.
(3) Year ended 31 March.
(4) Labour productivity growth is approximately equal to the sum of the contribution of capital deepening and multifactor productivity.
(5) Contribution to capital deepening is equal to the growth rate in the capital-labour ratio weighted by capital`s share of total income.
(6) Gross domestic product per unit of labour and capital.
(7) Percentage changes are calculated on unrounded numbers.

Symbols:
P provisional
.. figures not available