

**THE STATISTICS NEW ZEALAND AND STATISTICS NORWAY  
CONSUMERS PRICE INDEXES  
A COMPARISON**

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**Abstract**

As a cardinal output produced by national statistics offices, the Consumers Price Index (CPI), was identified by Statistics Norway and Statistics New Zealand as a significant output for comparison. Such a comparison would allow greater collaboration and learning between the two organisations and present recommendations that are applicable to the wider statistical community.

This paper outlines the respective purpose, conceptual approach and practical applications of best practice with regard to price collection, validation, calculation and dissemination practices of the CPIs of Statistics New Zealand and Statistics Norway. Furthermore, challenges and opportunities facing both organisations are analysed and followed by recommendations concerning the learning opportunities and areas for future improvements to practices.

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# 1. Introduction

In 2005 Statistics New Zealand and Statistics Norway initiated a comparison between the two statistical offices. As a cardinal output produced by national statistics offices, the Consumers Price Index (CPI), was identified as a significant output for comparison. Such a comparison would allow greater collaboration and learning between the two organisations and present recommendations that are applicable to the wider statistical community. The CPI was one of several outputs and projects identified where the two statistical offices could learn from each other's practices and undertake a benchmarking exercise with respect to methodology, processes and procedures. The comparison was initiated as the both countries are similar in size, population and composition. This enables considerations concerning resourcing, user needs, etc to be made in similar context. Conversely the CPI for each country is very different, allowing more of a counterfactual comparison.

This paper outlines the respective purpose, conceptual approach, and practical applications of best practice towards price collection, validation, calculation and dissemination practices of the CPIs of Statistics New Zealand and Statistics Norway. Furthermore, challenges and opportunities facing both organisations are analysed and followed by recommendations concerning the learning opportunities and areas for future improvements to practices.

## 1.1 Background

In both Norway and New Zealand the CPI is one of the best-known macro-economic statistical indicators, alongside Gross Domestic Product, and is used to measure the development in consumer prices or inflation in the economy. The comparison of the CPI of New Zealand and Norway was undertaken with respect to the underlying objective of the CPI, the resulting methodology, practical compilation and processing. The paper also briefly discusses differences in organisational aspects in both countries.

The CPI presents a unique opportunity for comparison, in that, while the indexes at first glance have similar key uses, albeit with slightly different emphasis (monetary policy, indexation of govt benefits etc), and the user communities in each country have similar perceptions as to the high-quality information provided by the two indexes, the underlying concept for the construction of the CPI is fundamentally different in each country. In New Zealand, the CPI is defined primarily as an inflation index, whereas the Norway CPI is defined as a cost of living index. The choice of underlying concept has a strong influence on the chosen methodology of many areas, none more-so than the treatment of owner-occupied housing (OOH). In the New Zealand CPI, OOH is based on the net acquisition principle, whereas the Norwegian CPI uses the rental equivalence approach.

Another significant difference is the frequency of the index. In New Zealand the CPI is calculated and published as a quarterly index, with only the food group published monthly, while in Norway the CPI is published on a monthly basis.

Due to these main differences it is interesting to discuss how this might have influenced the choice of methodology and practical compilation.

## 1.2 Structure of the paper

Section 2 of this paper sets out the purpose and conceptual approaches adopted by the Norwegian and New Zealand CPI, while section 3 details the implications of this for the choice of index construction. As a significant difference between the two indexes, the treatment of owner-occupied dwellings is outlined in section 4 followed by ongoing weighting review and

methodology in section 5. Ongoing collection, calculation, sampling and methodology are detailed in section 6 and 7, while section 8 details specific goods and services for comparison. Dissemination techniques and channels are described in section 9. Section 10 looks at the ongoing development and management of the Norwegian and New Zealand CPI, and section 11, the resources required for all of the above.

Sections 12, 13 and 14 summarise the key initiatives going forward, points for comparison and recommendations.

Throughout this paper recommendations, confirmation of existing practices, areas for refinement, areas for development or areas for future research and improvement are highlighted.

## **2. Purpose and conceptual approach**

### **2.1 Conceptual approach**

Conceptually, CPIs can take one of three broad approaches in their underlying conceptual approach, namely, the uses, payments, or acquisitions approach. Each of these approaches gives rise to different treatment of particular items, and also different interpretation and ultimate end use. As mentioned above, the CPIs of New Zealand and Norway differ in their underlying concepts. The New Zealand CPI is an acquisitions index and is defined as a measure of inflation, while the Norwegian CPI is regarded as a cost of living index (COLI). An inflation index is often restricted to goods and services acquired by households in monetary transactions, while a COLI index attempts to represent a wider set of prices, such as imputed prices.

### **2.2 Objective of the CPI**

The New Zealand CPI is a measure of the price change of goods and services purchased by private New Zealand households. The CPI measures the changing cost of purchasing a fixed basket of goods and services which represents the expenditure pattern of New Zealand households on average at the index base period.

The primary purpose is as a measure of inflation for use in monitoring economic and monetary policy<sup>1</sup>; an indicator of the effect of price change on the purchasing power of households' incomes, as a means to adjust benefits, allowances and incomes, some excise duties and income thresholds for government assistance, and as a price deflator in the construction of constant price Gross Domestic Product and Retail Trade statistics.

The CPI in Norway measures the price change of goods and services purchased by private Norwegian households. It measures the cost of purchasing a fixed basket of goods and services from one period to another. The fixed basket represents the average expenditure pattern of Norwegian households (the resident concept).

The CPI is used as an indicator of the inflation in consumer prices faced by private households. It is also used as an indicator for monitoring the effect of price change on the purchasing power of households' incomes, as a price deflator in National Accounts, and for adjusting contracts, etc.

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<sup>1</sup> The New Zealand CPI is the key indicator for the monitoring of monetary policy. The Reserve Bank of New Zealand is charged with maintaining the annual change in the all groups CPI between 1 and 3 percent, over the medium term. This is institutionalised in the Policy Targets Agreement between the Minister of Finance and the Governor of the Reserve Bank.

A sub-aggregate series that is adjusted to exclude the effects of taxes and energy in the CPI is compiled for use by the Norwegian Central Bank in their inflation targeting regime.<sup>2</sup> These sub-aggregates are CPI adjusted for taxes (CPI-AT), CPI adjusted for taxes and excluded energy (CPI-ATE) and CPI excluded energy (CPI-AE).

Interestingly, while the objective of each index is different, the uses of each are largely in line with one another. This can be seen that while the Norwegian CPI is a cost-of-living measure, it is also used as an inflation measure. Similarly, in New Zealand, it is an inflation measure, and used to adjust benefit payments and to adjust for changes in household purchasing power<sup>3</sup>.

***Recommendation 1:** That the New Zealand and Norwegian CPIs retain their respective conceptual approaches, given the different desired purpose of the index in each country.*

### **3. Scope, Coverage and Index Construction**

#### **3.1 Scope and coverage**

Further to the conceptual approach detailed above, the CPI's scope must be explicit so that the universe of transactions of interest can be defined. The choice of conceptual approach plays some part in deciding the transactions that a CPI sets out to measure, however, the transactors also play a large part in defining the transactions within the scope of a CPI.

The New Zealand CPI measures the changing cost to private New Zealand households for purchasing a fixed basket of goods and services. The target population for the CPI and the Household economic Survey (HES) is New Zealand-resident, private households living in permanent private dwellings. This does not include overseas visitors who expect to be resident in New Zealand for less than 12 months; people living in non-private dwellings such as hotels, motels, boarding houses, hostels, motor camps and homes for the elderly; patients in hospitals; residents of psychiatric and penal institutions; members of the permanent armed forces; members of the non-New Zealand armed forces; and overseas diplomats. No exclusions of expenditure are made based on the age of head of household or household income.

Following from the conceptual approach, the scope of the index intends to measure net purchases by private households. This can be seen most notably in the treatment of the purchase of used cars and insurance. The expenditure on used cars can be regarded as special given the small trade-orientated nature of the New Zealand economy, where a large proportion of used cars purchased in New Zealand have been directly imported. The transactions of interest here cover the purchase of (often imported) cars from dealerships, not the transactions of used cars between households, and the net margin from sales of used cars by households and car dealerships. Insurance is measured by the net approach with respect to the expenditure assigned, however, the transactions measured are the gross premiums.

The Norwegian CPI covers the expenditures of all resident, non-institutional households (both urban and rural), except for those whose head of household is 79 years or older. The CPI reflects purchases of all goods and services offered to households in Norway including the

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<sup>2</sup> On March 29, 2001 The Norwegian government adopted a new Regulation on Monetary Policy. The Norges Bank (Central bank of Norway) is to implement a monetary policy aimed at an annual growth rate over time of 2.5 percent in consumer prices. According to the regulation, the direct effects of consumer prices caused by changes in interest rates, taxes, indirect taxes, and special temporary disturbances are not to be taken into consideration.

<sup>3</sup> Note there is often a tension with the objective of the CPI and its use. This was explicitly discussed at both the 1997 and 2004 New Zealand CPI Revision Advisory Committee.

shelter services of owner-occupied dwellings. It also includes own-account production of goods and services for own final consumption, but it excludes illegally sold goods and services.

The concepts and definitions of the Norwegian CPI are generally in line with the specifications recommended in the ESA95<sup>4</sup> and EU regulations. The main departures from the ESA95 are with the expenditure weights for insurances, the recording of services prices, and the exclusion of illegal goods and services. The insurance weights represent the gross expenditures by households on insurance premiums rather than the net expenditures (premiums less benefits). The recording of service prices occurs in the month for which consumption at the observed price commences, not the month in which the actual price is paid. For example, annual highway toll fees could be paid, for instance, in November, however, the new prices do not take effect until January and will not be reflected in the index until then. The exclusion of illegal goods and services is standard practice in price indexes and in agreement with specific EU regulations for price statistics.

### 3.2 Classification

Both the Norwegian and New Zealand CPIs make use of the internationally recognised, and International Labour Office (ILO) recommended, Classification of Individual Consumption According to Purpose (COICOP). COICOP is used both for the CPI and HES in both countries.

However, New Zealand only adopted a COICOP based classification with the implementation of the 2006 CPI review. As the adapted classification, called the New Zealand Household Expenditure Classification (NZHEC), replaced the previous classification, which was different in many respects, Statistics New Zealand has provided a long term time series of the lower level series. There are obvious benefits that stem from data integration with aligned classifications; however New Zealand's GDP Household Consumption Expenditure, while utilising a classification loosely based on COICOP, does not align well with the NZHEC.

Given the conceptual approach of the New Zealand CPI, changes were required to COICOP to align it closer with the acquisitions approach and the domestic economy. Series that align with COICOP divisions are also provided in line with ILO recommendations: *“For the purposes of international comparisons, the classification should also be reconcilable with the most recent version of the United Nations (UN) Classification of Individual Consumption According to Purpose (COICOP), at least at its division level”*.

In Norway the COICOP is followed in the classification of household expenditure for individual products and further refined by the addition of a fifth digit for grouping products in the HES. COICOP was introduced in 1999 and time series before 1999 were re-arranged to align with COICOP. The Norwegian industrial classification SIC94, derived from Classification of Economic Activities in the European Community (NACE rev. 1), is used for classification of retail outlets in the Business Register and in the Norwegian CPI.

### 3.3 Index formulae and construction

One major difference between the two CPIs is length of time between reweights. The Norwegian CPI is reweighted yearly, whereas the CPI of New Zealand has traditionally been reweighted every third year.

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<sup>4</sup> European System of National Accounts, the international standard that relates to the preparation of national accounts in EU/EEA countries, in effect from 1999

The New Zealand CPI is a Laspeyres type index (actually a Lowe index, as the weight reference period precedes the price reference period)<sup>5</sup>. Annual chaining is not currently possible as the HES is conducted only once every three years. Currently, every second reweight is also accompanied by a reselection of retail outlets and a review of the methodology. It is with the major review that the CPI is re-expressed to a base of 1000 for the new price reference period; this last occurred with the release of the September 2006 quarter, on a base of June 2006 quarter (=1000).

The Norwegian CPI is a Laspeyres type index (again, actually a Lowe index) which is calculating using annual links (August year t - July t+1) with July as the price reference month. These links are then multiplied to calculate the long-term index series; the reference year at the present is 1998. The Norwegian CPI is re-weighted in August every year when the new information from the HES is available.

### 3.4 Elementary aggregate index formulae

Elementary aggregates (EA) are calculated where no expenditure information is available. They can be of three forms, the arithmetic mean of price relatives (Carli), ratio of arithmetic mean prices (Dutot), or the geometric mean of price relatives (Jevons). The use of the Carli formula is advised against by the ILO, the Jevons formula is recommended where substitution is possible between outlets, and the Dutot formula is recommended where substitution is limited or zero prices are possible.

In New Zealand, elementary aggregates are calculated for about 685 representative items in each of the 15 pricing areas when prices are collected regionally. However, where postal questionnaires are used, or prices are collected nationally, or for broader groupings of regions, the national price movement is imputed into the 15 regions for aggregation.

With the implementation of the 2006 review, the Jevons formula was first used for items where consumers were able to substitute towards stores that show lower relative price change<sup>6</sup>. The Jevons formula is used to calculate most regional average prices for items that are collected regionally, although the Dutot formula is still used in some cases. The New Zealand CPI uses the Jevons formula for approximately 70 percent of the basket items (which represent about 56 percent of the weight of the CPI).

HES data on expenditure by type of store is used to weight outlet types, such as convenience stores, chemists, butchers, hardware stores, department stores and supermarkets. Further, Retail Trade Survey data on turnover is used to weight supermarket store chains relative to each other for combining prices collected at supermarkets.

In Norway, the EA level normally does not involve any weight information. The exception is the index for food and non-alcoholic beverages, alcoholic beverages and new cars where sales information is used as weights on EA level since these indexes are purely based on electronic transaction data. At present there are 826 representative items in the Norwegian CPI and eight major regions which should calculate to 7,200 EAs<sup>7</sup>. The EAs are calculated using the Jevons

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5 A price index that measures the proportionate change between period 0 and t in the total value of a specified basket of goods and services. The quantities in the basket will typically be those of some weight reference period b, which precedes the price reference period 0.

6 The Jevons formula is also used in some cases for nationally priced items for aggregating products within a provider. However, the Dutot formula is used to aggregate average prices for outlets. An example of this is internet services, where customers are assumed to substitute between plans for a given provider readily in response to relative price change, whereas they might not substitute between providers so readily.

7 All the representative items in the CPI are not present in every region. The number of EAs will therefore be lower than 7200.

formula for the price relatives of one commodity. This is used for almost 70 percent of the expenditure shares of the CPI. For the rest of the EAs in the CPI, the Dutot formula is used.

There are no inconsistencies in the overall CPI for Norway. The index is calculated item-by-item to derive the national index two ways. First, the items are aggregated by the COICOP classification (4, 3, 2, and 1 digit). Second, the CPI is also aggregated for delivery sectors – agriculture, fish, other domestic consumer goods, imported consumer goods, rent, and other services. Each item at the national level is assigned to one of these groups and aggregated to the total using the same item weights as in the COICOP aggregation.

#### **4. Treatment of owner occupied housing**

Although a dwelling is usually regarded as a fixed asset, meaning that the purchase of a dwelling is classified as gross fixed capital formation and not an acquisition of a durable consumer good, the purchase of a dwelling gives households access to a shelter service. Thus, the purchase of a dwelling represents a mix of investment and consumption expenditures. Owner-occupiers do not pay regular rent, so the cost of living in an owner-occupied dwelling, as well as the expenditures entailed, must be estimated. Owner-occupied housing can be treated according to either the use, payments or acquisition-approach and the approach chosen should be in line with the underlying purpose of the CPI.

One of the main differences between the New Zealand and Norwegian indexes is the method used to measure owner occupied housing, with New Zealand using the net acquisition approach and Norway use approach.

Two common methods are appropriate within the use-approach; rental equivalence and user cost. Both approaches are regarded as notional prices for the flow of services from an owner occupied dwelling used (ie consumed) each period. However, if the objective of the CPI is to measure a strict inflation index, notional prices are not recommended, and neither approach is appropriate. Since an inflation-index requires monetary transactions, the acquisition approach is a more appropriate way of estimating owner-occupied housing.

The choice of approach for owner-occupied housing has significant implications not only for pricing and weighting methodology, but also the impact of owner-occupied housing on the CPI. The respective treatment of owner-occupied housing is discussed below, followed by New Zealand research into the impact on the overall CPI.

Under the acquisitions approach, used for compiling the New Zealand CPI, the expenditure weight allocated to purchase of housing represents the value of the net increase in the stock of owner-occupied housing during the weight reference period. Expenditure on newly constructed dwellings by owner-occupiers, any net shift between owner-occupied dwellings and rental properties, and alterations and additions to established owner-occupied dwellings is included. Other expenditures relating to all areas of home ownership for which a good or service is being acquired are included within the scope of the CPI. These include local authority rates, dwelling insurance, real estate fees, repairs and maintenance.

Price change is based on the cost of constructing a new dwelling. To represent movements in the target expenditure on a constant quality basis, a survey of outlets that construct standard-plan houses is undertaken. Respondents are asked to provide a quote for standard-plan houses they build fairly regularly.



Quality defining characteristics are collected to ensure constant quality pricing. These include, number of bedrooms, important plan features (eg en suite) and significant structures. When the plan changes, or there are changes to a plan's specifications, the quality of these changes is assessed, and any price component deemed to be a result of quality change is removed. Furthermore, when price change is recorded, respondents are asked to provide reasons for the change in quote to assist in this assessment. It is also assumed that the house will be built on a level section and that the section (or land) is not part of the price.

To estimate the cost of owner-occupied housing Norway uses the rental equivalence approach. Norway has a sufficiently active rental sector, though only a minority of Norwegian households are tenants (23 percent according to the Population and Housing Census 2001). During the 1990s there has been a slight increase of the rental share probably due to rising house prices from 1993.

In 2005 Statistics Norway developed a new rental market survey that is conducted yearly. The comprehensive data from these surveys has given better knowledge of the rental market in Norway, especially about the price-determining factors for rents. According to this survey, size and geographical location of the dwelling, as well as the letting status is important to determine the rent. Typically rents will be lower if the landlord is a relative, a friend or the employer of the tenant. Similarly the rents in social rental dwellings and in student homes will be lower compared to private landlords (both professional and non-professional). The average rents in the survey are calculated for different segments of the market such as geographical areas, letting status, size (such as number of rooms and utility floor space), type of building, and period of tenancy.

Rented dwellings in Norway are typically private homes let out for hire for a certain length of time. Only a minority of dwellings in Norway are built for the purpose of renting only and these are principally student homes. The stock of rented dwellings is quite heterogeneous both with the distribution of different types of landlords, and the size and type of dwellings. Many single-family houses in Norway are designed so that a secondary housing unit, normally situated in the first floor or in the basement, can either be let out for hire or used as a part of the residence. Secondary units in single-family houses form a quantitatively important part of rental dwellings in Norway. Another characteristic ownership arrangement for rental dwellings are dwellings owned by households. Either the owner has an extra dwellings often acquired through inheritance, or she is temporarily absent from her ordinary dwelling. Secondary units and other private dwellings are the dominant types of private rental arrangements in Norway accounting for around 40 percent of the rental market.

A rental dwelling is classified as being owned by a professional landlord if either a company owns it or if it is privately owned and situated in a multi-family building (eg a block of flats), in which the majority of the dwellings are rental units. The share of the rental sector held by professional landlords is around 20 percent. Rental dwellings owned by employers (either in private or public sector) and let out for hire to employees constitute a low share of the Norwegian rental sector. Hospitals and armed forces mostly own those dwellings that are still present, but declining, in the housing stock. Social rental housing also counts for a low share in Norway. According to the Population and Housing Census 2001, rental dwellings where the municipality is the landlord make up less than four percent.

Although the rental market is quite active, the use of the rental equivalence approach is somewhat discussable due to the size of the rental market and as the rental and owner occupied markets are not perfect substitutes. Based on monthly rents from around 2,000 tenants, the cost of owner-occupied housing is estimated. In the monthly estimation of the "rent" of the owner-

occupiers, Statistics Norway stratifies observations along two dimensions – dwelling size and geographical location. Changes in the rent that are due to social benefits and thus not faced by owner-occupiers are not included in the calculation of the "rent" for owner-occupiers.

Due to the rental and owner-occupied markets are not being perfect substitutes, Statistics Norway has developed a regression model to estimate the weight for owner-occupiers. The regression model corrects the imperfections in the size of the dwellings and geographic location between the rental and the owner-occupied market. The estimated "rent" for each possible owner-occupier is then input in the HES. . To avoid "subsidised" rents, only private and professional landlords are included. This means that a private landlord that is related or has a friendship to the tenants, as well as social benefit landlords and employers, are excluded in the regression model.

Two different approaches to pricing and weighting of owner occupied housing have been adopted by Statistics New Zealand and Statistics Norway. Some preliminary research by Statistics New Zealand demonstrates that, over the period compared, there are quite significant differences between the current acquisitions-based CPI and both the CPI plus interest (payments) and the CPI with imputed rents (uses) series<sup>8</sup>.

***Recommendation 2:** Statistics Norway should consider alternative methods to the rental equivalence approach to estimate owner-occupied housing costs*

## 5. Weighting review and methodology

The New Zealand CPI is reweighted approximately once every three years to ensure that the expenditure weights allocated to the basket of representative goods and services continue to reflect the relative importance of goods and services acquired by households for consumption purposes. The time between reweights is well within the ILO recommendation of at least once every five years. The current price reference period is the June 2006 quarter, based on information from the 2003-04 HES and a number of other sources.

Information obtained from a range of other sources, including Statistics New Zealand surveys, government administration data, retail transaction data and information provided by businesses, is used to complement HES data. HES data requires additional data sources to provide an accurate estimate of expenditure for a number of reasons:

- Respondents tend to under-report expenditure on some goods and services (such as tobacco and alcohol)
- large, infrequent purchases (such as new dwellings and new cars) may not be reported frequently enough by the nearly 3,000 households in the survey to provide accurate estimates of total household expenditure.

Table 5.1 shows the proportion of the June 2006 quarter expenditure weights obtained from the HES for the sample of goods and services included in the CPI basket and the proportion of the weight estimated using sources other than the HES.

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<sup>8</sup> These series were constructed for analysis and provide indicative results only. For more on this research, please see Smedes M., (2005), Measurement Issues in the New Zealand Consumers Price Index, Paper presented at the OECD Seminar: Inflation Measures: Too High –Too low – Internationally Comparable?, Paris 21–22 June 2005

**Table 5.1 Breakdown of data sources for CPI expenditure weights**

Group	Household Economic Survey (HES)	Other sources	Total
	Percent		
Food	80.7	19.3	100.0
Alcoholic beverages and tobacco	0.4	99.6	100.0
Clothing and footwear	100.0	0.0	100.0
Housing and household utilities	45.0	55.0	100.0
Household contents and services	99.4	0.6	100.0
Health	17.1	82.9	100.0
Transport	71.4	28.6	100.0
Communication	100.0	0.0	100.0
Recreation and culture	93.7	6.3	100.0
Education	67.3	32.7	100.0
Miscellaneous goods and services	54.4	45.6	100.0
<b>All groups</b>	65.5	34.5	100.0

The table shows that 65.5 percent of the total expenditure weight was sourced from the HES, and the remainder was based on information from other sources. Of the HES-sourced weights, more than two-thirds comprised spending directly on goods and services in the basket, with the remainder being spending on goods and services not directly included in the basket.

HES was the main weighting source for communication (100 percent), clothing and footwear (100 percent), household contents and services (99.4 percent), and recreation and culture (93.7 percent). Groups where other information sources were heavily relied on included alcoholic beverages and tobacco (the HES contributed just 0.4 percent), health (17.1 percent), and housing and household utilities (45.0 percent).

Weighting information for the Norwegian CPI is collected via the HES, although this has a low response rate. From the HES Statistics Norway receive expenditures for each five digit COICOP category. Below this level, the expenditure shares are distributed to each representative item. The distribution within each five digit COICOP is based on different sources such as scanner barcode data, other sales information, etc.

The HES is conducted yearly using 26 panels of households surveyed every two weeks and covers all Norwegian private households except those whose head of household is 79 year or older. The households in the survey are selected using a two-stage sampling process. The first stage divides the geographic area of Norway into 109 geographic strata. All municipalities with 30,000 or more inhabitants are included in the sample and for the remaining strata the largest municipality in each is selected. The second stage involves the selection of individual households in each area using probability proportionate to size. Approximately 2,200 households participate in the survey throughout the year, averaging 85 per two-week period. The non-response rate is about 50 percent.

Each sampled household maintains a diary of purchases for a two-week period. This is followed by an interview survey to recall all major purchases during the 12 months prior to the survey period. The expenditure information is collected for around 800 items classified into five digit COICOP categories. From this information Statistics Norway estimates the annual household expenditures for the each of the representative items in the CPI. To avoid strong influence of one year of expenditures, the three-year moving average of HES expenditure

estimates to provide the weights for the CPI items at the national level. In August 2007, the moving average of the expenditures of 2004, 2005 and 2006 was introduced in the CPI.

One common problem in the HES could be underreporting of expenditures for specific consumption groups (ie tobacco, alcoholic beverages). For the time being, Statistics Norway does not adjust any expenditure. However, a project in Statistics Norway is investigating improved weights using, among others, national accounts data and scanner barcodes. As a result to this project the expenditures for liquor, wine and wine-based aperitifs were adjusted. The correction was based on scanner-data from Vinmonopolet, the state-owned liquor and wine stores which have a monopoly in the Norwegian liquor and wine market, and covered the population of retail sales of liquor and wine. This correction resulted in a significantly higher expenditure share for liquor. The expenditure share for wine and wine based aperitifs was also higher due to the correction.

When the CPI items are reweighted every year in August, CPI staff calculate the effects of the new weights on the published indexes and use this to complement information in the press release.

Overall, weights in both countries are derived from the equivalent to a household expenditure survey although in quite different ways. Statistics Norway reweight the CPI every year and do not make any adjustments to the HES figures. Statistics New Zealand reweights every three years and makes a number of adjustments to improve the HES figures, for either out of scope expenditure adjustment, under-reporting, or differences in methodology. In Norway the CPI and HES use the same classification while in New Zealand they were, up until very recently, different. Due to these and systems differences Norway can reweight the CPI within a week or two. The equivalent tasks in New Zealand takes months of effort.

***Recommendation 3:** Statistics Norway should utilise alternative sources of information to ensure the quality of CPI expenditure weights.*

## **6. Price collection and sampling issues**

### **6.1 Data collection**

Price collection stands out as a significant difference between the two CPIs. The use of field-collection by price collectors is a point of difference between New Zealand and Norway. While Norway is using price collectors for the initial visit only, Statistics New Zealand uses field collection for the ongoing collection of prices and relevant details. Furthermore, the use of scanner barcodes sets Norway apart from New Zealand, while both are utilising the internet and email as collection vehicles. The various modes of collection are set out below in table 6.1.1, although it should be noted it is difficult to accurately quantify exact proportions of the CPI collected through the different methods, as some items within the CPI are collected through a combination of the two methods.

**Table 6.1.1 Data collection methods – New Zealand and Norway**

Method of collection	Number of CPI representative items		Number of respondent businesses		Share of CPI weight		Response rate in percent	
	New Zealand	Norway	New Zealand	Norway	New Zealand	Norway	New Zealand	Norway
Field collection	515		4,404		56		100	
Questionnaires	117	572	2,462 <sup>1</sup>	2,784	29	32.5	96-97	93-95
Scanner barcodes		120 <sup>2</sup>		229		11.9		100
Other electronic data		12		432 <sup>3</sup>		5.4		100
Register (electronically)		7 <sup>4</sup>		894		17.1		
Internet	48	120	60	194	9	16.2	100	100
Email	5	4	15	10	6	3.0	100	
Telephone		2		2,100 <sup>5</sup>		13.9		70
<b>Total</b>	<b>685</b>	<b>826</b>	<b>6,941</b>	<b>4,545<sup>1</sup></b>	<b>100</b>	<b>100</b>		

(1) Tenants not included

(2) Detailed consumption groups that consists of several items

(3) Municipals

(4) Electricity including transfer, new vehicles and books

(5) Tenants in the rental survey

The New Zealand CPI uses four methods for collecting pricing information; postal questionnaires, field collection, internet and direct communication (primarily email). Prices are collected weekly, monthly, quarterly or annually – depending on the expected frequency of price changes exhibited by the good or service. Weekly surveys are conducted for fresh fruit and vegetables, and motor fuels. Monthly surveys are limited to food, non-food groceries, electricity, gas, tobacco, alcoholic drinks, newspapers, internet services, cellphones, rental cars, and air travel. Some items are monitored throughout the quarter, eg telephone call charges. Items like tertiary education fees, where the prices are set once a year, or seasonal/fashion clothing, which are only available in some seasons, are surveyed annually. All other items are priced during the middle month of the quarter, for field-collected items, or at the middle of the middle month for most postal collections.

A large proportion of prices are collected by personal visits to retail stores by Statistics New Zealand field collections staff based in 15 main urban areas around New Zealand. Although this is a time consuming and resource intensive task, it allows accurate prices and sufficient price determining characteristics for each item to be collected and monitored. During pricing any changes in quality or quantity are noted by staff and discussed with the retailer. This method places lower burden on the respondent than a postal survey.

Postal surveys are used where it is not practical for an interviewer to pay a personal visit to an outlet or where a price can be accurately obtained from a questionnaire.

Where possible Statistics New Zealand uses electronic information obtained directly from agencies (eg rentals from Housing New Zealand).

When prices are controlled by a national authority and the same price applies to all regions (eg motor vehicle relicensing fees) or when the expenditure on an item (eg hotel and motel accommodation) is not linked to the area of residence, or when the sample size means that

regional data would be unreliable, national average prices are used. This means that the same price is used for each region in the CPI.

The Norwegian CPI also uses four methods for collecting prices; questionnaires (both postal- and web-based), scanner barcodes and other electronic data, and central collected prices through the internet or direct communication (either through email or telephone). The expanded use of scanner barcodes in the Norwegian CPI is unique. For the sub-index food and non-alcoholic beverages, Statistics Norway receives around 300,000 price observations each month from the big retail chains. All these price observations are placed in 120 very detailed consumption groups. From Vinmonopolet Statistics Norway receives scanner barcodes each quarter. The price development of medicine and health related products are also based on scanner barcodes from drug stores, while the prices of electricity including transfer, new vehicles and books are taken from electronically registers.

Approximately 500 of the total 2784 outlets in the sample receive and report the questionnaires through the internet (web based). In addition, all 432 municipals in Norway are reporting local taxes connected to dwellings electronically, as well as households' payments to kindergartens, through web-based questionnaires. However, the electronic price collection among municipals is a collaborative project between the government, municipals and Statistics Norway, with the reported prices collected centrally by Statistics Norway. As such, the CPI staff are not involved in the data capture phase. Prices for electricity tariffs including transfers, new cars and books are taken from electronically registers.

Quite a lot of centrally collected prices are taken from the internet, especially prices for different services. This includes prices controlled by the government where the same price applies to all regions, eg medical and physical treatment. Prices for cinemas and theatres, airline tickets, newspaper subscriptions, and holiday package tours are all typically collected through the internet.

Prices are recorded for the 15th of the reference month and collected monthly for most items. For the main part, prices are collected monthly. The other prices are collected either quarterly or once or twice a year, depending on the frequency of price changes, for example prices for car insurance, newspaper subscriptions, and cinemas and theatres are collected quarterly, while prices for items such as kindergarten fees, after-school activities, sporting activity fees, and dental services are collected twice per year. Other items such as bus tickets, TV license fees, cable TV fees, and new boats, whose prices typically change annually, are collected once per year.

***Recommendation 4:*** *Statistics New Zealand should investigate the greater use of technology for price collection to increase efficiency, such as scanner data sources, administrative data and field collection by handheld devices*

***Recommendation 5:*** *Statistics New Zealand should consider improvements to processes and systems to streamline data collection and processing, and the collection of data by electronic collection means.*

## **6.2 Outlet samples**

In New Zealand sample frames are selected by the appropriateness of the potential pool of respondents. Appropriateness refers to the coverage of the sample frame (both geographical and sales to the target population), ability to exclude businesses serving businesses, and completeness of the frame. The primary source for initial samples is the Statistics New Zealand Business Frame (BF). This is an administrative data source of all businesses registered with

Inland Revenue Department for Goods and Services Tax (GST). Other frames have been utilised such as administrative lists from other government organisations and industry bodies. Respondents have traditionally been selected via purposive sampling, but with some use of random sampling techniques. Maintenance of the sample is undertaken purposively, usually from sources such as the internet and phonebook.

For each grouping of similar goods and services in the basket that are visited by price collectors in each of the 15 regional centres, collectors were given target numbers of outlets to select, broken down by store type (such as 'department store' and 'appliance store'). Store type information from the HES was used to determine the main store types for each group of similar goods and services in the basket. In some cases, price collectors were also given further guidance about specific chains to include in the sample. Price collectors then used their judgement to select representative retail outlets in the pricing centres, to meet the target numbers of outlets.

The primary source for drawing the sample of outlets for the Norwegian CPI is the Central Register of Establishments and Enterprises (CRE). This is an administrative data source that covers all establishments on the Norwegian mainland classified according to NACE<sup>9</sup>.

An establishment is registered to all new legal units, with some rare exceptions. There are some units that never take up any economic activity, and the number of registered establishments is therefore higher than the number of active establishments. New establishments are included in the statistics until we have information from statistical or administrative sources. Establishments that are not active according to statistical or administrative sources are not included in the statistic.

The quality of the population of active enterprises is monitored by directly contacting units in connection with data like turnover and persons employed (among other things) that is captured by Structural Business Statistics (SBS) and through administrative registers in the monitoring system for establishments in the CRE. The quality regarding the industry code for establishments and enterprises in the CRE is continuously maintained. This takes place by contacting the enterprises in the SBS surveys, through administrative sources such as the National Insurance Administration's annual check, and in other ways through direct contact with the enterprises.

Other frames used when drawing the CPI sample of outlets are the administrative list from big retail chains and lists from other government organisations.

Each year, 1/6 of the outlets are replaced by a new sample. The frame from which the sample is obtained is stratified into geographical locations; the same eight major regions as used in the calculation of the CPI and industrial classification. Within each strata, the sample of outlets is selected by probability proportional to size (PPS) methods where historic sales are used as a size variable. The advantage of PPS sampling is the inclusion of the largest units with certainty while still giving all units a non-zero probability of inclusion. Due to the assumption that price development for food and non-alcoholic beverage do not differ between regions, the frame of retail chains is stratified into store and profile, eg low price, medium price and high price.

***Recommendation 6:*** *Statistics New Zealand should investigate the greater use of random selection of outlets.*

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<sup>9</sup> The current Standard for Industrial Classification (SN94) used in Statistics Norway, is based on the EU's standards NACE Rev. 1

**Recommendation 7:** *Consideration should be given by Statistics Norway to evaluate the stratification of the outlet samples by geographical location.*

### **6.3 Product sampling**

The product groups selected by the national statistical offices can have a tight or loose specification depending on the product group. A tight product specification means a precise and restrictive definition, so the product group narrows. A loose product specification is vague and permissive, so that the product group widens. For example, specifying a TV set of a particular brand and model would be a tight specification, while just “TV sets” would be a loose specification because it allows for all kinds of TV sets. An intermediate option could be to specify the screen size but no other features of the TV as done in the Norwegian CPI, while clothing and furniture often require loose specifications because there are so many brands and styles that different outlets rarely sell exactly the same products.

The pricing specifications for the goods and services priced at retail outlets in the New Zealand CPI was reviewed as part of the 2006 CPI review to ensure that surveyed varieties and sizes are representative of household purchases. The samples of product sizes, brands and varieties were reselected at that point with assistance from scanner data.

Furthermore, the summary information collated from retail transaction data for supermarkets (obtained from ACNielsen) and for appliances (obtained from GfK) is used to:

- determine representative specifications for goods in the basket
- provide price collectors with information about the market shares of the main brands
- provide price collectors with specific brand-share targets for selected goods, to ensure that the mix of brands in the CPI price samples reflected market shares.

Product sampling in the Norwegian CPI is done in two stages. In the first stage, staff in the statistical office selects product groups or representative items and specify these. At the second sampling stage, the actual product is selected by outlets and the CPI interviewer who initiated the new outlet into the CPI. The product recorded is an observable entity comprising a specific model/variety of a single good or service (product) offered for purchase at a stated price in a specific outlet at a specific point in time. A product may be considered as a cluster or set of transactions. For example, a single knife in an outlet is a product, whereas table knives generally form a product group.

Product groups or product variants can be selected for price collection through simple random sampling or other kinds of probability sampling. Due to lack of comprehensive sample frames of goods and services, the representative items in the Norwegian CPI are selected centrally by purposive sampling techniques. However, as a source of identifying possible representative items, Statistics Norway uses the HES as a guideline, as well as scanner barcode and other relevant information and information from different business sectors especially are used to identify and judge the market share of new commodities before entering the CPI.

**Recommendation 8:** *Both Statistics New Zealand and Statistics Norway should investigate the estimation of CPI measures of variance with the assistance of their respective Survey Methods Divisions.*



## 7. Quality management

A significant issue that must be overcome with the construction of a CPI is quality control ie identifying quality change and dealing with this appropriately. As the CPI sets out to measure 'pure' price change, changes in the quality of goods and services must be taken into account in index compilation. Quality changes are often considered one of the most complex aspects of measurement in CPIs.

Products constantly disappear from the marketplace and are replaced in the CPI by similar, but somewhat different, products carrying different prices. In a fixed basket, however, the same product should be priced in each period to ensure an accurate comparison. When new products differ with respect to package sizes, volumes, or other characteristics, from the original products they replace, an adjustment should be made to reflect any differences in the quality of the new product.

It has been estimated that quality changes are the most significant single source of bias in a CPI. Inappropriate or inaccurate adjustments for quality changes are a significant issue and can result in the CPI either overstating or understating the 'true' price change. In general, many observers view the potential bias as upward given the rapid rate of technological advances occurring in the marketplace.

### 7.1 Quality control

Quality control in the price collection phase is crucial in both New Zealand and Norway. There are a number of price collection vehicles used by Statistics New Zealand and Statistics Norway which present issues with quality control of data received and the load placed on respondents. Each of the collection vehicles used by the two Statistics offices, and the quality issues they present, is discussed below.

Quality control is placed in high importance within the collection of prices for Statistics New Zealand, especially given the relationship between quality control and explicit quality adjustment (detailed below). A number of techniques are employed to ensure that quality determining characteristics are tracked and the same item priced over time.

Quality control work in Statistics Norway has been conducted in recent years within the framework of "systematic quality work," inspired by the principles of Total Quality Management (TQM) and similar work in other national statistical institutions such as Statistics Sweden.

The CPI programme was one of the first in Statistics Norway to participate in the agency programme of TQM in 1998–99. Initially, the programme started using International Standardization Organization (ISO) methodology but later adopted the TQM approach. Each year numerous quality improvement projects are undertaken. The CPI has contributed to these efforts by the use of scanner barcodes for collecting of prices of food, non-alcoholic beverages, and liquor and wine in the CPI, as well as a source of weights for the CPI annual weight update. One other quality improvement project is the documentation of various CPI monthly processes so that operational manuals with written procedures are in place.

#### Field collection

Statistics Norway and New Zealand utilise field pricing in very different ways. Statistics Norway uses field pricing officers to enlist field outlets and select representative products with

the shop owner. Following these initial visits, outlets receive a questionnaire on an ongoing basis.

Statistics New Zealand still utilised field based collection of prices as its primary collection vehicle. However, this is still a paper based system and requires significant effort throughout the year to maintain the forms, processes and systems used to manage printing of the forms, price collection and price reporting. In addition, given the involvement in sample maintenance and quality adjustment by field pricing staff (detailed below), they require rigorous protocols and procedures to be documented. These are contained within the *Field Pricing Manual*. However, while an older version of the manual exists, redevelopment is required to incorporate documentation released with the major review of the CPI in 2006 and review older protocols for item replacements etc.

#### Postal and electronic questionnaires

The main quality issues are the respondent burden and the instructions to respondents. If the outlets are over-burdened the quality of their responses may be low. Among others issues, some respondents may give the same response period after period.

Statistics Norway uses a Statistical Act thus reporting prices is a mandatory task and the outlets receive penalties for non-compliance. The outlets are instructed to report actual transaction prices as well as find replacements when a product is permanent out of stock or obsolete. If this is not done, the CPI may reflect wrong short-term price development as well as suffer long-term effects of not introducing new and approved products. To instruct the shop-owners an interviewer visits the new outlets twice to initiate them into the CPI sample.

By the time being only random checks are done to ensure that respondents have not given the same response month after month. A more systematic way of identifying these cases is under development.

#### Scanner barcodes

The items in the scanner barcodes received from retail chains are identified by an EAN number. The EAN number is then connected to internal representative items numbers. If an EAN-number is no longer in use, the price observation will not be in the calculation of the CPI. To improve the quality of the use of scanner data, a list of EAN-numbers that are not being connected to their corresponding representative items is being produced every month. This aims to immediately find a new EAN-number that could be connected to the specific representative items. However, this is quite a time- and resource-intensive task.

Since August 2005 price records for food and non-alcoholic beverages have been used instead of just connecting a sample of EAN-numbers, avoiding the problem of non-existing EAN-numbers for the food and non-alcoholic beverage prices.

#### Register, internet, telephone and email

The quality issues are connected to how well the websites or registers are updated as well as the responses received by telephone or email. One problem associated with internet or register collection is the loss of respondent contact. One important aspect with electronic registers is the possibility of receiving information of a certain format so that the data can be transferred to the data validation system correctly and efficiently. Similarly with postal questionnaires, email can put an administrative burden on respondents.

## 7.2 Quality adjustment

Two categories of methods when adjusting for quality changes are explicit and implicit adjustment methods. An explicit method involves assigning a monetary value to the quality difference between the old and new product, while implicit methods covers the methods that infer the quality difference by the difference in price between the old and new item or from similar items.

Both explicit and implicit methods are used in the construction of the New Zealand CPI. In the 1997 review, Statistics New Zealand highlighted the area of quality adjustment as being the most significant for managing overall bias in the CPI. Quality change is an ongoing process that requires price statisticians' continual attention. Whereas, other sources of potential bias (item and outlet substitution, new goods, new outlets), can be minimised by periodic reviews of the CPI basket and sample of retail outlets.

Due to a lack of appropriate information (the use of postal and electronic questionnaires gives only limited information about the quality of the replacement product); only implicit methods are used to adjust for quality changes in the Norwegian CPI. If the replacement product is of different quality compared to the old product, an imputation method is used to adjust for that quality change. This means that the price change between the old and new product will be equal to the average price change of other products of similar quality in the same major region. This method is sometimes referred to as 'bridged overlap'.

Developing solutions and assessing techniques for addressing the problem is difficult. Hedonic techniques currently offer the most promising tool for dealing with quality change.

**Table 7.2.1 Changed quality: all goods and services – New Zealand**

Period	Total representative items in CPI	Quality changes, total number	Quality changes per quarter, average	Total price observations	Price observation per quarter, average	Share of overall prices
06/07	685	20,370	5,093	432,979	108,245	0.047
05/06	672	16,068	4,017	516,957	129,239	0.031
04/05	672	18,584	4,646	426,171	106,543	0.044
03/04	672	15,478	3,870	419,669	104,917	0.037
02/03	672	14,519	3,630	436,976	109,244	0.033
01/02	678	14,408	3,602	434,300	108,575	0.033
00/01	678	15,066	3,767	427,290	108,142	0.035
99/00	678	12,814	3,204	432,568	106,823	0.030

Given that Statistics New Zealand makes use of explicit quality adjustment, the number of quality assessments made each month and quarter are relatively high, as can be seen in table 7.2.1. Notably, the number of edits, in absolute terms and as a share of total prices, has been steadily rising over time. Methods currently employed by Statistics New Zealand include direct assessment by both price collectors and analysts, estimation using both overlap and overall mean methods, and hedonic estimation. Each and every instance of commodity substitution is unique and must be carefully considered to ensure that the aim of measuring pure price change is met, as far as practicable.

The use of hedonics has been adopted for quality adjustment subsequent to the 1997 CPI review. Since that time, hedonic models have been used to calculate quality adjusted price indexes for used cars, refrigerators, and fridge-freezers. However, given its small size, Statistics New Zealand has struggled to maintain the core group of skills needed for the development and use of hedonics. This has resulted in a fairly limited programme for the

introduction of hedonic methods and increased emphasis on improving more traditional quality adjustment techniques. This emphasis has occurred via the provision of regular training in quality adjustment techniques to staff and empowering them to exercise their judgement in performing quality adjustment.

Statistics Norway utilises the overlap method when samples of products are renewed in July each year, the start-up of a new link. Thus structural changes in the population of outlets are disregarded by using the chaining technique with annual links and new samples of outlets. However, changes within the sample of outlets during a year are mostly accepted without adjustment. If an outlet closes down, it is not replaced, unless it opens again during the link period, with the old or a new owner selling the same type of assortment.

The most sold varieties of goods and services are chosen when outlets select the products to be priced each month. This is also requested whenever a forced replacement has taken place. As earlier described, the local price collection is done by postal and electronic questionnaires. Whenever a forced replacement has taken place, the outlet should judge whether the quality has changed and mark this on the questionnaires. For representative items collected through local price collection, the item specifications are established centrally. The specifications are in some cases rather loose and the owner of a selected outlet chooses the highest seller within their assortment. For food, non-alcoholic beverages, everyday commodities, alcoholic beverages and medical and health related products, the prices are collected through scanner barcodes and re-specified by EAN-codes. For these items, monthly chaining is used to maintain the sample and avoid the need for quality adjustment.

According to table 7.2.2 the number of times an outlet reported quality change varies from 42 – 81 on average per month within the index link period from 1999 to 2007. As a share of average price observations per month in each index period, changed quality accounts for only 0.001 – 0.002 percent in this period.

**Table 7.2.2 - Changed quality: all goods and services – Norway**

Period	Total representative items	Quality changes, total number	Quality changes per month, average	Total price observation <sup>1</sup>	Price observation per month, average	Share of overall prices
06/07	826	848	71	368,026 <sup>2</sup>	30,669	0.002
05/06	819	653	54	366,909 <sup>2</sup>	30,576	0.002
04/05	976	782	65	517,632	43,136	0.002
03/04	929	780	65	518,636	43,220	0.002
02/03	936	649	54	475,255	39,605	0.001
01/02	924	499	42	411,578	34,298	0.001
00/01	901	585	49	424,368	35,364	0.001
99/00	874	973	81	463,668	38,639	0.002

(1) Total price observations and price observations per month is real observations, that means imputations are not included

(2) Scanner barcodes for food and non-alcoholic beverage is not included due to the use of full scale scanner barcodes from 2005

From table 7.2.3 we can see that replacements are reported far more often than changed quality, with average replacements per month varying from 201 to 487 times during the period 1999 to 2007<sup>10</sup>. As a share of total average price observations per month, replacements account for between 0.00 and 0.016 percent for the period 2004 – 2007. The reason the share of

<sup>10</sup> Each index link or weighting period in the Norwegian CPI goes from August year t to July year t+1, with July as the price reference month.

replacements are increasing in the period 2005 – 2007 is the exclusion of scanner barcodes for food and non-alcoholic beverages; even though the tendency is increasing shares of replacement. This is somehow expected due to the rather dynamic populations of products, at least within commodity groups like clothing and high-tech products.

**Table 7.2.3 Replacements: all goods and services – Norway**

Period	Total representative items	Replacements, total number	Replacement per month, average	Total price observation <sup>1</sup>	Price observation per month, average	Share of overall prices
06/07	826	5,839	487	368,026 <sup>2</sup>	30,669	0.016
05/06	819	5,031	419	366,909 <sup>2</sup>	30,576	0.014
04/05	976	4,525	377	517,632	43,136	0.009
03/04	929	4,124	344	518,636	43,220	0.008
02/03	936	3,397	283	475,255	39,605	0.007
01/02	924	2,670	223	411,578	34,298	0.006
00/01	901	2,392	199	424,368	35,364	0.006
99/00	874	2,409	201	463,668	38,639	0.005

(1) Total price observations and price observations per month is real observations, that means imputations are not included

(2) Scanner barcodes for food and non-alcoholic beverage is not included due to the use of full-scale scanner barcodes from 2005

One would expect that, given both countries are of similar size, population and composition, New Zealand and Norway would have rather equal number of replacements and changed quality in their national CPIs. However, several circumstances may influence the number of replacements and thus quality change. First of all, the different price collecting method may result in differences because the price collector judges the quality of the replaced product differently than the outlets that are responsible of reporting the price on the questionnaires. From tables 7.2.2 and 7.2.3 we find increasing numbers of replacements but rather stable numbers of quality change. This could indicate that the outlets judge the quality of the replacement equal to the old product or do not bother to judge the quality or do not mark for changed quality on the questionnaires.

Second, the number of replacements and thus quality changes will be influenced by the specifications of the representative items. Tight specifications will normally result in more registered replacement than rather loose specifications. Clothing is an example of commodities where standardisation is less compared with other commodities so that tight centrally provided specifications are not feasible. In Norway the specifications are quite loose except for high tech commodities like audiovisual equipment, computers, mobile phones, etc. Third, economic or seasonal conditions may influence the number of replacements. Norway has quite changing weather conditions and due to this products will change radically over a year. Clothing is an example where fashion and style can be important determinants of how much people are willing to pay.

**Recommendation 9:** Statistics Norway should consider adopting explicit quality adjustment practices, in line with ILO and HICP guidelines.

**Recommendation 10:** Investigation should be undertaken by both countries into the impact of different quality adjustment methods on their respective CPIs.

## 7.3 Data validation

In New Zealand all prices are subject to many quality checks. These measures are micro and macro edits. Micro edits are quote or average price specific, in that they check whether the movement for that particular quote or average price is 'reasonable'. This is determined by when the percentage change that an individual quote or average price moves outside a set tolerance range. If a quote or average price fails by moving more than the tolerance, that quote or average price is flagged for inspection, and is either passed (as correct) or corrected. Macro-edits are used in a smaller number of cases, and are measures to determine whether a movement in quote or average price is in line with similar quotes or average prices in other geographical locations. An average price fails a macro-edit if the average price level falls outside given bounds of that of the national.

All 'as collected prices' (ACPs) are subject to micro-edits. Regional and national average prices are then calculated for each CPI item and micro-edits are also performed on the regional and national average prices. Regional average prices are examined to check that none of the period-to-period movements in any of the average prices are different to the national movement.

The process of micro edits is also performed on item level Laspeyres Product Totals (LPT). Further, expectations reports, prepared earlier in the quarter are used to confront LPT movements.

Although not a formal measure, careful observation of prices and movements is undertaken at each level that micro- and macro-edits are performed.

In the Norwegian CPI, substantial computerised editing and validation procedures are in place to correct for simple data capture errors<sup>11</sup>, capture outliers, and identify unusual price changes. Respondents usually provide comments on the CPI questionnaire when unusual price changes occur. These are reviewed as part of the monthly editing process and follow-up with respondents or other means are regularly taken to verify such price changes. In general, source data are analysed frequently for consistency with CPI concepts as the CPI is revised each year.

The method used for identifying extreme values in the Norwegian CPI at a micro level is a combination of various tests including the HB<sup>12</sup> method, also referred to as the quartile method. The HB method is based on price ratios of the median, first and third quartiles. The extreme price observations are defined as price ratios that are more than a predefined multiple  $C^{13}$  of the distance between the median and the quartile. Price ratios should be calculated between current month and last month, in addition the price ratios between the current month and the price reference month may be calculated if considered necessary. The HB method is based on the assumption that the price ratios are normally distributed. After the first sub-index calculation a special 'validation meeting' takes place. The aim of the meeting is to decide whether the validation has come to an end or whether more validation is necessary.

Part of the regular CPI review process involves investigating large or unusual changes in aggregate indexes (macro-edits). Reasons for the changes are documented based on analysis of component movements and use of secondary source data. For example, large movements in key components such as energy can be verified by analysing the movements in petroleum and electricity prices. Secondary information from trade associations can also provide explanatory information.

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<sup>11</sup> An example of this is a transposition error - if 300.0 was entered rather than 30.00, the system will automatically make the correction.

<sup>12</sup> Hidiroglou and Berthelot (1986)

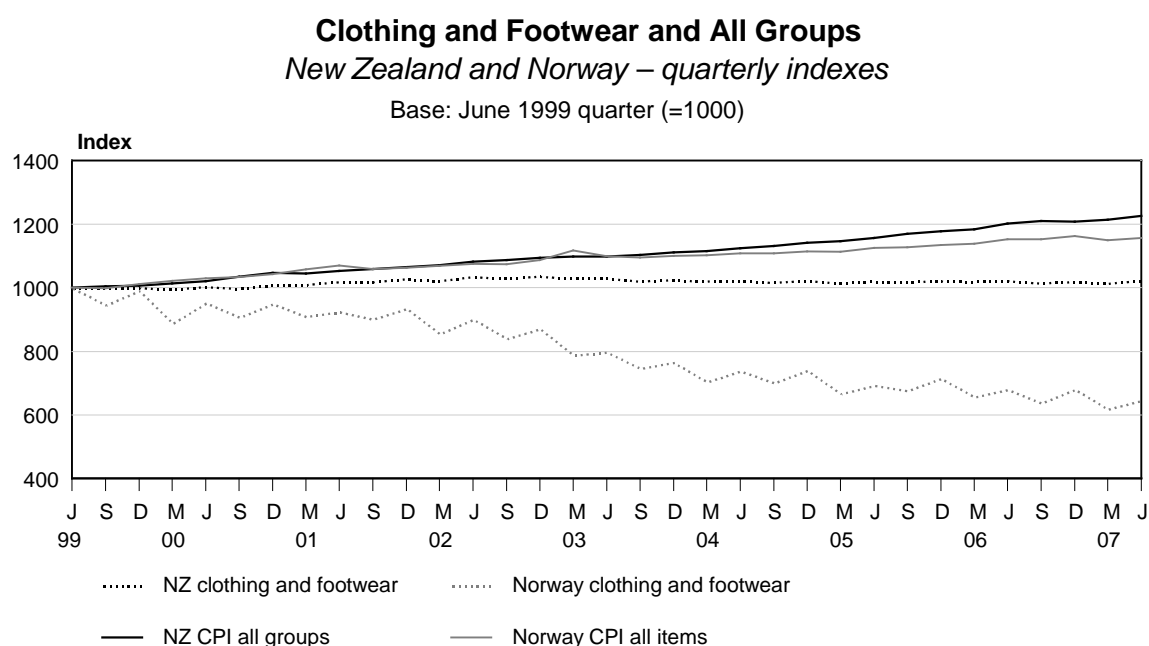
<sup>13</sup> C represents the width of the confidence interval; the number of inter-quartile deviations (dQ1 or dQ3) measured from the median.

**Recommendation 11:** Statistics New Zealand should investigate ways to incorporate the use of smarter and more efficient computerised data editing and validation techniques similar to that of Statistics Norway.

## 8. Specific goods and services

### 8.1 Clothing and footwear

The treatment of clothing and footwear presents national statistical offices with significant issues given the seasonal variation and availability, and the ability to define fashion as a quality characteristic.



As New Zealand is a small open economy there is significant trade of goods and services, and this includes clothing items. New Zealand has a small niche clothing export sector, and imports the bulk of its clothing. Before the wide ranging trade reforms of the mid 1980s, New Zealand had a strong textile and clothing manufacturing industry. Subsequent to the reforms, all but the niche market producers have either closed or moved offshore. As such, the predominance of the clothing purchased in New Zealand originates overseas (although much of this still utilises New Zealand sourced inputs, especially wool).

Following the reforms, the currency depreciated strongly against our trading partners, and as a result, prices rose for imported goods. Despite overseas developments in manufacturing technologies and falls in prices for agricultural products and textiles, prices for clothing in New Zealand rose over the 1980s, as exchange rate fluctuations most likely dominated medium term price movements. As imported clothing may be of different quality it is unlikely that any price change was directly introduced from these items<sup>14</sup>, although increases in the volume of imported goods likely introduced greater competition into the New Zealand clothing market. Prices subsequently stabilised in absolute terms over the 1990s, but fell relative to other prices.

<sup>14</sup> Country of origin was not specified at the time (this has subsequently introduced shortly after the reforms), and it was at pricing officers discretion as to whether the imported clothing items represented comparable replacements for item replacements.

Prices for clothing items are collected on two different frequencies. A majority of items are collected quarterly while the remainder are priced annually with winter fashion and seasonal clothing priced in the June quarter (winter runs from June through to August), and summer fashion and seasonal clothing in the December quarter (summer runs from December through to February). Furthermore, school uniforms are priced at the beginning of the school year and included in the March quarter.

Where prices for seasonal and fashion clothing are collected once a year, prices for the intervening quarters are imputed. Thus, effectively an annual price change is shown for these items.

Statistics New Zealand has recently reviewed its clothing editing practices, and decided to continue its current approach, for the meantime<sup>15</sup>. Explicit quality adjustment is performed for items where the fashion element is assumed to be similar, with items either taken directly as a comparable replacement, or if small or unquantifiable changes have occurred, the ‘50/50 rule’ is followed, where half the price difference between the two items is assumed to be pure price, while the other half is quality (however, if the direction of price change and quality change are inversely related, all price change would be shown). For items that are too dissimilar, all price difference is assumed to be as a result of quality. There are weaknesses in this approach, however, and an international best practice is yet to emerge for the treatment of seasonal clothing.

**Table 8.1.1 Quality changes: clothing and footwear – New Zealand**

Period	Total representative items	Quality changes, total number	Quality changes per quarter, average	Total price observations collected	Price observation per quarter, average	Share of overall prices
06/07	70	3,509	877	11,614	2,904	0.30
05/06	79	2,785	696	11,261	2,815	0.25
04/05	79	3,151	788	11,547	2,887	0.27
03/04	79	2,854	714	11,359	2,840	0.25
02/03	79	2,771	693	11,301	2,825	0.25
01/02	83	2,879	720	12,015	3,004	0.24
00/01	83	2,757	689	11,860	2,965	0.23
99/00	83	2,569	642	11,784	2,946	0.22

Table 8.1.1 demonstrates the effort required to maintain constant quality pricing for clothing and footwear. A large number of prices are collected each year, and between 22 and 30 percent of these prices require quality adjustment of some sort. Given the effort required to make the quality adjustments outlined above, significant effort is expended for clothing and footwear.

Since 1999, clothing prices in Norway, as measured in the CPI have fallen by about 34 percent, while the shoe prices have a price decrease of almost 15 per cent. Trade liberalisation over the past few years has probably been a significant factor behind this. Moving of clothing production to countries with quite low costs, such as China, is another important factor. Increased competition in the clothing market may also explain this downward trend in clothing prices. Another important explanation is the development in the import-weighted Norwegian currency. The currency, NOK, has appreciated by almost 8 per cent in the period 1999 to 2006.

<sup>15</sup> The review of clothing editing practices identified several different approaches utilised internationally. However, there were no overwhelming alternatives to the current methodology, even with its drawbacks. Until an agreed international practice emerges that is superior, Statistics New Zealand will continue to look simply for improvements around its current methodology.



The Uruguay round of the General Agreement on Tariffs and Trade (GATT) committed member countries to reduce trade barriers to imports of textiles and other goods. As a result of this, Norwegian quota restrictions on textile imports have gradually been phased out. The last quotas for clothing were removed in 1998. The Parliament also decided to reduce tariff rates gradually from 1994 to 2004. Tariffs on certain products from developing countries were eliminated.

The graph above illustrates that clothing prices fall most in the years after the decline in tariffs. There was a particularly marked decline in tariffs from 1999 to 2000 as a result of the elimination of tariffs on certain products from developing countries.

In addition to the direct effect of lower tariff rates on clothing prices, trade liberalisation has prompted a shift in imports from high-cost countries to low-cost countries such as China and those in Eastern Europe. For example, the share of Norwegian clothing imports from China increased from 20 percent in 1990 to approximately 40 percent in 2005. This was matched by a reduction in imports from EU countries. During the 1990s quite a lot of clothing chains were established in Norway, causing increased competition and probably lowering the prices as well.

The difficulties of measuring the price development of clothing arise with the change of season when winter clothes replace summer clothes and vice versa. In the Norwegian CPI clothing is separated into a basket of typically summer clothing and a basket for winter clothing in addition to clothing that is available the whole year. The weights for summer and winter clothing are fixed throughout the year. Both the summer and winter basket is used in the index the whole year with imputed prices those months a seasonal product is not available. The imputations are done by extrapolation by the price movement of those clothes that are available.

As can be seen from table 8.1.2 that the number of times changed quality is reported for clothing and footwear varies from 5 – 22 on average per month from 1999 – 2007. As a share of average price observations for clothing and footwear, changed quality varies from 0.002 – 0.005 percent. With a lack of appropriate explicit quality adjustment methods, bridged overlap is the most used methods in the Norwegian CPI. However, several analyses have pointed that the use of bridged overlap for clothing and footwear may cause significant downward bias. As far as possible, direct comparison is used when measuring the price development for clothing and footwear.

**Table 8.1.2 Changed quality: clothing and footwear – Norway**

Period	Total representative items	Quality changes, total number	Quality changes per month, average	Total price observation	Price observation per month, average	Share of overall prices
06/07	105	269	22	63,129	5,261	0.004
05/06	102	231	19	53,849	4,487	0.004
04/05	106	204	17	51,940	4,328	0.004
03/04	92	197	16	46,561	3,880	0.004
02/03	91	123	10	42,833	3,569	0.003
01/02	90	96	8	33,615	2,801	0.003
00/01	84	65	5	35,365	2,947	0.002
99/00	84	176	15	37,126	3,094	0.005

As illustrated in table 8.1.3 the times replacement has occurred for clothing and footwear are much higher than the times changed quality has been reported.

**Table 8.1.3 Replacement: clothing and footwear – Norway**

Period	Total representative items	Replacements, total number	Replacement per month, average	Total price observation	Price observation per month, average	Share of overall prices
06/07	105	3,561	297	63129	5,261	0.056
05/06	102	3,135	261	53849	4,487	0.058
04/05	106	2,565	214	51940	4,328	0.049
03/04	92	2,184	182	46,561	3,880	0.047
02/03	91	1,619	135	42,833	3,569	0.038
01/02	90	1,248	104	33,615	2,801	0.037
00/01	84	1,175	98	35,365	2,947	0.033
99/00	84	1,400	117	37,126	3,094	0.038

As pointed out in section 7.2, one would expect increasing shares of replacements due to the rather dynamic populations of products. Whether one would expect increasing number of quality changes as well, depends on the commodity group. Since the shares of quality changes are quite stable, this indicates that the replacement within clothing and footwear are of same quality as the replaced products. The changes within clothing are often related to fashion and style (with the associated subjective quality aspects) more than objective quality aspects. Thus, direct comparison of the replacement and the replaced product within clothing is recommended as far as possible.

## 8.2 Audio-visual equipment

The purchase of audio-visual equipment within New Zealand has strongly increased over the last ten years. The expenditure on audio-visual equipment in the CPI has risen from 0.68 in the June 1999 quarter, to 0.74 percent three years later in the June 2002 quarter, and to 0.94 percent in the June 2006 quarter. What is notable with audio-visual equipment is that new goods are often introduced into the market at high prices, and low associated volumes, and decline rapidly, with increasing volumes. Further, there is no assurance that prices for new audio-visual equipment goods track similarly to, ie are well represented by, existing goods in the CPI. Research has demonstrated that when these goods are introduced into the CPI does indeed matter.

Further to this, the treatment of evolutionary technology changes in audio-visual equipment in the New Zealand CPI receives great attention to detail and effort, given the explicit quality adjustment that is performed when the quality of the item priced changes, to account for the rapid and continual increase in product quality.

The high number of quality assessments performed each quarter, as in table 8.2.1, demonstrates just how rapid technology changes are detected and accounted for. Further, there is a steady increase in the number of assessment, suggesting that the pace of technology change is also increasing over time.

Given the high risk of new goods and quality bias arising within audio-visual equipment, great care is taken to ensure that all relevant quality determining characteristics are specified on pricing forms and are monitored closely by both field staff and analysts, trends in technological evolution are monitored, and quality assessment methodologies applied consistently.

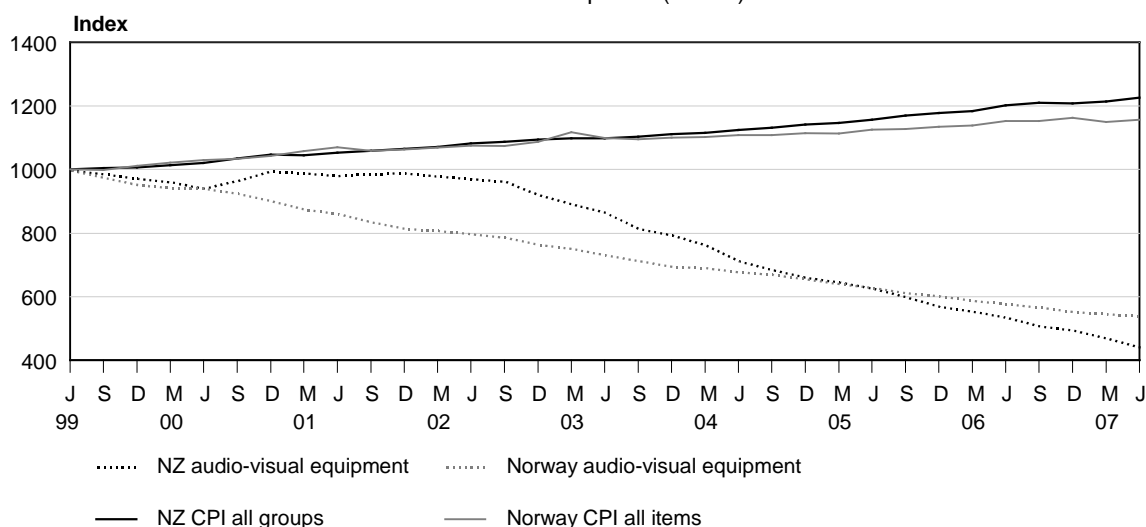
**Tables 8.2.1 Quality change: audio-visual equipment – New Zealand**

Period	Total representative items	Quality changes, total number	Quality changes per month, average	Total price observation	Price observation per month, average	Share of overall prices
06/07	10	1,036	259	3,714	928	0.2789
05/06	8	544	136	3,167	792	0.1718
04/05	8	649	162	2,605	651	0.2491
03/04	8	548	137	2,452	613	0.2235
02/03	8	633	158	2,533	633	0.2500
01/02	7	434	109	2,117	529	0.2050
00/01	7	416	104	2,028	507	0.2051
99/00	7	355	89	1,969	492	0.1803

To ensure that the sample of audio-visual products represents transactions made by households, much use of electronic data proved by GfK. This information is used to maintain the product specifications (to ensure that the relevant changes in quality determining characteristics, and new characteristics, are captured and monitored), new models and brand shares are monitored, and expenditure weights below the class level are adjusted, if necessary, to reflect relative shifts in expenditure within audio-visual equipment.

**Audio-visual Equipment and All Groups**  
*New Zealand and Norway – quarterly indexes*

Base: June 1999 quarter (=1000)



The price of audiovisual equipment as measured in the Norwegian CPI has fallen by more than 40 percent since 1999 as can be seen in the above graph ‘Audio-visual equipment and all groups’.

A potential bias for the CPI is new goods bias; the time lag from when new, predominantly high-tech commodities enter the market, until they enter the index. In the Norwegian CPI special attention is paid to introduce new high-tech commodities during the annual update of the basket of good and services. However, to maintain a dynamic and updated basket, replacements during the year are an important task. In tables 8.2.2 the number of replacement within audiovisual equipment is illustrated. Compared with clothing and footwear, that typically has quite a high turnover, the share of replacements for audio-visual equipment is lower. Even though some high-tech products are often replaced by a new and better product

(like computers and mobile phones), many commodities within this consumption group can be found throughout the year, for example refrigerators, stoves, television, etc.

**Tables 8.2.2 Replacements: audio-visual equipment – Norway**

Period	Total representative items	Replacements, total number	Replacement per month, average	Total price observation	Price observation per month, average	Share of overall prices
06/07	27	469	39	11,597	966	0.040
05/06	28	312	26	11,268	939	0.028
04/05	32	340	28	12,264	1,022	0.028
03/04	30	297	25	12,117	1,010	0.025
02/03	27	270	23	11,047	921	0.024
01/02	26	199	17	10,605	884	0.019
00/01	26	157	13	7,327	611	0.021
99/00	20	121	10	7,479	623	0.016

The bridged overlap method is used for quality adjustment with this consumption group. The reason only implicit methods for quality adjustment are used in the Norwegian CPI is partly due to lack of appropriate explicit methods as well as lack of detailed information to develop hedonic regression. Because of price collection by either postal or electronically questionnaires for a large part of the items in the CPI, the opportunity to receive detailed information is quite limited. Since physical price collectors are not an option in the Norwegian CPI, Statistics Norway is depending on expanded use of scanner barcodes to receive appropriate information to be used in explicit quality adjustment methods.

Table 8.2.3 illustrates the number of quality changes within this consumption group. The average number of quality changes per month compared with the average price observations per month gives a share that varies from 0.002 to 0.008 in the period 1999 to 2007. Except for the period 2006 to 2007, when the average number of quality changes doubles, the shares are as low as within clothing and footwear.

Even though the shares of replacements are lower compared to clothing and footwear, there is still a tendency towards an increasing number of replacements within audio-visual equipment. However, unlike clothing and footwear one would expect increasing number of quality changes as well. This is not the fact for the Norwegian CPI, and may illustrate that price collection through questionnaires is not optimal for these kinds of commodities.

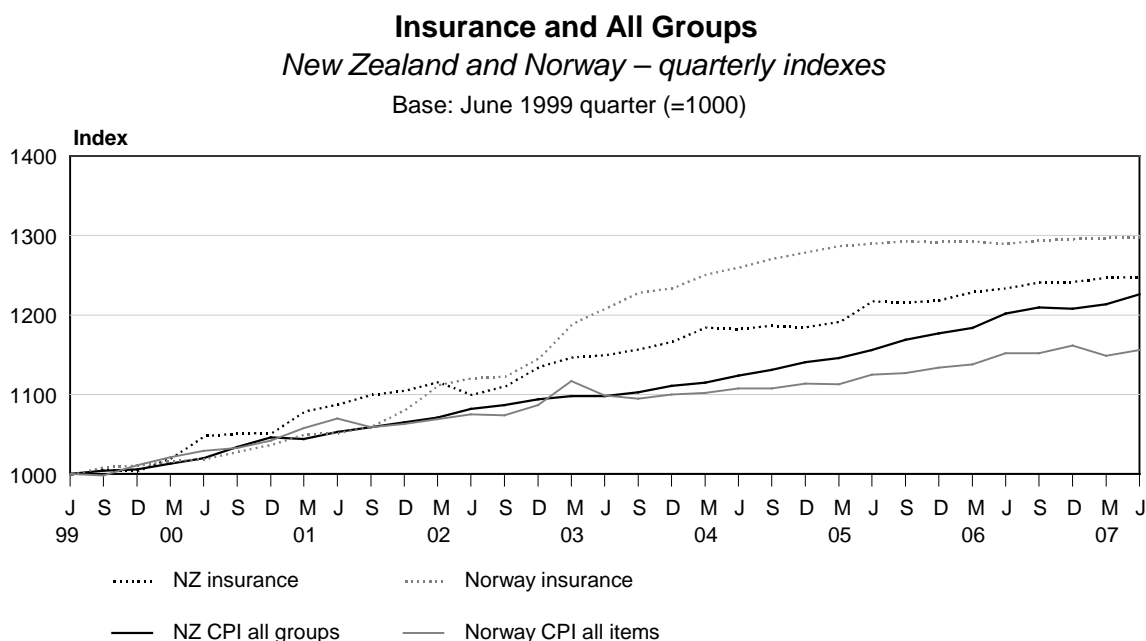
**Tables 8.2.3 Quality change: audio-visual equipment – Norway**

Period	Total representative items	Quality changes, total number	Quality changes per month, average	Total price observation	Price observation per month, average	Share of overall prices
06/07	27	97	8	11,597	966	0.008
05/06	28	50	4	11,268	939	0.004
04/05	32	54	5	12,264	1,022	0.004
03/04	30	37	3	12,117	1,010	0.003
02/03	27	25	2	11,047	921	0.002
01/02	26	27	2	10,605	884	0.003
00/01	26	36	3	7,327	611	0.005
99/00	20	26	2	7,479	623	0.003

**Recommendation 12:** Statistics Norway should consider the use of price collectors for certain consumption groups, eg clothing and electronic equipment.

### 8.3 Insurance

The treatment of insurance presents challenges in the estimation for both weighting and pricing purposes, in that while the implicit service fee is the transaction of interest, this is both technically difficult and time consuming. The New Zealand CPI covers most forms of insurance: vehicle, dwelling and contents, health and some life products<sup>16</sup>, while the Norwegian CPI includes only vehicle insurance at this stage.



The expenditure weights allocated to the various types of insurance service in the New Zealand CPI have been estimated on a 'net' basis. Under a net approach, the weight given to insurance relates to the administrative costs of providing the service, which is collecting premiums and paying claims, and the profits of insurance companies. The value of the insurance service can be defined as:

- gross insurance premiums payable by households
- plus premium supplements (income earned on investing prepaid premiums and actuarial reserves)
- less claims
- less changes in actuarial reserves.

Using the net approach for insurance services, spending on goods and services that is funded by insurance claims is allocated to the expenditure weights of those goods and services.

While the weights for insurance are calculated on a 'net' basis, pricing of insurance is done on a gross basis. Cover values are supplied to respondents every quarter who provide a premium for the good and amount specified. These cover values are rated forward each quarter by a

<sup>16</sup> Most types of life insurance are excluded from the CPI because they are considered to represent savings and investment, rather than consumption. However, 'term' life insurance provides risk-only cover and has no surrender or residual value. Claims are paid out only in the event of death, disability or personal accident. With respect to the CPI, the service provided by term life insurance can be regarded as protection against the risk of disability, personal accident and loss of life. Given that there is no investment element in this type of life insurance, it is appropriate to include it in the CPI.

relevant index to ensure that the premiums supplied cover a constant quantity of goods and/or services each quarter.

The gross approach is used to estimate the expenditure weight for different types of insurance and the premiums for insurance policies in the Norwegian CPI. The gross premium, gross expenditure approach is based on the view that the claims receivable by households represent one of the sources of funds from which expenditures are made.

For the time being, only vehicle insurance is covered in the Norwegian CPI. In April 2004 the method for vehicle insurance in the Norwegian CPI was changed due to new guidelines from Eurostat concerning the Harmonised Index of Consumer Prices (HICP). Previously only comprehensive vehicle insurance was covered, but this was expanded to cover third party insurance as well in 2004. According to the guidelines from Eurostat, the price determining variables should be fixed over time to avoid changes in the premium paid by households being affected by changes in the conditions of the insurance. Analyses shows that each vehicle insurance policy typically includes around 15 – 20 price determining variables.

There are only a few large insurance companies in Norway. The sample of companies used to calculate the price development for vehicle insurance consist of the three largest companies that together have a market share of around 80 percent.

To calculate the index for vehicle insurance Statistics Norway receive a large sample of policyholders (both comprehensive and third party insurance) from the insurance companies in the sample each quarter. Based on this sample an average premium is calculated and compared with the corresponding average in the base period. The total index for vehicle insurance is calculated as a weighted average of each insurance company in the sample. Total number of policyholders of vehicle insurance is used as weighting information. The reason for calculating an index for each company is due to the conditions for each specific insurance policy that is not comparable across companies.

Vehicle insurance is the predominant insurance type in Norway and accounts for more than 50 percent of the population of insurance that is within scope of the CPI. Other insurance services that should be considered in the Norwegian CPI are dwelling and contents, and travel insurance. Insurance services such as disablement insurance and accident insurance is often covered by the workplace and hence demanded by a minority of private households.

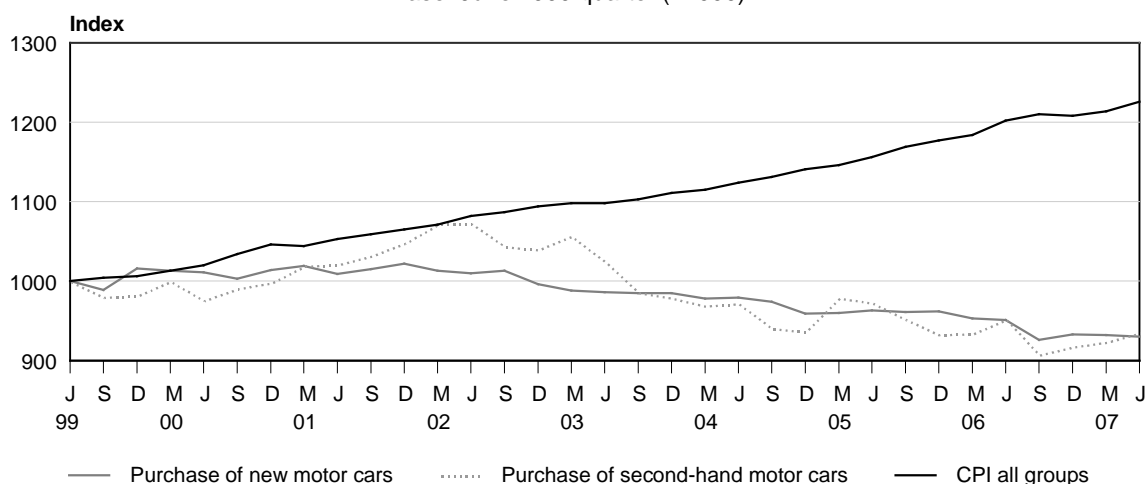
Private health insurance, pet insurance, boat insurance and child insurance only have marginal market share, although the demand is growing. Life insurance is excluded in the coverage of the CPI.

***Recommendation 13:** Statistics Norway should increase the coverage of insurance services such as dwelling and contents, and travel insurance.*

## **8.4 New and second-hand cars**

Measuring price change for used cars presents some particular challenges. Unlike new cars, where prices can be observed from one quarter to the next for the same sample of makes and models, each second-hand car sale is in some respects unique.

**Motor Cars and All Groups**  
*New Zealand – quarterly indexes*  
 Base: June 1999 quarter (=1000)



Purchase of second-hand cars had an expenditure weight of 3.30 percent of the New Zealand CPI at the June 2006 quarter, making it one of the more highly weighted of the goods and services in the basket. The expenditure weight allocated to the purchase of new cars represents gross expenditure on new cars for private use by households. The expenditure weight for purchase of second-hand cars, derived from the HES, represents net purchases of second-hand cars (that is, purchases of second-hand cars minus sales and trade-ins of second-hand cars, including trade-ins on purchases of new cars).

Second-hand car prices and related information are collected quarterly from dealers via a postal questionnaire. The current sample of approximately 300 second-hand car dealers, are asked to provide information on every second-hand car sold to households in the middle month of the quarter. Information collected on each sale includes:

- make
- model
- whether or not it's a second-hand import, station wagon or automatic
- year of manufacture
- engine size
- odometer reading (km)
- price (agreed transaction price including GST, before any trade-in).

Statistics New Zealand uses hedonic regression to calculate the price index for second-hand cars. The method was implemented in the September 2001 quarter, replacing the previously used 'cell estimation' method, which had limitations such as making use of only some of the reported sales and not making use of odometer readings. Each quarter, sales information collected for the past eight quarters is fitted to a hedonic regression parameter model, along with information about the CPI urban area and the sale quarter. The model estimates price as a linear function of the following parameters:

The modelled price for quarter t = median age x age parameter + median engine size x engine size parameter + median odometer reading x odometer reading parameter + average make&model parameter + average CPI urban area parameter + parameter for quarter t

The index number for quarter t is then the modelled price for quarter t divided by the modelled price for period 0) x 1000.

New car prices are collected by field visits, generally around the 15th of the middle month of the quarter and the cash price (applying to the private New Zealand householder) of each of the models is collected. A sample of cars was selected to represent both the make and CC rating of the cars purchased by households and the models chosen are selected based on sales volume and account for a significant proportion of the industry.

As new features (such as airbags, ABS braking, CD stereos, etc) are often added over time, older models can cease being manufactured and a replacement car has to be chosen, explicit adjustments are made to take into account any changes in the quality of the car. The use of explicit quality adjustment for new cars has made a significant impact to the way that the index series has tracked for new cars.

In these situations the manufacturers are contacted and asked to supply the perceived value to the customer of the additional, or ceased, features. Further, each time a manufacturer is contacted, the details of the new feature and its perceived customer value are recorded in a database. This allows for consistent application of adjustments for new cars. Perceived values for engine changes are not asked of the manufacturer, as these are directly adjusted for by Statistics NZ. The value of the new features is then subtracted from the price of the new model. By removing the value of new features, the same quality of car is priced over time.

The purchase of new cars have an expenditure weight of around 9 per cent in the Norwegian CPI, and is therefore one of the more highly weighted consumption groups in the CPI. Since 2003 new car prices are computed by using electronic register data received from new vehicles importers. The number of cars sold in Norway each month is included in the data. The price index for new vehicles is calculated by the use of the Fisher-formula and monthly chaining. Monthly chaining is used to maintain the sample and avoid the use of quality adjustment. In the calculation of the index, the information of model and make of car, motor efficiency, the specific weight of the car and cylinder volume is included.

The critical issue in this method is the price concept; the use of list price. However, research has shown that the car dealers reporting prices tend to record the list price as the actual price for a car often depends on negotiation between the dealer and the buyer. Statistics Norway considers the electronic data for new vehicles of such good quality regarding information of the technical standard of the different cars in the sample as well as the number of observation and therefore accepts the use of list price.

Based on comprehensive electronic data for new vehicles, Statistics Norway has developed hedonic methods to treat quality change of cars, but has not yet implemented this in the monthly production of the CPI.

Second-hand cars have a weight of just less than 4 per cent. The price development for second-hand cars follows the price development for new vehicles due to the problem of recorded prices of used vehicles. Among others, the problem is defining a sample of used vehicles that is stable over time and the lack of information makes it difficult to identify quality change as well as develop acceptable methods for treatment of quality changes. The weights for used cars in the CPI are calculated using net weights (purchases less sales of vehicles). This conforms to international best practice.

***Recommendation 14:*** *Statistics Norway should consider implementing hedonic regression for treating quality changes in new cars.*



*Recommendation 15: Statistics Norway should consider the possibility of own price collection for second-hand cars.*

## **9. Dissemination, user needs and engagement**

One of the notable differences between Statistics New Zealand and Norway is the practices relating to dissemination. First and foremost is that the New Zealand CPI is published on a quarterly basis, while the Norwegian CPI is published every month. Furthermore, the range and depth of information available, release schedules and level of analysis all vary between the two countries.

### **9.1 First release**

The New Zealand CPI is produced on a quarterly basis. However, the Food Price Index (FPI), the food group of the CPI, is published monthly.

The release of the CPI is done at a conference held on premises from 10:30am to 10:45am on the release date and is open to the public, although usually it is members of the press, economists from the major trading banks and policy analysts from The Treasury and Reserve Bank of New Zealand who attend. The conference is held as a 'lock-up', ie the attendees are unable to leave or release any information till the corporate release time of 10.45am. No one outside of Statistics New Zealand, such as MPs or other government officials, has access to the results or content of the release prior to the corporate release time. At 10:45, the highlights, full commentary and supporting index series are made available on the internet, publications are sent electronically to registered customers by customer services, printed copies are kept in the main foyer and index series are made available on the public use database for download.

Business customers are usually informed through either receiving or downloading the commentary and index series. Many banks, financial houses and government departments have subscriptions to the public use database to download the index series, which allows access to all publicly available series.

Technical users have publications, information papers and technical papers available to them, which are usually posted on the internet when released. These publications are also announced in the CPI commentary. Also, a debrief meeting is held with the Reserve Bank of New Zealand and The Treasury in the week following the release.

The release of the Norwegian CPI is done by a press release including main tables on the internet at 10:00am sharp. The press release and some tables are sent electronically to registered customers by customer service, all published index series are made available in Statistics Norway's statistical database, StatBank, for download. A limited version of the CPI press release is available for the public as a WAP service.

Business customers are usually informed through either receiving or downloading the press release and the attached tables. Some organisations have customized outputs that are compiled in-house.

### **9.2 Databases and internet access to information**

Statistics New Zealand makes many of its indexes available to the public, either via the many tables attached within the release, but also via information centre requests or subscription services. All information that is published is available free-of-charge for smaller data requests. Users with subscriptions to the Information Network For Official Statistics (INFOS) database can access a greater number of series.

A great number of standard and non-standard series are made available to users. Information on from the standard, ie NZHEC hierarchical structure, is available down to the class, or third, level of the classification. At the class level there are about 100 series available. Non-standard series include regional series, CPI less selected series, alternative groupings of CPI items<sup>17</sup>, and alternative measures of inflation<sup>18</sup>. The regional series are available for the all groups CPI and most group level series at a broad regional breakdown. The food group is available at the separate (15) region level, as all prices are collected in each region.

Furthermore, points effect of each class on the all groups movements and a number of weighted average prices are also included within the tables of the release for items that are (relatively) homogeneous. The CPI release includes 37 average prices, while 44 are included with the FPI release.

Table 9.2.1 outlines the series which are available in the tables attached with the regular release and on INFOS, the later broken down by type.

**Table 9.2.1 Available series – New Zealand**

Release	Total series available on INFOS			Series published in release tables <sup>(1)</sup>
	Total	Standard	Non-standard	
Consumers Price Index	302	161	141	179
Food Price Index	53	20	33	36

(1) This number includes the 90 unique class level series' quarterly movements and points effect on all groups

Furthermore, information requests are often passed onto the CPI team, where on a case-by-case basis, indexes below the published level (or increasingly so, weighted average prices) are provided to users.

Similar to New Zealand, all published information in Statistics Norway is free-of-charge and available on the internet. The press release, standard tables and metadata are available through the Norwegian CPI website. A greater number of series are available in StatBank. The available information includes the all-item-index and all the published sub-indices - down to 4 digit COICOP, as well as the CPI-AT, CPI-AE, CPI-ATE, HICP<sup>19</sup> and the CPI group by delivery sector. For foodstuff and non-alcoholic beverage some unofficial 5 and 6 digit COICOP groups are published as well. Statistics Norway provides its customer with a lot of non-standard information free of charge either through e-mail or telephone.

Some users receive supplementary series or special aggregates for payment on a regular basis. This includes Special aggregate of food items provided to the Norwegian Agriculture Economic Research Institute (NILF) and CPI trimmed mean and CPI weighted mean to the Norwegian Central Bank.

Indexes and weights below the published level are given to users by request after consideration of user needs and the quality of the unpublished data. This information is either provided for free or by remuneration depending on how much work this involves.

17 Series include: COICOP division series (in line with the ILO resolution concerning price indexes), tradable component, non-tradable components, goods component, services component, local and central government charges, CPI all groups plus interest

18 The alternative measures produced by Statistics New Zealand are trimmed means (5, 10, 15, 20, 25, & 30 percent trims) and weighted percentiles (10th, 25th, 50th, 75th, and 90th percentile)

19 The HICP is calculated monthly for use by Eurostat. Both the CPI and the HICP are derived from the same source data, which have been compiled according to EU standards.

Table 9.2.2 outlines the series available through Statistics Norway’s website.

**Table 9.2.2 Available series – Norway**

Products	Total series available in STATBANK	Series published in press release tables <sup>1</sup>
CPI	309	97
CPI-AT, CPI-ATE, CPI-AE	60	27
Expenditure weights	159	27

(1) These series are included in STATBANK as well

## 10. Periodic and ongoing review of methodology

To maintain relevance, credibility, and to engage effectively, national statistical offices must review their CPI methodology and practices in both an ongoing (rolling) basis and by administering an advisory committee to their CPIs. Both Statistics New Zealand and Statistics Norway have such processes in place, although not without differences in approaches, which are outlined below.

Improvements to the New Zealand CPI are made on a rolling basis and as part of the three-yearly review. At each review, the basket and weights of representative items is updated. Every second review is treated as a major review, which is informed and directed by the Revision Advisory Committee (RAC). The RAC is established every six years, timed to coincide with every second re-weight of the index, to provide the Government Statistician with advice on the shape and calculation of the CPI. The committee comprises a group selected to bring both professional expertise and the confidence of stakeholders to the review process. The last RAC met in 2004 to provide input into the 2006 review of the CPI.

The RAC met to investigate, review and form recommendations concerning the general nature and objectives of the CPI, the general principles that should be considered in the construction of the revised CPI (with reference to the coverage and range of goods and services represented in the index and the coverage of the household population regions), the appropriate classifications to be used in the CPI regimen, and the methodology used to calculate the index.

The purpose of the rolling review is to ensure that pricing indicators and weighting for items are representative. This work is generally at the regimen level below that which is published. Current and future projects being undertaken as part of the rolling review are the redevelopment of childcare and kindergarten, international airfares, telecommunications, real estate fee, hospital services, ferry services, and prescription medicines.

In addition to the above, to assist in setting the agenda for, and providing user input into, development of the wider macro-economic statistics system, the Advisory Committee to Economic Statistics meets twice yearly to discuss priorities and developments – issues are debated and guidance and feedback given from users’ perspective.

The Norwegian CPI is reviewed each year to maintain the representativity of the CPI. Through this process the weights are updated, new items are included and old ones are dropped, and the specifications of the representative items are updated. The update of the sample of outlets is also a part of this process, as well as changed methodology. In this process all items in the basket are reviewed for relevance every year, although high technology items are given the most attention.

An advisory committee has been established for the price statistics in Norway. The Advisory Committee for Price Statistics provides input about user needs for the CPI. This committee consists of representatives from government ministries, labour organisations, trade associations, and academics. It meets annually to review the CPI programme and discuss potential programme changes. The Committee also provides input on user satisfaction with existing CPI data and user needs for additional data. This input is evaluated and is considered for current and future projects, as well as for programme enhancements. As a result of this input, Statistics Norway has considered several programme changes such as regional CPIs and implemented others such as the series adjusted for the effects of energy and the effects of taxes.

Statistics Norway conducted a user survey in 1997 and found users were satisfied with the CPI programme. One area of interest for additional data in the 1997 survey was for regional indexes. Statistics Norway discussed this and determined it was too costly to implement. In 2002 International Monetary Fund (IMF) investigated the quality of several statistical practices including the CPI within Statistics Norway. This exercise resulted in a summary assessment of data quality elements; Reports on the Observance of Standards and Codes (ROSC). The IMF ranked the CPI (as well as the other official statistics) as being of high quality. The user survey conducted as part of ROSC indicates the users are generally satisfied with the timeliness, accuracy, coverage, and level of detail of the existing CPI products. Some users, however, would like to see more detailed CPI items published.

As a part of the Price Project<sup>20</sup>, an important project in the CPI is to improve the measurement of services. Introducing explicit methods (hedonic regressions) for quality adjustment will have a priority. For the time being hedonic regression methods for quality adjustment of new cars is a priority. Since no price collectors are involved in the collection of the monthly prices in the CPI, scanner barcodes and other electronic data is necessary to introduce explicit methods of quality adjustment. Extending the use of scanner data and other electronic data is therefore an ongoing process. The treatment of owner-occupied housing and introducing more services within the health and insurance consumption groups are other important tasks.

***Recommendation 16:*** *Statistics Norway and Statistics New Zealand should continue to utilise independent advisory boards/committees to guide price index development and practice.*

## **11. Resources**

Internationally, the resources granted to a national statistical office differ greatly. The following section outlines the resources within Statistics New Zealand and Statistics Norway with respect to staffing establishment and organisation, policies, experience, training, processing systems and knowledge management.

### **11.1 Organisation**

In New Zealand the production of the CPI is undertaken within the Prices Business Unit, within the Macro-Economic, Environmental, Regional and Geographic Statistics group. Collection of price data is managed by the Integrated Data Collection service area for postal- and field-collected data. The collection of internet data and head office pricing is undertaken within the Prices Unit. The HES is undertaken by the Standard of Living Business Unit within the Social and Population Statistics group.

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<sup>20</sup> The aim of this project is to improve price and volume measurements in Statistics Norway. The frame for this project is from the EU's council regulation 1165/1998 and Handbook on price and volume measurement in National Accounts (Eurostat 2001).

In Norway the production of the CPI is laid down in department of Economic Statistics, Division of Economic Indicators. Price collection, which is done by questionnaires and scanner barcodes, is done by Division of Data processing. This division produces the questionnaires and receives all the data that is part of the local price collection<sup>21</sup>. The weights in the CPI are expenditure shares from the yearly HES. The conducting of the HES is done in the Division of Social Welfare. Field staff in the Department of Social Surveys conducts the monthly rent survey. The maintaining of the information system for the CPI is laid down in Division of IT Economic Statistics.

## 11.2 Staff

There are several teams involved in the collection, publication, maintenance and development of the New Zealand CPI. These teams are the Field Collection, Outputs, and Development teams. The Regional field supervisor is responsible for the coordination of pricing officers and the collection of prices. This team accounts for seven Full Time Equivalents (FTEs). The outputs team is responsible for the publication and maintenance of the CPI. This team accounts for 10 FTEs, see table 11.2.1.

The development team is responsible for major redevelopments of price indicators, the three-yearly review of the basket and weights of goods and services, and coordinating the Revision Advisory Committee which informs every second three-yearly review. The development team accounts for seven FTEs, although this fluctuates given the work programme.

The CPI Outputs and Development teams are supported by the Statistical Methods team and Technical and Analytical Support teams. Combined, these teams contribute about 1 FTE to CPI development, improvement, and process innovation.

**Table 11.2.1 Staff involved in the New Zealand CPI**

Activity	FTE	Full or part time staff	Division
Quarterly and monthly production	10	Full time	Prices
Coordination of pricing staff	1	Full time	Field Collections
IT issues	0.5	Full time	IT Operations
Statistical methodology support	0.5	Full time	Statistical Methods
Development – rolling review and 3 yearly review (incl HES validation)	7	Full time	Prices
Field pricing staff	7	Part time	Field Collections
<b>Total</b>	<b>26</b>		

There are about 18 FTEs used annually on the Norwegian CPI processes, see table 11.2.2. The staff involved in the monthly CPI production also contributes in conducting the yearly routines like calculating and updating the weights based on the new HES, and introducing new items in the CPI. The yearly routines also include maintenance of the existing representative items. Updating all the taxes to be used in the consumer price index adjusted for taxes (CPI-AT) and consumer price index adjusted for taxes and excluding energy (CPI-ATE) is another important yearly task.

The additional staff equivalents are in other Statistics Norway Divisions. Two are involved in the HES, five in initiating new outlets into the CPI sample and collecting the rentals for dwellings as well as preparing the rental survey, and 0.5 FTEs in data entry for CPI

<sup>21</sup> Local price collection concerns all the prices collected by questionnaires and scanner barcodes, while central price collection is prices collected by staff in Division of Economic Indicators.

questionnaires. One person from the Division of IT Economic Statistics is working almost full time to maintain and develop the data validation system.

The development team is responsible for major changes in the CPI. Among those ten FTEs used in the Division of Economic Indicators three people are working almost full time with development projects. Those involved in the monthly CPI production, are also using part of their work-time on small development projects. An overview of the staff involved in the Norwegian CPI is given in table 11.2.2.

**Table 11.2.2 Staff involved in the Norwegian CPI**

Activity	FTEs	Full or part time	Division
Monthly production	5	Full time	Economic Indicators
Contact with the outlets	1	Full time	Economic Indicators
IT issues	1	Part time	Economic Indicators
Research projects	3	Full time	Economic Indicators
Data capture	½	Part time	Data Collection Methods
IT development	1	Part time	IT Economics Statistics
Preparing the HES for the CPI	2	Part time	Social Welfare Statistics
Preparing the rental survey	1	Part time	Sample Surveys
Conducting the rent survey and initiating new outlets	4	Full time	Sample Surveys
<b>Total</b>	<b>18 ½</b>		

**Recommendation 17:** *Consideration should be given by Statistics Norway and Statistics New Zealand to the allocation of resources to investigate and implement the recommendations made in this paper.*

### 11.3 Training

Statistics New Zealand places great emphasis on staff training. For the Prices Business Unit, staff are given training in index theory (equivalent to two full days training and an additional supporting project work), a one day workshop on quality adjustment, Excel based Product total linking and index calculation training, and comprehensive modular training on the processing system (equivalent to four full days training). Given the level of explicit quality adjustment, this level of training is seen as the entry level training, and staff are encouraged to participate in weekly discussion groups on the ILO manual and conference papers, author conference papers and articles for *Price Index Newsletter (PIN)*, and develop their skills further with on-the-job application of price index theory.

In addition to training provided to analytical staff, all staff – analytical and field pricing staff – attend a conference to discuss pricing issues and research work. This is held approximately every 18 months.

Statistics Norway uses quite a lot of recourses on staff training. New employees go through a comprehensive training program focusing on statistics, index theory, computer tools and quality management. Other training available focuses on team work and management. The training is either through Statistics Norway's internal training-program or through external training such as private training offices or university training. Substantial on-the-job training is also provided, usually through the use of mentors. Staff are encouraged to do research and publish their findings. There is an agency review process for published research to ensure that it meets the high professional standards set by the Statistics Norway.

## 11.4 Information systems

The New Zealand CPI utilises a comprehensive index calculation system for the capture, editing, validation and calculation of prices and indexes; the Generalised Index Facility Toolbox – GIFT. GIFT is a relational database with all relevant price metadata (product descriptions, raw prices, quality adjustment ratios, etc) can also be stored. Some processes are performed outside of GIFT; however, those performed outside of GIFT are progressively moved into the system where possible. GIFT houses all indexes produced by Statistics New Zealand, with the Overseas-trade Price Index – Volumes the only exception. This allows the use of data collected via other collections to be utilised, eg CPI data is used in the calculation of the Producers Price Index, and some PPI data is used in CPI calculation.

All indexes produced as part of the CPI process are calculated in GIFT and moved to the Time Series Manager (TSM) database, a central repository for all published and private time series are stored. The public series in TSM are also used to create the Public Use Database, which can be accessed via the INFOS system supplied to subscribing customers.

In Norway a new information system was introduced in August 1999. This is an Oracle-based database where all the price information is restored. Validation, calculation and aggregation are, for the bulk of prices, done in SAS. In addition to the calculation of sub-indexes in the main information system, a significant part of the sub-index calculation is done in Excel. This is because Norway has introduced so-called part time surveys for some representative items and consumption groups, where data is collected centrally or less frequently than every month. Sub-indexes are then entered to the main information system before the final aggregation. After aggregation the all-item-index and all the sub-indexes are transferred to an individual database where only the CPI members have access.

All tables are created in a FAME-application. Staff from the Economic Statistics IT Division developed the whole production system, but during the monthly production only members of the CPI group handle the system. This leads to high level of security in the monthly process of compiling the Norwegian CPI.

## 11.5 Documentation and knowledge management

Sources and methods documentation for the New Zealand CPI was completed in August 2005; however, this is only internal at present. These documents ensure that all methodology, weighting information (sources, theoretical approach, etc), pricing concepts, quality adjustment techniques for homogeneous categories of items have been documented. Sources and methods are progressively being made available through the *Price Index News*, a quarterly newsletter, which features a 'nuts and bolts' section containing abridged sources and methods, free of the internal technical jargon!

Process documentation is thoroughly documented and consistent with Statistics New Zealand's Business Management Framework (BMF)<sup>22</sup>, which is utilised to instil good project management practices within Statistics New Zealand. Processes for field pricing staff are documented within the *Field Pricing Manual*. Documentation concerning field pricing procedures and protocols is vital when field pricing officers are required for quality control and flagging quality changes. While an older version of the manual exists, redevelopment is required to incorporate documentation released with the major review of the CPI in 2006 (with

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<sup>22</sup> Under the BMF all releases must have a charter; stakeholder register; process schedule; and risk, issue and dependency register. Furthermore, a documented debrief should be held following each release.

the collection of new goods and services, and updated specifications for most items), and review older protocols for item replacements etc.

Statistics Norway has done a lot of work in the field of documentation during the past few years. At present, all the main processes of the CPI production and information system are appropriately documented, and there are instructions available for every phase in the CPI production. However, the documentation work is an ongoing process and a lot of attention must be paid into updating documents in the future. Among others one aim is to organise the documents into an online handbook, which could be built like web pages. In Norway a comprehensive documentation of metadata "About the statistics" is developed and available on the internet.

**Recommendation 18:** *Statistics New Zealand should publish an external sources and methods document.*

**Recommendation 19:** *Statistics Norway should mainstream the existing documents concerning procedures and work instructions into one online handbook.*

## **12. Challenges, limitations and opportunities**

### **12.1 Scanner data**

Currently the use of retail transaction data within the New Zealand CPI is restricted to the calculation of expenditure weights and the quality maintenance of the items to price.

Substantial use is being made of retail transaction data, obtained from ACNielsen in New Zealand and from Australian company GfK.

ACNielsen collects details of sales of barcoded products that are scanned at checkout counters in supermarkets up and down the country. Aggregate sales information is obtained for about 375 categories, broken down by quarter, leading manufacturer, leading brand and, in some cases, variety.

GfK collects similar information for a range of small and large appliances sold through most of New Zealand's main appliance retailers and department stores. Information is obtained on the volume and value of sales of about 30 different categories, broken down by feature. For example, the information quantifies the relative importance of colour TVs with standard, LCD and plasma displays.

The ACNielsen and GfK information has been used to help:

- determine the expenditure weights of some goods in the CPI basket
- determine whether expenditure-weight adjustments were required, and, if so, by how much
- select representative products to survey when price collectors visit retail outlets each month or quarter
- ensure that the mix of brands in the CPI price samples reflects market shares.

Recent efforts should also see the incorporation of head office pricing for a large New Zealand-wide retail chain. Transaction data obtained from this outlet will be used at the collected price level to give a more representative measure of price change for goods purchased from this store.



In recent years, there has been a growing focus on use of scanner barcodes for computing price indexes for the Norwegian CPI. Statistics Norway started to use scanner barcodes in the CPI as early as 1996 for a selected number of food and other everyday commodities. The reasons for the growing focus are multiple, but the most important is perhaps that the indexes become more robust as scanner data give us access to more information about transactions. Another advantage is that the burdens for the reporting stores are far lower than earlier due to electronic, and to large extent automatic, routines for reporting.

Scanner barcodes are electronic data generated on the place and time of the transaction. This data holds information about price, amount, place, time and a short description of the products. The possibility for computing more correct indexes becomes substantially larger with this type of information available. First of all, it is possible to compute elementary indexes containing all the items in a consumer classification group. Secondly, we can take into account the changes in volume as prices change. This implies that the weights of the different items become more correct and that we take into account the substitution effect as prices change. The Norwegian CPI has implemented full-scale scanner data in the sub-index for food and non-alcoholic beverages as well as the sub-index for all alcoholic beverages except beer. Price development for some medical and health-related products is also based on scanner barcodes. Statistics Norway receives the scanner barcodes with no compensation to the retail chains.

Since August 2005, Statistics Norway has used scanner barcodes to compute the sub-index for food and non-alcoholic beverages in the CPI. This means that instead of computing the sub-index based on price information from approximately 250 representative items, the sub-index is now computed based on price information from over 14,000 items. The items are weighted together based on shares of sales, which means that the weights are more detailed now than they were earlier. The main elements in the new sub-index are stores stratified by store chain and profile. Nearly all items in the market are included and a new level is introduced in the consumer classification (COICOP 6). The Fisher-formula and monthly chaining compute the indexes on the lowest level. The new method implies larger monthly price variations, especially for goods with large seasonally variations in turnover and prices.

In Norway alcoholic beverages are sold by Vinmonopolet, the state-owned wine and liquor stores. The exception is different types of beer which are sold in ordinary retail shops. Every quarter Statistics Norway receives scanner barcodes from the headquarters of Vinmonopolet containing data for all its outlets in Norway. The data gives transaction information about amount sold and transaction price for liquor, wine and wine-based aperitifs. The sub-indexes for liquor and wine are computed the same way as the sub-indexes for food and non-alcoholic beverages.

Retail pharmacies have in recent years been reorganised into different chains. In the CPI some of these chains are reporting monthly prices for a sample of medical products and other health related products through scanner barcodes. This includes medical products with and without prescriptions. However, some of the pharmacies are still reporting the monthly prices through postal questionnaires, so implementing full-scale scanner barcodes is not yet possible within this consumption group. Therefore, only the price information is used when calculating EAs for medical and other health related products.

***Recommendation 20:*** *Statistics Norway should continue to expand the use of scanner barcodes.*

## 12.2 HICPs and other international price comparisons

New Zealand is one of 45 countries participating in the joint OECD-Eurostat Purchasing Power Parities (PPP) programme, which is a subset, or regional implementation, of a larger exercise called the International Comparison Programme (ICP).

New Zealand's involvement in the PPP programme began in the early 1980s, with price data supplied on an 'as requested' basis. Historically, New Zealand has not contributed actively to the PPP programme; requirements were met by a combination of using existing data and some supplementary pricing. In the late 1990s Statistics New Zealand reassessed its commitment, and a more concerted effort was made to be involved in the data collection process, provision of prices, index outputs, methods discussions and meetings. At the completion of the 2005 round, Statistics New Zealand has increasing its commitment to the PPP programme, taking on a much more active role in data supply, attending conferences and input into pricing specifications.

Furthermore, Statistics New Zealand is currently participating in the Friends of the Chair group which is reviewing the 2005 Round of the International Comparison Programme.

Statistics Norway plays an active role in the HICP work programme managed by Eurostat. The work programme started in 1993 where the objectives were to obtain comparable measures of price development. HICP was first published in 1997. HICPs are produced in all Member States in addition to Iceland and Norway. The work programme involves monthly production and dissemination of the HICP and regular participations in Eurostat meetings and discussions related to the HICP.

Norway has participated in the PPP-program since 1980. Before 1992 the OECD guided the PPP cooperation. Since 1993 Norway has joined the PPP-program managed by Eurostat. Norway plays a quite active role in this program by among others participating in the work-meetings as well as Task force groups.

Norwegian CPI staff regularly attend the ECE/ILO meeting on consumer prices in Geneva and have occasionally contributed papers to the Ottawa Group meetings on price measurement issues.

## 13. Summary of findings

The main differences between the CPIs in New Zealand and Norway respectively can be summarised as follows:

- Underlying concept; an inflation index versus a COLI
- Frequency of the publication; quarterly versus monthly
- Data collection; use of price collectors versus postal questionnaires as the main source for the local price collection
- Reweighting every three years versus annually chaining
- Source(s) of weighting information; HES and a range other supplementary data versus only the HES and some scanner barcodes
- Explicit quality adjustment versus the use of implicit methods
- Owner occupied housing; net acquisitions versus rental equivalence

The most significant difference between the New Zealand CPI and the Norwegian CPI is the objective of index. The New Zealand CPI is regarded as an inflation index, while the Norwegian CPI is defined as a COLI-index. This leads to another main difference; the measurement of owner occupied housing. New Zealand has chosen a net acquisition approach,

while Norway is using the rental equivalence approach. The frequency of the two indexes is another difference; in Norway the index is produced and published every month, whereas in New Zealand the index (except for food) is produced and published on a quarterly basis. The time between weighting period is also a significant difference, which in Norway is one year and in New Zealand three years. The sources of information used for weighting purposes also differ greatly; while the HES is used solely for the expenditure weights in Norway, Statistics New Zealand used the HES and wide range of other sources to make independent estimates of expenditure. One other difference between the two indexes is the use of explicit versus implicit methods for quality adjustment. At present Norway only use implicit methods while New Zealand uses explicit (including hedonics) and implicit methods.

A significant difference appears in the price collection methods namely the use of physical price collectors in New Zealand and mostly questionnaires in Norway.

## **14. Future initiatives**

The use of electronic data sources for both weighting information and price collection is currently being investigated in the New Zealand CPI. Such sources include scanner data, EFTPOS transactions data and the possible use of handhelds. Such initiatives will lessen respondent burden and lead to cost savings in field/postal collection and data processing.

Improvements in Statistics Norway and in the Norwegian CPI is an ongoing process. Statistics Norway started in 2004 a big project – the Price project – where the aim is to improve price and volume measurements in Statistics Norway. The frame for this project is from the EU's council regulation 1165/1998 and Handbook on price and volume measurement in National Accounts (Eurostat 2001). The project is organised into several smaller projects in specific units in Statistics Norway.

Several new council regulations for the HICP will be approved in the future and this will also influence the current methods in the CPI. Among others the price collection periods has to be expanded for certain consumption groups due to a newly adopted council regulation. Another important future task for the HICP is the inclusion of owner occupied housing based on the net acquisition approach that might be approved.

Other areas that will be in focus the coming years; development and introduction of explicit methods for handling quality changes, expanding the numbers of services - especially within the health consumption groups, leisure services and communications, and consider alternative expenditure weight sources. To meet user needs, dissemination of more detailed information will be obliged whenever the price survey for a consumption group has undergone major quality improvements.

## Appendices

### Appendix One – Table of similarities and differences

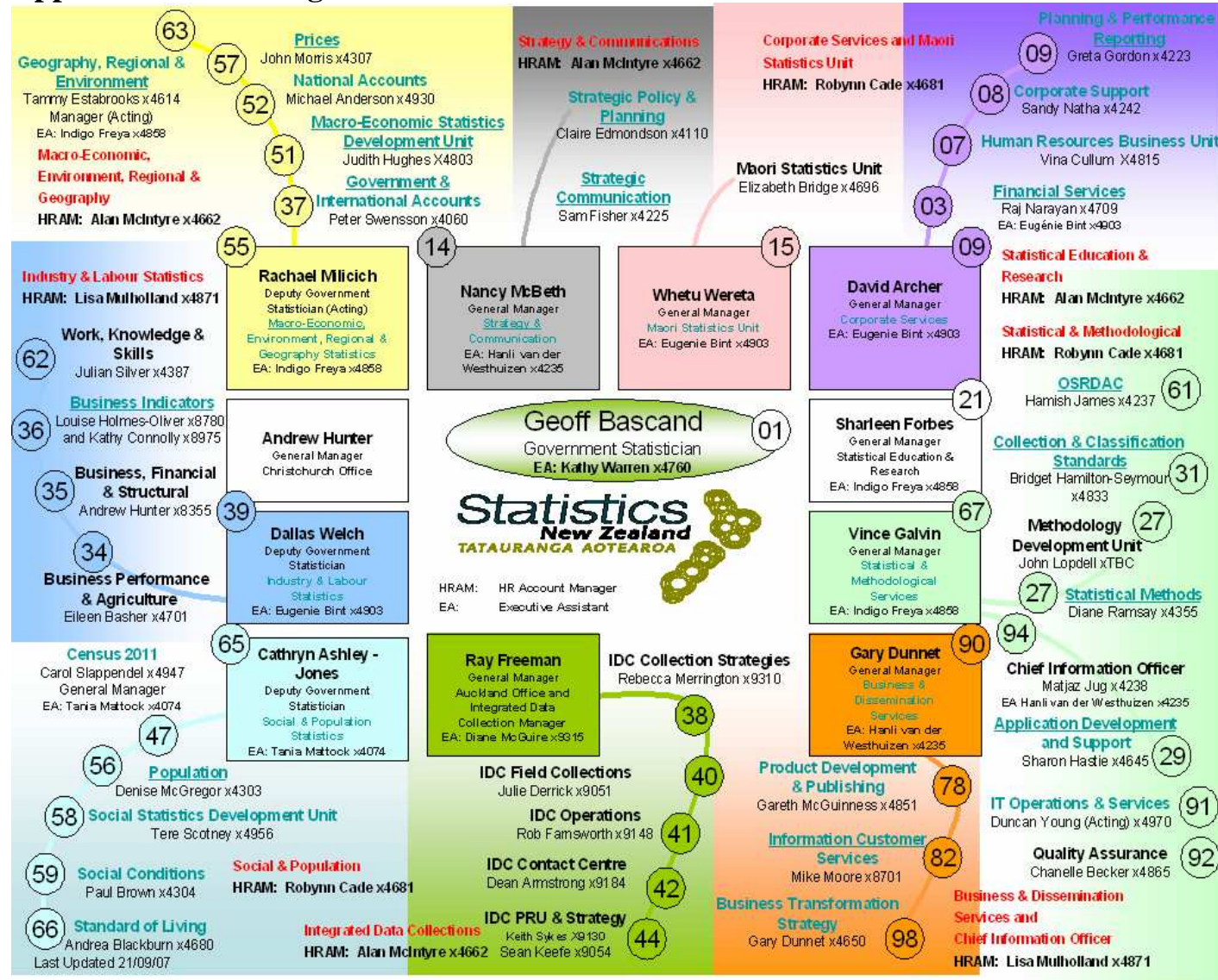
Statistical office	Statistics New Zealand	Statistics Norway
Purpose and objective	Measure of inflation Net acquisition approach	Cost of Living Index User cost with rental equivalence for OOH
Scope and coverage	Private New Zealand Households (Resident approach)	Private Norwegian households 79 years old and below (Resident approach)
Weights	Household Economic Survey (Response rate ~70%) and a number of alternative sources	Source: Household Expenditure Survey Response rate ~50% Weights are 3-yearly moving average
Classification	The New Zealand Household Expenditure Classification; based on COICOP	COICOP
Sampling	Only some statistical sampling of postal questionnaires	Outlet sampling is done via random sampling techniques
Data collection methods	Mostly field collected items	Mostly scanner barcodes and postal questionnaires
Editing/Validation	Rigorous editing and validation processes. However, a large amount of double handling as price collection is still paper based	Streamlined automated process.
Quality adjustment	Explicit and implicit	Implicit only
Index Aggregation	Jevons and Dutot for elementary aggregates	Mostly Jevons for elementary aggregates
Data Series	Over 350 series available	Over 500 series available
Frequency	Quarterly for the CPI, while the Food Price Index is monthly	Monthly CPI
Serviceability and Accessibility	CPI is released on the 11th working day after the reference period (FPI 9 days)  Equal access to all. Access is mostly internet based.	CPI is released on the 10th working day after the reference period  Equal access to all. Access is mostly internet based.

## Appendix Two – Expenditure weights, New Zealand and Norway

	<b>Main COICOP groups</b>	<b>New Zealand</b>	<b>Norway</b>
	All item index	1000	1000
01	Food and non-alcoholic beverages	173.8	113.8
02	Alcoholic beverages and tobacco	72	28.0
03	Clothing and footwear	47.5	58.4
04	Housing	200.2	280.7
05	Furniture and furnishings, carpets and other floor coverings	54.9	63.4
06	Health	52.3	29.1
07	Transport	172.4	180.0
08	Communications	32.6	25.4
09	Recreation and culture	102.1	121.9
10	Education	20.8	3.2
11	Restaurants and hotels	.. <sup>(1)</sup>	35.2
12	Miscellaneous goods and services	71.3	60.9

(1) Statistics New Zealand has not included a Restaurants and hotels group in the New Zealand Household Expenditure Classification (NZHEC)

# Appendix Three – Organization chart for New Zealand



## Appendix Four – Organization chart for Norway

