

New Goods and the CPI: An Empirical Analysis on the Impact of When New Goods Are Introduced into the Index

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Abstract

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The appearance of new goods and services in the marketplace can present a significant issue for the compilation of the Consumers Price Index (CPI). As the New Zealand CPI uses a fixed basket approach, new goods are generally added only when the basket is reviewed and reweighted. The CPI is therefore subject to a form of potential measurement bias called 'new goods bias', which increases as the delay with which new goods are introduced into the index lengthens.

This paper summarises the conceptual issues of new goods bias and describes the treatment of new goods in the New Zealand CPI. The paper also presents an empirical analysis of the potential impact on the index of the following:

- the timing of the introduction of new consumer electronic goods to the CPI
- the expenditure weights assigned to these items.

The goods examined include digital cameras, DVD players/recorders and flat panel televisions.

1. Introduction

The New Zealand Consumers Price Index (CPI) measures the changing cost of purchasing a fixed 'basket' of representative goods and services. The basket is re-selected and re-weighted every three years. The appearance of new goods and services in the marketplace between re-weighting periods can therefore present a significant issue in compiling the CPI. The inability of the CPI to account for the price behaviour of new goods potentially gives rise to a form of measurement bias, referred to as 'new goods bias'.

The purpose of this paper is not to quantify any measurement bias in the New Zealand CPI. Rather, the aim is to provide an insight into the importance of the 'when' and the 'how' of introducing new goods into the CPI. This paper presents an empirical analysis of the timing of the introduction of new consumer electronic goods into the index.

This paper begins with a description of the compilation practices of the CPI in New Zealand. It also gives a summary of the conceptual issues of measurement bias, followed by a description of Statistics New Zealand's treatment of new goods. The paper then presents the results of the empirical analysis, and discusses their implications.

2. The New Zealand CPI

The New Zealand CPI, as with most CPIs produced by statistical agencies, measures the price change of a fixed basket of representative goods and services. In a fixed-weighted index, the quantity bought of each commodity in the basket is assumed to remain constant for the life of the index. In other words, the index will only show changes in the prices of these commodities, while keeping quantity and quality fixed.

The current CPI basket is comprised of approximately 670 representative goods and services. Information from the Household Economic Survey (HES) and other sources is used in selecting the goods and services and in assigning expenditure weights.

Prices for the majority of items are collected from 15 pricing centres throughout the country¹. Field surveys and postal questionnaires are the two main modes of price collection. Electronic information is also obtained directly from agencies where appropriate.

2.1 CPI Revision Advisory Committee

A Revision Advisory Committee (RAC) is established every six years, timed to coincide with every second re-weight of the index and provides the Government Statistician with independent advice on the upcoming revision to the CPI. The committee comprises a group selected to bring both professional expertise and the confidence of stakeholders to the review process.

The committee last met in 2004 to provide input into the 2006 revision of the CPI. The committee's 20 recommendations have played a major part in shaping the development work programme leading up to the implementation of the re-weighted CPI in 2006.

¹ Main exceptions are items which may be unavailable in some regions and nationally priced items.

2.2 Index formula

The CPI is calculated using a Laspeyres-type formula, which measures price changes for a weighted basket of goods and services over time. The weights reflect household expenditure patterns in the reference period and remain fixed between the three-yearly reviews. The Laspeyres index can overstate the actual price movements, as it does not capture any substitution that occurs towards items that have become relatively cheaper.

An alternative approach would be to calculate the index using the Paasche formula, where weights reflect current period expenditure patterns. The Paasche index provides a comparison of what it would have cost to purchase today's basket at prices of a historic period.

In contrast to Laspeyres, the Paasche formula will tend to understate the actual price change experienced by consumers because it makes the assumption that the substitution that led to the expenditure pattern in the current period was also in place in the past.

While the Laspeyres formula assumes no substitution and the Paasche formula assumes full substitution, a 'superlative' index, which in some way averages the consumption patterns of the two comparison periods, may be considered more appropriate with regards to accurately reflecting the substitution effect. The Fisher index, for example, is a superlative index which is calculated as the geometric mean of the overstating Laspeyres and the understating Paasche indexes.

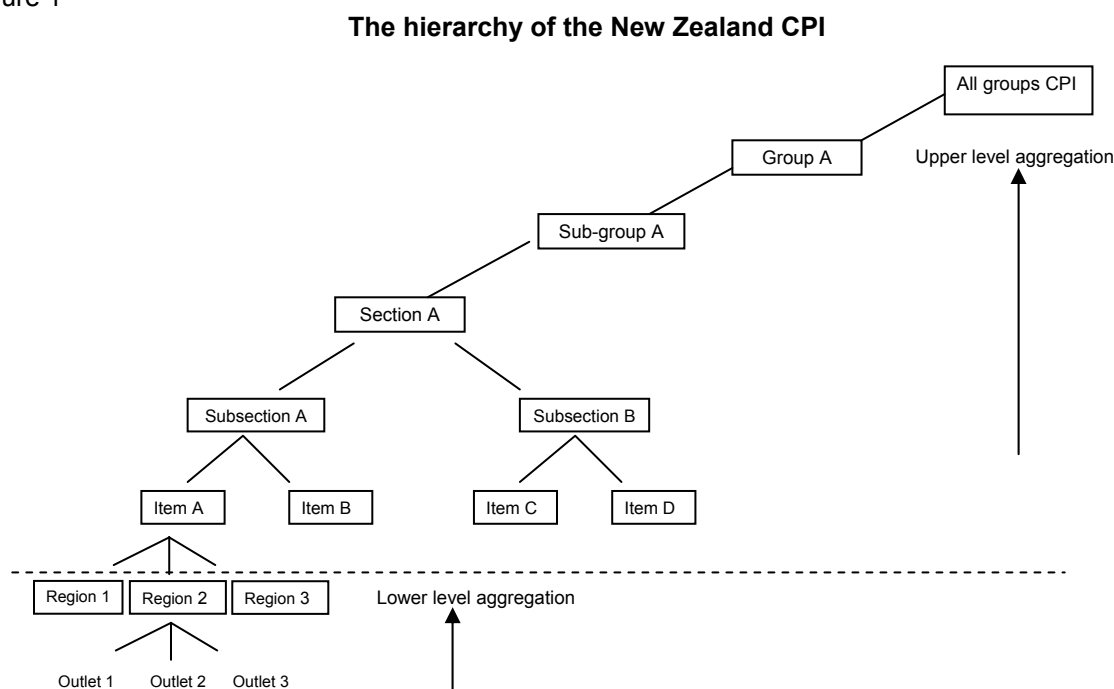
In practice, however, it is not feasible to produce CPIs in real time using a superlative index formula as Statistics New Zealand, and statistical agencies in general, are not yet in a position to collect and process information on current household expenditure.

It is possible to produce a retrospective superlative index after some delay. Such an index can be calculated and compared to the Laspeyres index as an estimate of the effect of item substitution bias.

2.3 CPI hierarchy

The goods and services covered by the CPI are classified into nine groups, which are then further broken down into subgroups, sections, subsections and items. The current hierarchical structure of the CPI is illustrated in Figure 1.

Figure 1



3. Sources of bias

The CPI provides an estimate of ‘representative’ price change. The issue of measurement bias arises where the practices and decisions on which items to price, the weights, and where to price those items, run the risk of becoming unrepresentative over time.

Statistics New Zealand, and statistical agencies in general, are faced with various constraints in managing the risk of measurement bias. The timeliness and the cost of compiling the index must be considered along with the quality of the output.

There are five major sources of possible bias in consumer price indexes²:

- Item substitution bias
- Outlet substitution bias
- New goods bias
- New outlet bias
- Quality change bias.

3.1 Item substitution bias

As stated previously, the Laspeyres index formula is not intended to reflect substitution of items within the basket. The basket of goods and service is determined in the base period. A potential source of bias arises if the household expenditure patterns in the current period have become significantly different to the reference basket. For example, consumers may be expected to buy more of the items which have become relatively cheaper, compared to other items in the basket.

² Another source of bias not covered in this paper is the formula bias. A more detailed discussion can be found in Morris (1997).

Under a Laspeyres formula, re-weighting the basket periodically will help minimise the effect of item substitution bias, but cannot eliminate it. It is important to recognise that item substitution is likely to occur continuously, so any set of fixed weights will become outdated and unrepresentative over time.

It is generally accepted that the best solution to account for item substitution is the use of a superlative index formula. However, given that it is impractical to use a superlative index formula in the ongoing production of the CPI, the next best alternative is to update the weights in a Laspeyres formula as frequently as possible. International studies have shown that the size of the bias is directly linked to the frequency with which the basket is updated. Frequent updates minimise the bias from longer-term substitution effects (for example, from butter to margarine) and reduce the risk of the base basket becoming unrepresentative.

In New Zealand, the CPI basket is re-weighted on a three-yearly cycle. In this respect, Statistics New Zealand's approach is aligned with the International Labour Organisation's (ILO) recommendation of at least once every five years. The 2004 RAC also concluded that the current frequency of re-weighting is satisfactory (Recommendations 6 and 10).

3.2 Outlet substitution bias

In the base period, a sample of retail outlets is selected to represent the outlets used by the population. Where possible, weights are assigned to each outlet type or chain based on market share information. In a fixed-weight index, the sample of outlets and any associated weights generally do not change throughout the life of the index. Over time, consumers are likely to substitute more of their purchases towards outlets showing lower relative price change. Any price change as a result of shifts in such consumer shopping patterns may not be captured by the CPI.

The choice of an elementary index formula is important in managing this bias. Three formulae have commonly been used to construct elementary indexes:

- The ratio of arithmetic mean prices (RAP) – also known as the Dutot formula
- The arithmetic mean of price relatives (APR) – also known as the Carli formula
- The geometric mean of price ratios (GM) (or the ratio of geometric mean prices – the ratio of means and the means of relatives are the same) – also known as the Jevons formula.

The Carli formula has traditionally been used by many countries. However, it is no longer recommended by the ILO following studies showing that it is likely to produce an upwardly biased estimate of household inflation. One of its flaws is the inability to handle 'price reversals'. Most countries have adopted either the Dutot or Jevons, or a combination of both.

At present, Statistics New Zealand uses the Dutot formula to construct all elementary indexes. This formula assumes that there is no outlet substitution, that is, the same quantities are purchased at each outlet in each period. In contrast, the Jevons formula assumes the same expenditure in each outlet in each period. For example, if the price of an item doubles, the quantity purchased is halved, leaving overall expenditure unchanged. The ILO recommends that Jevons be used where appropriate, except in cases where there is little possibility for substitution (such as items which are only available from a few or even a single outlet in a geographical region), or where individual prices may become zero or near zero (since the geometric mean becomes zero).

As recommended by the 2004 RAC (Recommendation 9), Statistics New Zealand will implement the Jevons formula for items it considers are subject to outlet substitution, as part of the 2006

review. The re-weighted CPI will use a combination of Dutot and Jevons formulae to calculate the elementary aggregates.

3.3 New goods bias

New goods bias is the term used for the failure of a price index to account for the introduction of both new goods and new services into the marketplace. Due to the fixed basket approach of the CPI, the price movements of any new goods, although experienced by households, would not be captured by the index.

If the price change pattern for the new good is the same as that for existing items in the basket, no bias will occur, as the CPI price change will still be representative. However, new goods tend to enter the market at high prices which fall significantly as their market share expands. The implication is that by not pricing new goods, the CPI could overstate household inflation if expenditure on these goods is significant. This problem is especially prominent in the consumer electronic sector. For products such as cellphones and DVD players, initial price levels are high and few units are bought. As production and component costs decrease, prices often fall sharply, leading to rapid uptake of the new good.

In assessing the potential impact of new goods bias on the CPI, it is important to note that initial volumes of most new goods are generally very low, given that relatively few households are early adopters. The size of any bias on the CPI overall is therefore likely to be minimal in the early stages of the product's introduction. However, if a new good is not incorporated into the index until after it has become a well-established good, the impact of any bias would be much more significant.

Another aspect to consider is the definition of new goods. It can be difficult to distinguish new products from existing products where the quality has changed. The ILO manual defines entirely new goods as those that "cannot easily be linked to an existing item as a continuation of an existing resource base and service flow, because of the very nature of the newness", and gives frozen foods, microwave ovens and cellphones as examples. Entirely new goods are also referred to as 'revolutionary goods', in that they do not fit into any existing expenditure class, even though they may satisfy an established consumer need or want. On the other hand, 'evolutionary goods' are replacements for or variants of existing items that continue to provide a similar service flow, but possibly in new ways or to different degrees (for example, a new car model with a more powerful engine).

Because revolutionary goods are distinctively new, they cannot generally be incorporated into the CPI basket within an existing expenditure class. Thus, as stated in the ILO resolution, new goods which cannot be classified to any of the existing elementary aggregates should normally be included only during a periodic review of the basket (Paragraph 28).

The size of any bias is dependent on three main factors: the relative importance of the new good; the delay in which the new good is introduced into the index; and the price movements of the new good relative to those of the CPI basket. In New Zealand, new goods are generally only brought into the basket as part of the three-yearly re-weight of the index. Again, the frequency of the re-weighting is consistent with ILO's recommendation of occurring at least once every five years.

Consumer price indexes are used for many purposes, one of which is to measure the changes in the cost of living³. For CPIs based on a cost of living conceptual framework (COLI, such as that of the United States of America), the issue of consumer welfare gains should also be considered in the discussion of new goods bias. Conceptually, a COLI should account for any gains in consumer welfare from new goods simply becoming available for consumption. However, consumer welfare gains from new goods are not as strong an issue for CPIs based on other conceptual frameworks.

3.4 New outlet bias

This type of bias is similar in nature to the new goods bias, in that it relates to the CPI's possible failure to account for new offerings in the marketplace. If the set of outlets for price collection is fixed between periodic outlet reviews, the expenditures at these new outlets are significant and their price movement differs from existing outlets, a bias may be introduced to the index.

Statistics New Zealand manages this bias by undertaking an outlet sample review at every second CPI re-weight (approximately once every six years). In between the formal reviews, the outlet sample is maintained by monitoring market changes and updating the sample accordingly. This is achieved by ensuring that price collectors consistently report to the office any outlet closures and the appearances of any significant new outlets in their regions.

3.5 Quality change bias

Dealing with quality change is considered to be one of the more difficult and least tractable problems in CPI compilation. Items constantly disappear from the marketplace and are replaced in the CPI by similar, but somewhat different, items carrying different prices. In a fixed basket, however, the same item should be priced in each period to ensure like is compared with like. When new items differ with respect to package sizes, volumes or other characteristics, from the original items they replace, an adjustment should be made to reflect any differences in the quality of the new item.

Inappropriate or inaccurate adjustments for changes in quality are a significant issue and can result in the CPI either overstating or understating the 'true' price change. In general, many observers view the bias as upward given the rapid rate of technological advances occurring in the marketplace. Quality change is an ongoing process that requires price statisticians' continual attention. The other sources of potential bias, in contrast, can be effectively managed by one-off changes or periodic reviews of the CPI basket.

The 2004 RAC endorsed Statistics New Zealand's current practices of quality adjustment in the CPI (Recommendation 7).

³ A cost of living index measures changes in the cost of preserving a particular standard of living.

4. Treatment of new goods in New Zealand

New goods and services are usually added to the New Zealand CPI only when the basket is reviewed and re-weighted. This means that generally there could be a delay of up to three years before the price effects of a new item are directly shown in the index.

An example of a possible new goods bias in New Zealand is cellphone handsets. This item was added to the CPI basket in the September 2001 quarter. By not capturing the fall in price and the significant rise in popularity that was apparent in the late 1990s and early 2000s, an upward bias may have been introduced into the New Zealand CPI.

In order to minimise the possibility of new goods bias, it would be ideal to introduce new goods as soon as they have made an impact on household expenditure patterns. However, this would require an identification of the goods and services on entering the market, and an accurate tracking of its market share (and hence, expenditure weight). The lack of timely and robust information in regards to sales volume has limited the ability to bring new goods into the basket between re-weights. In practice, Statistics New Zealand manages the bias by ensuring important new items (items with relatively significant expenditure) are brought into the CPI at the time of basket re-weights. Often, Statistics New Zealand will have information on which new goods have become increasing significant prior to a re-weight. This may be confirmed when HES expenditure data becomes available.

It should be noted that a number of items have been incorporated into the New Zealand CPI between periodic re-weights. However, these tend to be items which can be fitted into an existing elementary aggregate (for example, road user charges) or are evolutionary goods (such as new models of gaming consoles).

Over the past few years, a number of goods have been incorporated into the CPI with considerable delays; this is partly due to the rapid development of new consumer electronic goods in recent times. Table 1 gives some examples of recent new items in the CPI and their date of introduction. Some of these goods and services were widely adopted by households some years prior to their introduction.

Table 1

Examples of Recent Additions of New Goods and Services to the CPI
By date of introduction

Item	Quarter of introduction ¹	Whether introduced as part of periodic basket review
Cellphone service charges	June 1999	Periodic basket review
Internet charges	June 1999	Periodic basket review
Cellphone handsets ²	September 2001	In-between basket reviews
DVD players	June 2002	Periodic basket review
Multifunction devices ³	March 2005	In-between basket reviews
Digital cameras	June 2005	In-between basket reviews

¹ Link period. First contributed to quarterly movements in the following quarter.

² Cellphone handsets were introduced after handsets became not as widely or heavily subsidised by service providers.

³ Replaced two separate CPI items: Printer and Scanner.

⁴ Replaced traditional (analogue) cameras.

As part of the 2006 rebase, a range of goods and services will be introduced into the CPI. Many of these goods and services are being added to the basket despite not being regarded as

evolutionary or revolutionary goods. Rather, household expenditure on these items has increased to a level of significance that would warrant their inclusion in the basket of representative goods and services. Examples of such items are:

- barbecue
- beauty therapy
- bottled LPG
- bottled water
- courier charges
- laptop computer
- rice cooker
- spa pool
- surfboard.

In regards to evolutionary or revolutionary goods which will be brought into the CPI basket at the 2006 rebase, most are consumer electronic products that have been available in the marketplace for a period of time. Examples of such items are:

- digital photo printing
- digital recording media
- DVD player/recorder
- flat panel television
- home theatre system
- portable MP3 player.

As noted earlier, new goods bias becomes an issue when the new good's price movement is different to those of existing CPI items and when it achieves significant market share. It could be argued that the impact of omitting new goods in the CPI basket is to some extent lessened by the likelihood that the new good would have created downward pressure on prices of similar existing items already in the basket. Rossiter (2005) cites digital camera as an example of this: the price index for traditional film cameras in Canada was declining before digital cameras were introduced into the index. Rossiter suggests that although price changes of digital cameras were not shown in the CPI, the prices of traditional cameras were driven by competitive pressure from digital cameras. In New Zealand, there was a similar occurrence. The Camera price index (which only contained traditional film cameras) saw an average annual decrease of 2.4 percent in the two years prior to the introduction of digital cameras to the basket in the June 2005 quarter. The rate of price decrease, however, noticeably accelerated after digital cameras replaced traditional cameras in the index.

4.2 New classification system

The revised CPI will be moving to a new classification system, based on the United Nation's Classification of Individual Consumption According to Purpose (COICOP). The 2004 RAC endorsed moving to a new COICOP-based classification that would potentially facilitate international comparability and consistency with best-practice guidelines (Recommendations 11 and 12).

Statistics New Zealand has finalised the new classification, referred to as the New Zealand Household Expenditure Classification (NZHEC). The NZHEC classifies household expenditure by purpose and has 13 expenditure groups.

The current CPI was intended to have fixed weights at the fourth or subsection level of the index. In practice, expenditure weights have generally been fixed at the item level, of which there are approximately 670 categories. In comparison, with the NZHEC classification, the intention is to fix expenditure weights at the third or “class” level of the classification, of which there are 106 categories⁴. The implication is that the revised basket will be less rigidly fixed, providing flexibility for new items to be introduced and existing items to be re-weighted between periodic re-weights. This would allow substitution effects (such as from one fruit item to another) within the class level to be reflected in the index.

5. Empirical Analysis

This part of the paper focuses on an empirical analysis of two aspects of introducing new goods to the index: the timing, and the expenditure weights assigned to the new good. The aim is to estimate the importance of the above on the CPI, using three consumer electronic goods as test subjects - digital cameras, DVD players/recorders and flat panel televisions. The underlying question is: if these items had been introduced earlier and weighted appropriately, what impact might this have had on the index?

The rationale for choosing digital cameras, DVD players/recorders and flat panel televisions for the analysis are two-fold. Firstly, the literature on bias generally agrees that new goods bias is especially problematic for consumer electronic products and goods with an element of technology. The second reason is attributed to the availability of relevant external electronic transaction data, which Statistics New Zealand has recently acquired from market research companies to assist with the current CPI review⁵.

One of the electronic transaction datasets contains detailed sales information for a range of small and large appliances sold through most of the country's main appliances retailers and department stores⁶. The volume and value of sales for about 30 product categories was available. This information tells us the actual pace of consumer adoption of the goods being studied and allows us to possibly determine at what period the new good being examined could have been incorporated into the CPI, compared to when it was actually introduced or planned to be introduced.

5.1 Methodology

The analysis involves constructing new index series using electronic transaction data information relating to the timing of significant sales and relative importance of the items in question. The resulting new series could then be compared with the existing indexes at the All groups, group and section levels.

In order to construct the new indexes, we require information on expenditure and prices of new goods for the periods examined. While the electronic transaction data provided information from which to derive expenditure weights, information on prices was not as readily available.

⁴ There are 106 categories within the 11 groups that will form the CPI All groups index.

⁵ Uses of this information for the 2006 review include determining the expenditure weights (or relative importance) of some goods in the CPI basket, selecting representative items to price survey and to ensure that the mix of brands in the samples reflects market shares.

⁶ The supplier of this information was GfK Australia.

For the flat panel televisions and DVD players/recorders analyses, the indexes of the existing 'old' goods in the CPI being replaced were used to represent the price change of the new goods. The justification for this is that there is an expectation that the price movement of the existing CPI item is to some extent driven by the emerging new good. Analysis based on electronic transaction data shows that plasma and LCD televisions had broadly similar price movements to conventional television sets in the period between July 2003 and June 2005. Likewise, analysis on DVD devices shows that price movements for DVD players/recorders were broadly in-line with those of DVD players during the period examined.

In the case of digital cameras, however, analysis showed that the movements of the price series for digital cameras (constructed based on electronic transaction data) did not track closely with that of the Camera item index of the CPI. Therefore for the analyses on digital cameras, a price index time series showing the price movements of digital cameras was derived using the electronic transaction data and the CPI series since digital cameras were introduced.

The changing importance of the new good would be reflected by updating the expenditure weight on an annual basis (at June quarters), where appropriate (again using electronic transaction data and HES 2003/2004 data). In the case of digital cameras, expenditure share between the existing traditional camera item and new digital cameras item would also be re-allocated at each subsequent June quarter re-weight of the item.

The steps involved in the analysis are broadly outlined below:

1. Using electronic transaction data and other sources, identify the period for which the new good is significant enough to warrant being introduced into the basket in the analysis (the link period).
2. Calculate a new expenditure weight for the item in question based on information from the electronic transaction data and HES 2003/04.
3. Adjust the expenditure weight of the existing CPI item at the link period and calculate new indexes, keeping expenditure weights fixed at the section level and above.
4. Link the new index to the existing index at the link period.
5. Adjust the item weights at each subsequent June quarter (that is, the link period) in order to reflect the growing importance of the new good.

In developing the above methodology, a number of assumptions have been made either explicitly or implicitly:

- For the flat panel televisions and DVD players/recorders analyses, the price movements of the new item and the related item already in the CPI basket are assumed to be consistent in the periods after the new item's introduction. If this assumption does not fully hold and prices of flat panel televisions and DVD players/recorders have fallen more sharply, then the impact would be greater than those shown in the following analyses.
- For digital cameras, prices prior to the September 2004 quarter are assumed to have fallen at the same rate as they have since then.

- As the available electronic transaction data relates to the period July 2003 to June 2005, estimates were made for the unavailable quarters based on extrapolation and HES 2003/2004 data. An adjustment was also made to account for sales not included in the electronic transaction dataset, which covers approximately 80 to 90 percent of the New Zealand market.
- By fixing the expenditure weights at the section level and above, an assumption is being made that substitution towards the new good occurs within the section in question, but not between sections. Fixing expenditure weights at this level of the index is broadly consistent with the planned ongoing level of fixing weights at the class level following the implementation of the 2006 CPI rebase.

5.2 Scenarios examined

As outlined earlier, the introduction of three new goods are studied in this analysis: digital cameras, DVD players/recorders and flat panel televisions. The six scenarios being examined are summarised in Table 2.

Table 2

Summary of the six scenarios being examined

Scenario	Good	Link quarter actually / to be introduced to the CPI	Link quarter introduced in analysis	Corresponding existing CPI item	Subsequent weight updates in analysis
1	Flat panel television	June 2006	March 2004	Colour television set	June 2004 June 2005
2	DVD player/recorder	June 2006	June 2004	DVD player	June 2005
3	Digital camera	June 2005	December 2002	Camera	June 2003 June 2004 June 2005
4	Digital camera	June 2005	June 2005 (with different weighting)	Camera	N/A
5	Combined effects of Scenarios 1 and 2				
6	Combined effects of Scenarios 1, 2 and 3				

5.3 Results and discussion

The results of the analysis, along with relevant existing indexes, are presented in the section. The resulting index series from the analysis are labelled 'New' indexes and are presented along with the existing indexes. Two new series are generally presented in each graph – one showing the item being introduced with new weights and with no further weight updates, and the other showing the effect of annually re-weighting the new item relative to other items within the section index. The time period in bracket refers to the period in which the item in question is introduced.

A table showing the changing relative weights of the item in question within the section, as a result of subsequent weight updates, is also shown following each graph showing section level indexes.

To aid interpretation, all index series have been expressed on a base of June 2002 quarter (=1000).

5.3.1 Scenario 1: Flat panel televisions

Television sets available in New Zealand nowadays are mainly based on four technologies: conventional or cathode ray tube (CRT), rear projection, plasma display and LCD display. Of these, plasma and LCD sets are relatively new to the market and have been rapidly gaining in popularity.

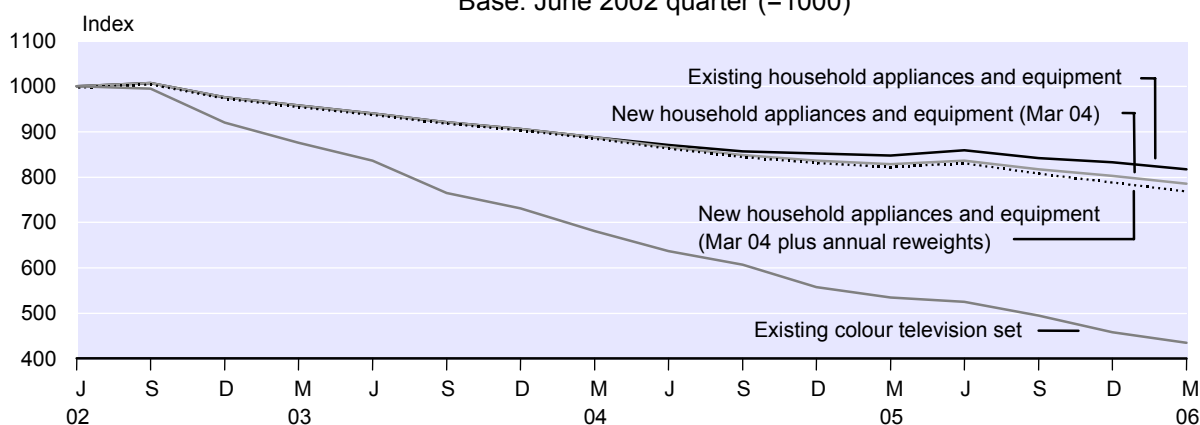
As shown in Table 2, flat panel television sets (which include both plasma and LCD) will be added to the CPI basket in the June 2006 quarter, as part of the 2006 rebase. Flat panel televisions will be brought into the CPI as an additional item, so that it will exist along side the conventional television item. Each item will then have its own elementary aggregate index measuring price changes and will be given appropriate expenditure weights.

This analysis (Scenario 1) looks at the effects of introducing flat panel televisions in the March 2004 quarter (using electronic transaction data), and re-weighting the item at each subsequent June quarter.

Figure 2

Household Appliances and Equipment and Colour Television Set Analysis on the introduction of flat panel televisions

Base: June 2002 quarter (=1000)



Weight of Television item as percentage of the Household Appliances and Equipment section¹

Index	Jun 02	Mar 04	Jun 04	Jun 05
Existing Household Appliances and Equipment	15.40	11.81	11.25	9.42
New Household Appliances and Equipment (Mar 04)	15.40	26.44	25.34	21.64
New Household Appliances and Equipment (Mar 04 + ann. re-weights)	15.40	26.44	28.50	37.03

¹ Weights have been 'price updated' to reflect price changes since the June 2002 quarter.

Figure 2 shows that, under Scenario 1, the Household appliances and equipment index (a section level index) would have been up to 45.9 index points lower during the period examined. In comparison, had the item not been re-weighted at each subsequent June quarter following its introduction, the difference between the existing series and the new series would have been up to 32.0 index points.

Figure 2 shows the difference between the existing series and the new series growing as the importance of the flat panel televisions increases.

It is also possible to illustrate any differences between the existing series and the new series in terms of percentage changes. From the period flat panel televisions are introduced in the analysis (March 2004 quarter) to the March 2006 quarter, the average annual percentage change of the new series (with annual re-weights) is a decrease of 6.79 percent. In comparison, the existing series showed an average annual decrease of 4.06 percent in the same period.

Table 3

CPI All Groups																
<i>Analysis on the introduction of flat panel televisions</i>																
Base: June 2002 quarter (=1000)																
Index	Jun 02	Sep 02	Dec 02	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05	Sep 05	Dec 05	Mar 06
Existing CPI all groups	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094
New CPI all groups (Mar 04)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1088	1094
New CPI all groups (Mar 04 plus annual reweights)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1087	1093

Table 3 shows that, had flat panel televisions been introduced to the CPI at the March 2004 quarter, and re-weighted at each subsequent June quarter, the CPI All groups index would have been up to 1.0 index points lower than the existing index. In comparison, had the item not been re-weighted at each subsequent June quarter following its introduction, the difference between the existing series and the new series would have been up to 0.7 index points.

In terms of percentage changes, the new All groups series (with annual re-weights) showed an average annual increase of 2.99 percent between the March 2004 quarter and the March 2006 quarter. In comparison, the existing All groups series showed an average annual increase of 3.04 percent in the same period.

Scenario 2: DVD players/recorders

DVD players have been included in the CPI since the June 2002 quarter. Since that time, devices with an additional function of recording (either to recordable discs or to a built-in hard disk drive, or both) have appeared on the New Zealand market and have become increasingly popular⁷.

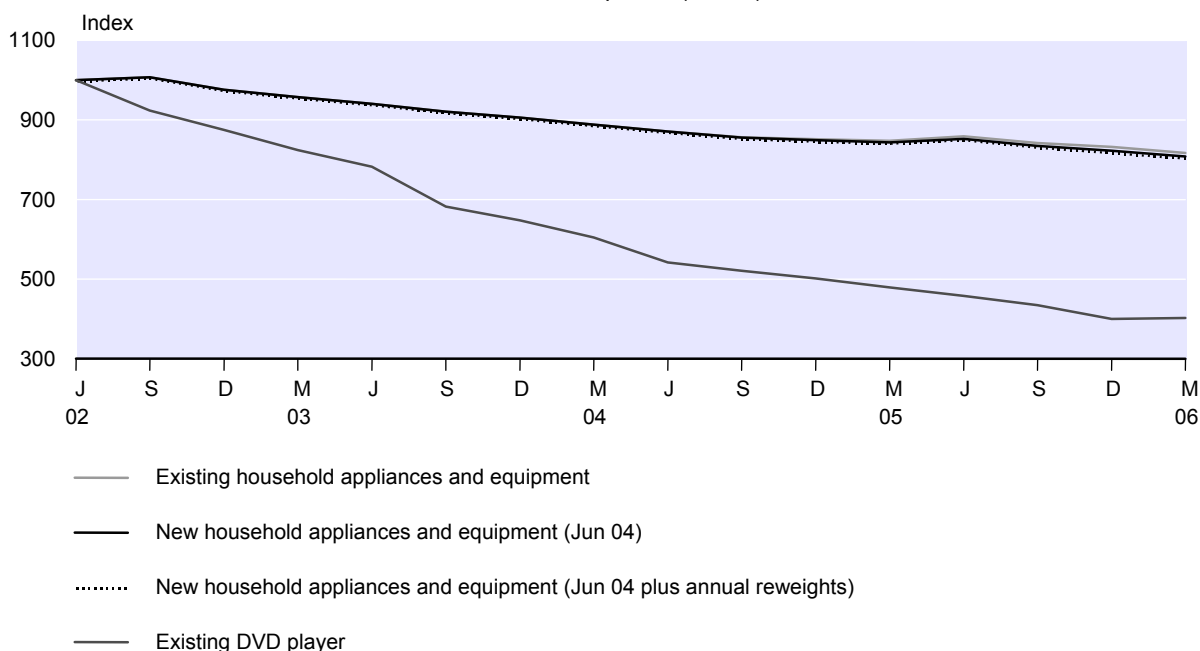
Like flat panel televisions, DVD players/recorders are also being brought into the CPI basket as part of the 2006 rebase. However, the difference is that DVD players/recorders and traditional DVD players will both feed into the same elementary aggregate index, which will be named 'DVD players and recorders'.

This analysis (Scenario 2) looks at the effects of introducing DVD players/recorders in the June 2004 quarter, and re-weighting the item at the June 2005 quarter.

⁷ An arguably related product is the DVD/VCR combination player, which is being introduced to the CPI in June 2006 as a replacement for conventional video recorders. It should be noted that this analysis excludes DVD/VCR combination players.

Figure 3

Household Appliances and Equipment and DVD Player
Analysis on the introduction of DVD players/recorders
 Base: June 2002 quarter (=1000)



Weight of DVD players item as percentage of the Household Appliances and Equipment section¹

Index	Jun 02	Jun 04	Jun 05
Existing Household Appliances and Equipment	0.97	0.61	0.52
New Household Appliances and Equipment (Jun 04)	0.97	6.30	5.44
New Household Appliances and Equipment (Jun 04 + ann. re-weights)	0.97	6.30	8.33

¹ Weights have been 'price updated' to reflect price changes since the June 2002 quarter.

Figure 3 shows that under Scenario 2, the Household appliances and equipment index would have been up to 10.7 index points lower during the period examined. In comparison, had the item not been re-weighted at each subsequent June quarter following its introduction, the difference between the existing series and the new series would have been up to 9.1 index points.

From the period DVD players/recorders are introduced in the analysis (June 2004 quarter) to the March 2006 quarter, the average annual percentage change of the new series (with annual re-weights) is a decrease of 4.19 percent. In comparison, the existing series showed an average annual decrease of 3.57 percent in the same period.

Table 4

CPI All Groups
Analysis on the introduction of DVD players/recorders
 Base: June 2002 quarter (=1000)

Index	Jun 02	Sep 02	Dec 02	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05	Sep 05	Dec 05	Mar 06
Existing CPI All Groups	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094
New CPI All Groups (Jun 04)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1080	1088	1094
New CPI All Groups (Jun 04 plus annual reweights)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1080	1088	1094

Table 4 shows that, under Scenario 2, the CPI All groups index would have been up to 0.2 index points lower than the existing index. In comparison, had the item not been re-weighted at each subsequent June quarter following its introduction, the difference between the existing series and the new series would also have been up to 0.2 index points.

In terms of percentage changes, the new All groups series (with annual re-weights) showed an average annual increase of 3.00 percent between the June 2004 quarter and the March 2006 quarter. In comparison, the existing All groups series showed an average annual increase of 3.02 percent in the same period.

Scenario 3 and 4: Digital cameras

Digital cameras have been widely available in New Zealand for a number of years. However, they were not incorporated into the CPI until the June 2005 quarter. From the June 2005 quarter onwards, digital cameras replaced traditional film cameras in the CPI, so that the index for camera from that point on measures the price change of only digital cameras.

This part of the analysis examines two scenarios:

- Scenario 3: Introducing digital cameras at the December 2002 quarter, then re-weighting the item and re-allocating the relative weight between traditional cameras and digital cameras at each subsequent June quarter.
- Scenario 4: Introducing digital cameras at the June 2005 quarter, as has happened in the CPI. This analysis looks at the impact of updating the item's weight at the time of introduction, as opposed to leaving the expenditure weight of cameras unchanged (which was the approach taken in the CPI).

Figure 4.1

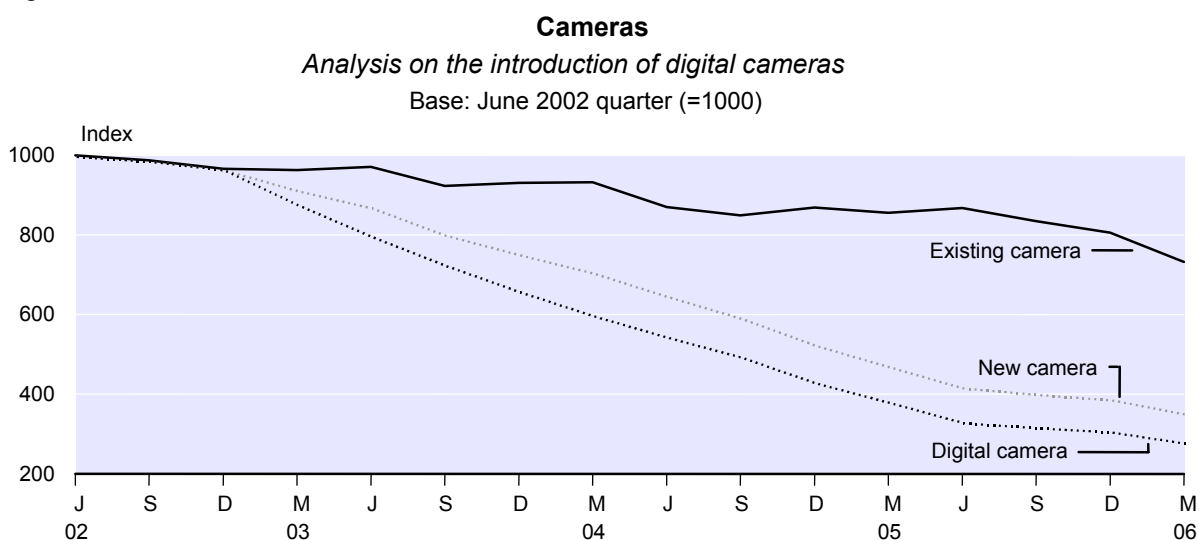
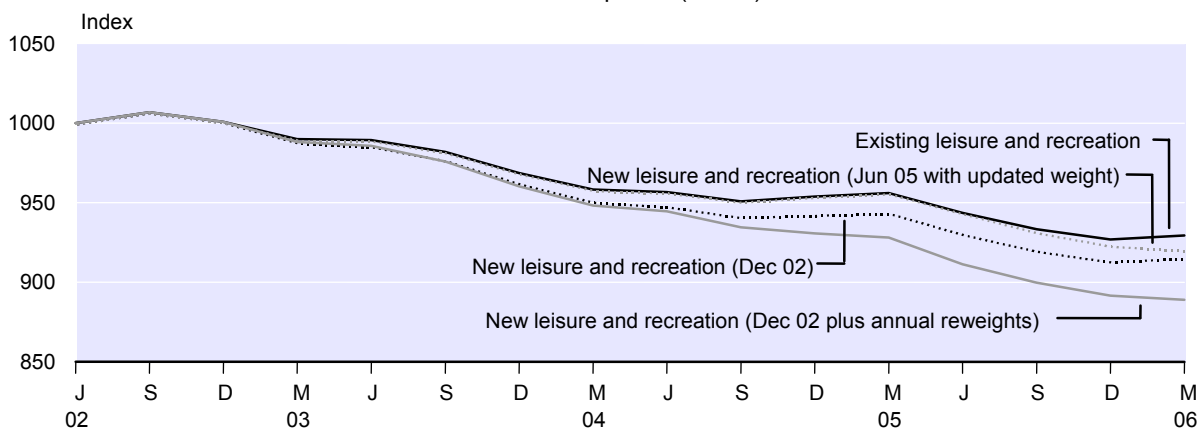


Figure 4.2

Leisure and Recreation Supplies
Analysis on the introduction of digital cameras
 Base: June 2002 quarter (=1000)



Weight of Camera item as percentage of the Leisure and Recreation section¹

Index	Jun 02	Dec 02	Jun 03	Jun 04	Jun 05
Existing Household Appliances and Equipment	1.69	1.64	1.66	1.54	1.56
New Leisure and Recreation (Dec 02)	1.69	3.88	3.55	2.88	2.40
New Leisure and Recreation (Dec 02 plus ann. re-weights)	1.69	3.88	4.58	6.70	9.17
New Leisure and Recreation (Jun 05 with updated weights)	1.69	1.64	1.66	1.54	8.85

¹ Weights have been 'price updated' to reflect price changes since the June 2002 quarter.

The Digital Cameras index shown in Figure 4.1 was constructed using electronic transaction data and the CPI Camera series from the September 2004 quarter to the March 2006 quarter. The average quarterly price movement during this period was then used to derive the quarterly index numbers for the period of the December 2002 quarter to the June 2004 quarter. It was then possible to assess the implied prices of digital cameras as at the December 2002 quarter, which we consider to be plausible.

The New Camera index was constructed by combining the CPI Camera series (which measured the price change of traditional cameras until the June 2005 quarter) and the Digital Camera index constructed. In order to reflect the relative importance of traditional cameras and digital cameras, weights were assigned to each series according to their expenditure levels. These relative weights were then reallocated at each subsequent June quarter, as part of the item re-weight.

Figure 4.2 shows that, under Scenario 3, the Leisure and recreation supplies index (a section level index) would have been up to 41.1 index points lower than the existing index during the period examined. In comparison, had no further weight updates been carried out following its introduction, the difference between the existing series and the new series would have been up to 18.8 index points. of the camera item (which showed a price decrease in the quarter), causing the item movement to offset the combined effects of other items in the section showing increases.

It can be seen from Figure 4.2 that, under Scenario 4 (introducing the item at the June 2005 quarter with updated weights), the Leisure and recreation supplies index would have been up to 9.0 index points lower than the existing index during the period examined.

From the period digital cameras are introduced in the analysis (December 2002 quarter) to the March 2006 quarter, the average annual percentage change of the new series (with annual re-weights) is a decrease of 3.60 percent. In comparison, the existing series showed an average annual decrease of 2.25 percent in the same period.

It is notable that in the March 2006 quarter, two of the new series showed a quarterly decrease in this analysis, as opposed to an increase in the existing index. This is due to the increased weight

Table 5

CPI All Groups
Analysis on the introduction of digital cameras
 Base: June 2002 quarter (=1000)

Index	Jun 02	Sep 02	Dec 02	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05	Sep 05	Dec 05	Mar 06
Existing CPI All Groups	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094
New CPI All Groups (Dec 02)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1088	1094
New CPI All Groups (Dec 02 plus annual reweights)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1087	1093
New CPI All Groups (Jun 05 with updated weight)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094

Table 5 shows the individual impact of Scenario 3 and Scenario 4 on the All groups index.

Under Scenario 3 (introducing digital cameras in the December 2002 quarter with annual weight updates), the CPI All groups index would have been up to 1.0 index points lower than the existing index. In comparison, had the item not been re-weighted at each subsequent June quarter following its introduction, the difference between the existing series and the new series would have been up to 0.5 index points.

Under Scenario 4 (introducing digital cameras in the June 2005 quarter), the difference would have been up to 0.2 index points.

In terms of percentage changes, the resulting new All groups series from Scenario 3 (with annual re-weights) showed an average annual increase of 2.42 percent between the December 2002 quarter and the March 2006 quarter. In comparison, the existing All groups series showed an average annual increase of 2.45 percent in the same period.

5.3.2 Scenario 5: Combined effects of flat panel televisions and DVD players/recorders

The first four scenarios looked at the potential impact of each item individually. In the current scenario, the combined effects of introducing flat panel televisions and DVD players/recorders in the March 2004 quarter and June 2004 quarter, respectively, are examined.

Figure 5

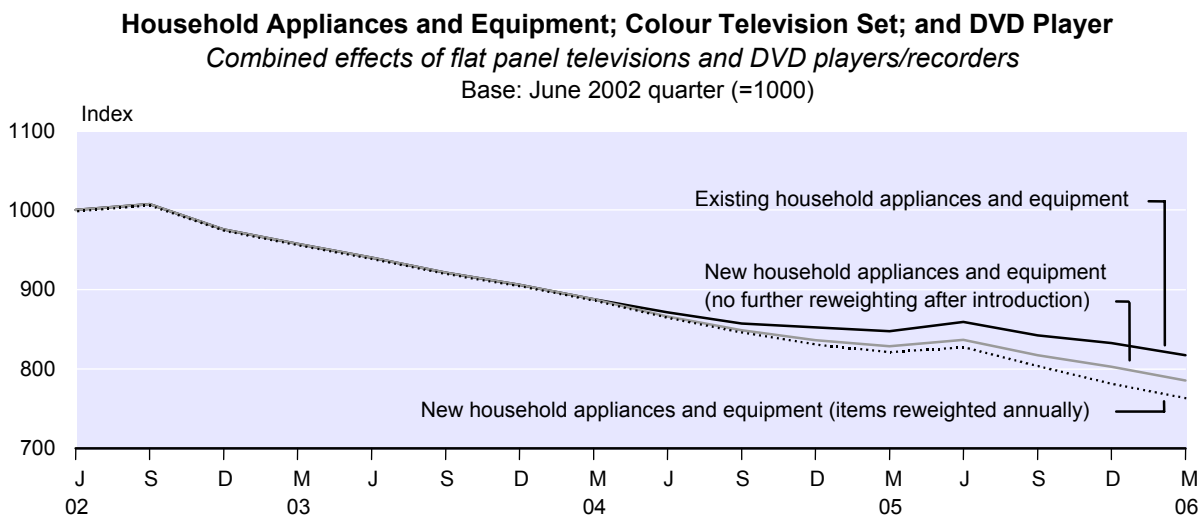


Figure 5 shows that, under Scenario 5, the Household appliances and equipment index would have been up to 52.5 index points lower than the existing index during the period examined. In comparison, had no further weight updates been carried out following the initial introduction of flat panel televisions and DVD players/recorders, the difference between the new series and the existing series would have been up to 32.0 index points.

From the period a new item is introduced in the analysis (flat panel televisions in the March 2004 quarter) to the March 2006 quarter, the average annual percentage change of the new series (with annual re-weights) is a decrease of 7.19 percent. In comparison, the existing series showed an average annual decrease of 4.06 percent in the same period.

Table 6

CPI All Groups
Combined effects of flat panel televisions and DVD players/recorders
 Base: June 2002 quarter (=1000)

Index	Jun 02	Sep 02	Dec 02	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05	Sep 05	Dec 05	Mar 06
Existing CPI All Groups	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094
New CPI All Groups (no further reweighting after introduction)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1088	1094
New CPI All Groups (items reweighted annually)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1087	1093

Table 6 shows the combined effects of the analysis of flat panel televisions and DVD players/recorders on the All groups index. Under Scenario 5, the All groups index would have been up to 1.1 index points lower than the existing index. In comparison, had no further weight updates been carried out following the initial introduction of flat panel televisions and DVD players/recorders, the difference between the new series and the existing series would have been up to 0.7 index points.

In terms of percentage changes, the new All groups series (with annual re-weights) showed an average annual increase of 2.98 percent between the March 2004 quarter and the March 2006

quarter. In comparison, the existing All groups series showed an average annual increase of 3.04 percent in the same period.

Scenario 6: Combined effects of flat panel televisions, DVD players/recorders and digital cameras

In this scenario, the combined effects of all three items on the All groups index are examined.

Table 7

CPI All Groups
Combined effects of flat panel televisions, DVD players/recorders and digital cameras
Base: June 2002 quarter (=1000)

Index	Jun 02	Sep 02	Dec 02	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05	Sep 05	Dec 05	Mar 06
Existing CPI All Groups	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1055	1059	1068	1081	1088	1094
New CPI All Groups (no further reweighting after introduction)	1000	1004	1011	1015	1015	1019	1026	1031	1039	1045	1054	1059	1068	1080	1088	1094
New CPI All Groups (items reweighted annually)	1000	1004	1011	1015	1015	1019	1026	1031	1038	1045	1054	1058	1067	1079	1086	1092

Table 7 shows that, under Scenario 6, the All groups index would have been up to 2.1 index points lower than the existing index. In comparison, had no further weight updates been carried out following the initial introduction of the three items, the difference between the new series and the existing series would have been up to 0.5 index points.

From the period a new item is introduced in the analysis (digital cameras in the December 2002 quarter) to the March 2006 quarter, the average annual percentage change of the new All groups series (with annual re-weights) is an increase of 2.39 percent. In comparison, the existing All groups series showed an average annual increase of 2.45 percent in the same period.

From the period all three new items have been introduced in the analysis (June 2004 quarter) to the March 2006 quarter, the average annual percentage change of the new All groups series (with annual re-weights) is an increase of 3.02 percent. In comparison, the existing All groups series showed an average annual increase of 2.92 percent in the same period.

5.4 Analysis of results

The results from the analysis are summarised below.

At the section level of the CPI:

- the impact of introducing the new goods to the CPI earlier and using more appropriate weighting generally appeared to be significant
- regular tracking of the importance of the new item and periodic re-weighting of the new item's expenditure generally had a measurable effect on the index
- despite the late introduction of a new good, updating the item's expenditure weight at the point of introduction (as opposed to leaving the expenditure weight unchanged) would have made a difference to the section level index.

At the All groups level of the CPI:

- the impact of the three items individually on the All groups index appeared to be insignificant. On a rounded index points basis, only flat panel televisions had an effect on the All groups index numbers (that of minus 1 index point)
- the effects of the items examined, when combined, were more significant.

6. Conclusions

This paper has provided an insight into the importance of the early introduction and appropriate weighting of new items being brought into the basket. Although the empirical analysis was based only on three consumer electronic goods, it has highlighted the potential of electronic transaction data in dealing with the appearance and changing importance of new goods and services.

Electronic transaction data (primarily on supermarket sales) is already being used to inform decisions in periodic CPI reviews and for ongoing sample maintenance. However, the electronic transaction data used in this analysis is the first dataset with detailed information on the consumer electronic sector that Statistics New Zealand has acquired, and will continue to receive on an annual basis.

The availability of this data will assist Statistics New Zealand to more effectively monitor the emergence and changing importance of new goods and services in the marketplace. Subject to resources, it would then be possible to reduce the delays in which new goods are incorporated into the CPI, and to more accurately reflect the relative importance of new items, both when first incorporated and then annually as they grow in importance.

7. References

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