

New measures of inflation for groups of households

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Abstract

New measures of inflation being developed for groups of households, called household living-costs price indexes (HLPs), will provide greater insight into the inflation experienced by eight household groups (beneficiaries, superannuitants, Māori, and income quintiles). This paper introduces the new indexes and considers some outstanding design issues prior to their first publication.

We discuss the conceptual treatment of insurance, under a ‘payment’ approach, and the measurement of quality-adjusted price change for interest payments. We also consider the definition of income, and explore whether to ‘standardise’ income and, if so, which equivalisation scale to use.

Within-group variation in inflation experiences means that it matters how we decide to aggregate household expenditure patterns. The option of equally weighted household-specific expenditure shares (‘democratic’ weights) is compared with aggregate household expenditure (‘plutocratic’ weights). Decomposing differences between these approaches provides insights into the role played by consumer luxuries and necessities.

1. Introduction

This paper describes how existing data can be reused to produce new statistics and provide greater insights. We produce new measures of inflation for groups of households using price-change data already collected for the consumers price index (CPI), and household group-specific expenditure patterns from the Household Economic Survey (HES). This approach is relatively low cost because there is no additional data collection.

The first section of this paper summarises work undertaken to date. It focuses on a feasibility study prepared for the 2013 CPI Advisory Committee (Statistics NZ, 2013a), using data collected over a 4-year period (2008–12). The study provides a proof of concept and the backbone methodology. An overview of the historical and international context of population-group measures of consumer price change provides provenance and orientation for the remainder of the paper.

The second section focuses on the refinements and enhancements being considered before the HLPs, showing household-group-specific inflation rates, are published from early 2016. We focus on three outstanding design issues:

1. Practical implementation of a ‘payment’ conceptual approach
2. Composition of each population group, elaborating on income groups
3. Aggregation of household inflation.

Research and consultation is ongoing, so please contact the author if you have any views about how the design of these new indexes would best meet customer needs.

1.1 Background

The CPI measures the change in prices of goods and services acquired by New Zealand-resident private households. It is an aggregate measure that represents the price change experienced *on average* by households. The ability of a whole-of-population average to represent any particular household, or group of households, depends on the homogeneity of expenditure patterns – that is, how much or how little household expenditure patterns differ from the average – and on the variation in inflation rates for different commodities. This paper and the new HLPs will highlight differences in household expenditure patterns and how they impact on the distribution of household inflation.

In August 2014, Statistics NZ announced its intention to provide a suite of HLPs to provide greater insight into the inflation experienced by eight household groups (beneficiaries,

superannuitants, Māori, and income quintiles) (Statistics NZ, 2014c). The decision was a response to the 2013 CPI Advisory Committee and associated submissions from a public consultation.

The committee, a customer group set up to advise the Government Statistician on the CPI, recommended that the CPI’s principal use is to inform monetary policy-setting, and acknowledged that its design is a compromise between this principal use and other uses such as adjusting a range of public and private payments (Statistics NZ, 2013b). It was in this light that the committee recommended Statistics NZ provides extra indexes to reflect changes in the purchasing power of incomes of particular population subgroups.

1.2 Design outline

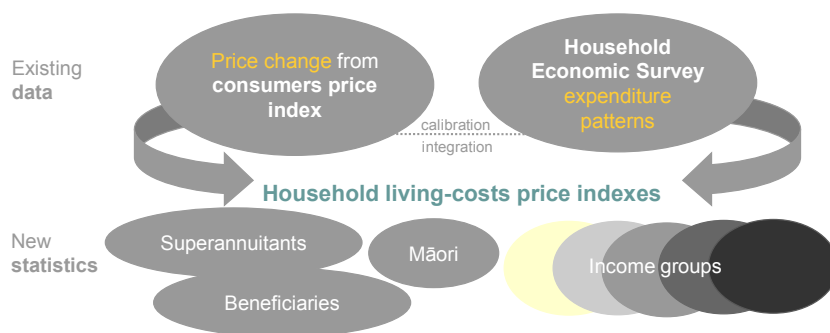
For any group, there are two basic ingredients for measuring inflation:

1. Commodity-level price change
2. Expenditure patterns to aggregate price change.

The approach to calculating the HLPs will be to use population-group-specific expenditure patterns from the Household Economic Survey to weight the lowest-level price indexes in the CPI basket of goods and services (see figure 1). The basket comprises about 700 commodities and is designed to be a representative sample of consumer spending. The Household Economic Survey expenditure patterns are calibrated to CPI expenditure totals, to minimise known reporting bias in the survey.¹

Figure 1

Blueprint for household living-costs price indexes (HLPs)

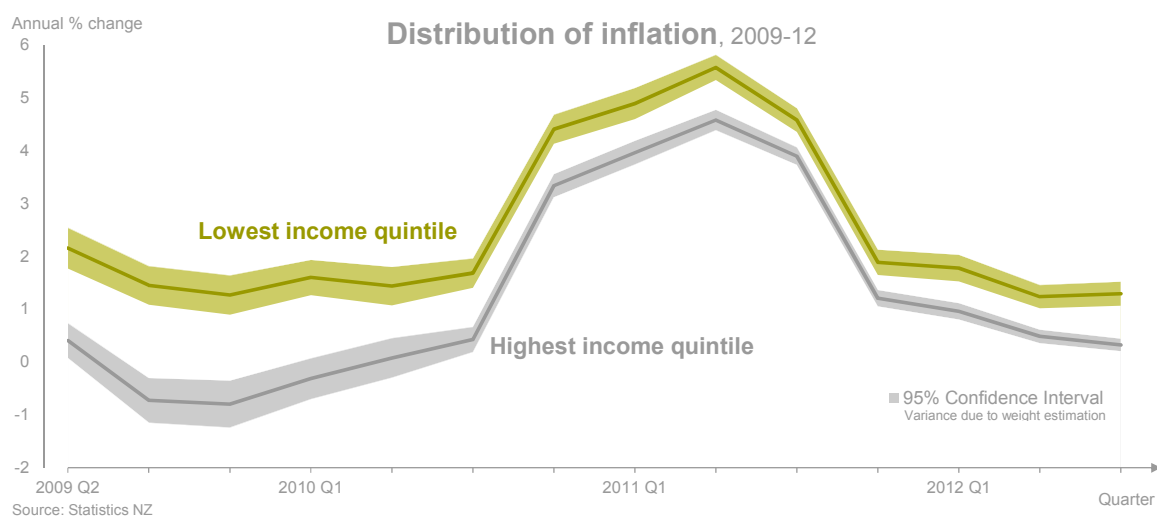


Source: Statistics NZ

A feasibility study prepared for the 2013 CPI Advisory Committee found that variation in household expenditure patterns, coupled with differential rates of inflation across consumption goods and services, resulted in a discernible distribution of population group-specific measures of inflation over a 4-year study period in 2008–12 (Statistics NZ, 2013a). For example, as shown in figure 2, strong statistical evidence was found to support observed differences between inflation experienced by the lowest income quintile and the highest income group. The main reasons for the higher rate of inflation for the lowest income group were higher contributions to inflation from housing and household utilities, tobacco, food, and insurance, and a lower contribution from interest payments, which displayed deflation over the study period.

¹ CPI expenditure weights are compared with available administrative data as part of their estimation and quality assurance (see Statistics NZ, 2014b). Differential reporting bias by population groups will be a limitation of the methodology.

Figure 2



1.3 Ancestry of household-group inflation measurement

Consideration of household-group inflation is as old as the CPI itself. It is closely related to questions about the purpose and construction of the headline measure of consumer price change. Bentley (2014) describes the evolution of CPI use in New Zealand, the implications for the reference population, coverage of goods and services, and the availability of household inflation measures for specific groups of households.

Over the 100-year history of the CPI², the index has evolved from being a necessities index, initially limited to food and house rent, for wage determinations by the Arbitration Court, through a wider measure of household inflation, to its present-day focus as a macroeconomic indicator for monetary policy targeting.

In 1948, an advisory committee for a revision to the CPI from 1949 recommended widening the scope so that the index was no longer restricted to necessities. In reality, it took until 1955 for sufficiently liberal thinking to see private motoring and beer included in the CPI basket of goods and services, and a further 20 years for wine and spirits to be included. Both the 1978 and 1985 CPI advisory committees discussed having a special-purpose price index limited to 'basics' or 'necessities', but rejected the notion due to the practical difficulties of classifying items as either necessities or luxuries.

Successive reviews of the CPI in the mid-20th century considered that the variation in expenditure patterns between New Zealand households was likely to be less than in some other countries. This view, combined with the lack of a comprehensive household budget survey, meant no formal attempts were made to construct group-specific indexes until 1975.

Since the first modern Household Economic Survey in 1973–74 (the then Household Survey) the construction of special indexes for particular household groups has been technically feasible. A beneficiaries price index was published in 1975, and Jackson (1978) considered indexes for several household groupings, including income, age, occupation, and family type. Jackson found the clearest pattern of differential rates of inflation was for households grouped by income of head of household. Expenditure weights for the beneficiaries price index were noticeably

² Regular national price collection began in 1914. Linking the Retail Prices Index to the CPI has created a 100-year consumer price-change time series, an achievement celebrated in 2014 with a series of special products (Statistics NZ, 2014a) and publication of *The New Zealand CPI at 100: History and Interpretation* (Forbes & Victorio).

different from those used in the CPI for food and rent. Despite this, the 1978 and 1985 CPI advisory committees concluded that movements in the beneficiaries price index over its one-year life-span were not significantly different from those of the CPI. The index was discontinued in 1976.

A longer-lived household-group price index was the superannuitants price index, published in the mid-late 1990s and sorting superannuitants by home-ownership status. A faster rate of inflation was found for renters than owner-occupiers, the latter more closely tracking the CPI. This index was discontinued in 1999 when interest payments were removed from the CPI (making the CPI more suitable as an inflation target and less amenable to household-group-specific measures).

In the recent past, CPI advisory committees have recommended special consumer price indexes for particular groups of households. The 1997 committee stated that the extent to which the CPI represents the expenditure patterns of different socio-economic groups should be considered. The 2004 and 2013 committees explicitly recommended producing supplementary indexes for different population groups, such as government transfer recipients (including superannuitants), income groups, wage and salary earners, and (by the 2013 committee) ethnic groups.

1.4 Growing international interest in distribution of inflation

Internationally, the scope and coverage of CPIs varies. Calculating and publishing CPIs for subpopulations also varies across countries. Some national statistical agencies produce official CPI estimates for subpopulations, while research on this topic has been undertaken in many countries that do not have official estimates. The current publication practices in selected countries are summarised in table 1.

The International Labour Organisation's (2003) *Resolution Concerning Consumer Price Indices* provides the following advice:

Significant differences in the expenditure patterns and/or price movements between specific population groups or regions may exist, and care should be taken to ensure that they are represented in the index. Separate indices for these population groups or regions may be computed if there is sufficient demand to justify the additional cost.

There appears to be a growing international interest in data and statistics about the distribution of household income, consumption, and wealth. The Organisation for Economic Co-operation and Development's (OECD's) *How's Life?* measures of well-being³ and *Framework for Statistics on the Distribution of Household Income, Consumption and Wealth* (OECD, 2013) provide insightful guidance on these topics. The *Report by the Commission on the Measurement of Economic Performance and Social Progress* (Stiglitz, Sen & Fitoussi, 2009), which has been helping to shape the development of economic statistics internationally, highlighted the importance of understanding the distributional aspects of inflation:

A point of particular relevance from a welfare perspective is the question about whose price index is evaluated. Often, conceptual discussions about price indices are conducted as if there were a single representative consumer. Statistical agencies calculate the increase in prices by looking at the costs of an average bundle of goods. However, different people buy different bundles of goods (eg poor people spend more on food and less on entertainment) and they may buy their goods and services in different types of stores (which sell 'similar' products at very different prices). When all prices move together, having different indices for different people may not make much of a difference. But recently, with soaring oil and food prices, these differences may have become more marked and people at the bottom of the income distribution may have seen real incomes fall by much more than those at the top of the income distribution.

³ See, for example, OECD, 2011.

Table 1**Availability of household-group price indexes in selected countries**

Country	Household-group consumer price indexes*
New Zealand	None
Australia	Five analytical living-cost indexes (ALCIs): <ol style="list-style-type: none"> 1. Employee 2. Self-funded retiree 3. Age pensioner 4. Other government transfer recipient 5. Pensioner and beneficiary (combining groups 3 and 4)
Canada	None ⁴
Japan	<ul style="list-style-type: none"> • Income quintiles • Retired elderly households For head of household: <ul style="list-style-type: none"> • Age group • Occupation • Tenure
United Kingdom	<ul style="list-style-type: none"> • Four consumer price indexes (with different methods and/or coverage) • Retail prices index (RPI) pensioner indexes
United States of America	Three consumer price indexes ⁵ : <ol style="list-style-type: none"> 1. CPI – U (urban consumers) 2. CPI – W (wage earners and clerical workers) 3. CPI – E (aged 62 years and older)

* Current known official publication. Regional indexes are excluded.

The Australian Bureau of Statistics (ABS) has been publishing household-group inflation measures for the past 15 years. Initially, these were published annually, but in response to growing interest they have been published quarterly since 2009 (ABS, 2011). The most recent Australian Household Expenditure Survey had an increased sample size to improve the precision of commodity weighting for the pensioner and beneficiary living-cost index (ABS, 2012).

The Statistics Bureau of Japan has published a CPI for ‘retired elderly households’ since August 2011 (Maruyama, 2011), in addition to their suite of subpopulation indexes.

In the United Kingdom, there are separate indexes conceptually suited to different purposes – the Consumer Prices Index (CPI) and Retail Prices Index (RPI). These indexes and their variants have different coverage and methods.⁶ A recent study (Flower & Wales, 2014) provides inflation estimates for households in different positions of the income and expenditure distributions, for households with and without children, and for retired and non-retired households. The study provides new insights into earlier studies such as those by Ley (2005) and Levell and Oldfield (2011). A review of consumer price indexes (Johnson, 2015) recommended that the UK’s Office for National Statistics develop analytical inflation indexes for a range of household types. The report notes “the idea that there is one measure of inflation which tells us how much costs are changing for all different households is clearly absurd”.

A consistent feature of the international studies is that household-group inflation measures use budget surveys (equivalent to the Household Economic Survey) to weight commodity price

⁴ An analytical study was undertaken for low-income households and senior citizens for the period 1993–97 (Taktek, 1998).

⁵ See Stewart (2008).

⁶ See Evans and Restieaux (2013) for an overview of these indexes and their uses.

change. An important limitation of this approach is the assumption of negligible differential rates of commodity-price change, below the level of weighting, for different household groups. This may not be accurate if household-group expenditure patterns differ below the level of commodity-price change used. To minimise the impacts of this potentially wrong assumption on the HLPs, we intend to apply the group-specific weights to price changes for the 700 basket-level commodities. We also intend to look at the impact of group-specific store-type weighting, and group-specific regional expenditure weighting, to further tailor the approach.

2. Outstanding design issues

2.1 Conceptual approach

The household living-costs price indexes (HLPs) will be constructed using a ‘payment’ conceptual approach. This approach is noted as “often used” by the International Labour Organisation (ILO, 2003), “when the primary purpose of the index is for the adjustment of compensation or income”. The 2013 CPI Advisory Committee recommended this approach for HLPs.

The ‘payment’ approach tracks the price change for goods and services ‘paid for’, regardless of the timing of their acquisition or use. In contrast, the CPI uses an ‘acquisition’ approach, reflecting price changes for goods and services when they are acquired. The main practical difference between these approaches is on the measurement of housing, interest, and insurance. The acquisition-based CPI commodity-level price indicators can be translated to a payment approach with the following modifications⁷:

- including interest payments
- excluding net acquisition of owner-occupied housing
- using gross expenditure weights for insurance.

The rest of this section considers the practical implementation of a ‘payment’ approach. We build on the methods used in the 2013 feasibility study, considering whether it is necessary or desirable to refine any aspects of that approach.

2.1.1 Measuring ‘pure’ price change for interest payments

A basic principle of price indexes is that they should measure ‘pure’ price change – that is, the change in price for a fixed quality and quantity of a good or service. In many cases, this requires the use of quality adjustment methods to control for quality changes occurring over time, so that ‘pure’ price changes can be estimated.⁸ See Bentley (2011) for an outline of the general approach to quality adjustment in the New Zealand CPI.

The *Consumer Price Index Manual* (ILO, 2004) acknowledges that application of this principle to interest payments is “not altogether straightforward”. With interest payments, it is difficult to precisely pinpoint the underlying quality and quantity that should remain fixed. International practice is to fix the underlying quantity of debt by multiplying changes in interest rates by a suitable price index. This can either be a simple revaluation or the debt-profile approach – a more sophisticated method that also accounts for the age of the debt.

The current New Zealand methodology for tracking price change for interest payments, as used for the analytical series ‘CPI plus interest’, is to track the average effective interest rate, with no

⁷ Conceptually, there are differences in the timing of ‘acquisition’ and ‘payment’ for other commodities (particularly services), but the differences are assumed to be small and short-lived (with differences in timing typically within quarters or between neighbouring quarters).

⁸ The International Labour Organisation’s Resolution Concerning Price Indices (ILO, 2003) states that “when a quality change is detected, an adjustment must be made to the price, so that the index reflects as nearly as possible the pure price change”.

further quality adjustment. The method dates back to 1993, a transient period for determining the principal use of the CPI and the associated conceptual approach underlying its methodology. Interest payments were included in an otherwise acquisition-based approach.⁹ The CPI more fully adopted the acquisition approach in 1999, when interest payments were removed from the CPI headline measure. This transient history and lack of attention once removed from the headline CPI may help explain the reasons for the current quality-adjustment approach (or lack of approach) to interest payments. Stott (1997) describes the reasons given in 1993 for choosing this method. They include an argument that property prices were also being captured in the purchases of new houses (the CPI included a land component at that time), noting that countries where mortgage debt is quality-adjusted don't include property prices elsewhere.

The current interest payment method does not align well with international practice, nor the basic principle of measuring 'pure' price change. The *Consumer Price Index Manual* (ILO, 2004) makes the point quite clear:

Since the real value of any monetary amount of debt varies over time according to changes in the purchasing power of money, it is not appropriate to use the actual base period monetary value of debt in calculations for subsequent periods. Rather, it is necessary first to update that monetary value in each comparison period so that it remains constant in real terms (i.e. so that the quantities underpinning the base period amount are held constant).

For the HLPs, we propose indexing the underlying debt to maintain a fixed basket of debt, in line with international best practice. For the 2013 feasibility study, the published analytical series was multiplied by the index for purchasing newly built houses, excluding land (subgroup 04.2 from the CPI).¹⁰ Two potential modifications to this approach are being considered, using:

- a debt-profile method, rather than simple revaluation
- a market-value property price index (including land), or the CPI, to quality-adjust the underlying quantity of debt.

Debt-profile method

The debt-profile method takes a sophisticated approach to quality adjustment of underlying debt. It incorporates the age of the debt to maintain a constant age profile of debt. This method can be implemented by dividing debtors into debt-age cohorts, and applying separate debt indexes to each one.

Figure 3 presents a stylised overview of the debt-profile method for the period t_1 , 1 year after a base period t_0 . A few features are worth noting:

- Different lagged debt index movements are used to quality-adjust each debt-age cohort.
- The weight of each cohort is anticipated to decrease as the age of debt increases.¹¹
- The nominal interest rate could be the average effective rate (as currently calculated), or separate rates and debt profiles for variable- and fixed-rate debtors, separately identified for each fixed-rate term.
- At the time of a reweight, the base period will move forward (currently, in New Zealand, this occurs every three years). For debtors with unchanged loans, the same lagged debt index will be used to quality-adjust their nominal interest rate as what is used for the

⁹ The CPI had a 'use' approach in 1949-74, an 'expenditure' approach (combining elements of 'acquisition' and 'payment' approaches) in 1975-99, and an acquisition approach from 1999 on (see, for example, Bentley, 2014, for more details).

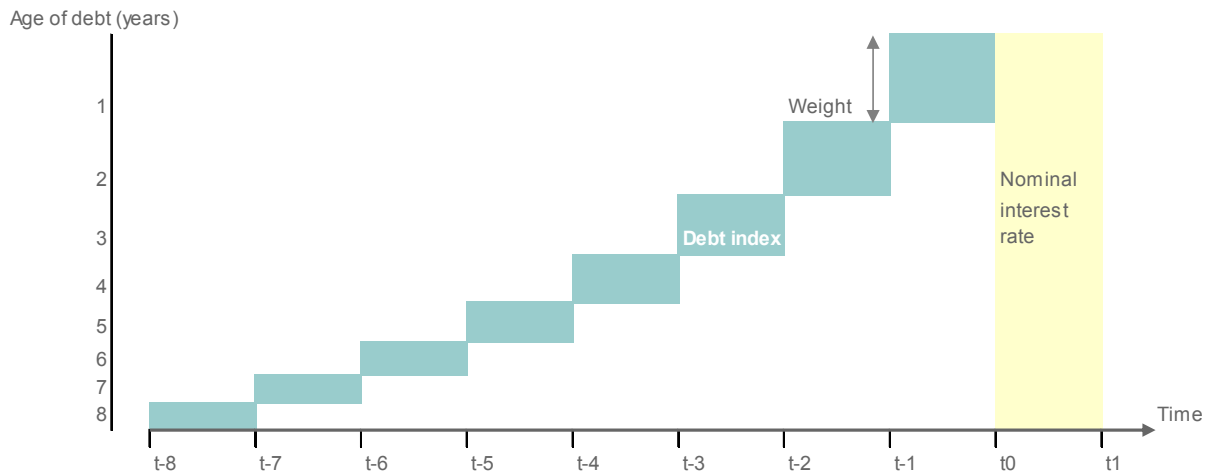
¹⁰ Prior to 1993, property prices were used as a debt index and a simple revaluation method was applied.

¹¹ The *Consumer Price Index Manual* (ILO, 2004) states that debt older than 8 years is normally insignificant. However, we have not yet investigated data on the debt profile in New Zealand. The UK debt-profile model includes debt up to 23 years old (ONS, 2014). Statistics Canada's model includes debt up to 25 years old (Statistics Canada, 2014).

duration of the previous based period. The weight of such debtors will decrease over time and eventually drop out of the model.

Figure 3

Debt-profile method: A stylised overview



The extra refinements of the debt-profile method come with some additional costs. Firstly, there are the practical costs of implementing a more complex method in terms of obtaining, maintaining, and processing data. For example, Woodhouse (1997) notes that the debt-profile model used in the UK is so complex that it has become questionable whether the approach is cost-effective. It would be more complex to tailor the debt-profile approach to each household-group, if there were thought to be sufficient differences in the debt profile for each group.

There is also a trade-off when using lagged price indexes in quality-adjusting price change in contemporary periods. For example, the Australian Chamber of Commerce and Industry (ACCI) has criticised the use of the debt-profile method in that country. It argues that:

...One of the most important qualities in a price index is that it reflect[s] actual movements in the quarter being recorded ... since the switch to the debt profile approach [introduced in Australia in 1989], there have been additional problems caused because of the delayed effects of movements in the cost of housing so that current movements in the CPI often tend to reflect past movements in the price of housing so that movements in the CPI are no longer centred on the actual quarter. (1997)

Scope of consumer debt and debt index for quality adjustment

Two further issues need to be agreed for the interest payment price indicator. We need to determine the scope of debt to include in the HLPs, and the associated issue of determining an appropriate debt index to convert nominal debt into a real debt series. In the feasibility study, all consumer debt was included, and the newly built houses (construction) subgroup of the CPI was used as a debt index.

It may be considered preferable to limit the scope of debt to mortgage debt, as owner-occupier housing costs would not otherwise be covered under a 'payment' approach.¹² The commodities underlying other forms of consumer debt (such as car loans, hire purchases, and credit card debt) have already been covered by the rest of the HLPI basket, so it could be argued that to include interest on them would be double-counting the inflation on these products (since the

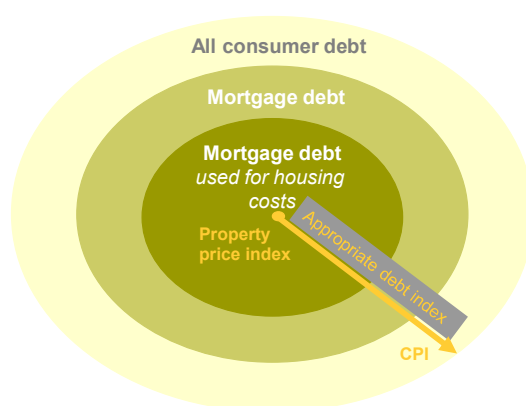
¹² More specifically, shelter costs would not otherwise be covered. Indirect owner-occupier costs such as insurance, repairs and maintenance, and local authority rates are explicitly included.

inflation should be incorporated, conceptually, into an appropriate debt index for these products, as shown in figure 4).

On the other hand, due to the fungible nature of money, mortgage debt can and is used to fund expenditure on a range of goods and services other than house purchases.¹³ To exclude non-mortgage debt may represent an inconsistent approach. For example, a household may take out a larger mortgage (or refinance the loan) to be able to fund a new car or holiday, which otherwise would have necessitated some other form of finance.

Figure 4

Scope of consumer debt | Conceptually appropriate debt index



The scope of interest payments (and underlying debt) in the indexes will influence the choice of an appropriate debt index. Figure 4 gives a visual representation of this. Plausible alternative candidates are:

- new-dwelling (construction) price index (subgroup 04.2 of the CPI)
- market-value property price index (such as Property IQ's house price index)
- a broad measure of inflation, such as the CPI.

A logical starting point for considering an appropriate debt index – a price index to uprate mortgage debt – would be a property price index, since this is the underlying asset used as collateral for the debt. It could be a property price index that tracks the market value of property, such as Property IQ's house price index.¹⁴ However, a major component of such an index is the effect of the price of the land, rather than the dwelling structure. It is generally agreed that purchase of owner-occupier housing represents part consumption expenditure and part capital expenditure. One way to decompose the two components is to treat the dwelling structure as consumption expenditure, and the land component as capital expenditure (see, for example, ILO, 2004). This may suggest a preference for a property price index that only covers consumption expenditure (and is not influenced by changes in land prices). Conveniently, such a price index is readily available as the construction subgroup of the acquisition-based CPI, which tracks changes in the price of purchasing fixed-quality newly built houses.

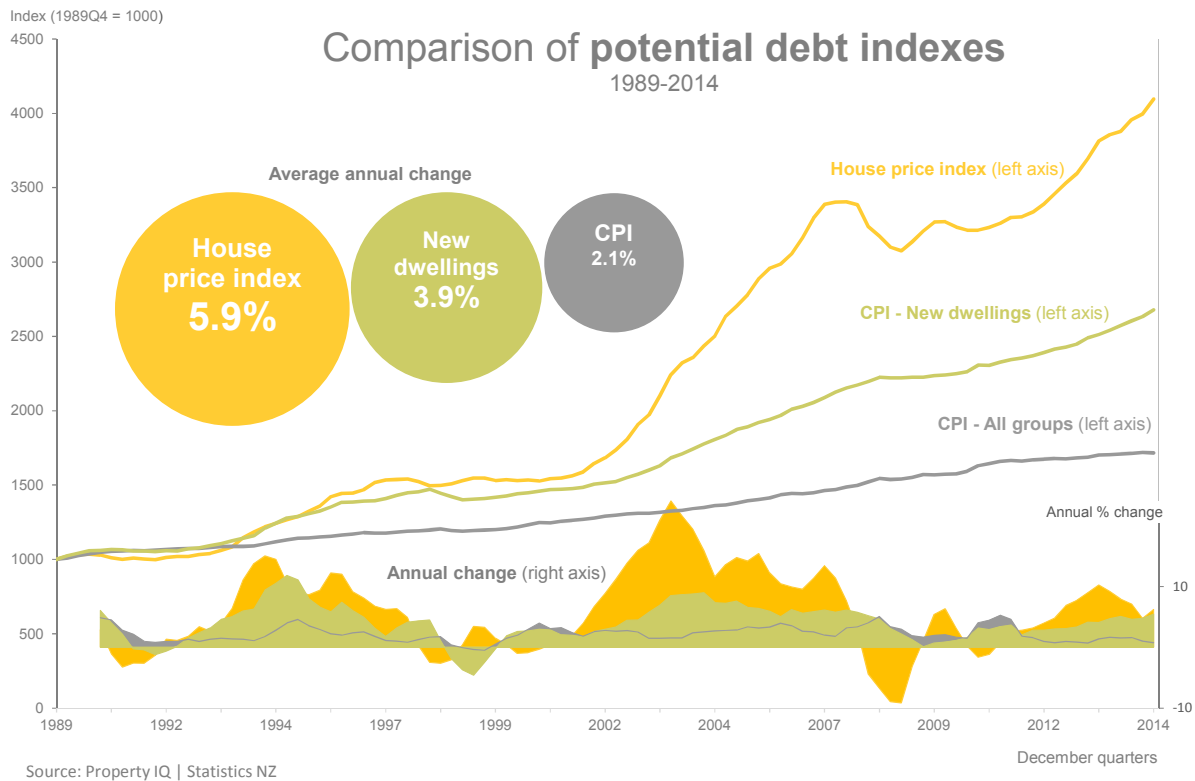
Given these arguments about the fungible nature of money, and how mortgage debt can be used to fund a whole range of consumption, the *Consumers Price Index Manual* (ILO, 2004) suggests that “for the proportion of the debt deemed to be used for other [non-shelter] purposes, it would

¹³ See Smith (2006) for a discussion of trends in equity withdrawal in New Zealand.

¹⁴ Property IQ's house price index is used to quality-adjust real estate and conveyancing fees in the CPI, to help ensure the price change for the same set of house transactions is reflected.

be more appropriate to use a general index of price inflation for debt revaluation purposes". The CPI is often considered a general index of price inflation.¹⁵

Figure 5



The practical implications of using each of the debt indexes under consideration can be studied historically by looking at the price change each has recorded. Clearly, the usual caveats about using the past to predict the future apply. Figure 5 illustrates how Quotable Value/Property IQ's house price index has shown the greatest volatility and largest price increase overall over the past 25 years. The CPI has been the flattest series, and the new dwellings series has tracked between the other two.¹⁶ Interestingly, over the past 9 years (between the June 2006 and December 2014 quarters), the CPI new dwelling series and house price index have increased by near-identical amounts overall (with average annual increases of 3.6 percent and 3.7 percent, respectively).

It can be seen that the issues of conceptual coverage of debt and quality adjustment are inter-related. If a narrow scope covering only mortgage debt for housing costs is considered most appropriate, this would likely suggest a housing-related debt price index. If a wider scope is considered desirable, either considering the use of mortgage debt for non-housing purposes or including non-mortgage loans (which make up a sizeable proportion of all debt), then there may be arguments for considering a wider price index, such as the CPI.

2.1.2 Treatment of insurance and expenditure on items insured

For HLPs, under the 'payment' approach insurance expenditure weights will be on a 'gross' basis, based on total household spending on insurance premiums. This is in contrast to the 'net'

¹⁵ For example, the Reserve Bank of New Zealand uses it in this way in its Monetary Policy Target.

¹⁶ Since 1999, the CPI – new dwellings series has tracked the price of purchasing newly built houses, excluding land. Prior to 1999, this series also included residential sections (land prices).

basis used in the CPI, which includes only the proportion of insurance premiums that contributes to the cost of providing the insurance service.¹⁷

This means the conceptual scope for insurance payments is the same as that used in the Household Economic Survey; there will be no need for conceptual adjustments to determine the HLPI weights on insurance. However, the appropriate conceptual treatment of expenditure on *items insured* needs to be determined. This includes treatment of expenditure by insurance companies on behalf of households on replacement goods.

Using net expenditure on items insured could be justified on the grounds that it avoids double counting of expenditure already covered as gross payments on insurance premiums. However, to estimate the net expenditure it may be necessary to assume that all claim funds are used for expenditure on the items insured. Due to the fungible nature of money, this is unlikely to be entirely true. Using gross expenditure on items insured is considered “the most appealing approach” by the *Consumer Price Index Manual* (ILO, 2004). The justification is that claims receivable is a source of household income. The manual is ambiguous about whether this guidance applies only to gross expenditure actually paid by households, or also includes expenditure by insurance companies on replacement goods on behalf of households.

2.1.3 Treatment of second-hand goods, including used cars

The treatment of second-hand goods is a further consideration for the ‘payment’ approach. Although perhaps trivial compared with the substantive issues already discussed, it still warrants some thought to ensure we apply suitable methods from the outset. The main area affected is expenditure weights for used cars.

The issue with second-hand goods is that these purchases do not represent ‘final consumption expenditure’. In the CPI, second-hand purchases from businesses are in scope, as this represents consumption that is new to the household sector. If purchases are from another household, the expenditure has already been captured once and it could be considered double-counting to re-record the expenditure on these products.

The Household Economic Survey, used to derive expenditure weights, captures households’ expenditure on second-hand goods. The survey also captures the proceeds received by households from the sale of second-hand goods. This means it is straight forward to estimate households’ net expenditure on second-hand goods. In the CPI, this will only reflect expenditure on second-hand goods that are new to the household sector (and any margins made by intermediaries, such as car dealers¹⁸). In the case of the HLPIs, applying this approach will capture the net expenditure of the household-group on second-hand goods – that is, expenditure on goods that are ‘new’ to the group. The *Consumer Price Index Manual* (ILO, 2004) endorses this approach:

The difference between total expenditures and total sales is usually described as households’ net expenditures. This is the weight to be attached to the second-hand good in question.

2.2 Group definitions

The eight household groups chosen for HLPIs were the ones most commonly identified in submissions to the public consultation (Statistics NZ, 2014c). The classification of households into HLPI groups will be based on demographic information collected in the Household Economic Survey and designed to provide the most useful breakdown based on customer needs. The 2013 feasibility study provides working definitions, which can be refined as needed. Table 2 summarises these definitions and outlines some alternatives that are being considered.

¹⁷ In practice, the CPI uses a ‘net’ basis for the weights on insurance, but tracks the ‘gross’ price of premiums, since ‘net’ prices are unobservable.

¹⁸ It can be argued that a proportion of the net expenditures should be treated as purchases of intermediate services and not as purchases of second-hand goods.

Table 2**Household group definitions**

Household group	Working definition	Potential alternatives
Beneficiary	Households where the highest-income recipient received a benefit payment, classified as a 'main benefit' in the Household Economic Survey ¹⁹	Benefits classified as 'supplement benefit' in the Household Economic Survey could also be included.
Superannuitant	Households with one or more people aged 65 years or older who received New Zealand Superannuation, and where a superannuitant had the highest household income	This definition could be simplified to households where the highest-income recipient received New Zealand Superannuation.
Māori	Households where at least one member has reported Māori ethnicity (as any of their ethnicities)	Using Māori descent would be possible in future, as a descent question has been added to the Household Economic Survey from the 2015/16 survey on.
Income groups	Households classified into five income groups (quintiles), using before-tax regular and recurring income	Possibilities include: <ul style="list-style-type: none"> • equivalised income • disposable income • expenditure quintiles (discussed in the following section).

2.2.1 Government transfer payment group definitions

The definitions for beneficiary, income groups and superannuitant will be based on the income questions of the Household Economic Survey. These relate to income received over the past year. The main choice for beneficiary is which benefits to use to classify households. Benefits are classified in the Household Economic Survey as 'main benefit' (for example, jobseeker support) and 'supplement' benefit (for example, accommodation supplement), so either could easily be used to define the group. The working definition of superannuitant is consistent with the classification of households used in the superannuitants price index published in the mid to late 1990s (see Bentley, 2014, for information about this index).

2.2.2 Māori group definition

Te Puni Kōkiri expressed interest in an index of consumer price change for Māori households as part of the public call for topics for the 2013 CPI Advisory Committee. We received further support for a Māori HLPI as part of the 2014 public consultation. The group definition (using ethnicity) has been based on the availability of ethnicity in the Household Economic Survey dataset.²⁰

19 This group definition was referred to as 'main beneficiary' in the 2013 feasibility study.

20 Statistics NZ's statistical standard on ethnicity (Statistics NZ, nd) provides the following definition: "Ethnicity is the ethnic group or groups that people identify with or feel they belong to. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality, or citizenship. Ethnicity is self-perceived, and people can belong to more than one ethnic group."

It would be possible to change to a definition based on descent²¹, in addition to or instead of ethnicity in future, as a descent question has been added to the Household Economic Survey for the 2015/16 survey onward. An indication of the impact of a potential change is given by the 2013 Census – 599,000 people identified with the Māori ethnic group, while 669,000 people were of Māori descent.

Household ethnicity will be defined using a wide definition, where any household member reports Māori ethnicity as any of their ethnicities. This is consistent with the definition used in some recent publications by Te Puni Kōkiri (see, for example, Te Puni Kōkiri, 2011).

2.2.3 Income group definitions

Many submissions to the public consultation on the 2013 CPI Advisory Committee recommendations supported the regular dissemination of HLPs by income group (Statistics NZ, 2014b).

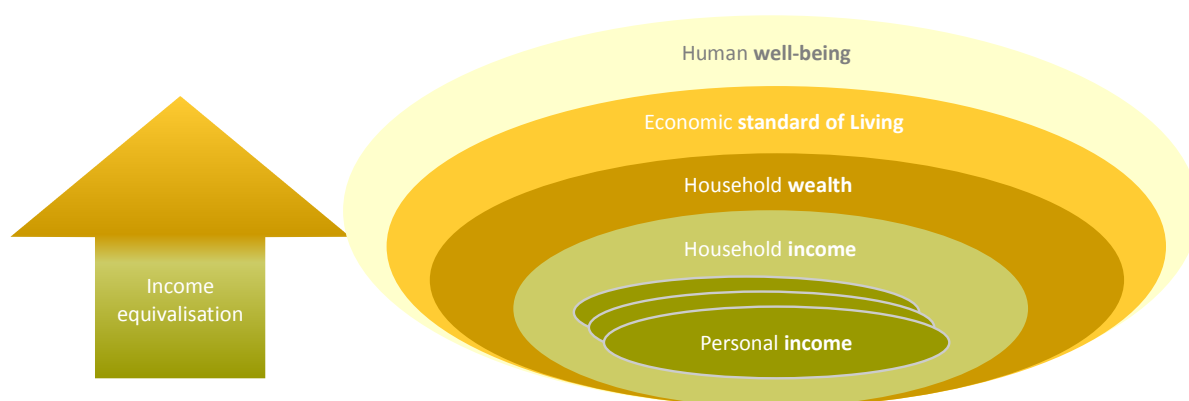
Potential uses of the income HLPs include to:

- better understand households with lower economic standard of living
- enhance understanding of the impact of inflation on changes to the distribution of income
- provide context to aid understanding and explanation of the other HLPs (for Māori, beneficiaries, and superannuitants).

Income can be used as an objective measure to help understand economic (or material) standard of living.²² Yet there are important limitations to using income alone to proxy economic standard of living. Most importantly, it ignores household wealth in terms of assets. For example, householders who are owner-occupiers without a mortgage would need a lower income to have the same economic standard of living as householders who do not own their own home, all else being equal.

Figure 6

Conceptual links between income and economic standard of living



We first focus on how income equivalisation (also known as ‘income standardisation’) can be used to better represent economic standard of living, by accounting for how households pool

21 Statistics NZ’s statistical standard on Māori descent (Statistics NZ, nd(b)) provides the following definition: “A person has Māori descent if they are of the Māori race of New Zealand; this includes any descendant of such a person.”

22 The OECD’s *Framework for Well-being Indicators* (2011) uses three dimensions to measure well-being: economic (or material) standards of living, which “determine people’s consumption possibilities and their command over resources”; quality of life; and sustainability.

their resources. (Figure 6 illustrates how income equivalisation aims to get closer to capturing economic standard of living.) Next, we consider disposable income, from both theoretical and practical perspectives. Finally, we look at alternative ways to classify households, using household expenditure instead of, or as well as, income. We consider whether this gets closer to understanding economic standard of living, and the practicalities of using such a measure.

Income equivalisation

Income equivalisation is a technique that adjusts income information to help with the comparison of economic standards of living across households. The basic concept is to look at income per 'standardised' person, where each person is standardised according to the household they live in.

The technique is based on the premise that larger households need relatively fewer resources per person to maintain the same standard of living as smaller households; there are economies of scale and pooling of resources within larger households. Equivalised household income is household income adjusted to account for differences in household composition.

Choice of income equivalisation scale

Many possible income equivalisation scales are available, and there is no internationally generally accepted method. The *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth* (OECD, 2013) summarises the current situation:

While there has been considerable research by statistical and other agencies to estimate appropriate values for equivalence scales, no single standard has emerged ... choosing a specific equivalence scale is hence fraught with difficulties.

Factors commonly taken into account are the size of the household and the age of its members. Many other factors, such as location and labour force status, could affect transport and other costs, and therefore affect households' standard of living. As discussed in section 2.3.1, large differences in expenditure patterns are observed within income quintiles, even after household income has been equivalised.

Given these difficulties, the OECD (2013) points to the use of simple equivalence scales, noting their transparency as advantageous. The following three scales have most commonly been used by OECD countries:

- **OECD equivalence scale** (also called the 'old OECD scale' or 'Oxford scale'), which assigns a value of 1 to the first household member, 0.7 to each additional adult, and 0.5 to each child.
- **OECD-modified scale**, a revised version of the above scale that implies greater economies of scale – it assigns a value of 1 to the first household member, 0.5 to each additional adult and 0.3 to each child. This scale was adopted by Eurostat (the statistical office of the European Union) in the late 1990s and has been widely used internationally in recent years.
- **Square root scale**, as used by some recent OECD publications, which divides household income by the square root of household size. It makes no differentiation between adults and children.

The **Revised Jensen scale** (Jensen) is used in New Zealand (see, for example, Ministry of Social Development, 2014). The Jensen scale has a more sophisticated treatment of children

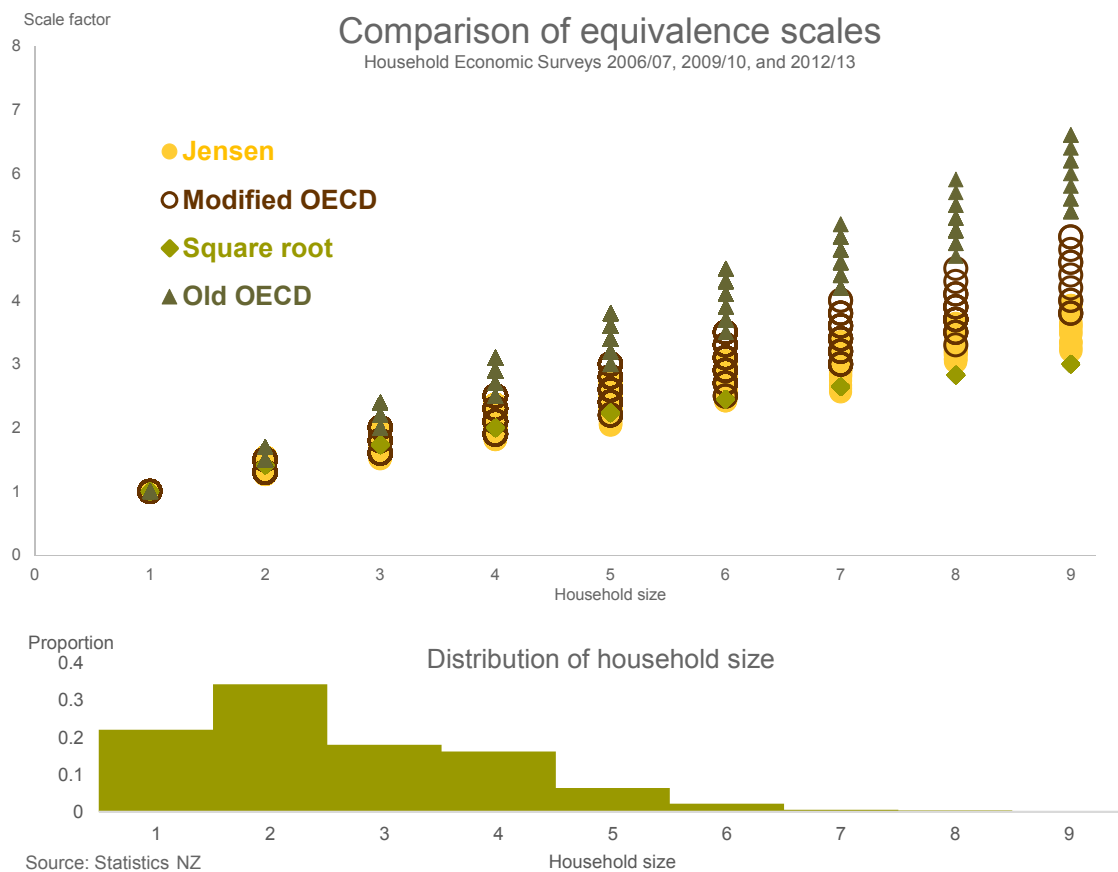
that takes account of their age in yearly increments.²³ It classifies children as those aged under 18,²⁴ whereas the OECD uses an age criterion for children of under 14.

As the modified OECD scale is a simple scale that is widely used internationally, it could be considered the default choice if there are no clear arguments for using another scale. The United Nations' *Fundamental Principles of Official Statistics* (2013) states that "the use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels".

Empirical comparison of equivalisation scales

The impact of using the modified OECD scale (hereafter called 'OECD') has been compared with the Jensen and square root scales.²⁵ As shown in figure 7, the Jensen scale tends to imply economies of scale for larger households, between that of the square root scale (which assumes the lowest economies of scale) and the OECD scale. The multiple points for each household size represent households with different adult/child compositions.

Figure 7



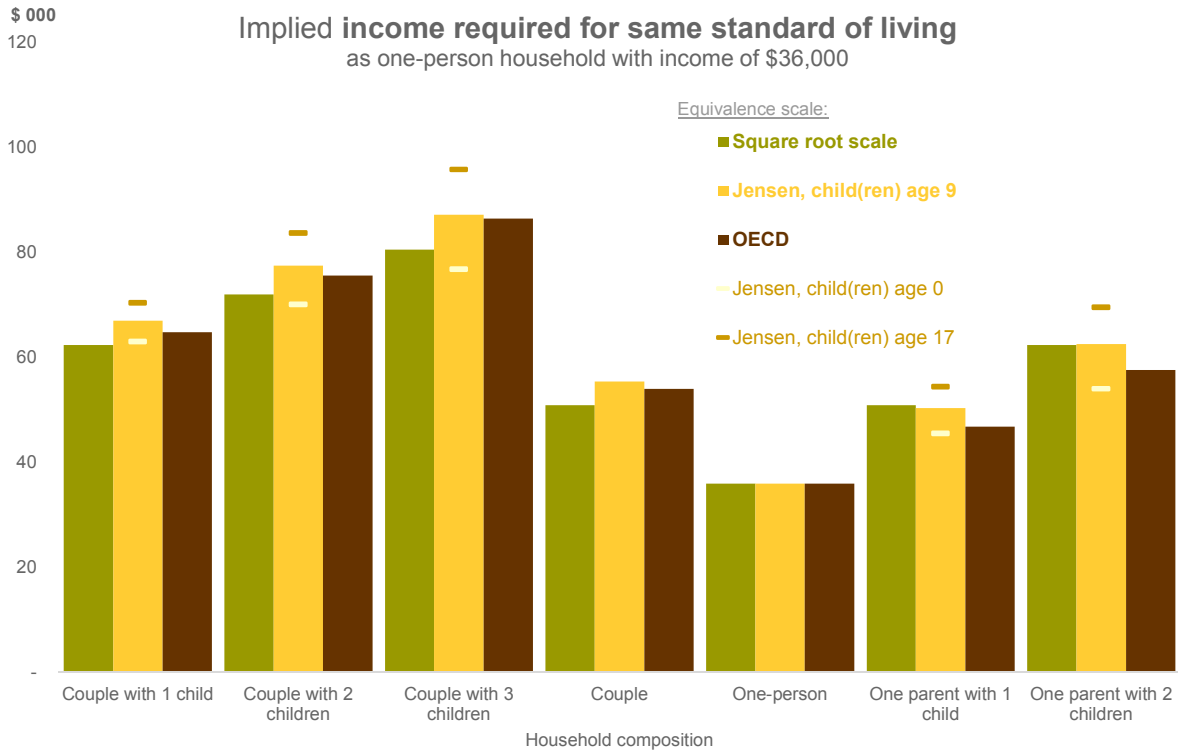
23 In the Jensen scale, the equivalence scale factor = $(a + 0.460697c + 0.0283848g)^{0.621488}$ where a = number of adults ; c = number of children; g = \sum age of children, expressed as an integer

24 More precisely, children are classified as those aged under 18 who do not have a partner in the same household.

25 The old OECD scale has not been analysed further, due to its decline in popularity.

For more modestly sized households with, say, fewer than five people – which represents the vast majority of New Zealand households – the impacts are more complex. The scales treat the age composition of households differently, which somewhat limits the impacts of different age criteria used to classify children and adults. The impacts of the square root scale, Jensen, and OECD scales for common household types are shown in figure 8.

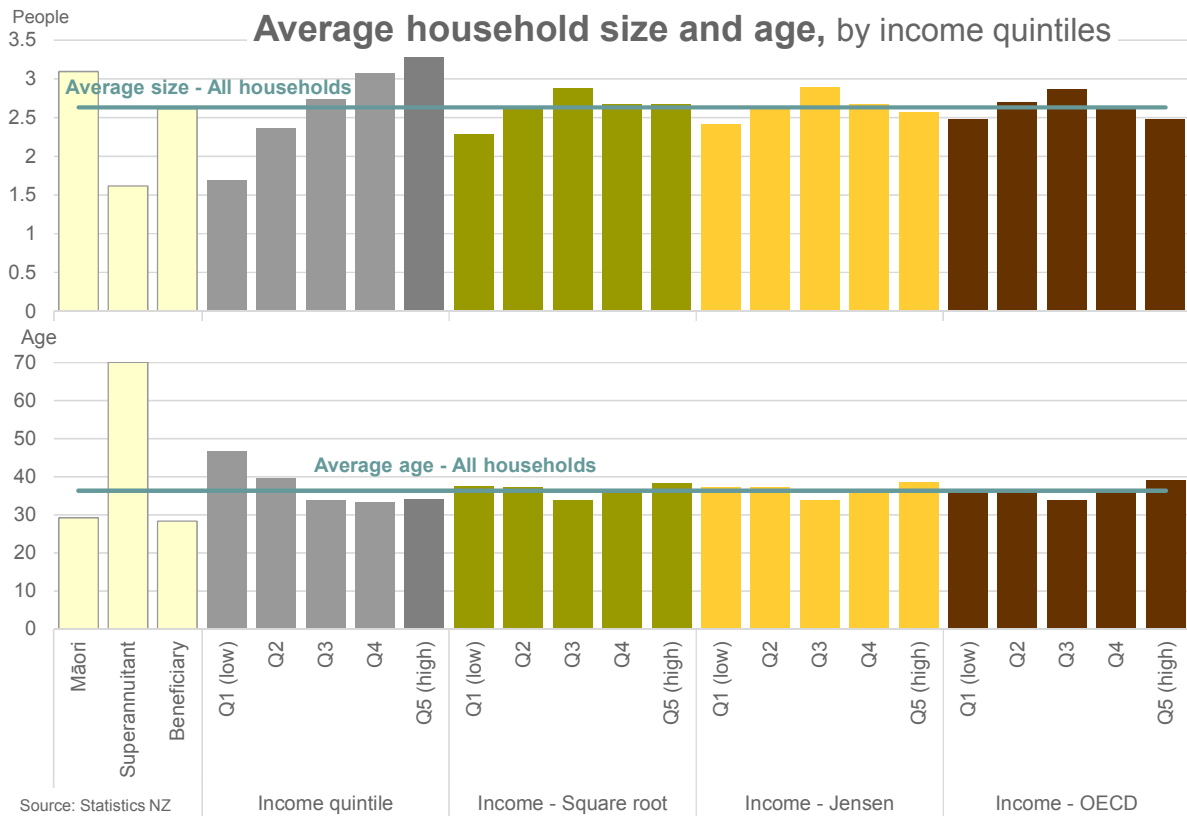
Figure 8



Source: OECD | Statistics NZ

Another way to look at the impacts of the equivalisation scale is to look at the distribution of household size and age across the quintiles, before and after equivalisation. As shown in figure 9, the different scales have broadly similar impacts on the household size and age composition of each income quintile. Some larger households shift into lower income quintiles following equivalisation. Conversely, some smaller households shift up the income distribution – typically, these are superannuitant households, which affects the age composition post-equivalisation.

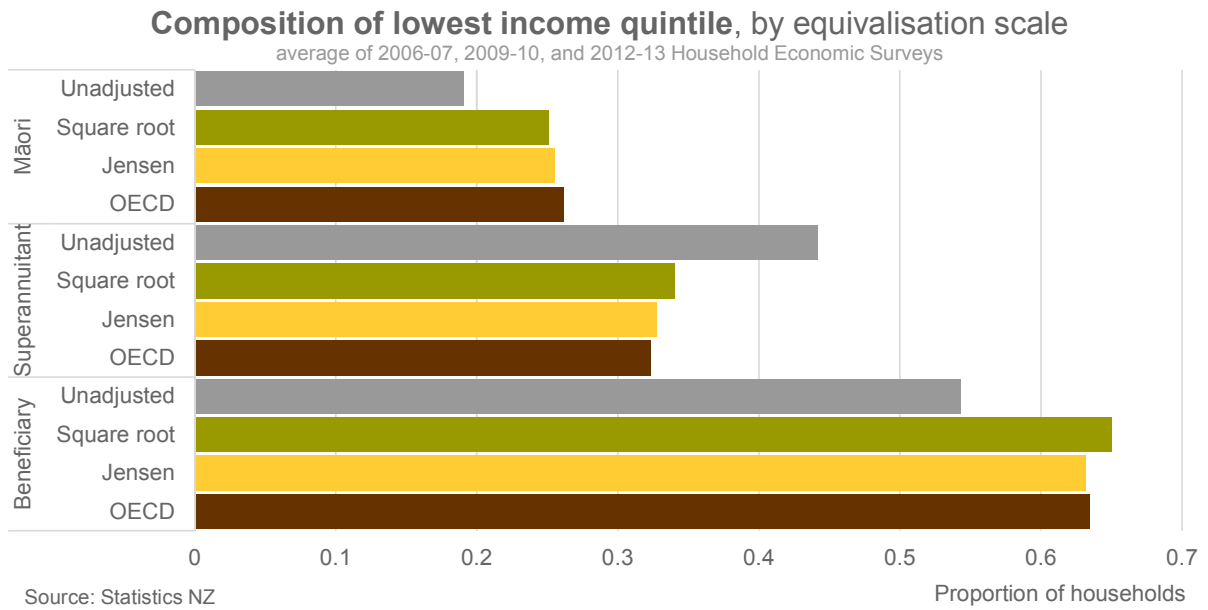
Figure 9



We have also looked at the proportion of superannuitant, beneficiary, and Māori households that are classified in each quintile using the different scales. Analysis of recent Household Economic Surveys has found consistent patterns from equivalisation, regardless of the scale used. For example, looking at the proportion of households classified to the lowest income quintile, more beneficiary and Māori households, and fewer superannuitant households, are classified to the lowest income group post-equivalisation (see figure 10).

The differences between the three scales investigated (Jensen, OECD, and square root) are often small, and therefore hard to reliably observe within the limits of the statistical power of the survey (given the modest achieved sample size of 3,000 households per survey). For example, the ranking of the scale that classifies the most households of a particular subgroup to the lowest income quintile can change from survey period to period, likely reflecting sampling variation rather than real-world phenomena.

Figure 10



Disposable income

It could be argued that disposable (or net) income – that is, income available after income tax – could be considered a better measure for classifying households. It likely gets closer to economic standard of living, as it represents what is available to spend on consumption or for savings.

The New Zealand Treasury models disposable income for respondents to the Household Economic Survey. This data has been used to investigate the impacts of using gross rather than disposable income. As discussed in section 2.2.2, the classification of households is relatively consistent, regardless of whether gross or disposable income is used. Notably, there is a 99 percent correlation (Pearson product-moment correlation coefficient) between income and disposable income. This may mean that, for practical purposes, the additional modelling required to estimate disposable income could be omitted without any material reduction in quality.

2.2.4 Alternative definitions of 'rich' and 'poor'

Expenditure quintiles

International studies suggest total household expenditure may be a better way to classify households with lower economic standard of living than using household income, if the ultimate aim of the classification is to proxy economic standard of living. Total expenditure may be preferable because households may fund some of their expenditure by decreasing their assets or increasing their liabilities.

The *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth* (OECD, 2013) gives theoretical and practical arguments for considering consumption (which is largely akin to expenditure) rather than income:

It is the consumption of goods and services along with other inputs such as time that ultimately satisfies a household's needs and wants. Because of this, consumption is a more important determinant of economic well-being than income alone ... because consumption expenditures fluctuate less than incomes, they can be considered a better proxy of living standards. This view is supported in a number of studies ... which find stronger relationships between consumption and subjective well-being than between income and subjective well-being.

The framework cites the findings from a number of studies of the collection of income and expenditure data in household surveys. These have found better reporting of expenditure by households with lower levels of resources, which tend to under-report their income. The opposite pattern is found for higher-expenditure households, which tend to report better-quality income information than expenditure data.

A recent British investigation into the variation of inflation across households (Flower & Wales, 2014) suggests a weakness of analysis by income group. It states that because "... households will smooth consumption through time in the face of income shocks, dividing them into deciles of equalised expenditure may help to avoid the 'temporary low income' or income-poor, asset-rich effects...". The report discusses particular problems with the lowest income decile, which is affected by households with temporary zero or negative income. Conversely, using expenditure to group households is affected by atypical large purchases. The patterns noticed in the British study may be somewhat diluted in this analysis, given the use of quintiles rather than deciles.

Joint income and expenditure quintiles – average of income and expenditure

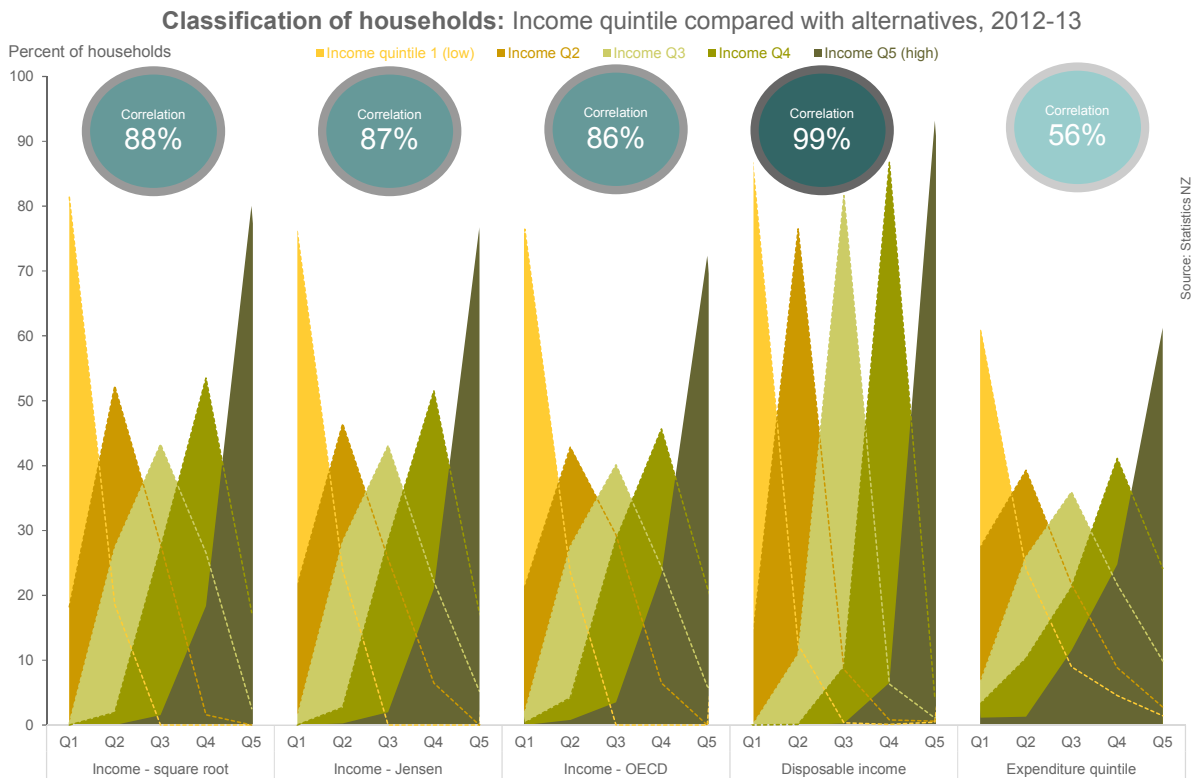
Another way to classify households to assess economic standard of living would be to use the average of a household's income and expenditure. This may help to smooth unusual income or expenditure in a given year. Stiglitz, Sen and Fitoussi (2009) emphasise a need to understand the joint distribution of household income, consumption, and wealth to better understand well-being. Combining income and consumption expenditure could be viewed as aligning with this approach.

Empirical comparisons of classifications

This section compares the alternative group definitions that could be used to classify households.

Using disposable income to classify households leads to reasonable consistency compared with gross income (see figure 11). Expenditure is least well correlated with the other classifications – possibly reflecting one-off or irregular expenditure. Inherently, the cash-flow measure – using both income and expenditure to classify households – is moderately correlated with the other measures looking at all the quintiles. The cash-flow measure is well correlated with other measures looking at the classification of the lowest quintile against the other quintiles.

Figure 11



Impact of using income equivalisation on feasibility study results

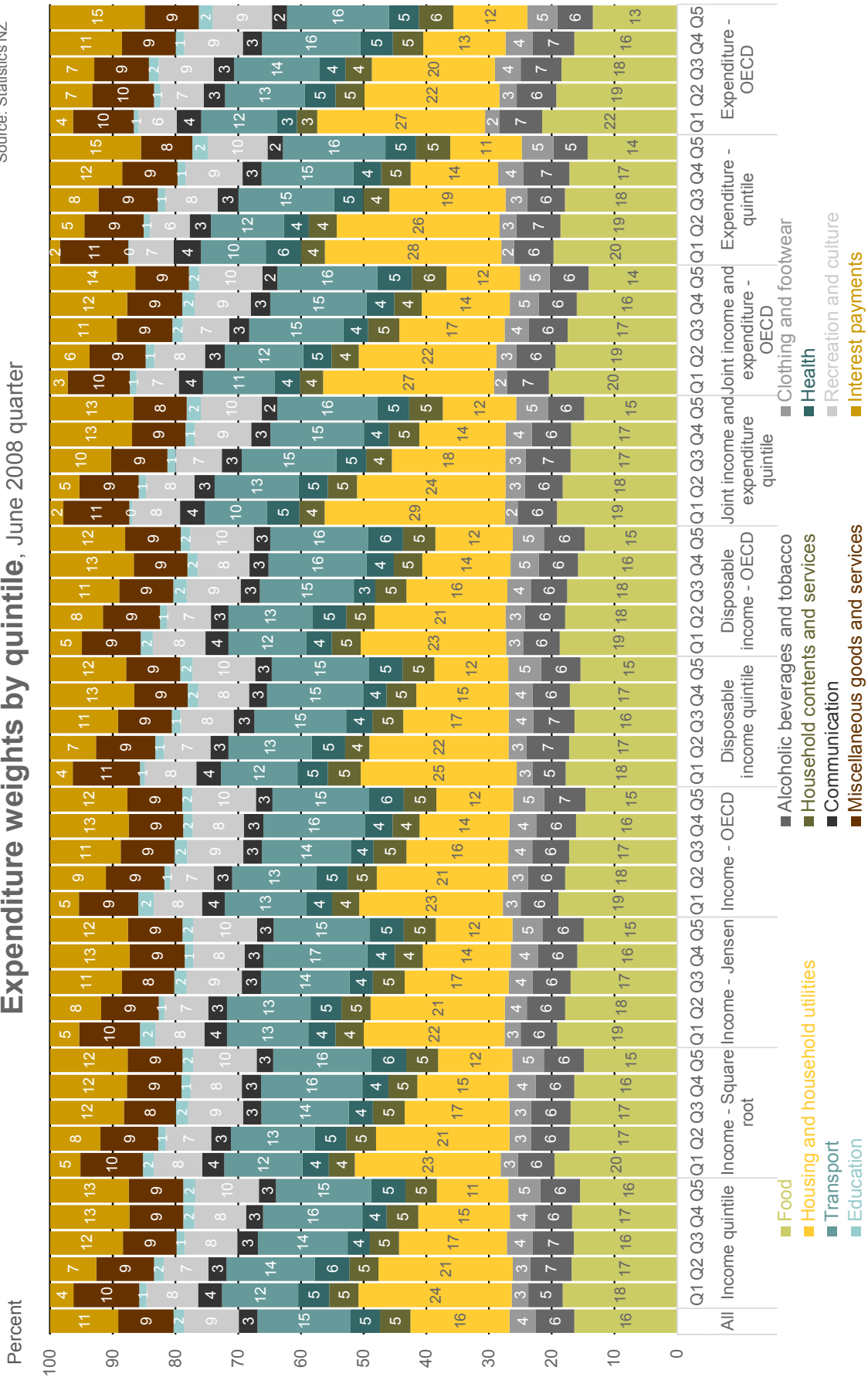
To assess sensitivity to the choice of different income group definitions on the estimates of spending patterns and consumer price change for each income quintile, the 2013 feasibility study results have been re-run using the different quintile definitions investigated.²⁶

²⁶ The income equivalisation scales discussed in section 2.2.1 can be equally applied to expenditure. In fact, the scale factors have typically been determined by looking at expenditure (rather than income) data.

Figure 12

Source: Statistics NZ

Expenditure weights by quintile, June 2008 quarter

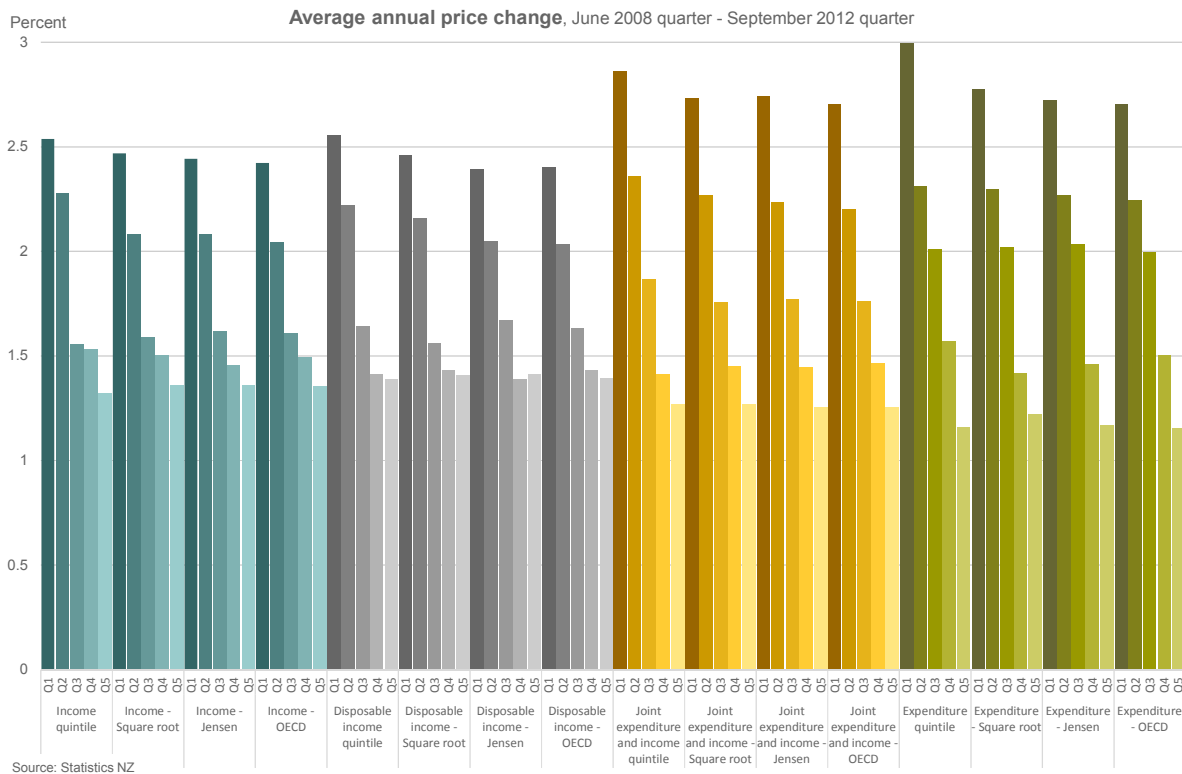


Household expenditure patterns using different quintile definitions (figure 12) reveal a number of interesting insights:

- Overall patterns of expenditure are broadly consistent, regardless of the quintile definition.
- Little difference in patterns is found between the Jensen and modified OECD scales.
- Results for regular income compared with disposable income are similar – greater differences are observed using cash flow and expenditure definitions, compared with income definitions.
- ‘Between definition’ differences appear to be invariant to the survey period (2008 weights used the 2006/07 Household Economic Survey; 2011 weights the 2009/10 survey).

As shown in figure 13, similar patterns are found when looking at the average price change over the study period (2008–12). The major patterns are observable, regardless of the quintile definitions. The most pronounced differences are for the expenditure quintiles. Equivalisation dampens the differences between high and low quintiles, regardless of the choice of equivalisation scale.²⁷

Figure 13



2.3 Aggregation of household inflation

This section considers how to aggregate household expenditure patterns. We discuss conceptually appropriate approaches to aggregation depending on the use of the price indexes, and the practical implications of the preferred option.

²⁷ Flower & Wales (2014) also found the greatest differences in inflation (over the period 2003–14) between household groups defined by their total expenditure (rather than income).

The weighting methods used for the CPI involve calculating expenditure patterns from aggregate household expenditure – that is, calculating total expenditure on each commodity in the CPI basket for the CPI reference population (all private New Zealand-resident households).

Weighting proportions are derived from the aggregates. Effectively, this treats the whole of New Zealand as a single ‘super-household’, which is consistent with the household sector defined in the institutional sectors of the *System of National Accounts 2008* (Intersecretariat Working Group on National Accounts, 2008). The method is conceptually appropriate to the CPI’s principal use as a macroeconomic indicator for monetary policy purposes.

An important consequence of the household-sector weighting method, used in the CPI, is that the expenditure weights do not necessarily represent a ‘typical’ household well. In fact, a consequence of the method is that higher-expenditure households have a greater influence on the aggregate weights. In effect, households’ expenditure patterns are weighted according to their position on the expenditure distribution.²⁸ This feature has led to the method being commonly referred to in the CPI literature as ‘plutocratic’ weighting.

For HLPs, the inflation of a ‘typical’ household within household groups may be of more interest than the inflation of the group treated as a whole. Inflation of a ‘typical’ household within a group can be estimated by calculating expenditure proportions for each household and then taking a simple unweighted average of these proportions.²⁹ In the literature, this is often referred to as ‘democratic’ weighting.³⁰

Table 3 provides a summary of the weighting approaches that may be appropriate for different purposes. It is worth noting that the HLPs will be on a ‘payment’ conceptual approach, suitable for adjustment of monetary payments (see section 2.1 for details).

Table 3

Choice between weighting methods

	Household-sector weighted (‘plutocratic’)	Household weighted (‘democratic’)
Summary of approach	Inflation experienced by the group treated as a single ‘super-household’	Inflation experienced by a ‘typical’ household within the group
Use	May be conceptually appropriate for: <ul style="list-style-type: none"> • macroeconomic measurement • deflation of (aggregate) nominal expenditure 	May be conceptually appropriate for: <ul style="list-style-type: none"> • measuring changes in real median incomes • indexation of monetary payments³¹
Practical implementation	Most expenditure estimates are readily available from CPI weights. The Household Economic Survey can be used to allocate expenditure to population groups	Requires micro-level calibration of household expenditure, prior to aggregation of household-specific expenditure shares. This will use the CPI and Household Economic Survey in a more data-intensive way

28 *At What Price? Conceptualising and Measuring Cost-of-Living and Price Indexes* (Schultze & Mackie, 2002) references calculations for the United States CPI that the household ‘represented’ by the plutocratic CPI is around the 75th percentile of the income distribution.

29 Unweighted for the population. Estimation from the Household Economic Survey will clearly require the use of sampling weights.

30 We agree with Astin and Leyland (2015) that the use of the terms ‘plutocratic’ and ‘democratic’ could be deemed emotive. In this paper, we have instead adopted the terminology ‘household-sector weighted’ and ‘household weighted’.

31 Where the aim of indexation is to maintain the purchasing power for the ‘average member’ of the group receiving payments.

The calibration of household expenditure to CPI weights, described in the design outline (section 1.2), would be applied at a *micro-level* for each household, for the household weighting approach. This step minimises known reporting bias in the Household Economic Survey. It would only be required once under the household-sector weighting approach.

At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes (Schultze & Mackie, 2002)) describes which weighting approach may be appropriate for which purpose:

There are uses for the CPI or its components in which plutocratic weighting is called for – the component indexes of the CPI are used in deflating current dollar consumer expenditures as part of producing measures of real gross domestic product (GDP). And it is probable that a plutocratic index would come closer than a democratic one to the weights appropriate for indexing the tax system. But for most purposes a democratic index would be preferable. For analysis of economic welfare – e.g., measuring changes in real median incomes – a democratic index would clearly be superior. And that is equally true for the index used to determine cost-of-living allowances in social security and other public transfer programs.

More recently, in the United Kingdom the Royal Statistical Society (Diggle, 2015) gave its support for household group measures of inflation, using a payment approach, aggregated using democratic weights:

We fully support Paul Johnson's recommendation that the ONS [Office for National Statistics] should produce regular inflation indices for different household groups. However, we believe these should be based, to the extent possible, on actual household spending. We also believe this suggestion needs to be taken to its logical conclusion by combining the inflation indices to produce a 'democratically weighted' overall index that is published monthly. Such a 'household inflation index' (HII) would then be suitable for general uprating purposes as well as tracking the real growth in household income.

We have not found any previous New Zealand research into the impact of using household-weighted expenditure to aggregate household inflation indexes. It is noted, however, that the 1991 CPI Advisory Committee recommended that the then-Department of Statistics investigate the feasibility of using such weights (New Zealand Government, 1991).

2.3.1 Empirical investigation of different aggregation methods

To gain understanding of the likely impact of the chosen aggregation method, we have looked empirically at the sensitivity of the method used on past data. First, we look at the differences in expenditure patterns, then turn our attention to the impact on the 2013 feasibility study results.

The major patterns are invariant to the survey period,³² so appear enduring to the household groups and more likely to be persistent than observed differences in inflation rates, which also depend on differences in the relative movement of prices. These patterns provide a good indication of the potential for differences in inflation rates from application of different aggregation methods.

32 The expenditure patterns using 2006/07, 2009/10, and 2012/13 Household Economic Surveys have been investigated (corresponding to the 2008, 2011, and 2014 CPI reviews, respectively).

Figure 14

Potential for aggregation method impact on inflation rate estimates

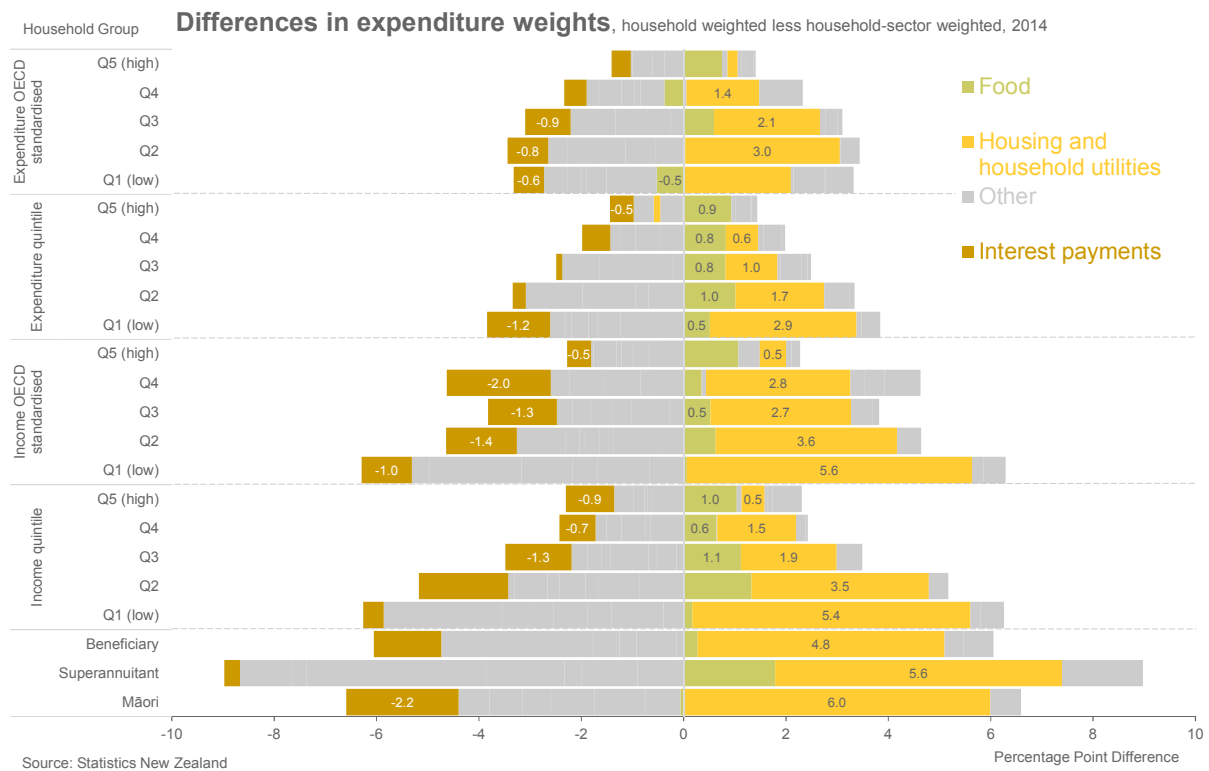


Figure 14 shows the expenditure group-level differences in expenditure patterns, using household weights ('democratic' weights) compared with household-sector weights ('plutocratic' weights), as used for the CPI.³³ There are a number of interesting features:

- Differences in weighting patterns are observed for every household group.
- Housing and food attract higher weights under the household weighting approach (suggesting housing and food are a larger proportion of the expenditure pattern for a 'typical' household than would be the case under household-sector weighting).
- Interest payments are more highly weighted under the household-sector approach, reflecting greater expenditure on interest by higher-expenditure households.
- The greatest differences (heterogeneity) in expenditure weights were found for superannuitant households. Appendix B shows a detailed decomposition for this group.

The impact of using the two weighting methods under consideration has been investigated for the feasibility study period (2008–12). The household weighted indexes showed greater inflation for each of the household groups considered (see figure 15). Since the Household Economic Survey (used to estimate the weights, see section 1.2) is a sample survey, there is a level of statistical uncertainty in the results. It was found that inflation rates would be estimated with about 20 percent greater precision using the household weighted method compared with the household-sector weighted approach.³⁴

33 Full group-level differences for each of 2008, 2011 and 2014 are shown in Appendix A

34 For all households, the sampling errors on the average annual percent change (due to sampling of households in the Household Economic Survey) were estimated to be 0.032 percentage points for the household weighted method and 0.039 percentage points for the household-sector method. The sampling errors were estimated using the delete-a-group Jackknife method, with 100 replicate groups.

Figure 15

Aggregation method impact on annual average percent change, 2009–12

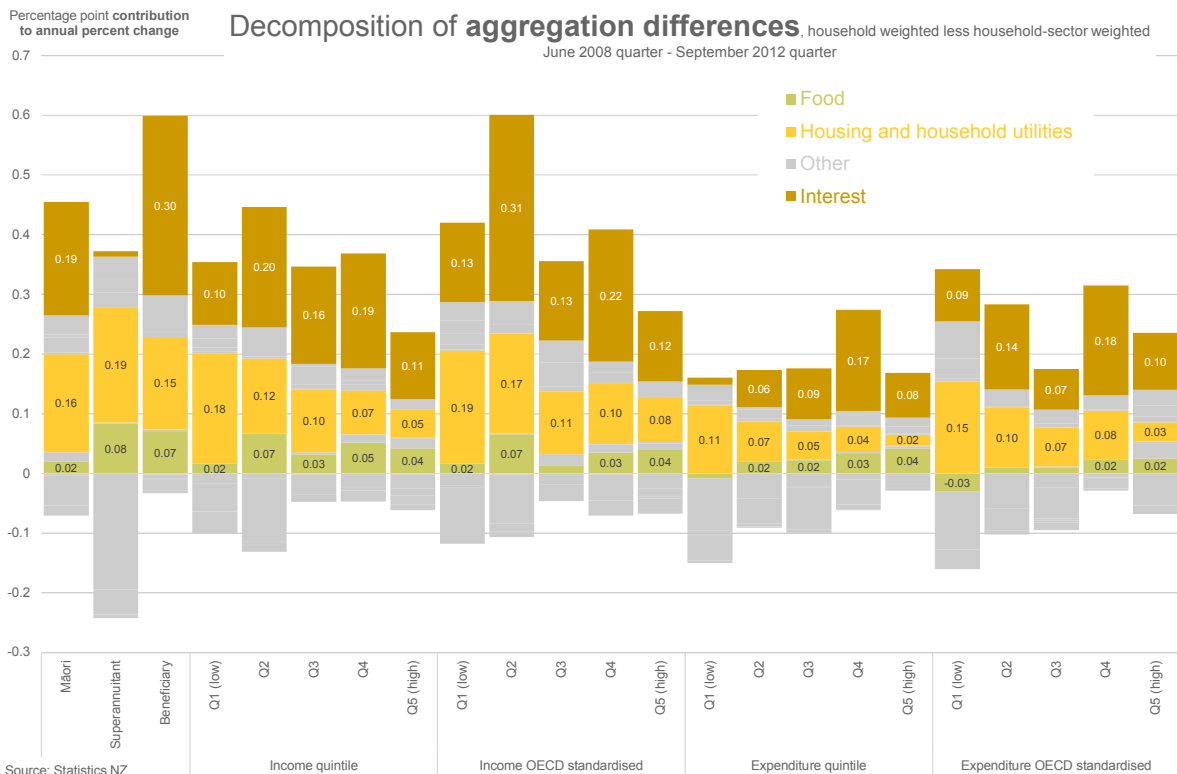
		2009Q2	2009Q3	2009Q4	2010Q1	2010Q2	2010Q3	2010Q4	2011Q1	2011Q2	2011Q3	2011Q4	2012Q1	2012Q2	2012Q3
Māori	Household weighted	1.5	0.6	0.6	1.2	1.2	1.6	4.2	5.0	5.4	4.5	2.0	1.6	1.1	1.0
	Household-sector weighted	1.0	0.0	0.0	0.4	0.6	1.1	3.9	4.7	5.1	4.2	1.8	1.4	0.9	0.8
Superannuitant	Household weighted	3.0	2.5	2.3	2.6	1.9	2.0	4.7	5.0	6.0	5.2	2.3	2.2	1.5	1.5
	Household-sector weighted	2.9	2.5	2.4	2.6	2.0	1.9	4.6	4.9	5.9	5.1	2.1	1.9	1.2	1.1
Beneficiary	Household weighted	2.2	1.4	1.1	1.4	1.3	1.8	4.3	5.1	5.4	4.3	2.0	1.8	1.4	1.5
	Household-sector weighted	1.2	0.2	-0.1	0.3	0.4	1.2	3.9	4.7	5.0	4.1	1.7	1.6	1.3	1.3
Q1	Household weighted	2.6	2.0	1.8	2.0	1.6	1.9	4.5	4.9	5.6	4.6	2.0	1.9	1.4	1.5
	Household-sector weighted	2.3	1.6	1.4	1.7	1.4	1.7	4.4	4.9	5.5	4.5	1.9	1.7	1.2	1.3
Q2	Household weighted	1.8	1.1	1.2	1.5	1.4	1.7	4.3	4.9	5.6	4.6	2.1	1.9	1.3	1.3
	Household-sector weighted	1.4	0.5	0.5	0.9	0.9	1.3	4.1	4.7	5.3	4.4	1.9	1.6	1.1	1.1
Q3	Household weighted	1.3	0.4	0.5	0.9	0.8	1.2	3.9	4.6	5.2	4.3	1.6	1.3	0.8	0.8
	Household-sector weighted	0.9	-0.1	-0.2	0.3	0.4	0.8	3.6	4.3	4.9	4.1	1.4	1.1	0.7	0.7
Q4	Household weighted	0.8	-0.3	-0.2	0.3	0.5	0.9	3.9	4.5	5.2	4.2	1.5	1.2	0.7	0.7
	Household-sector weighted	0.3	-0.9	-1.0	-0.4	0.0	0.5	3.6	4.2	4.8	4.0	1.3	1.0	0.7	0.6
Q5	Household weighted	0.7	-0.3	-0.2	0.2	0.5	0.7	3.6	4.2	4.8	4.1	1.3	1.0	0.5	0.3
	Household-sector weighted	0.5	-0.5	-0.6	-0.1	0.2	0.5	3.4	4.0	4.6	3.9	1.2	0.9	0.4	0.3

Source: Statistics NZ



Decomposing the reasons for the differences (figure 16) shows that housing and interest payments contributed to higher inflation for the household weighted indexes (interest had deflation over the period, but lower weights under the household weighted method). Interestingly, there is still heterogeneity in the expenditure patterns (and therefore inflation rates) for equivalised household income and equivalised household expenditure. Grouping households by expenditure led to more homogeneity in expenditure patterns, compared with using income to group households.

Figure 16



is to a great extent dependent on what surplus of income is available after the needs of housing and food are satisfied". Clothing has been included in the CPI since 1924.

The classification of petrol and telecommunication services as necessities reflects how society has changed over the past century. Petrol and other private motoring costs, along with telephone services, was first included in the CPI in 1955. Like clothing, classification of cars as luxuries does not reflect intra-class variation in consumption patterns. As implied in the classification of petrol, some lower-value cars must be necessities.

3. Concluding remarks and future direction

We have seen in this paper how new insights can be obtained from existing data collections. Household living-costs price indexes will soon be disseminated to provide greater insight into the inflation experienced by groups of households. These new measures will use the rich household expenditure and demographic information collected in the Household Economic Survey and existing detailed commodity-price information from the CPI.

We revisited the prototype HLPs prepared in a feasibility study for the 2013 CPI Advisory Committee, which provides a proof of concept and the backbone methodology. We have considered whether it is necessary or desirable to refine any aspects of the approach.

A number of technical decisions are required prior to routine dissemination. Based on customer needs, these may need to balance conceptually ideal approaches with a good pinch of pragmatism to ensure the new measures can be quickly developed. The 2013 CPI Advisory Committee process, including public consultation, has shown there is a great deal of interest in these new statistics, and widespread support for releasing the HLPs sooner rather than later.

The use of the 'payment' conceptual approach for HLPs has provided an opportune time to review the measurement of 'pure' price change for interest payments. The methods used for the analytical series 'CPI plus interest' do not align well with international practice, nor the principle of measuring 'pure' price change. The interest payment methods will be enhanced for use in the HLPs by using quality adjustment to control for quality change over time. This could be a simple revaluation approach or the more sophisticated debt-profile method. Options are being considered for the scope of interest payments (mortgage debt, or a wider scope of consumer debt), and what this implies for a debt index – a price index to uprate mortgage debt.

Looking at the definition of income quintiles has highlighted that using income alone to classify households would provide only a broad guide to their economic standard of living, as it does not capture households' assets. This does not mean that income cannot be used as a useful proxy for economic standard of living. Indeed, income is already used in this way in many contexts.

We have explored whether using income equivalisation (income per 'standardised' person) and/or disposable income should be used to get a closer approximation to economic standard of living. Income equivalisation accounts for the pooling of resources between household members, but not the sharing of resources across households (notably, within families across households, such as parents sharing resources with their dependent children).

It's difficult to choose any one scale, but the OECD guidance suggests the use of a simple scale for transparency. There is no single scale used internationally, but the modified OECD scale is widely used and could be considered the default choice if there are no strong arguments for an alternative. The modified OECD scale is also a simple scale, with the advantage of being easier to comprehend and therefore more transparent. Empirically, we have found little difference between the commonly used modified OECD, square root, and Jensen scales.

The final substantive issue considered in this paper is how to aggregate household inflation. This seemingly trivial matter has been found to be of practical significance. Within-group variation in inflation experiences means that it matters how we aggregate household expenditure patterns. Comparing differences between these approaches gives insights into consumer luxuries and necessities.

Future work

Statistics NZ will soon engage with the future customers and stakeholders of the household living-costs price indexes to understand their views and requirements. Important aspects to understand include:

- the household-group definitions that would be most useful
- whether the income-group definitions should align with other commonly used income indicators, or with the definition that best approximates households' economic standard of living – this might actually imply a definition based on households' expenditure
- the scope of interest payments (and debt index) that makes most sense
- the most useful aggregate of household group inflation – the inflation for a 'typical' household in the group, or the inflation for the group as a whole, treated as a single super-household.

Analytical investigations are still to be done to determine the impact of household-group-specific store-type and regional weights. Conceptually, the use of store-type and regional weights will reflect the prices faced by different household groups. We will assess ways to implement this within the constraints of the current sample of price quotes in the CPI and sample of households in the Household Economic Survey.

If there is customer interest in expenditure quintile HLPs then we could investigate ways to detect and treat atypical expenditure from the calculation of total household expenditure, for the purpose of classifying households into quintiles. For example, the single highest expenditure purchase (or highest few items of expenditure) could be removed or down-weighted, prior to aggregation. This would create an estimate of regular household expenditure, similar to the regular and recurring income measure that has been used for income quintiles.

Looking further ahead, the HLPs will undergo regular reviews and continuous improvement to ensure they stay relevant and meet the quality needed. Research and consultation is ongoing, so contact the author if you have any views on the design of these new indexes.

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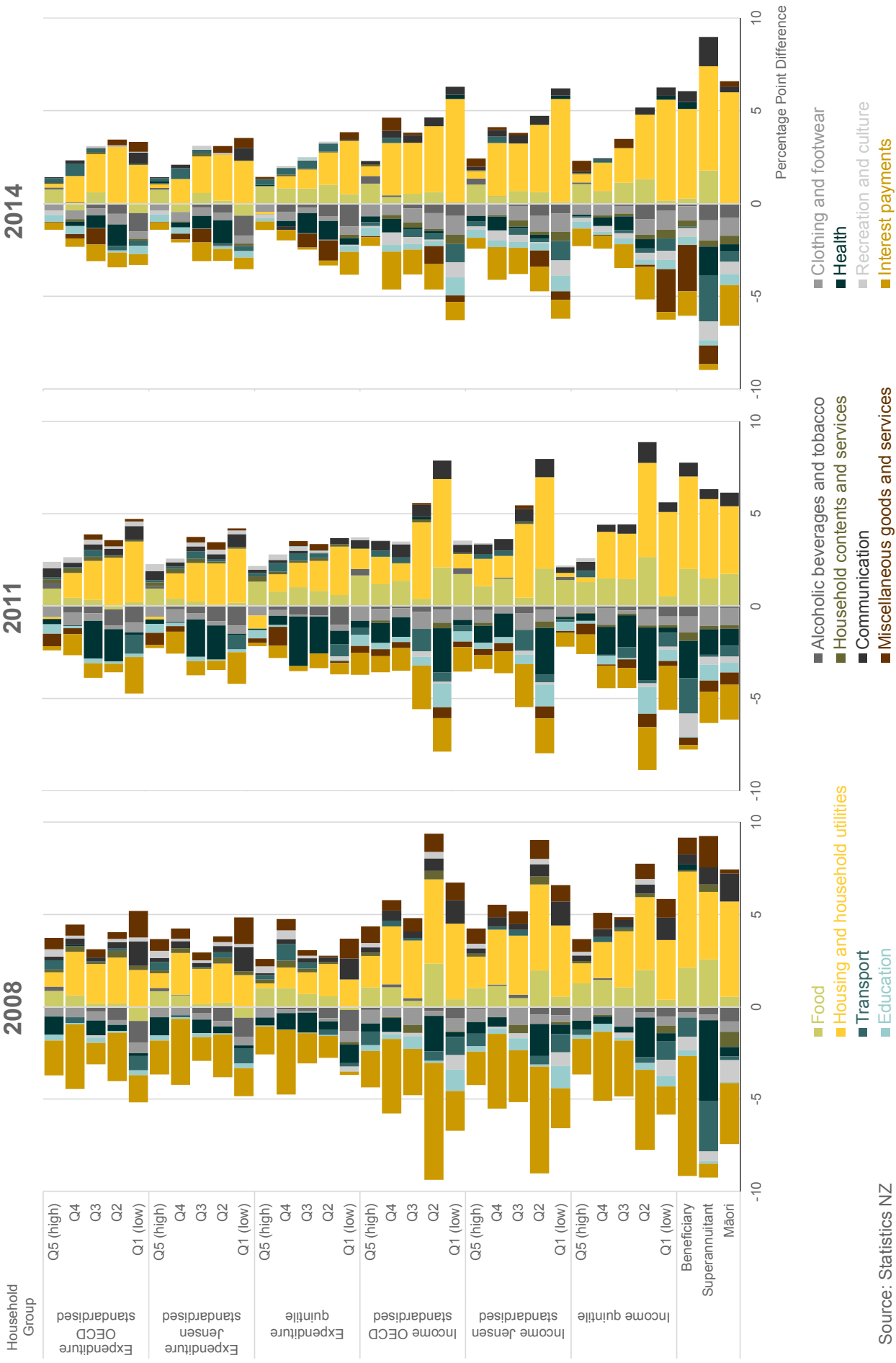
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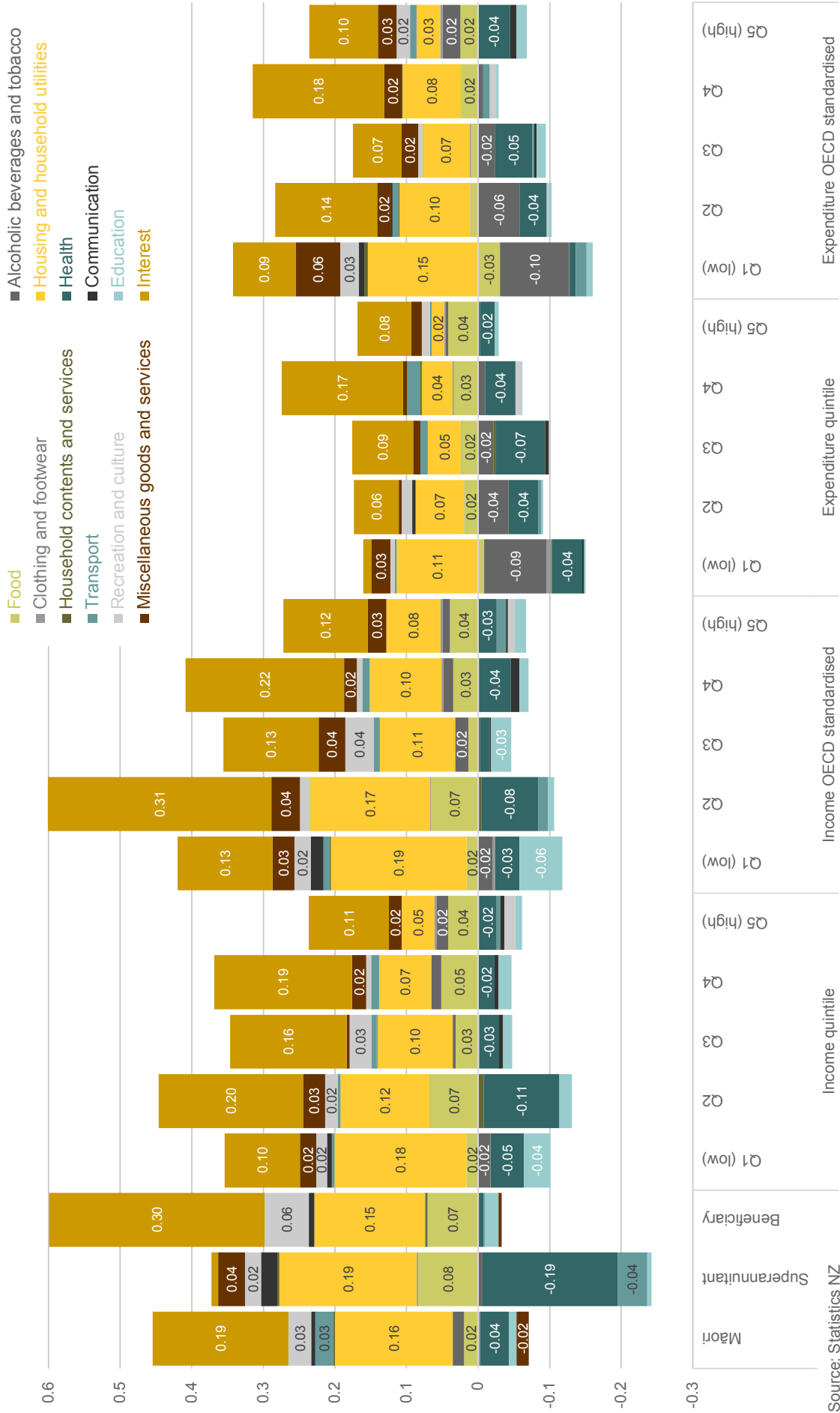
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Appendix A: Differences in expenditure weights, household weighted ('democratic') less household-sector weighted ('plutocratic')



Appendix C

Decomposition of aggregation differences, household weighted less household-sector weighted
June 2008 quarter - September 2012 quarter



Source: Statistics NZ