

Regional GDP Concepts, Sources and Methods



April 2007

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ISBN 978-0-478-26938-3

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1. Introduction

This paper summarises the concepts, sources and methods used in the regional Gross Domestic Product (GDP) feasibility study. The study was a joint project between Statistics New Zealand and the Ministry of Economic Development to determine the feasibility of producing regional GDP series, and whether regional GDP could be produced on an ongoing basis to an acceptable standard using existing data sources.

The project also looked at the value and potential uses of regional GDP data. Regional GDP data for 2000 to 2003 and a commentary on the data by Statistics NZ have both been published on Statistics NZ's website (www.stats.govt.nz).

The feasibility study involved developing data and methodologies that could be tested by compiling an experimental series. To do this, estimates of current price regional GDP were developed for 15 regions, and 16 industries within each region. These series were released on 18 December 2006 and are considered to be of acceptable quality at the region level, although they have not necessarily been subject to detailed analysis at the region-by-industry level.

The regional GDP methods and data used here have been peer reviewed and endorsed by an international expert on regional GDP.

The conclusion of the project is that it is feasible to compile regional GDP estimates for New Zealand, with existing data and in a way which is consistent with international practice.

2. Concepts and classifications

All technical terms used are contained in the glossary, including definitions of types and components of GDP.

The main conceptual reference for the New Zealand regional GDP is the Eurostat *Regional Accounts Methods* paper. This is the best resource, in the absence of an official United Nations or Organisation for Economic Cooperation and Development (OECD) regional GDP manual, and is designed to be used by all European Union countries. Eurostat experts have clarified key points.

Apart from *Regional Accounts Methods*, methodological papers from other countries were also reviewed for this project. In general, countries appear to agree about the basic concepts underlying regional GDP estimates, such as how residency is determined. These concepts are discussed in more detail later in this section. Differences in methodology are often due to differences between countries which affect data availability, and compilation approaches.

Scope

The regional GDP measure is based on the production-based measure of GDP. This measure should provide valuable information about the growth of regional economies, particularly when regional GDP is available by industry. An expenditure-based regional GDP measure is not being developed. Such a series requires information on inter-regional flows which are not currently available, and data sources would be expensive to develop. This is well covered in the Statistics NZ paper *Regional Input-Output Methodology Study*.

In the longer term, selected expenditure-based and income-based measures could be investigated. Examples include regional gross fixed capital formation and regional household expenditure. The New Zealand Institute of Economic Research's *Regional Economic Performance* publication noted that regional capital stock information would also be useful for productivity analysis.

This report is based around the adoption of a production-based approach. When a preferred technique such as the bottom-up approach is discussed, it is for a production-based methodology only. An expenditure or income-based approach might take a different tack.

The regional GDP estimates released here are based on industry estimates for value-added (the value of output after the cost of bought-in materials and services have been deducted). The output is valued inclusive of taxes on production and subsidies, which is consistent with the national accounts. To industry value-added, GST on production is added at the region level and on a pro rata basis, to obtain regional GDP. The amount of GST allocated to each region is recorded in the region-by-industry tables which are available with the *Research Report on Regional GDP* on the Statistics NZ website (www.stats.govt.nz). The calculation of GST is also consistent with the national approach.

Estimates for components of GDP are used in the calculation of GDP for some industries, but only total GDP is published by region, by industry. The components of GDP are:

- Compensation of employees
- Consumption of fixed capital
- Gross operating surplus
- Subsidies
- Taxes on production.

The use of components of GDP for regional GDP compilation is discussed in the methodology section.

Industries and regions

Regional GDP was compiled for 16 industry groups, based on the national accounts industry groupings (see Appendix). Due to the confidentiality requirements it is difficult to provide estimates at a greater level of detail. The 16 industries in the regional GDP estimates are:

- Agriculture
- Forestry, logging and fishing
- Mining, construction and electricity, gas and water supply
- Manufacturing
- Wholesale trade
- Retail trade
- Accommodation, restaurants and bars
- Transport, storage and communication services
- Finance and insurance
- Property services
- Ownership of owner-occupied dwellings
- Business services
- Central and local government administration
- Education, health and community services
- Cultural and recreational services
- Personal and other community services.

Regions are the administrative regions listed below. Tasman and Nelson were combined due to difficulty in assuring the methodology was correctly differentiating economic activity between the two regions.

The regions are:

- Northland
- Auckland
- Waikato
- Bay of Plenty
- Gisborne
- Hawke's Bay
- Taranaki
- Manawatu-Wanganui
- Wellington
- Tasman / Nelson
- Marlborough
- West Coast
- Canterbury
- Otago
- Southland.



General principles

Regional GDP estimates were compiled to be consistent with the published national estimates, the sum of the GDP of the regions equalling national-level GDP. However, there are conceptual and statistical issues that are particular to regional GDP estimation, as discussed below. These relate to the following questions:

- How do we allocate economic activity to regions – where the activity occurs or where the producer unit is located? (See Residency below)
- At what level does regional GDP measure business activity? (See Statistical units, page 7)
- How is regional GDP valued, for example does it include GST? (See Valuation, page 7)

Residency

Where a unit (eg a firm) is based in one region but also operates in another region raises a fundamental question in regional GDP compilation – what region or regions should the unit's activity be allocated to?

The two major principles to choose from are the **residence** principle and the **territory** principle. The former allocates the activity to where the unit undertaking the activity is based, while the latter allocates to the territory where the activity takes place.

The principle of residence is chosen as the primary one for regional accounts. This is the internationally preferred option for national accounts, balance of payments and regional GDP. Applying the residence principle aims for the measurement of the income, or GDP generation, by factors of production resident in the region (or country).

Residence and territory

The residence principle allocates the value-added to the region in which the firm or branch is resident, based on the physical and legal existence of a unit in that region. Issues can arise where a unit undertakes some sustained activity in another region. In practice, it is generally accepted that units present in an area for less than 12 months are not resident. Notional units are sometimes established to reflect a unit's centre of interest in a region where otherwise it might not be considered resident, for example where no legal unit exists. Similar notional units may also be needed in the regional accounts.

Under the territory principle, activity is allocated to the region in which the activity takes place. This is intuitively more understandable, as it measures the economic activity happening in the region regardless of where the unit is resident. Analysis of capital stock using the territorial principle may be more useful for data users than the residence principle, as it reflects the activity of capital assets operating in the region regardless of where production decisions are made.

Centre of economic interest

Adopting the residence principle requires us to determine the residency of units. The approach used for the national estimates has been adapted for the regional estimates.

The following is from the *System of National Accounts 1993 (SNA 1993)* with 'region' substituting for 'country':

"An institutional unit is said to have a centre of economic interest within a region when there exists some location – dwelling, place of production, or other premises – within the economic territory of the region on, or from, which it engages, and intends to continue to engage, in economic activities and

transactions on a significant scale, either indefinitely or over a finite but long period of time. The location need not be fixed so long as it remains within the economic territory." (14.12)

In addition:

"the ownership of land and structures within the economic territory of a region is deemed to be sufficient in itself for the owner to have a centre of economic interest in that region. ... It may happen, however, that an owner is resident in another region and does not have any economic interest in the region in which he owns the land or buildings other than the land or buildings themselves. In that case, the owner is treated as if he transferred his ownership to a notional institutional unit which is actually resident in the region." (14.14)

Applying the principles

There are two main situations where the principles of residence and territory differ:

1. The lack of (actual) producer units in the region in which the activity takes place.
2. Where activities themselves span many regions.

Examples of the first situation include mobile labour (travelling salespersons), mobile capital (aeroplanes, rail), and capital assets located separately from their production units.

Examples of the second situation include infrastructure assets such as electricity transmission. These situations pose issues which are difficult to resolve whichever concept is adopted.

Potential Differences for Residence and Territory Concepts

Situ-ation	Definition	Example	In principle	In practice	Impact	Comment
1	Large capital assets in another region	Dams, buildings, forests	Create notional unit	Create notional unit	Recognise activity in location of asset	Residence = territory
1	Small capital assets	Switch box, rail crossing	Not recognised as insignificant	Not recognised	Activity accrues to 'owning' producer unit	
2	Capital assets spanning regions	Power lines, roads, rail lines, pipelines	Create notional units in each region	Too impractical – use actual units	Activity accrues to 'owning' producer unit	Residence not = territory
2	Mobile capital	Aeroplanes	Eurostat: allocate across regions	Activity allocated across regions	Activity allocated across regions	Residence = territory
2	Mobile capital	Ships	Producer unit is base of operations	Producer is AES unit surveyed	Activity accrues to a particular region, not to where activity is being carried out	Need to test this for each unit, residence not = territory
2	Mobile labour	Salespersons	Allocated to producer unit region	Allocated to producer unit region		

Large capital assets such as buildings or dams may not always be recorded in business registers. When a significant unit is identified in an area and data is available, a notional unit may be created for regional GDP compilation purposes. Therefore we are able to apply the residence concept and record

its activity in the location in which the activity is actually taking place. Both the residence and territory concepts are applied.

For mobile capital (and air transport in particular), notional or actual units may not provide a good basis for measuring the activity taking place in each region. In practice, where notional or actual units are not being used for the estimates, the territory principle is being used.

Statistical units

Statistics New Zealand recognises or collects data from three main types of business unit:

- enterprise
- kind-of-activity unit
- geographic unit

An enterprise is a business or service entity: a company, partnership, trust, estate, incorporated society, producer board, local or central government organisation, voluntary organisation or self-employed individual. Data on financial position is often collected at this level.

A kind-of-activity unit (KAU) engages in predominantly one activity for which a single set of accounting records is available. A KAU is always attached to an enterprise and may also represent the whole enterprise. Data on production, operating surplus and sales are often collected at this level.

The geographic unit is a separate operating unit engaging in a predominant kind of economic activity from a single physical location or base. A geographic unit is always attached to a KAU, and a geographic unit may also represent a single KAU. Data on employment is often collected at this level. The geographic unit is the unit that provides information on regional activity.

The geographic unit is the statistical unit used in the regional GDP study.

The geographic unit generally has information on employment and limited information for other financial data. Information on GDP is usually collected at the KAU level. It is important to be able to allocate the GDP activity of the KAUs to the correct region. This is a particular issue for regional GDP compilation, with the larger KAUs operating across several regions.

KAUs that operate in only one region are not an issue for regional GDP compilation. Of almost 250,000 KAUs in the Annual Enterprise Survey (AES) 2002 sample, less than 1 percent of them were multi-region. Not surprisingly, these KAUs were larger firms that accounted for 40 percent of the weighted total sales, and 38 percent of weighted total GDP. The geographic units of these multi-region KAUs were modelled and allocated to regions, as described in the next section. The relatively small number of multi-region KAUs allows the modelling estimates to be analysed quite closely.

Valuation

This section clarifies how the regional GDP estimates are valued, for example whether the estimates include GST or not, and how other taxes are treated.

Based on international experience, the two main valuation approaches for regional GDP are:

1. Present industry value-added at basic prices, and then show commodity taxes associated with the industry region separately. These taxes would be regionalised using a consumption indicator (or other appropriate indicator such as population).
2. Present industry value-added at producer prices, including commodity taxes allocated to the region of the producer.

The second approach has been used, as this is consistent with the valuation used in current national accounts industry-level value-added estimates. Regional GDP by industry information is consistent with the national accounts industry value-added. The national industry value-added is published at producer prices – it includes taxes and subsidies on products, but excludes GST and unallocated import and stamp duties. Taxes and subsidies on products are regionalised according to where the value is added – that is, where the products are produced.

The two approaches are complementary rather than mutually exclusive. If national accounts were to derive estimates of industry value-added in basic prices, then in principle regional GDP industry estimates could be produced in basic prices as well. Eurostat prefers that regional GDP be prepared in basic prices.

GST and import duties are to be allocated using the Eurostat method, which is based on the regional spread of industry value-added. At this stage there is no intention to attempt an allocation based on consumption, which is a possible alternative method.

Effect of valuation on regional GDP

The effect of this valuation treatment is that certain taxes are concentrated in the regions where the product that is being taxed is produced. Examples of this include tobacco tax being allocated to Auckland and Hawke's Bay, where the tobacco manufactures are (or were); and gaming duty which is significantly allocated to Wellington, where administering agencies such as the TAB are located.

While this is the correct treatment in producer prices, it does influence per capita measures of regional GDP. Many analysts deriving per capita measures would more than likely prefer their regional GDP measures in basic prices, where product taxes would be more widespread across the regions.

3. Methodology

Regional GDP measurement approaches

This section discusses the methodology used to derive the regional GDP estimates.

The internationally preferred approach for regional GDP compilation is to directly measure the activity of local units (represented by geographic units in New Zealand), and build up regional accounts from this information. The geographic unit compilation approach is preferred as it directly measures value-added. This approach is also useful analytically since it clearly links the activities of businesses within a region to the growth of that region. The New Zealand regional GDP estimates have used this approach for most industries.

The method of building up regional estimates from geographic unit data is known as the 'bottom-up' approach. The alternative, where regional indicators are used to allocate national level GDP estimates to regions, is the 'top-down' approach.

A top-down approach is used if the bottom-up approach cannot be implemented for an industry. This is usually due to a lack of unit level data for that industry. Because there are many exceptions to applying a bottom-up approach across-the-board, regional GDP methodology has been determined on an industry-by-industry basis. The top-down approach was used for some industries in the New Zealand regional GDP estimates.

Bottom-up methodology

Data at the geographic-unit level, applied to KAU-level information, is required to apply the bottom-up approach. Several New Zealand data sources are used as the basis for bottom-up estimates in the regional GDP estimates. The key data sources include: the Annual Enterprise Survey (AES), Linked Employer-Employee Data (LEED), the Crown Financial Information System and the Local Authority Survey.

Surveys are often designed to survey all larger firms, along with a sampling of smaller firms. The key surveys provide data at the industry level and the regional GDP estimates have been built up by industry.

The AES is the principal data collection vehicle for compiling New Zealand's National Accounts, particularly for industry value-added. The target population for AES is all economically significant businesses operating within New Zealand. This makes it a significant quality data source for regional GDP, given its coverage and design.

Using KAU survey data

The following comments apply to survey information where all KAUs in the population are surveyed. This is known as full-coverage data.

Firms are often surveyed at the KAU level. In many cases a KAU consists of one unit, or all the geographic units are in the same region. In these cases a regional allocation of KAU data is a straightforward exercise.

As already noted, some large KAUs have operations that span several regions. This is an issue in regional GDP compilation given the survey collection level. For these KAUs, more information is required to assign the activities of the KAU to its component geographic units across regions.

This issue is addressed by integrating survey data with geographic unit data on employees. The latter information is available from Statistics New Zealand's LEED data source. The integration of survey data and LEED is a modified bottom-up approach.

LEED data provides a range of labour market information, including total employee gross earnings. This variable can be used as an activity indicator. In LEED, the geographic unit is the physical location of the business, with each geographic unit considered to be a distinct employer. This approach allows regional LEED statistics to be produced.

Statistics NZ's business register information allows the geographic unit information from LEED to be linked to KAU-level information from sources such as AES. LEED therefore allows modelling of the regional geographic unit values for KAUs that operate across multiple regions. KAU activity is allocated to the appropriate region by using LEED total gross earnings as a proxy for the relative contribution to GDP for each geographic unit within the KAU.

As an example of how the apportionment process works, assume a KAU with GDP \$500 has two geographic units in different regions:

- Geographic unit 1 has LEED total gross earnings = \$100
- Geographic unit 2 has LEED total gross earnings = \$150
- Geographic unit 1 value-added = $(\$100 / (\$100 + \$150)) * \$500 = \$200$
- Geographic unit 2 value-added = $(\$150 / (\$100 + \$150)) * \$500 = \$300$

Note the underlying assumption is that all components of GDP are allocated in proportion to gross earnings. Thus operating surplus and consumption of fixed capital are implicitly allocated in proportion to gross earnings. While this is generally considered to be a reasonable assumption, there are exceptions, as discussed later.

Approach when KAUs are sampled in surveys

A different approach is used where KAU survey data is sampled. The survey sampling for AES is on a national basis. The sample is not designed to collect accurate regional-level information. Some region or industry cells may not be sampled at all. To work around this design issue, a top-down approach has been applied.

From the sample surveys we have a national-level estimate for the sampled units of each industry. The national-level estimates are accurate as the sample is designed at that level. The question for regional GDP compilation is how to allocate these national-level estimates to regions. The method used was to allocate the estimates to regions by using regional indicators based on LEED data. This allocates sampled industry value-added to regions in proportion to LEED industry gross earnings.

This approach should provide a good estimate for the level of regional GDP for each industry, and the movements of estimates based on this approach will generally be less volatile than estimates based on full-survey data (since gross earnings movements are generally less volatile than GDP movements).

Where survey data is available for a region, regional GDP industry estimates are therefore a combination of the bottom-up (full-coverage data) and top-down (sample data) approaches. In practice, the regional GDP estimates are mainly (by value) derived from full-coverage data.

Top-down methodology

A top-down methodology uses regional indicators to allocate national GDP to regions. These methods are usually applied where survey data is not available for the bottom-up approach to be considered.

Industries or activities where a top-down approach is used include agriculture, part of property services, and ownership of owner-occupied dwellings.

For these industries (apart from agriculture, which is discussed below) GDP was allocated to regions by using an appropriate regional indicator to derive regional ratios able to be applied to national industry GDP. Where possible, the indicators used in the national estimates were adapted to derive regional indicators. This is to ensure the regional GDP estimates are as consistent with the national estimates as possible. The actual approach used varies, depending on which industry is being regionalised and what the national accounts method is.

For example, for residential property operators, the regional GDP allocation is a regional output indicator, based on regional rent prices and residential dwelling numbers. This is basically the same as the method used for the national estimates.

The regional agriculture industry methodology was consistent with the national accounts methodology. This involves producing gross output for 30 agriculture commodities, for example dairy, cattle, crops and seeds. Value-added was calculated for each commodity, using regional estimates for gross output. Gross output was calculated using regional volumes multiplied by national prices. Volume data was gathered using a range of sources, depending on the commodity, including the Agricultural Production Survey.

4. Compilation issues

Apportionment and structure

Where apportionment of KAU data is required, then modelling with LEED gross earnings is generally sound, although a number of issues do arise. Many other countries producing regional GDP estimates do not have geographic unit-level employee payment data equivalent to LEED, and rely on data such as the number of employees instead. Using employee numbers is not an ideal method as this does not differentiate between higher-paid workers who are generating high value-added for KAUs, and lower-paid employees generating lower value-added. Using LEED gross earnings for apportionment, as is done in the New Zealand estimates, is a good method as it takes into account different employee earning rates.

The modelling assumes that each geographic unit of a KAU has similar profit per employee. This assumption may break down, for example, when a KAU operates a less profitable regional geographic unit. When this occurs, regional allocation of GDP for this KAU must be questionable. GDP for the region with the less profitable geographic unit is overstated, and understated for other regions.

Similarly, questions arise with the modelling when one KAU takes over geographic units of another KAU. This can cause analytical issues when the value-added allocated to the geographic unit changes considerably under the new management. Does this reflect reality? Generally it is assumed that the management changes and restructuring have altered the previous conditions of the geographic unit, and that a revised value-added allocation is acceptable. The estimates are therefore usually left as they are, unless there is strong evidence of a problem, and data that allows for a corrective adjustment.

This modelling can't be used for activities with minimal employee costs, such as the renting and leasing of residential and commercial property. For example, a property renter may reside in Auckland and rent out a property in Waikato. In this instance there is no unit in Waikato and no staff. Creating notional units, as discussed earlier, for individual rental and commercial properties is not practical. A top-down approach is used as a practical way of deriving good quality regional estimates for the activity.

GDP relating to capital

There is a special case relating to the apportionment of large units across regions. This is where KAUs have large capital assets.

The significant components of value-added for a KAU are generally:

- compensation of employees
- consumption of fixed capital
- operating surplus.

The apportionment based on LEED effectively allocates GDP to geographic units in line with employee gross earnings (representing the bulk of the compensation of employees) of each geographic unit. This type of allocation (with variations depending on data availability) is adopted by most compilers of regional GDP, since other sources of GDP are likely to be correlated with the level of employee gross earnings.

However, the correlation assumption breaks down for a KAU with large capital assets in one region, and employees concentrated in another region. Using the standard apportionment method tends to allocate too much GDP to the region with the employees, at the expense of the region with the capital assets. Basically, the consumption of fixed capital component of GDP (relating in the main to the large capital assets) is being allocated to the wrong region.

Thus a 'capital intensive' adjustment has been applied to some industries with large capital assets in regional GDP estimates. In line with international methodology, the LEED apportionment method is used for the compensation of employees component of GDP. The modification is that the consumption of fixed capital component is allocated to regions, using a regional asset indicator. Operating surplus and other components of GDP are allocated to regions, in proportion to the sum of the compensation of employees and consumption of fixed capital allocated. The allocation of consumption of fixed capital, plus a portion of operating surplus, to the region with the capital assets represents the overall returns to capital of the KAU.

A regional asset indicator can be any appropriate indicator of capital in the absence of actual regional asset values. For example, electricity generation consumption of fixed capital is allocated to regions based on the maximum output of each generation source, by KAU by region.

In practice, adjusting regional GDP in this manner has only been done for KAUs within the mining, construction, and electricity, gas and water supply industry.

For other industries a capital intensive adjustment was tested, but was found to lead to results similar to those obtained from standard apportionment procedure. In some instances, a capital intensiveness adjustment could not even be tested due to a lack of appropriate regional asset indicators.

National GDP process and regional GDP process

The annual national accounts are compiled in stages, starting from raw survey data. Regional accounts are compiled in a similar manner.

In national GDP compilation a number of corrections and conceptual adjustments are made to the raw data. The regional accounts compilation mirrors these adjustments, although additional analysis may be required to allocate these adjustments to specific regions.

A good example of this is a unit that is balance-date adjusted. The national accounts (and the regional GDP estimates) are produced on a March-year basis. To put the estimates on a March-year basis, the survey data for some firms may be adjusted. Where a firm is balance-date adjusted in the national accounts, this adjustment relates to a specific firm. In the regional accounts, this adjustment should be allocated to the region of the firm that is being adjusted.

In any case, the general principle is quite straightforward. National accounts data and adjustments are analysed, and regionalised as well. The tables recording the treatment of each compilation stage are referred to as process tables. These show how all data sources and their adjustments are treated in the regional accounts.

Corrections for errors, balance-date adjustments and other adjustments are made to almost all national accounts industries. When reading the methodology section below, it should be remembered that these adjustments are applied to each industry.

5. Summary of regional GDP industry methodology

Industry comments and data sources

This section summarises the methodology at a more detailed level than the 16-industry published level. The published industries are aggregates of these more detailed industry workings.

The methodology developed here was to demonstrate the feasibility of producing regional GDP. In some instances, the methodology for specific industries could be developed further. For example, in several cases GDP is allocated to regions using a population indicator. With more time and investigation, more sophisticated indicators could be developed.

Agriculture

Agriculture GDP is allocated to regions using a top-down regional gross-output indicator. The indicator is built up from commodity estimates. The largest commodities are: dairy, cattle slaughtering, sheep slaughtering, agriculture services, sales of live animals, fruit and nuts, crops and seeds, and vegetables.

Regional agriculture commodity ratios are derived from regional volume and (sometimes) price data. These ratios are applied to the national commodity gross-output total. In practice, volume data may be solely used for regional ratios if price data is unavailable, or if there is little or no regional price differential (dairy is an example of this).

As an example, if national dairy gross output is \$5 billion and Waikato accounts for 20 percent of dairy volume, then the Waikato agriculture gross-output indicator will include \$1 billion from dairy (20 percent of \$5 billion). The total Waikato agriculture indicator is the sum of the individual commodity gross output estimates.

This approach is useful as an explanation since as regional agriculture movements can be directly related to actual regional events. A good example is a drought, which can be seen affecting milk production levels. The Ministry of Agriculture and Forestry (MAF) also uses a commodity approach in its regional agriculture commentaries, making MAF regional overviews a good reference for regional GDP agriculture validation and commentary.

The gross-output indicator could be improved slightly by deriving regional intermediate consumption estimates, and creating a regional value-added indicator instead of a regional gross-output indicator.

Agriculture services is estimated separately using a bottom-up approach based on AES data.

Forestry and logging

The forestry and logging industry grows and maintains plantation forests. Logging includes the activity of harvesting, up to the stage of creating logs. Processing beyond this point is classified to the wood and paper product manufacturing activity, within published manufacturing.

This industry is estimated by using a bottom-up approach based on AES data.

An exception is the change in standing-timber growth, which is not available from AES and uses a separate top-down method. The change in standing-timber growth is net of removals. In recent years this figure has been positive, worth hundreds of millions of dollars. Standing-timber growth is allocated to regions using regional standing-timber and wood-supply data supplied by MAF. It should be noted that MAF regions are wood-supply regions, and have been converted to administrative regions by

using territorial authority data on standing-timber volumes from the MAF National Exotic Forest Description.

Fishing

The fishing industry involves catching and gathering of marine life, and aquaculture. Note that fish processing is included in food, beverage and tobacco manufacturing activity, within manufacturing.

This industry is estimated by using a bottom-up approach based on AES data. The bottom-up method allocates geographic-unit value-added to the unit's physical location (usually a port). However, the capital of this industry is very mobile and ships may operate in multiple ports. This treatment could be reviewed if usable data on fishing vessel movements and asset values was available.

Mining

The mining industry includes oil and gas exploration and extraction, as well as mining and quarrying.

This industry is estimated by using a bottom-up approach based on AES data.

The capital intensive method has been applied to petroleum extraction. No indicator was used in this instance as all consumption of fixed capital relating to petroleum exploration was allocated to the Taranaki region.

Manufacturing

Manufacturing industries are estimated by using a bottom-up approach based on AES data.

The capital intensive method was tested for all activities in this industry. For many industries within manufacturing, the firms with large capital were concentrated in one region, and no adjustment was considered. There are a number of firms in food, beverage and tobacco manufacturing with capital assets across several regions. Due to lack of appropriate indicator data, we could not construct a capital indicator for these firms, nor test the capital intensive method for this industry.

Wholesale trade and retail trade

The wholesale trade and retail trade industries are estimated by using a bottom-up approach based on AES data.

Electricity, gas and water supply

The electricity, gas and water supply industry includes electricity generation, and transmission and supply, including electricity retailers. Water supply includes the operation of sewerage and drainage services.

This industry is estimated by using a bottom-up approach based on AES data.

The capital intensive method has been applied to electricity generators. The indicator used is maximum generation capacity. In other words, electricity generators' consumption of fixed capital, by firm, has been allocated to regions – based on the firm's electricity generation capacity in each region. Transmission lines have not been given any special treatment, and have been allocated to regions using the default bottom-up approach.

Construction

Construction includes construction and repair of buildings, roads, rail, harbours, water mains, transmission lines, pipelines or other civil engineering projects. Defence construction is included in central government.

This industry is estimated by using a bottom-up approach based on AES data.

International regional GDP compilers often find temporary building sites an issue because they are difficult to identify. Consequently, construction activity may not be allocated correctly to regions. This is not considered a major issue in the New Zealand accounts since LEED records staff activity in temporary building sites.

Transport and storage

The transport and storage industry provides passenger or freight services by road, rail or air.

This industry is estimated by using a bottom-up approach based on AES data.

An adjustment for mobile capital was considered for air transport. The indicator tested was based on regional domestic passenger movements. The results obtained were similar to those obtained from the bottom-up approach so no adjustment has been made, and the bottom-up approach is used.

Communication services

The communication services industry provides postal, courier and telecommunications services.

This industry is estimated by using a bottom-up approach based on AES data.

A capital-intensive adjusted method was considered but no data was available to make an adjustment.

Finance and insurance

Finance and insurance includes all units engaged in the provision of finance: financial asset investing; services to lenders, borrowers and investors; and insurance cover of all types.

This industry is generally estimated using bottom-up AES data. An exception is the superannuation activity (the operation of funds for the provision of retirement benefits) which is allocated to regions by using a top-down population indicator.

Property services

This property services industry includes all units predominantly engaged in renting and leasing assets, including buildings.

The activities of renting or leasing residential and commercial residential property are measured using top-down methods.

For the renting and leasing of residential property the top-down indicator is based on regional rentals and regional private-rental dwelling numbers. For the renting and leasing of commercial property, the top-down indicator essentially models the use of commercial property by each region, based on industry ratios for the use of commercial property. (This is therefore one of the last estimates made in the system as its derivation requires the estimates for all other industries in each region.)

All other activities in property services, such as real estate agents, and machinery and equipment hiring and leasing, are estimated by using bottom-up AES data.

Ownership of owner-occupied dwellings

Ownership of owner-occupied dwellings is an estimate of the imputed rental services of owner-occupied dwellings.

This is estimated by using a top-down regional indicator based on average regional rentals, multiplied by the number of owner-occupied dwellings in the region.

Business services

Business services covers a range of services, including: legal and accounting, marketing and business management, technical, computer, and employment placement and secretarial services.

This industry is estimated by using a bottom-up approach based on AES data.

Central government

The central government industry mainly consists of units engaged in formulating and administering central government policy. Public schools and hospitals are included in the education and health industries, respectively.

This industry is estimated by using bottom-up methods, with the data source being the Crown Financial Information System (CFIS) rather than AES.

Transit New Zealand's consumption of fixed capital is allocated to regions, based on its regional expenditure on road maintenance.

Local government

The local government industry includes units mainly engaged in local government administration, including regional, city and district councils.

This industry is estimated by using bottom-up methods, although the data source is the Local Authority Survey rather than AES. District councils are allocated to the region they predominantly serve.

Education

This industry includes all units engaged in providing education, including universities, schools, and training services.

The Ministry of Education and special school education applies the bottom-up approach, using CFIS data.

Pre-school is estimated by using bottom-up estimates derived from data from individual kindergartens or regional associations.

Primary and secondary schools are allocated to regions by using a top-down measure of the number of teachers. Primary and secondary school data is supplied at an aggregated level and needs to be broken down. The top-down method for primary and secondary education is considered to be reasonable as salaries and wages is such a large component of GDP.

Tertiary is estimated by using bottom-up data which is available by institution. The estimates are generally based on information from annual reports, which is consistent with the national accounts.

Market and non-profit institutions are estimated by using a bottom-up approach based on AES data.

Health and community services

The health and community services industry includes hospitals, other medical and dental services, veterinary services, childcare and residential care services.

Market and non-profit institutions are estimated by using a bottom-up approach based on AES data.

District health boards are compiled by using a bottom-up approach applied to the District Health Board Survey.

Other non-market government health institutions use the bottom-up approach applied to CFIS data.

Cultural and recreational services

The cultural activities in this industry include film and video production, distribution and exhibition; radio and television services; libraries; museums; and the arts. Recreation includes the provision of sports grounds and facilities, the provision of racing facilities, and gambling services including lotteries and casinos.

Market and non-profit institutions serving households are estimated by using a bottom-up approach based on AES data.

Non-market government is estimated using a bottom-up approach applied to CFIS data.

Personal and other services

Activities in the personal and other services industry include personal and household goods hiring, laundries, dry-cleaning, photographic services, gardening services, hairdressing, and staff employed by households. Religious organisations and interest groups are also included here.

Religious organisations and private households employing staff are estimated by using a top-down population indicator. It might be possible to investigate using LEED instead.

Market and non-profit institutions serving households (excluding religious organisations) are estimated by using a bottom-up approach based on AES data.

Non-market government is estimated by using a bottom-up approach applied to CFIS data.

Summary of Regional GDP Industry Methodology

Regional GDP published industry	National Accounts industry	Regional GDP method
Agriculture	Agriculture	Top-down gross-output indicator based on commodity estimates. Exception: agriculture services – bottom-up AES
Forestry, logging and fishing	Forestry and logging	Bottom-up AES Exception: net change in standing timber allocated to regions by using top-down change in net standing-timber volume
Forestry, logging and fishing	Fishing	Bottom-up AES
Mining, construction, and electricity, gas and water supply	Mining	Bottom-up AES Capital-intensive adjustment is applied
Manufacturing	Food, beverage and tobacco manufacturing	Bottom-up AES
Manufacturing	Textile and apparel manufacturing	Bottom-up AES
Manufacturing	Wood and paper products manufacturing	Bottom-up AES
Manufacturing	Printing, publishing and recorded media manufacturing	Bottom-up AES
Manufacturing	Petroleum, chemical, plastic and rubber product manufacturing	Bottom-up AES
Manufacturing	Non-metallic mineral product manufacturing	Bottom-up AES
Manufacturing	Metal product manufacturing	Bottom-up AES
Manufacturing	Machinery and equipment manufacturing	Bottom-up AES
Manufacturing	Furniture and other manufacturing	Bottom-up AES
Mining, construction, and electricity, gas and water supply	Electricity, gas and water supply	Bottom-up AES Capital-intensive adjustment is applied to electricity generation
Mining, construction, and electricity, gas and water supply	Construction	Bottom-up AES Exception: Owner builders – top-down indicator based on population
Wholesale trade	Wholesale trade	Bottom-up AES
Retail trade	Retail trade	Bottom-up AES
Accommodation, restaurants and bars	Accommodation, restaurants and bars	Bottom-up AES
Transport, storage and communication services	Transport and storage	Bottom-up AES

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Regional GDP published industry	National Accounts industry	Regional GDP method
Transport, storage and communication services	Communication services	Bottom-up AES
Finance and insurance	Finance and insurance	Bottom-up AES Exception: Superannuation funds – top-down indicator based on population
Property services	Property services	Residential property operators: top-down indicator based on regional rental value and regional private rental dwellings Commercial property operators: top-down indicator based on modelled estimates of industry use of the activity. Property services: bottom-up AES
Ownership of owner-occupied dwellings	Ownership of owner-occupied dwellings	Top-down indicator based on number of owner-occupied dwellings times average equivalent rental value
Business services	Business services	Bottom-up AES
Central and local government administration	Central government administration	Bottom-up CFIS Transit New Zealand consumption of fixed capital: top-down indicator based on regional expenditure on roads
Central and local government administration	Local government administration	Bottom-up LAS
Education, health and community services	Education	Ministry of Education and special services: bottom-up CFIS Pre-school: bottom-up data from kindergartens or regional associations Primary and secondary: top-down by number of teachers Tertiary: bottom-up estimates from annual reports Market and non-profit institutions: bottom-up AES
Education, health and community services	Health and community services	District health boards: bottom-up DHB survey Other non-market government: bottom-up CFIS Market and non-profit institutions: bottom-up AES
Cultural and recreational services	Cultural and recreational services	Non-market government: bottom-up CFIS Market and non-profit institutions: bottom-up AES
Personal and other services	Personal and other services	Non-market government: bottom-up CFIS Market and non-profit institutions: bottom-up AES Exceptions: religious organisations and private households employing staff – top-down population indicator

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Appendix

Regional GDP and National-Level Published Industries

Australia and New Zealand Standard Industrial Classification (ANZSIC)

Regional GDP published industries	National-Level GDP published industries (ANZSIC division or subdivision)
Agriculture	Agriculture (A01, A02)
Forestry and fishing	Forestry and logging (A03) Fishing (A04)
Mining, construction, and electricity, gas and water supply	Mining (B) Electricity, gas and water supply (D) Construction (E)
Manufacturing	Food, beverage and tobacco manufacturing (C21) Textiles and apparel manufacturing (C22) Wood and paper product manufacturing (C23) Printing, publishing and recorded media (C24) Petroleum, chemicals, plastic and rubber product manufacturing (C25) Non-metallic mineral product manufacturing (C26) Metal product manufacturing (C27) Machinery and equipment manufacturing (C28) Furniture and other manufacturing (C29)
Wholesale trade	Wholesale trade (F)
Retail trade	Retail trade (G)
Accommodation, restaurants and bars	Accommodation, restaurants and bars (H)
Transport, storage and communication services	Transport and storage (I) Communication services (J)
Finance and insurance	Finance and insurance (K)
Property services	Property services (L77)
Ownership of owner-occupied dwellings	Ownership of owner-occupied dwellings
Business services	Business services (L78)
Government administration and defence	Central government administration and defence (M) Local government administration (M)
Education, health and community services	Education (N) Health and community services (O)
Cultural and recreational services	Cultural and recreational services (P)
Personal and other services	Personal and other services (Q)

Glossary

National accounts definitions

Basic price

The amount receivable by the producer from the purchaser for a unit of a good or service produced as output, minus any tax payable, and plus any subsidy receivable. It excludes any transport charges invoiced separately by the producer.

Compensation of employees

Total remuneration, in cash or in kind, payable by enterprises to employees. Includes contributions paid on employees' behalf to superannuation funds, private pension schemes, the Accident Compensation Corporation, casualty and life insurance schemes, and other fringe benefits.

Consumption of fixed capital

This represents the reduction in the value of the fixed assets used in production during the accounting period, resulting from physical deterioration, normal obsolescence or accidental damage. It is valued at replacement cost.

Gross domestic product (GDP) – expenditure

The total market value of goods and services consumed from New Zealand at purchaser's prices, including final consumption, gross fixed capital formation and net exports. The regional GDP estimates do not use this approach, they are based on the production measure of GDP.

Gross domestic product (GDP) – production

The total market value of goods and services produced in New Zealand after deducting the cost of goods and services used in the process of production, but before deducting allowances for the consumption of fixed capital. The regional GDP estimates use this measure.

Gross operating surplus

This residual item is output at producer's values, less the sum of intermediate consumption, compensation of employees, and taxes on production and imports net of subsidies. It is approximately equal to accounting profit before the deduction of depreciation, direct taxes, dividends, interest paid and bad debts, and before the addition of interest and dividends received.

GST (goods and services tax) on production

The transactions of registered producers are recorded excluding GST, while those of final consumers (including producers of exempt goods and services) are recorded at actual market prices. The potential imbalance between the value of goods and services produced, and the value ultimately consumed, is removed by including the item 'GST on production' in the GDP account. This item produces a measure of the amount of GST included in the valuation of the final demand categories.

Intermediate consumption

The value of non-durable goods and services used in production. Valuation is at purchaser's values.

Output

Output consists of goods and services produced within an establishment that become available for use outside that establishment, plus any goods and services produced for own final use.

Producer values

The equivalent of purchaser values (see below), reduced by the trade and transport margins for delivering the items from producer to purchaser. This effectively gives the market sales value for the producer at the factory door, farm gate, mine head, and so on. For services, the producer value is the same as the purchaser value, as services are produced and consumed at the same time.

Purchaser values

The costs in the market of goods and services on delivery to the purchaser. For services, the purchaser value is the same as the producer value, as services are produced and consumed at the same time.

Subsidies

Current unrequited payments made by governments to enterprises, on the basis of the levels of their production activities or the quantity or value of the goods and services they produce, sell or import.

Taxes on production and imports

Taxes assessed on producers in respect of the production, sale, purchase and use of goods and services, and which add to the market prices of those goods and services. Includes sales tax, local authority rates, import and excise duties, fringe benefits tax, and also registration fees, such as motor vehicle registration, paid by producers.

Value-added

Used interchangeably with the term gross domestic product. The value added to goods and services by the contributions of capital and labour (ie after the costs of bought-in materials and services have been deducted from the total value of output).