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Inflation variability across Australian households: Implications for inequality and indexation policy

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Abstract

We examine the consumer price inflation experiences of Australian households across the income distribution using Australian Bureau of Statistics data and prices and methodology from the national consumer price index. Across the period 2011 – 2018, we find that the lowest income households have experienced the largest inflation and those at the top have experienced the least inflation. These differences in inflation experience are completely driven by alcohol and tobacco. When we remove alcohol and tobacco, we find that there is little variation in the inflation experiences of households across the income distribution.

JEL Codes: D63, D12, E31, J18
Keywords: Inflation; Household income distribution; inequality; Consumer Price Index

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1. INTRODUCTION

In this paper we consider the inflation experience of Australian households in different parts of the income distribution. Specifically, we break households into quintiles by equivalised household income and we examine their inflation experiences. Because household expenditure patterns differ across income quintiles and because different goods have different amounts of inflation, the impact of inflation on households can differ by income quintile.

This paper's main contribution to the literature is to quantify the differences in inflation experienced by Australian households grouped by income between 2011 and 2018. We utilise price data from the Australian Bureau of Statistics (ABS) Consumer Price Index (CPI); and publicly available ABS data from the Household Expenditure Survey (HES).

We construct inflation measures for household income groups that can be directly compared to the official measure of inflation because we use the same data sources, price index methods, products and product classifications, and measurement of price change as the ABS CPI. This approach is unique in the academic literature in Australia; and ensures the results can be compared to official CPI statistics and interpreted in the context of inflation for the household sector as a whole.

CPI is an important statistic for government and the private sector. It is used to index various welfare benefits provided by government, excise taxes, rental agreements and business contracts. Our results thus have two potentially important policy applications. The first is that if the inflation experience of low-income households is different than the average CPI, indexation of government payments which primarily go to low-income households may be over- or under-compensating those households for price changes. The second is that, if one accounts for differential inflation experiences, then standard measures of income inequality and its change over time may be misleading. If low and high income households have different inflation experiences, then merely looking at real incomes calculated using average CPI without considering the differential changes in purchasing power of that income may lead to over- or under-statement of inequality changes.

We find that expenditure patterns are quite different for households in different parts of the income distribution. Low income households spend a larger share of their income on necessities such as food and housing; high income households spend a larger share on transport, recreation and culture. These patterns are relatively constant across the eight years we consider.

We find that households in the bottom twenty per cent of the household income distribution experience the highest inflation, 14.8 per cent, during 2011-2018. Households in the top quintile experience the lowest inflation, 13.3 per cent. Households in the middle sixty per cent of the income distribution experience inflation between 13.7 and 13.9 per cent. These results suggest that low income households have become relatively worse off over time in terms of purchasing power even if there has not been much change in nominal income inequality.

Alcohol and Tobacco shows the greatest amount of inflation between 2011 and 2018, with prices having grown by 47.3 per cent. This is mostly driven by increases in taxation on these goods.[1] If we

[1] Excise rates for alcohol (beer and spirits) and tobacco are indexed twice a year in line with the Average Weekly Ordinary Time Earnings (AWOTE). In addition, tobacco excise increases by 12.5% on 1 September each year. Tax now accounts for about 65% of the price of cigarettes.

remove alcohol and tobacco from our calculations our results change substantially. Inflation, for all goods and services excluding alcohol and tobacco, has been lowest for the second and third income quintiles (10.1 and 10.6 per cent, respectively) and highest for the top quintile (11.9 per cent). The bottom and fourth quintiles both experience 11.3 per cent inflation over the 2011 to 2018 period.

The rest of the paper is organised as follows. We provide some background to our paper in the next section. In sections 3 and 4 we discuss our data, methods and results. We discuss the policy implications of these results in section 5 and we provide some concluding comments in section 6.

2. BACKGROUND

Inflation is a measure of the change in the general level of prices. In Australia, the Australian Bureau of Statistics (ABS) Consumer Price Index (CPI) is a measure of inflation for the household sector as a whole. The ABS CPI is constructed by pricing a fixed basket of goods and services purchased by Australian capital city households and combining these price changes with average household expenditure patterns to produce an overall measure of household inflation (ABS, 2018a).

Inflation measurement for the household sector is important from a number of perspectives, such as the effective macroeconomic management of an economy. Since 1993, monetary policy in Australia has been centred on a medium-term inflation target of 2 to 3 per cent per annum. While this macroeconomic perspective is important for price stability, employment and exchange rate perspectives, household inflation also has a direct impact on individual Australians as it reflects the changing prices households pay for the goods and services they purchase.

While the ABS CPI is a long-established measure of inflation for the household sector as a whole, dating back to September quarter 1948, information relating to the differential inflation experiences of Australian households is limited. Little is known in Australia, for example, about the inflation experiences of households across the income distribution. One of the aims of the paper is to produce measures of inflation for sub-populations grouped by income that are comparable to the official measure of inflation (ABS CPI). This element of the paper is unique because we employ the ABS CPI scope, concepts, data sources and methods to produce inflation by households grouped by income.

There is a substantial international literature relating to the differential inflation experience of households by income. Chiru (2005) for Canada; Hobijn & Lagakos (2005), Broda & Romalis (2009) and Kaplan & Schulhofer-Wohl (2017) for the United States; Mehrhoff and Breuer (2010) for Germany; and Weichenrieder & Gurer (2018) for 25 European Union countries have asked similar questions about the differential experience of inflation by household income level as we do in this paper. Like us, they utilise detailed household income and expenditure data, as well as price data, to produce inflation measures for households disaggregated by income over various time periods.

The results from these studies vary, making generalised insights difficult. Kaplan & Schulhofer-Wohl (2017) and Weichenrieder & Gurer (2018) find that lower-income households experience higher inflation than other households; Mehrhoff and Breuer (2010) found that the general inflation trends across households were almost the same; Chiru (2005) and Hobijn & Lagakos (2005) found higher-income households experienced higher rates of inflation in some periods of the study while lower-income households experienced higher rates of inflation in other periods. Broda & Romalis (2009)

found lower income households experienced lower inflation relative to higher income households over the period of study in the United States[2].

Chiru (2005) and Mehrhoff & Breuer (2010) use the same approach to produce inflation measures for households grouped by income. Both studies utilised household income and expenditure survey data to: allocate households to an income group; compute expenditure patterns for each household income group; and apply measures of price change from the national CPI to produce measures of inflation by household income group. This is the approach that we use in this paper.

The approach of Broda & Romalis (2009) is different to ours in two fundamental ways. Broda & Romalis only consider *non-durable products*--these represent about 30% of the CPI basket. *Durable*[3] products are excluded from the analysis, including significant expenditure categories like housing. Secondly, the products used to calculate price changes for each household income group are different. The authors utilise scanner data to allocate individual products to households at different income levels. For example, low quality products are allocated to low income households. This means a single CPI basket of products was not used to calculate price change for each household income group.

In the Australian context, Jacobs et al. (2014) undertook a study of Australian households by income group for the period 2003 to 2013. However, Jacobs et al. do not adopt the ABS CPI concepts and methods for some CPI expenditures groups, the most significant being housing. Jacobs et al. (2014) use price and expenditure data from the ABS Selected Living Cost Indexes (ABS, 2009) mortgage repayments series rather than the price and expenditure data relating to owner occupied dwellings from the ABS CPI.

Overall, the international literature suggests that it is important to have country-specific evidence. Very different results are found for different countries and different time periods. The one Australian study to date, while adding to the literature on household income and the impacts of price changes, does not provide inflation measures for households grouped by income in Australia. Hence, the importance of our study.

Understanding the burden of inflation across Australian households grouped by income can inform important policy areas, particularly inequality measures and the indexation of government expenditures.

While some have argued that inequality in Australia has not changed in the last 15 years or so (see Wilkins (2014); Wilkins (2016); Wilkins (2017)), there is some evidence that inequality in Australia has risen slightly over the last couple of decades (see Figure 1). Productivity Commission (2018), in their survey of the evidence, concludes that inequality has risen slightly in Australia in the last three decades. However this increase is against a backdrop of declining global income inequality and much larger within-country inequality increases in other countries such as the United States.

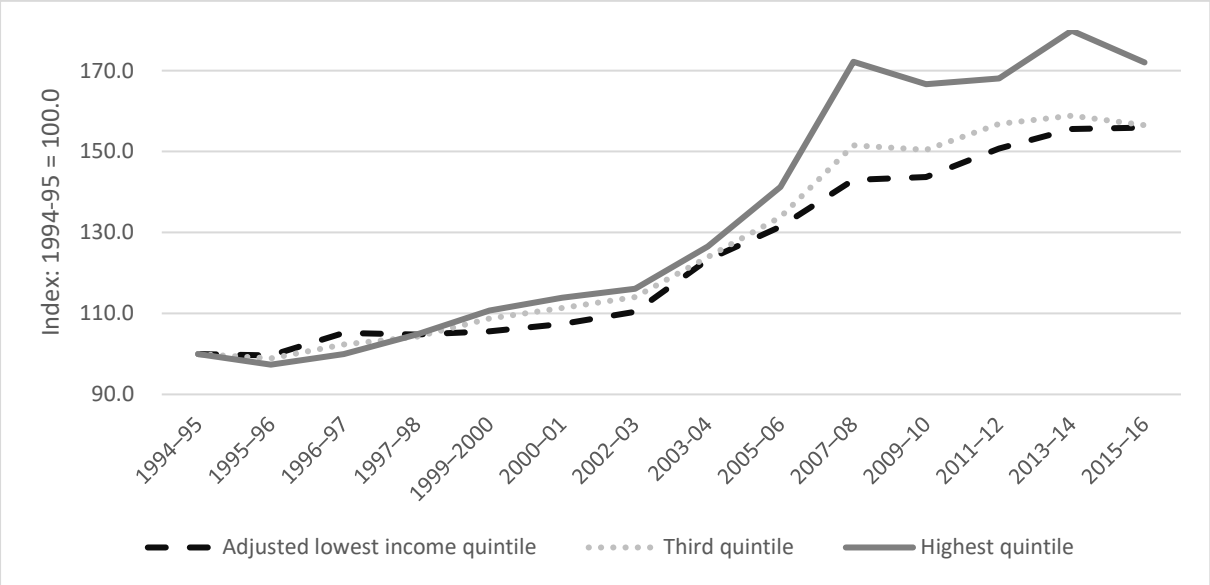
[2] The difference in the conclusions of Kaplan & Schulhofer-Wohl from those of Romalis & Broda are not necessarily contradictory. The results reflect the different approaches employed.

[3] Non-durable products have short life cycles (e.g. fresh fruit and vegetables); Durable products have longer life cycles and are purchased infrequently. E.g. motor vehicles

An often utilised measure of inequality in Australia is the change in *real* household income over time.[4] Real income is defined as the income received by a household after the effects of inflation have been taken into account. For example, if a household receives a 3 per cent increase in (nominal) income and the inflation rate is 2 per cent, then the *real* increase in income is 1 per cent. The real increase of 1 per cent represents the increase in the household's purchasing power.

Australian data for real incomes by households grouped by income show "between 1994–95 and 2015–16, the mean income of low income households increased by $151 per week in real terms to reach $421 per week in 2015–16. Middle income households increased by $309 per week over the same time period to reach $856 per week in 2015-16. In comparison, high income households increased by $841 per week to reach $2,009 per week" (ABS, 2017a). These statistics show that high income households have fared better than low income households over the period, and by consequence, according to this measure, income inequality has increased slightly in Australia.

Figure 1 – Index of Real Mean Weekly Income, by income group, 1994-95 to 2015-16



Source: *Household Income and Wealth, Australia, 2015-16*, ABS Cat.no. 6523.0

The measures of real income presented in Figure 1 are calculated by deflating nominal income using price change as measured by the ABS CPI. This method assumes that households with different incomes experience the same rate of inflation over time. However, by producing inflation measures by household income group separately, we can assess whether the burden of inflation falls disproportionately on households at particular income levels, and examine whether the official measures of real income can be improved. That is the task we undertake in this paper.

The second policy domain that may benefit from a better understanding of the burden of inflation on households grouped by income is the *indexation* of government payments to households. The ABS CPI is used to index or adjust a wide range of government payments to households to compensate

[4] Inequality is a complex topic and can be measured and considered from many perspectives including consumption, wealth, and opportunity (Corak, 2013; Atkinson, 2015). Here we only consider income inequality.

recipients for the changes in the prices of goods and services they purchase (DSS, 2018). If the ABS CPI measure of inflation is different to the inflation experienced by households who receive government payments it may be argued that the ABS CPI is a blunt indexation instrument that over- or under-compensates recipients for the products they purchase.

When the inflation faced by households who receive government payments is lower than the ABS CPI and their benefits are indexed by the ABS CPI, it can be argued that these households have been over compensated. That is, their purchasing power will increase by the difference between the ABS CPI and their inflation experience. Conversely, it may be argued that households where their inflation experience is higher than the ABS CPI have been under-compensated. It seems reasonable for the recipients of government benefits to have their payments indexed to reflect their inflation experience, not the inflation experienced by the household sector as a whole.

3. DATA SOURCES AND METHODS

3.1 Data sources

Three pieces of information are needed to study the relationship between household income and inflation. They are: (i) household income; (ii) household expenditure patterns; and (ii) the prices of goods and services purchased by households. For the first two items, we use data from the ABS Survey of Income and Housing (SIH) and the ABS Household Expenditure Survey (HES). We use summary data provided by the ABS calculated from the unit record file for the household income and household expenditure patterns data. We convert expenditure categories on goods and services in the HES to goods and service categories as priced in the CPI using an ABS-provided concordance. We then use CPI prices to examine the inflation experiences of households in different quintiles of the income distribution.

Our study covers the period from September quarter 2011 to September quarter 2018. This period has been selected because it provides a consistent data series over a reasonably long time period. The ABS CPI is subject to periodic review. Methods and data sources, along with the ABS CPI classification, typically change after a review. The most recent ABS CPI review occurred in 2011 with changes to methods, data sources and the classification implemented in September quarter 2011. The ABS CPI has not been subject to a major review since that time which allows us to construct comparable measures of inflation for the 8 years that we consider.[5]

We use published expenditure estimates for equivalised disposable household income quintiles at the detailed expenditure category level in ABS publication *Household Expenditure Survey, Australia: Summary of Results*[6]. Equivalised income is calculated by the ABS from the SIH using the OECD-modified equivalence scale of Hagenaars and Zaidi (1994) which assigns weight one to the first individual in the household, 0.5 to each additional adult and 0.3 to each additional child. The detailed

[5] Of note, the ABS CPI is subject to an ongoing program of enhancements to ensure it continues to reflect household inflations experiences. These ongoing enhancements include: continual review of products being priced, including high technology products; inclusion of new outlets that enter the retail market; and improvements to data sources – such as web-scraping and transactions data. See ABS (2018a).

[6] ABS Cat.no. 6530.0

expenditure category level is the 10-digit level of the Household Expenditure Classification (HEC). There are 709 detailed expenditure categories in the HEC in 2015-2016.

For our study, we re-classify these detailed estimates by household income group to the 87 ABS Consumer Price Index Commodity Classification (CPICC) to enable inflation measures to be compiled for each household income group that are comparable to the ABS CPI classification structure. Re-classification of the detailed household expenditure survey data is achieved by utilising the published HEC/CPICC concordance developed by the ABS (ABS, 2011b; ABS, 2018b).[7]

While almost all of the *CPI Expenditure Group* data by household income group were compiled by simply mapping HEC data to the CPICC using the concordance, two categories needed further attention.

The first of these categories, *Housing* expenditure, the highest proportion of expenditure by households in the ABS CPI. A key component of this expenditure group is *new dwellings purchased by owner-occupiers*. For the ABS CPI, new dwelling purchases by owner-occupiers include new homes (excluding land) and major improvements. In the CPI, it is calculated by multiplying the average value of private dwelling completions (sourced from the ABS Building Activity publication, ABS cat. no. 8752.0, table 75) by the change in the owner-occupied housing stock used to compile the National Accounts Household Final Consumption estimates (ABS cat.no. 5204.0, table 57). For this study we have produced expenditure for *new dwellings purchased by owner-occupiers* by allocating the total value for *new dwellings purchased by owner occupiers* to each household income group utilising mortgage repayments data from the ABS HES; see footnote 7.

The second category that requires additional attention is *Alcohol and tobacco.* Historically there have been significant differences between ABS HES data and other data sources on *Alcohol and tobacco* due the common problem of under-reporting of such consumption in consumer surveys (ABS, 2017c). We address this by utilising more accurate Household Final Consumption Expenditure data from the National Accounts to produce average household expenditure estimates for Alcohol and tobacco.[8] We generate *Alcohol and tobacco* expenditure for each income group by: (i) mapping ABS HES data to the CPI Alcohol and tobacco expenditure group using the concordance; and (ii) scaling up the Alcohol and tobacco expenditure group (in equal proportions across all income groups) to ensure consistency with publicly available National Accounts data. On average, these numbers will be more accurate than the self-reported data. Our approach assumes that under-reporting is the same magnitude in percentage terms for all income groups. We feel that this is the best approach in this situation in that it makes the weakest possible assumption. It matches the assumption that is made in producing the national statistics. We are unaware of any studies that have looked at this-under-reporting by income quintile.

[7] Merging the HEC categories to the CPICC involves some one-to-one matches but also involves many-to-one and one-to-many matches. The concordance shows which HEC categories match to which CPICC categories, but provides no information about the relative importance of each category in the case of one-to-many and many-to-one matches. Therefore, we also use non-published data from the ABS which provides the weights which need to be applied to each individual category when converting from HEC to CPICC. ABS will provide this data on request.

[8] We compare the HES data with the published expenditure the CPI at the expenditure class level (i.e. separately for wine, beer, spirits and tobacco). HES only records about one half of actual expenditure so we then scale up these expenditure amounts by the following factors, based upon the data: Spirits = 1.92; Wine = 2.09; Beer = 1.90; Tobacco = 1.98

In the Appendix, we show the results if we make no adjustment to alcohol and tobacco. We discuss this further below, but the adjustment has no impact on our overall assessment of the inflation experience of households in different parts of the income distribution.

3.2 ABS Price data

Here, we spell out some key features of the price data which are important in understanding our results and in comparing our paper to other studies.

There are many more products available to consumers than could possibly be priced for the purposes of the ABS CPI so some form of sampling approach is required. Note that an expenditure category (also called expenditure class) would be something like milk. But, within milk there are many products. Products differ by brand, size, variety and packaging. The ABS overcomes this practical problem by *using purposive sampling*[9] procedures, where products that are popular with consumers are selected for inclusion in the CPI basket. The ABS also utilises purposive sampling to select appropriate retail outlets from which to collect product prices.

The result of this sampling approach is a representative *basket* of products for which prices are tracked over time. For the CPI a representative basket of products is achieved by:

> "The goods and services included in the CPI pricing samples are selected carefully to represent the range of types and varieties of goods and services bought by the CPI population group. Selection is made only after obtaining detailed information about the buying habits of the CPI population group, such as which varieties and brands of products are the largest selling types or which packaging sizes are most commonly purchased." (ABS, 2018a, para 7.4)

Historically, price collection for the ABS CPI was undertaken by field visits to stores and phone calls to retail outlets to obtain prices for the products selected in the CPI basket. Over time the use of field collected and telephone collected prices has fallen, with an increased use of prices obtained from web scraping and the use of transactions data[10].

For this paper, the selected products and their prices for each of the household groups are identical to those in the ABS CPI basket[11]. These data are publicly available: the ABS publishes price indexes at the category level from the CPI—that is, for each of the 87 CPICC categories. By utilising CPI price data for all household groups, this study assumes all household income groups purchase the same products and pay the same average price for each broadly defined category of goods and services as the ABS CPI. Differences in inflation experience of households come about because of different expenditure

[9] Purposive sampling is where a 'representative' sample is chosen by an expert in the field of study. This sampling is subject to unknown biases but may be justified for very small samples.

[10] "The ABS is now utilising transactions data as a method of obtaining prices for use in the CPI. Transactions data is high in volume and contains detailed information about individual transactions including: date of purchase, quantities purchased, product descriptions, and value of products purchased. In the case of retail outlets, transactions data are often obtained by 'scanning' the barcodes for individual products at electronic points of sale. The benefits of transactions data are that they reduce collection costs and enhance the accuracy of the CPI by enabling products to be weighted by their economic importance, and increasing the frequency of price observations and the number of products priced." (ABS 2018a).

[11] Unlike the Broda & Romalis (2009) study, where the basket of products used to calculate price change for each household income group is different, this paper utilises a single basket of products (and prices) from the ABS CPI basket for all household income groups. Differences in inflation by income quintile are generated by the different income quintiles consuming different proportions of the 87 different categories but the same basket of goods within expenditure category.

patterns; e.g. all households consume eggs and footwear (and the same product types within those groups), but they consume them in different proportions. Our study does not account for the fact that different consumers might pay different prices for the same good. Nor does it account for the fact that different consumers might consume combinations of products different than those contained in the CPI basket.

3.3 Producing aggregate measures of inflation for each household income group

To produce aggregate measures of inflation for each household equivalised income quintile, we need to combine the expenditure patterns with estimates of price change. We take the expenditure patterns for each household income quintile calculated at the CPICC level; see section 4.1 above. Note that the Household Expenditure Survey is only conducted every six years so we use the 2009-2010 survey as our benchmark for September quarter 2011. We then update the expenditure patterns using CPI price changes from 2009-10 to September quarter 2011. These expenditure patterns underpin the calculation of inflation measures from September quarter 2011 to December quarter 2017. From December quarter 2017, we use the updated spending patterns calculated from the 2015-16 Household Expenditure Survey to calculate the household inflation measures for the period December quarter 2017 until September quarter 2018. In the December quarter 2017 we apply a method known as *chain linking*[12] to incorporate the new household expenditure patterns based on 2015-16 data into the calculation of inflation by households grouped by income. This provides us with one consistent, continuous inflation series for each household income quintile. It follows how the CPI was calculated over this time period and thus provides estimates that are comparable with published national account figures. Figure 2 summarises our approach.

We produce the measures of inflation for each household income group by combining the measures of price change with the household expenditure patterns. These data are combined using the *Lowe index formula.*[13] We are holding quantities constant and allowing prices to change, exactly as is done in the calculation of the CPI. The Lowe index formula is used to produce consumer price inflation measures by Statistics Canada, the U.S. Bureau of Labor Statistics, the ABS and other national statistics offices.

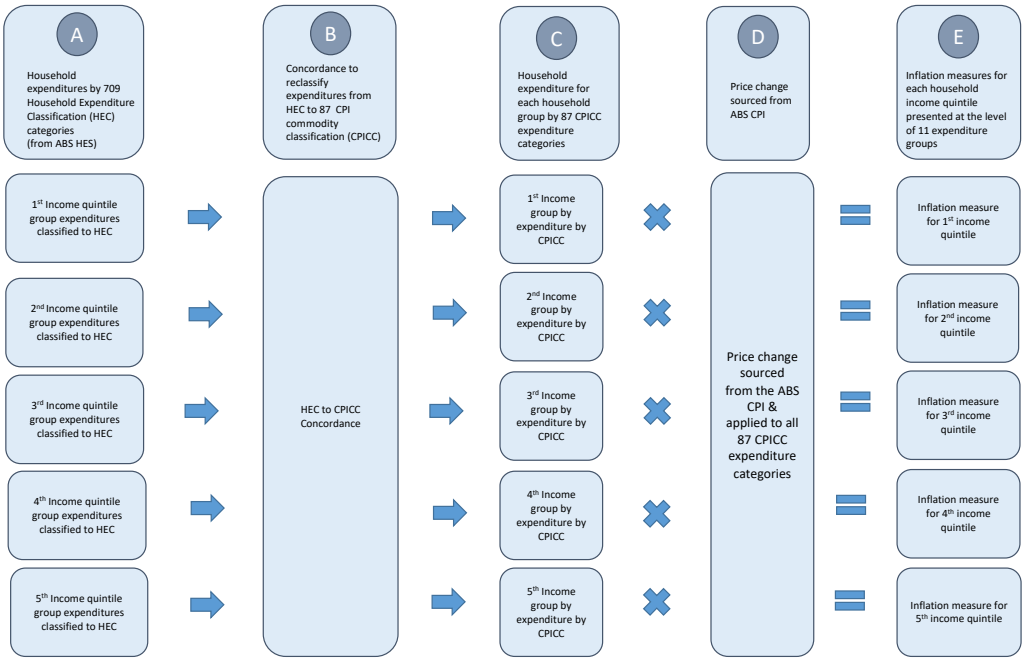
We calculate all of the inflation measures for each of the 87 expenditure classes of the CPICC. These expenditure classes can be grouped into 33 sub-groups and 11 major expenditure groups. We present our results in terms of the 11 major expenditure groups.

Different income elasticities of demand for households at different income levels will result in expenditure patterns that vary among households grouped by income. By consequence, when product prices change, the impact of these changing prices on the purchasing power on households will vary. These variations are the movements that drive our results.

[12] Chain linking is a process where the indexes produced under two different expenditure patterns are combined to produce one continuous index. See chapter 9 of ILO (2004), '*Consumer Price Index Manual: Theory and Practice*' for a detailed description of chain linking, including numerical examples.

[13] See paras 1.17 – 1.20 of ILO (2004), '*Consumer Price Index Manual: Theory and Practice'* for a detailed description of the Lowe index. Chapter 10 of ABS (2018a) contains numerical examples and a detailed description.

Figure 2: Data construction and creation of inflation measures



4. RESULTS

We first present a summary of the data by examining expenditure patterns by household income quintile. Table 1 presents the percentage share of expenditure for each household income quintile and two sets of population estimates. In the second column, we present the share of expenditure used in the CPI calculation. In the last column, we present expenditure shares for all Australian households. Recall that the ABS calculate CPI using only the eight major capital cities; all households covers the entire Australian population. These percentage shares are based upon the 2009-10 ABS Household Expenditure Survey (ABS, 2011a) and aggregated to the *CPI Expenditure Group* level of the CPICC. Table 2 presents the same information calculated based upon the 2015-16 ABS Household Expenditure Survey (ABS, 2017b).

Table 1 – expenditure shares for household groups utilising 2009-10 household expenditure data

2009-10 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	16.84	17.91	17.88	16.49	16.25	15.18	16.30
ALCOHOL AND TOBACCO	7.06	6.88	7.89	8.00	7.38	6.63	7.26
CLOTHING AND FOOTWEAR	3.98	2.65	3.37	3.35	3.56	4.43	3.72
HOUSING	22.30	24.21	22.92	23.46	22.79	19.65	21.99
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	9.10	9.22	9.24	8.38	9.29	10.34	9.47
HEALTH	5.29	6.67	4.67	5.73	4.88	5.08	5.25
TRANSPORT	11.55	10.19	11.67	12.18	12.29	13.49	12.41
COMMUNICATION	3.05	3.96	3.65	3.43	3.12	2.78	3.21
RECREATION AND CULTURE	12.56	10.57	11.10	11.21	12.68	14.27	12.54
EDUCATION	3.18	1.11	1.55	2.38	2.53	3.71	2.64
INSURANCE AND FINANCIAL SERVICES	5.08	6.65	6.06	5.39	5.21	4.44	5.22
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 2 – expenditure shares for household groups utilising 2015-16 household expenditure data

2015-16 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	16.09	17.82	16.75	16.42	16.16	14.15	15.91
ALCOHOL AND TOBACCO	7.09	7.72	7.94	8.49	7.60	6.71	7.48
CLOTHING AND FOOTWEAR	3.55	2.54	2.73	3.16	3.65	3.58	3.25
HOUSING	22.68	27.04	24.41	22.84	22.17	21.09	22.96
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	9.39	8.55	8.75	8.99	9.00	10.11	9.27
HEALTH	5.43	5.75	6.42	5.03	5.24	5.39	5.51
TRANSPORT	10.32	9.59	9.49	10.98	11.65	12.25	11.16
COMMUNICATION	2.68	3.47	3.21	2.99	2.84	2.32	2.85
RECREATION AND CULTURE	12.71	9.31	10.74	12.07	13.29	15.75	13.01
EDUCATION	4.27	2.54	3.02	2.89	2.53	4.06	3.16
INSURANCE AND FINANCIAL SERVICES	5.80	5.68	6.53	6.14	5.87	4.58	5.42
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

The expenditure shares by household groups presented in Tables 1 and 2 align with expectations. Low income households spend the largest proportion of their income on food and shelter. For the lowest income quintile, these two categories represent almost 45 per cent of all household expenditure in 2015-16. Low income households also spend significantly more in relative terms on *tobacco* (4.36 per cent of total expenditure) when compared to other household groups. Expenditure on tobacco decreases monotonically with income: the expenditure share is 3.68 for the second quintile and then drops to 3.47, 2.53 and 1.35 for the top three quintiles. The lowest income households also spend more on *Automotive Fuel*[14] (4.03 per cent of total expenditure) compared to other household groups.

High income households (the 5th Income quintile) spend significantly more in relative terms on *Recreation and culture*, primarily due to spending on *Holiday travel and accommodation* (7.55 per cent of total expenditure) when compared to other household groups and on the purchase of new *motor vehicles*[15] (4.46 per cent of total expenditure) when compared to other household groups (2.07 per cent for the 1st Income quintile; 2.26 per cent for the 2nd Income quintile; 3.06 per cent for the 3rd Income quintile; 3.06 per cent for the 4th Income quintile).

Overall, the three middle income quintiles have expenditure patterns that are similar to the ABS CPI.

Inflation measures for households grouped by income

Figure 3 presents the calculated inflation measures (price indexes) for the household income groups; the ABS CPI; and the total of all households for the period September quarter 2011 to September

[14] *Automotive fuel* is a sub-category of the *Transport* group.

[15] *Holiday travel and* accommodation is a sub-category of *Recreation and Culture; new motor vehicles* is a sub-category of the *Transport* group.

quarter 2018. Table 3 presents the percentage change for the household income groups; the ABS CPI; and a total of all households for the period September quarter 2011 to September quarter 2018.[16]

Table 3 – percentage change, September quarter 2011 to September quarter 2018

Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	4.5	2.5	3.1	4.1	4.5	5.2	4.2
ALCOHOL AND TOBACCO	47.7	63.8	58.6	52.7	47.4	33.5	47.3
CLOTHING AND FOOTWEAR	-6.5	-6.6	-6.2	-6.5	-6.4	-6.6	-6.5
HOUSING	22.3	23.3	22.7	21.8	22.5	22.8	22.6
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	2.9	0.4	0.3	1.0	3.9	5.3	3.2
HEALTH	36.4	33.8	31.0	28.8	36.8	37.9	34.5
TRANSPORT	7.2	10.5	8.5	7.3	7.1	7.4	7.9
COMMUNICATION	-16.3	-16.1	-16.1	-16.6	-16.8	-16.3	-16.4
RECREATION AND CULTURE	4.8	4.9	4.2	5.5	5.6	7.7	6.2
EDUCATION	36.3	35.1	36.7	36.8	36.7	37.4	37.0
INSURANCE AND FINANCIAL SERVICES	15.4	14.8	14.5	14.6	14.7	14.9	14.7
ALL GROUPS	**13.7**	**14.8**	**13.7**	**13.9**	**13.9**	**13.3**	**13.8**

Over the period September quarter 2011 to September quarter 2018, the 1st (lowest) income household group experienced the largest inflation rate (+14.8 per cent), while the 2nd Income quintile (+13.7 per cent), 3rd Income quintile (+13.9 per cent), 4th Income quintile (+13.9 per cent) and All Households (+13.8 per cent) recorded inflation rates similar to the ABS CPI (+13.7 per cent). The 5th (highest) Income quintile recorded the lowest inflation rate (+13.3 per cent).

In the Appendix, we re-calculate Tables 1 through 3 using the reported alcohol and tobacco expenditure without any adjustment. In Appendix Tables A1 and A2, we see very large under-reporting of alcohol and tobacco relative to the adjusted series presented in Tables 1 and 2. However, when we compare Table A3 to Table 3, the percentage changes in expenditure groups are nearly identical whether we use the adjusted or unadjusted data. Based upon these results, we continue the rest of the analysis using our preferred series which adjusts for the under-reporting of alcohol and tobacco.

Figure 4 presents the calculated inflation measures (indexes) for the household income groups, the ABS CPI, and a total of all households for each of the *Expenditure Groups* for the period September quarter 2011 to September quarter 2018. Analysis of these results provides insights into the causes of inflation variability across household income groups.

[16] Note that expenditure increases can be different for income quintiles at the level of these highly aggregated expenditure categories even when they have roughly similar fractions of expenditure. This is due to the fact that we do the calculations at the level of the 87 expenditure categories of the CPICC, as described above, and the share of expenditure can differ within the 11 aggregates presented in Table 3. So, for example, the alcohol and tobacco weights for the 1st income quintile is comprised of 3.36% alcohol (broken down by Spirits (0.63%), Wine (1.02%), Beer (1.71%)) and tobacco 4.36%. This is compared to the weight for 2nd income quintile which is comprised of 4.26% alcohol (broken down by Spirits (0.77%), Wine (1.36%), Beer (1.13%)) and tobacco 3.68%. These different weights will result in different inflation measures for each income quintile.

Figure 3 – Household income groups, price indexes, September quarter 2011 to September quarter 2018

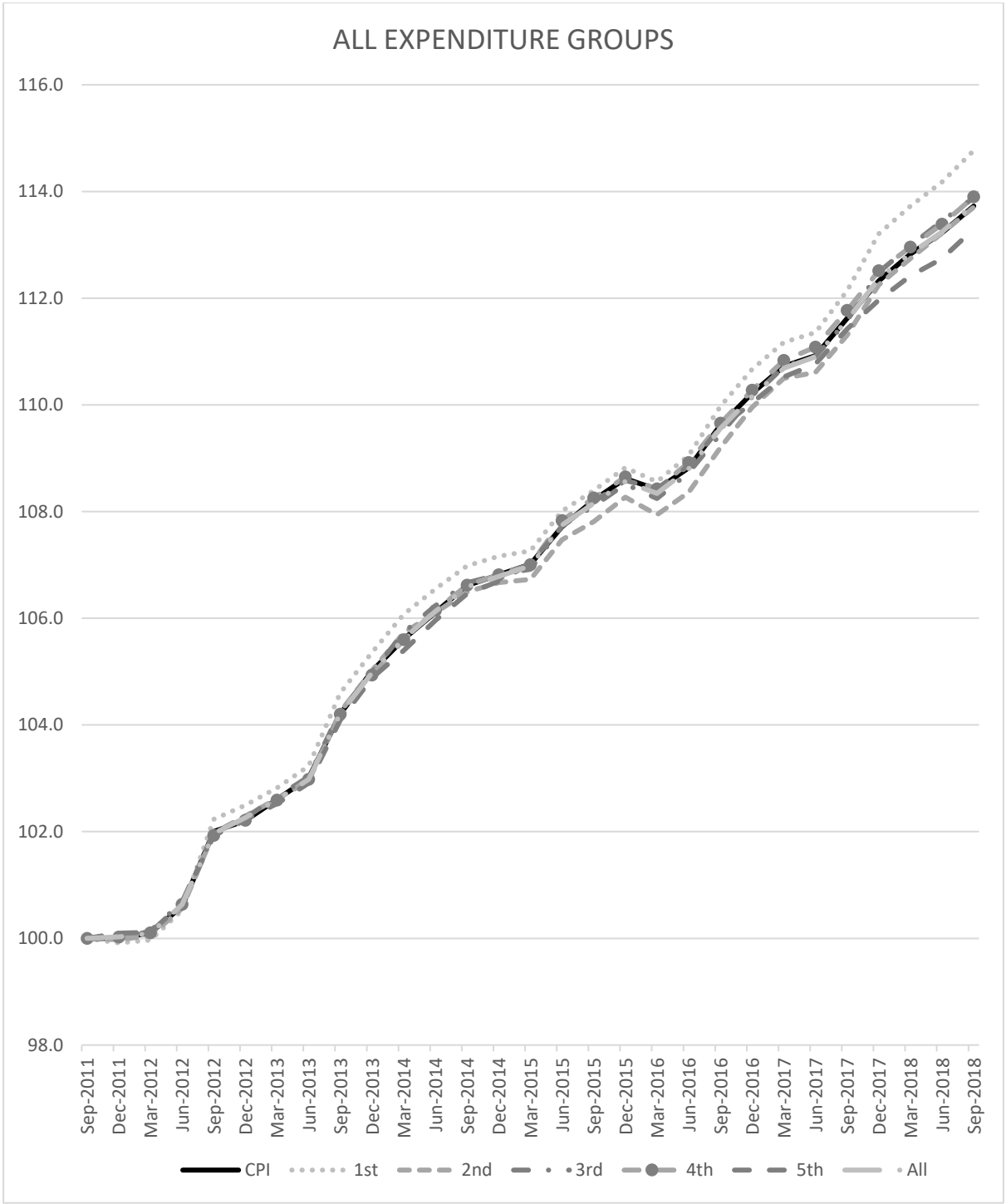
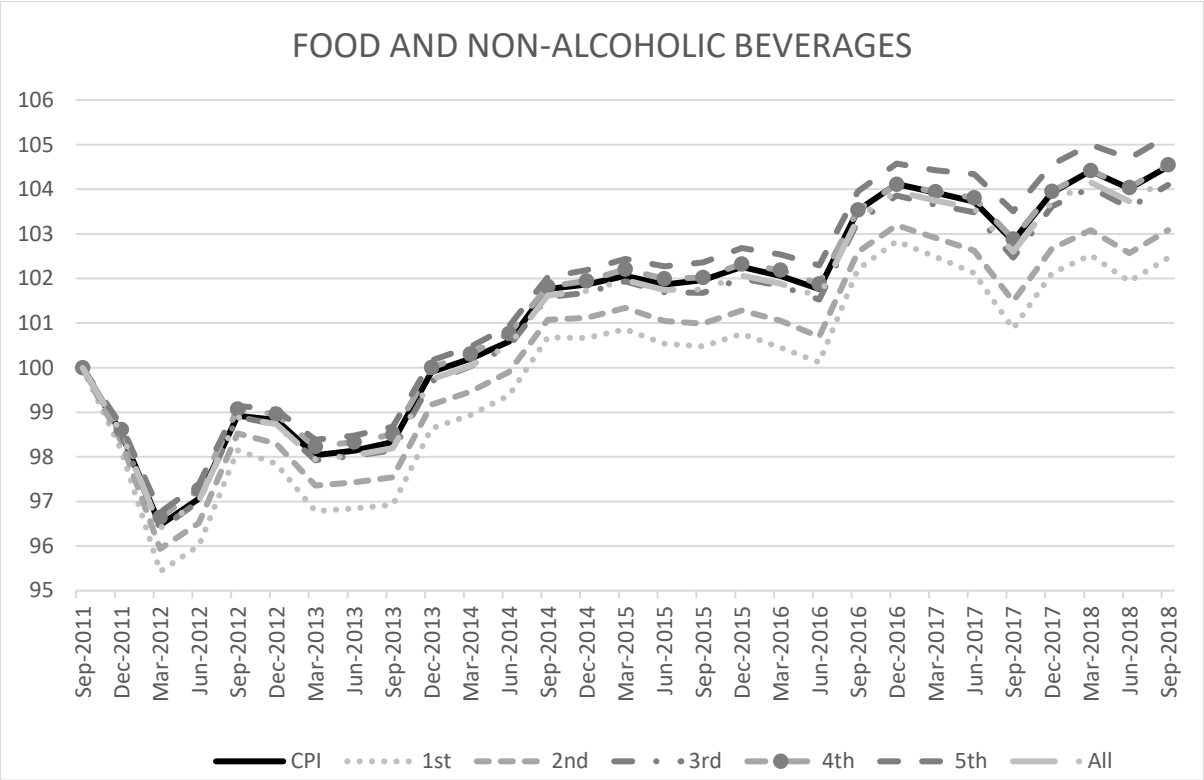
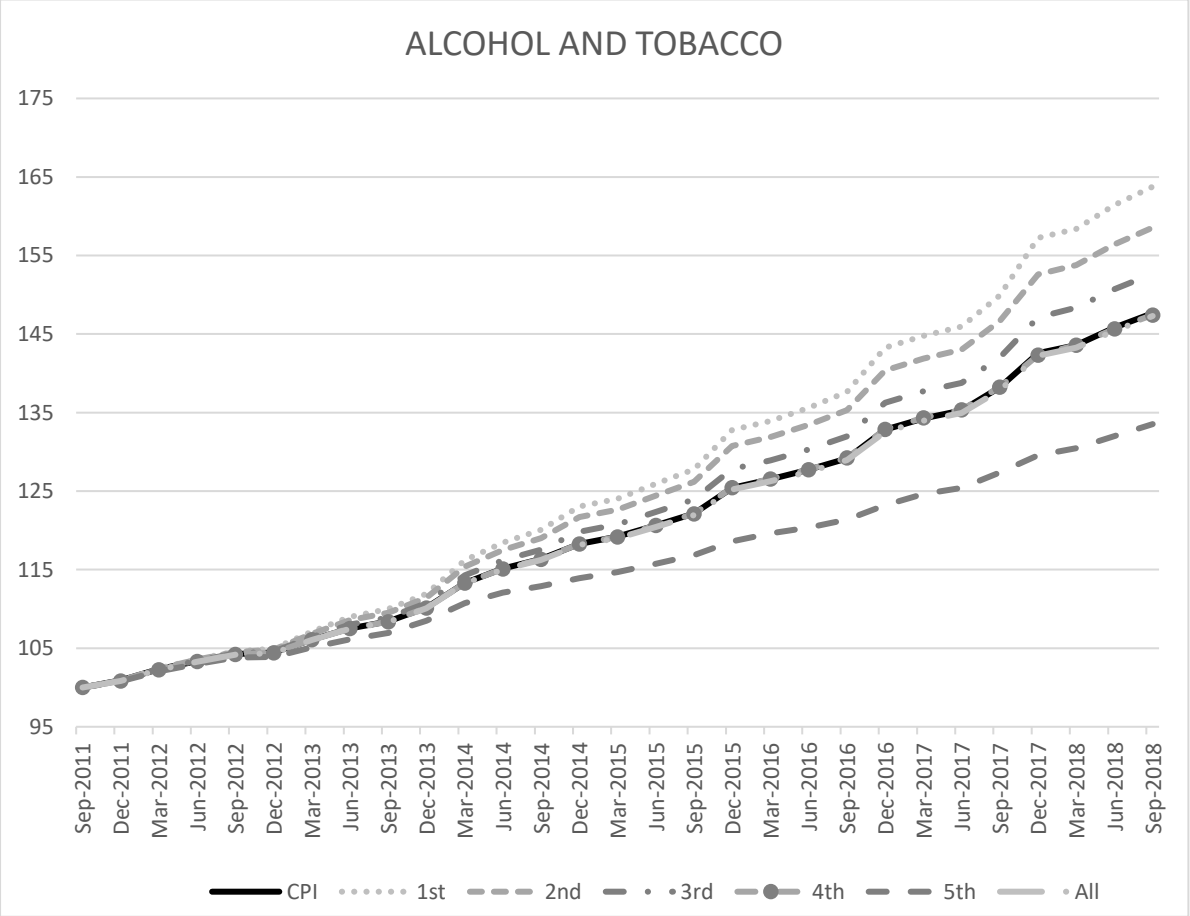


Figure 4 – Expenditure Groups by household income, price indexes, September quarter 2011 to September quarter 2018






CLOTHING AND FOOTWEAR
101
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95
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93
92
Sep-2011
Dec-2011
Mar-2012
Jun-2012
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Dec-2012
Mar-2013
Jun-2013
Sep-2013
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Mar-2014
Jun-2014
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CPI
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4th
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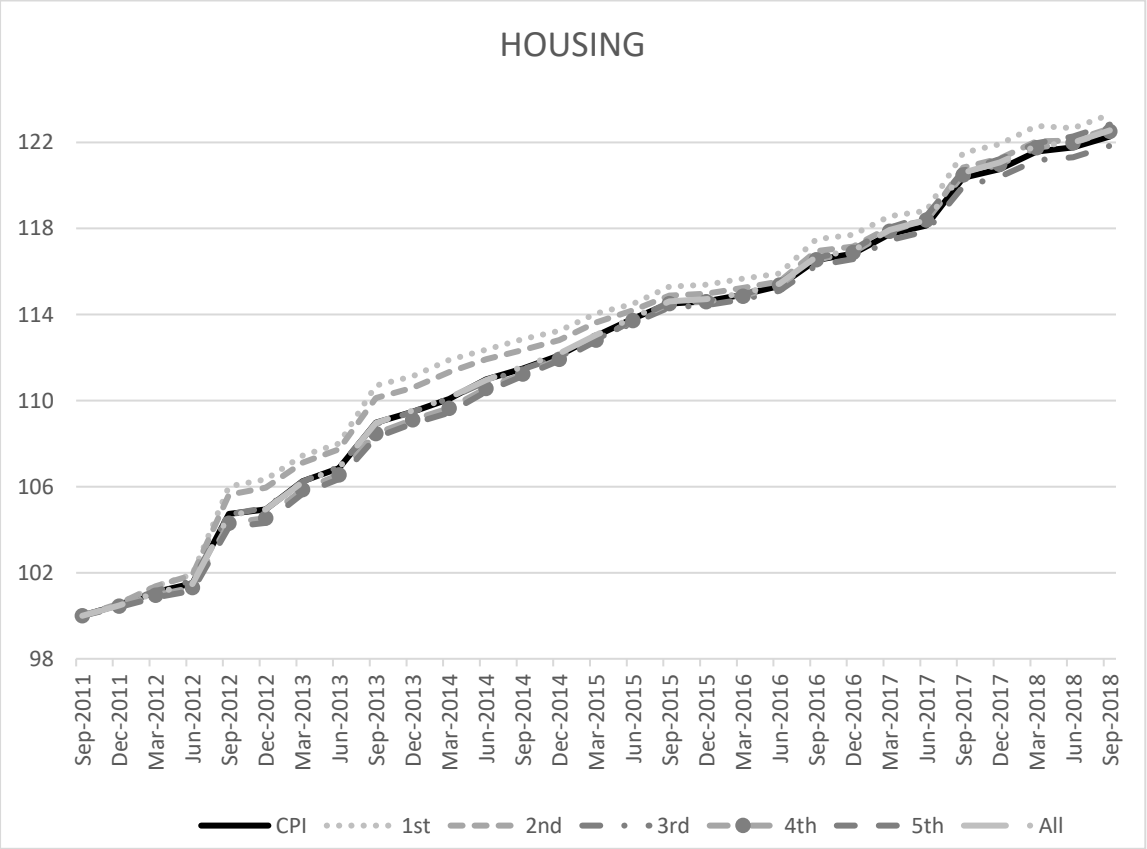
HOUSING
122
118
114
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102
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Sep-2011
Dec-2011
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Sep-2013
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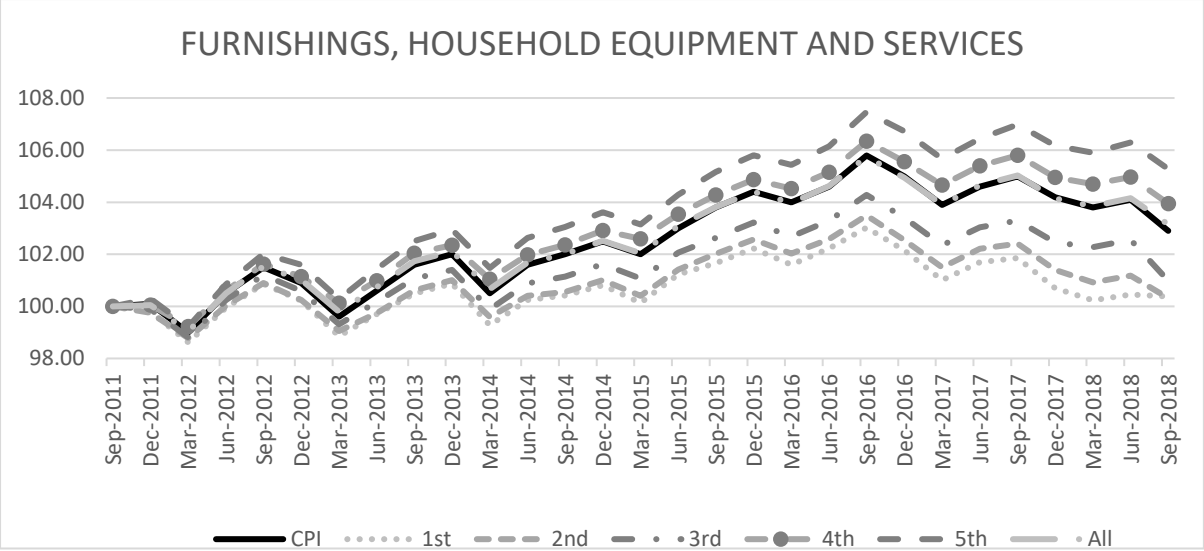
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES
108.00
106.00
104.00
102.00
100.00
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Sep-2011
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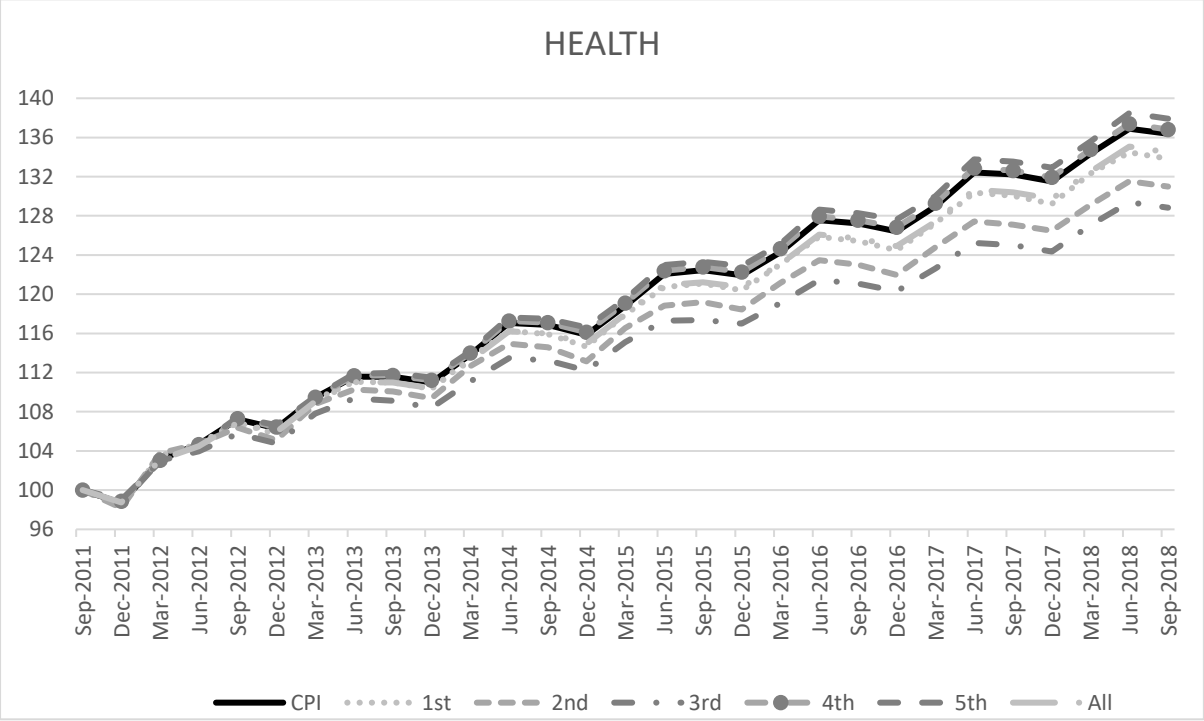
HEALTH
140
136
132
128
124
120
116
112
108
104
100
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Sep-2011
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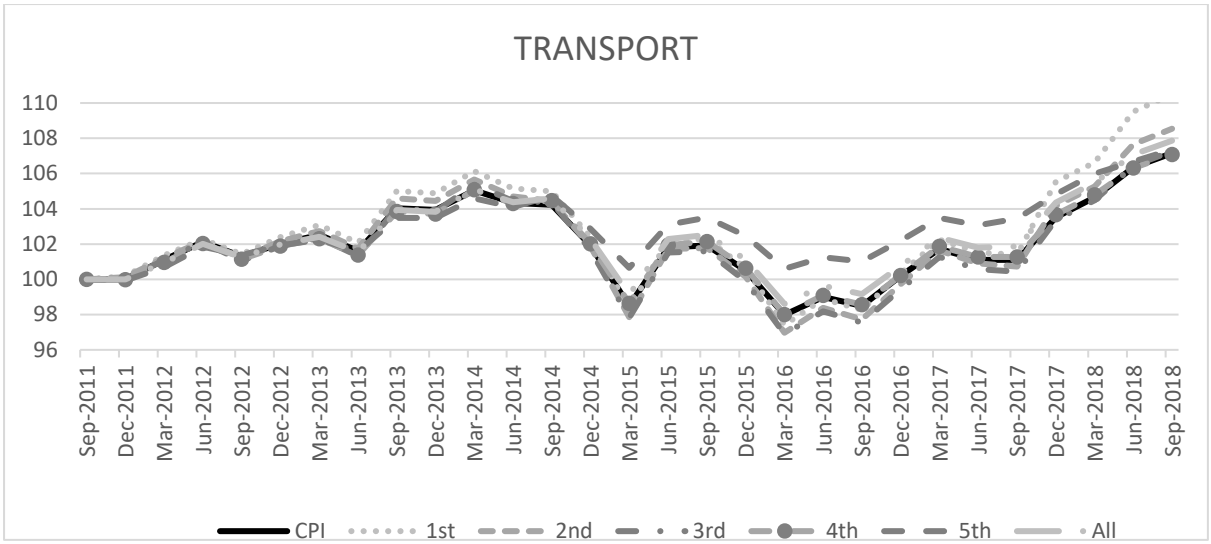
TRANSPORT
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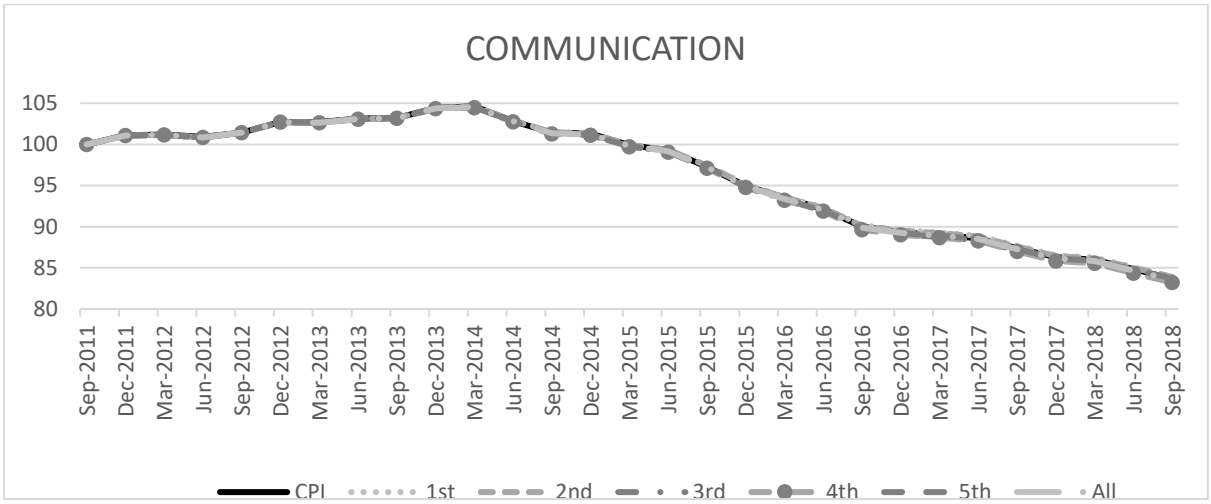
COMMUNICATION
105
100
95
90
85
80
Sep-2011
Dec-2011
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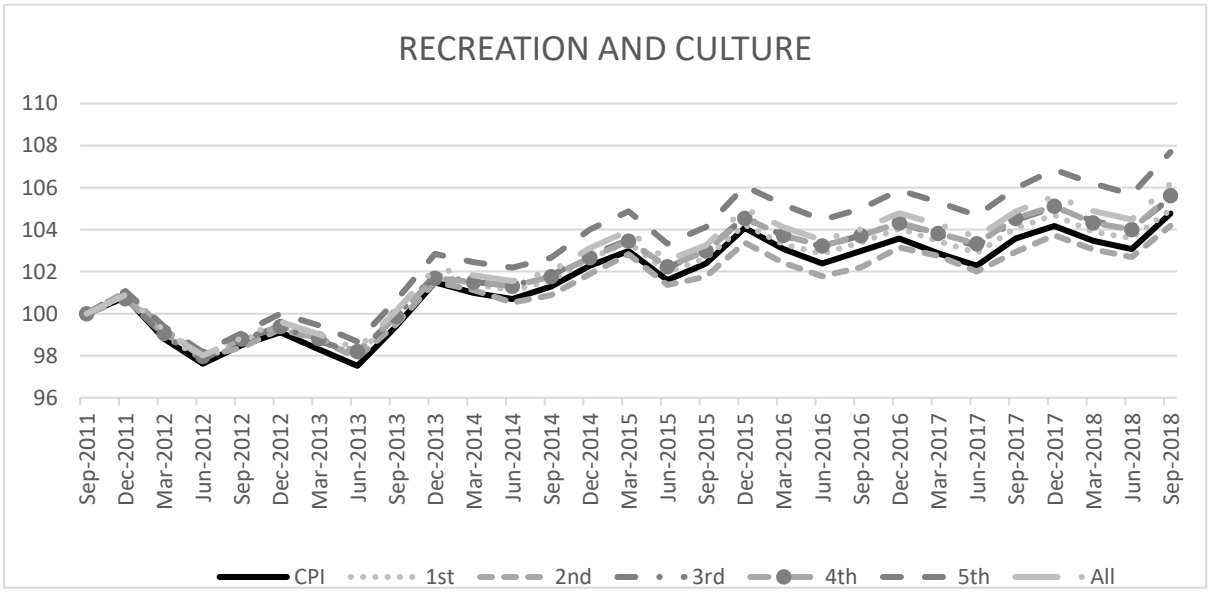
RECREATION AND CULTURE
110
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Sep-2011
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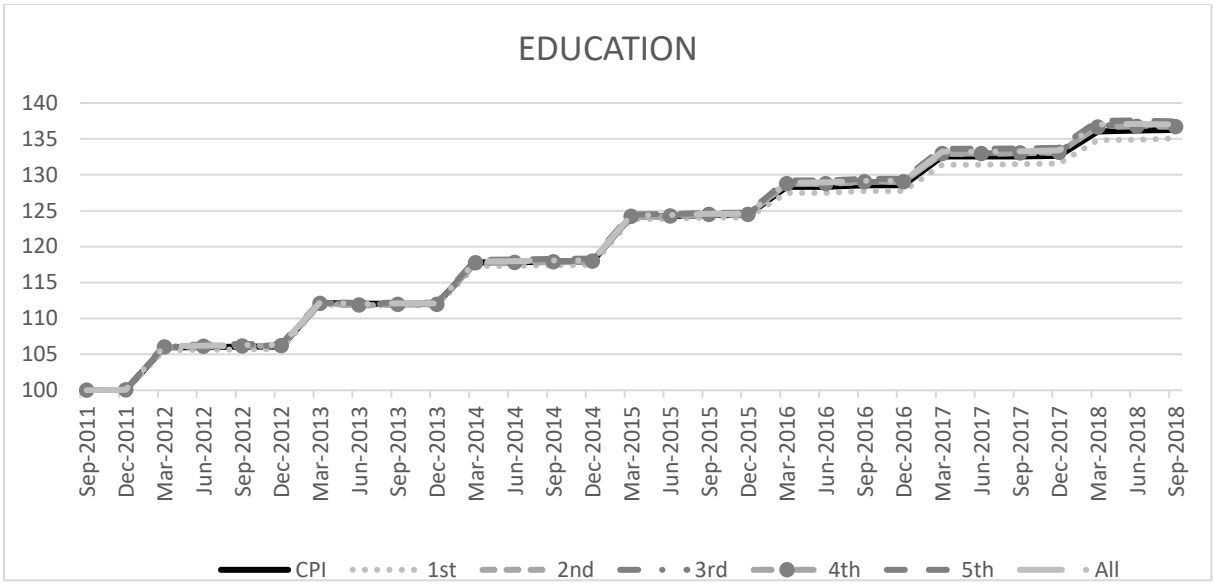
EDUCATION
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125
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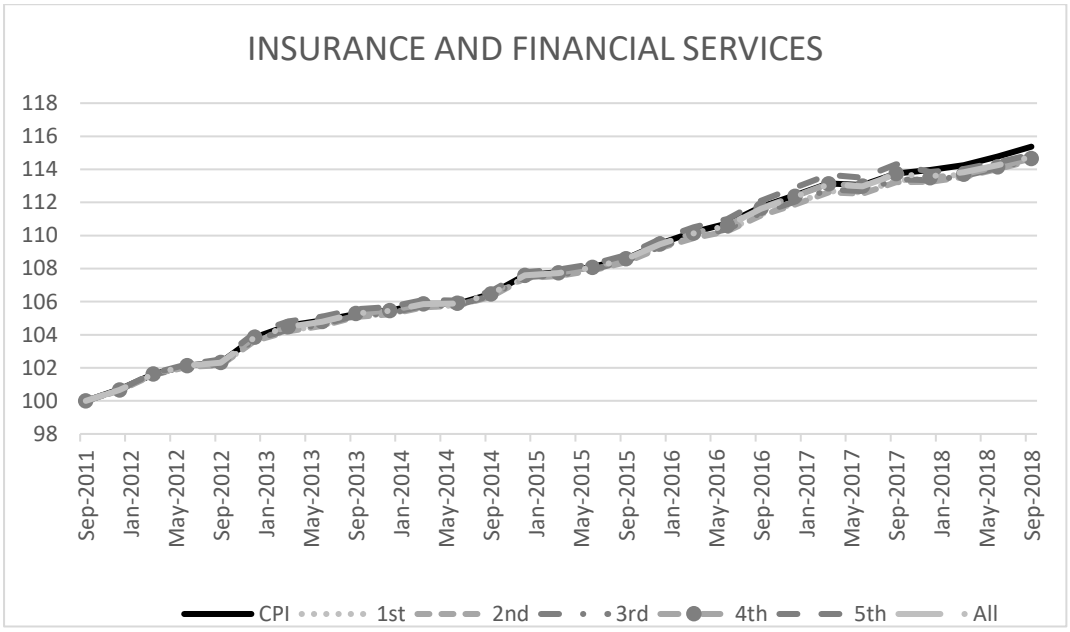
INSURANCE AND FINANCIAL SERVICES
118
116
114
112
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108
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104
102
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Sep-2011
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Jan-2013
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Sep-2018
CPI
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3rd
4th
5th
All

Three *Expenditure groups* in Figure 4 recorded similar inflation rates across the household income groups. These expenditure groups are: *Clothing and footwear*; *Communication*; and *Insurance and Financial Services*.

The lowest household income group experienced the highest inflation rate relative to other household income groups primarily due to price increases for products in the *Alcohol and tobacco, Housing* and *Transport* expenditure groups. The relatively large expenditure on *tobacco* by low income households coupled with consistent and large tobacco price increases (caused by tobacco taxes—see footnote 1) resulted in this expenditure group being a key contributor to overall inflation for the low income household group. The significant rise in *electricity* prices, a sub-category of the Housing group, also had a large impact on the inflation experience of the lowest income household group. Electricity prices rose significantly in September quarter 2012 (+15 per cent). Electricity prices also rose significantly in September quarter 2013 (+10.5 per cent), in September quarter 2016 (+5.3 per cent) and in September quarter 2017 (+8.9 per cent). Automotive fuel, a sub-category of the transport group, also contributed to the inflation experience of low income households. In December quarter 2017 the updated expenditure patterns significantly increased the weight of *automotive fuel* for low income households, and prices simultaneously rose by about 10 per cent.

However, the lowest income household group experienced smaller increases in weighted prices relative to other household income groups for *Food and non-alcoholic beverages; Furnishings, Household equipment and services;* and *Recreation and culture*. The *Supermarket price war* (Knight, 2017) in Australia over recent years has resulted is price falls for staple items such as bread (-2.4 per cent), milk (-3.0 per cent) and cheese (-1.2 per cent) for the period September quarter 2011 to September quarter 2018. Staples make up a relatively large proportion of low income household's expenditure. These items can be found in the *Food and non-alcoholic beverages* expenditure group. For *Furnishings, Household equipment and services,* the most significant price rise related to Child care (+45.3 per cent) for the period of this study. The lowest income household group experienced smaller increases in weighted prices for this expenditure group because low income household spend significantly (proportionately) less on Child care services compared to high income households. For *Recreation and culture*, again, the lowest income household group experienced smaller increases in weighted prices for this expenditure group because low income household spend significantly (proportionately) less on holidays compared to high income households.

The burden of inflation relating to the *Health* expenditure group impacted the first (+33.8 per cent), the fourth (+36.8 per cent) and the fifth (+37.9 per cent) quintile household income groups most significantly. The second quintile household income group (+31.0 per cent) and third income group (+28.8 per cent) recorded lower inflation rates for this expenditure group. Higher income households are most affected by price increases in private health insurance premiums, while the relatively high expenditure on *Health* by lower income households relates to the characteristics of this household income group. "Low income households are most likely to rely on government pensions and allowances as their main source of income" (ABS, 2017a). Age pensioners are one example of this the type of household within this income group. It's reasonable to expect *Age pensioners* to have relatively higher expenditure on medical items like pharmaceuticals, and medical and dental services than higher income groups.

The lowest level of inflation relating to the *Education* expenditure group was recorded by the first quintile household income group (+35.1 per cent) for the period September quarter 2011 to September quarter 2018. The remaining household groups all experienced Education inflation in the range 36.3 per cent to 37.4 per cent over the same period. Due to the characteristics of low income households, including Age pensioners, these households spend proportionately less on primary, secondary and tertiary education. These households also tend to use public education systems (which has prices close to zero for primary and secondary education) when education services are used.

Middle income groups (i.e. the second, third and fourth income quintiles) experienced similar inflation rates over the period; and similar to the ABS CPI. While differences in inflation were experienced across the expenditure groups by household (e.g., Recreation and culture, and Health), these differences offset to produce similar aggregate measures of inflation.

Persistence of inflation by household

While we know from the analysis above that the lowest income households experienced the highest inflation rate over the entire period of study (from September quarter 2011 to September quarter 2018), we are also interested in whether households that experience the highest inflation rate in one year also experience higher inflation rates in the next year as well.

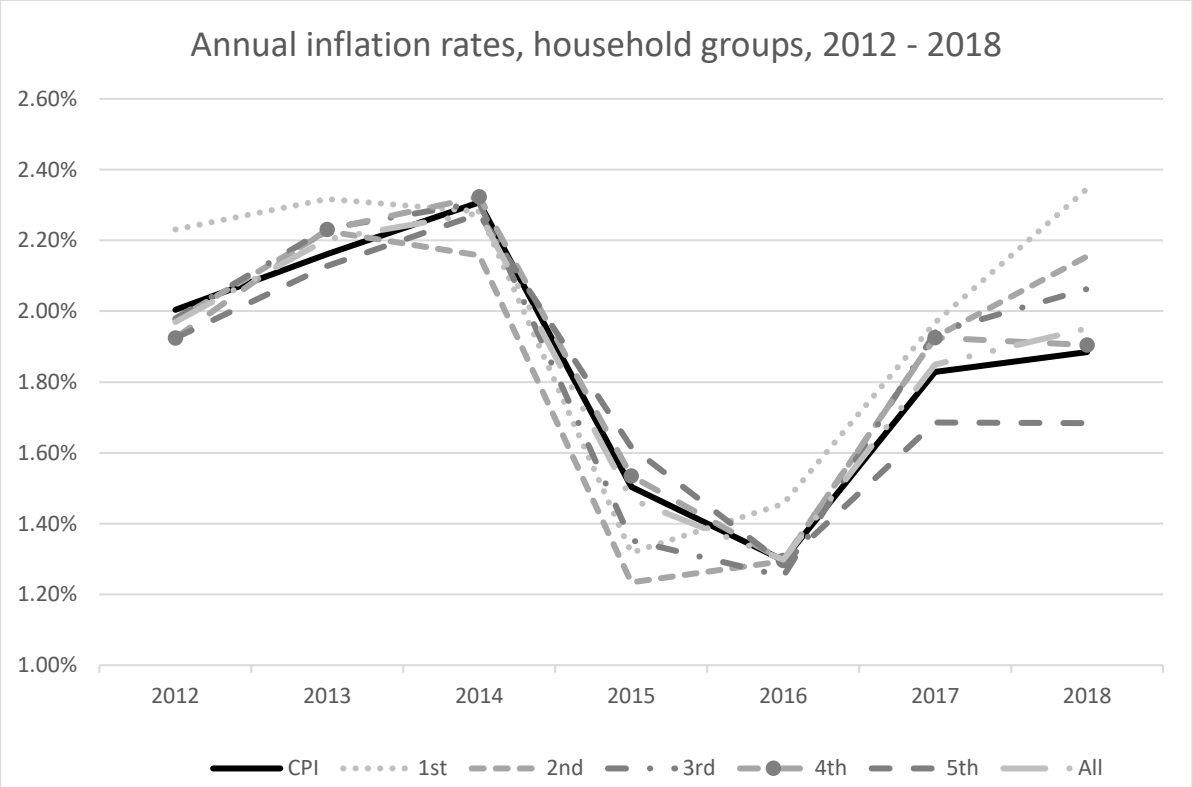
Household inflation persistence analysis is not new in the literature. Hobijn & Lagakos (2003), Chiru (2005) and Mehrhoff & Breuer (2010) have all examined this topic. Interestingly, results presented in the literature are mixed. Hobijn & Lagakos (2003) and Chiru (2005) find that individual households that are confronted with high inflation in one year *do not* generally face high inflation in the subsequent year as well; while Mehrhoff & Breuer (2010) find that households that experience the highest inflation rate in one year also generally experience higher inflation rates in the next year. We also find inflation persistence, akin to the last study.

Table 4 presents the annual inflation rates for each of the households grouped by income, as well as for *All households* and the *CPI*. The annual inflation rate for each household group is calculated as the price index from the September quarter in year *t*, divided by the price index from the September quarter in year *t-1.*

Table 4 –Annual inflation rates for each household group, 2012 to 2018

Year	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
2012	2.00	2.23	1.98	1.98	1.92	1.92	1.97
2013	2.16	2.32	2.23	2.23	2.23	2.13	2.20
2014	2.31	2.28	2.16	2.31	2.32	2.27	2.28
2015	1.50	1.32	1.23	1.35	1.53	1.62	1.47
2019	1.30	1.46	1.29	1.25	1.30	1.29	1.30
2017	1.83	1.97	1.93	1.94	1.93	1.69	1.85
2018	1.89	2.35	2.16	2.07	1.92	1.68	1.95

Figure 5 – Annual inflation rates, households grouped by income, 2012 - 2018



Impact of removing Alcohol and tobacco expenditure from the analysis

Alcohol and tobacco contributed 4.2 percentage points of the total 14.8 Percentage points change for the lowest income households for the period September 2011 to September 2018. The contribution of *Alcohol and tobacco* to the overall inflation experience of the lowest income households leads us to examine how much inflation variability across households grouped by income is due to price changes in Alcohol and tobacco. We begin by re-calculating expenditure shares for household groups utilising the 2009-10 and 2015-16 household expenditure data and present these in Tables 5 and 6.

Table 5 (Compare to Table 1) – Expenditure shares for household groups utilising 2009-10 household expenditure data (excluding Alcohol and Tobacco)

2009-10 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	18.12	19.23	19.41	17.93	17.55	16.25	17.57
ALCOHOL AND TOBACCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CLOTHING AND FOOTWEAR	4.28	2.84	3.66	3.64	3.85	4.75	4.01
HOUSING	23.99	25.99	24.88	25.50	24.61	21.04	23.71
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	9.79	9.90	10.03	9.11	10.03	11.08	10.21
HEALTH	5.69	7.16	5.07	6.22	5.27	5.45	5.66
TRANSPORT	12.43	10.94	12.67	13.23	13.27	14.45	13.38
COMMUNICATION	3.28	4.25	3.96	3.73	3.37	2.97	3.46
RECREATION AND CULTURE	13.52	11.35	12.05	12.19	13.69	15.28	13.52
EDUCATION	3.43	1.19	1.69	2.59	2.73	3.97	2.85
INSURANCE AND FINANCIAL SERVICES	5.47	7.14	6.58	5.86	5.63	4.75	5.63
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 6 (Compare to Table 2) Expenditure shares for household groups utilising 2015-16 household expenditure data (excluding alcohol and Tobacco)

2015-16 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	17.32	19.31	18.20	17.95	17.49	15.16	17.20
ALCOHOL AND TOBACCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CLOTHING AND FOOTWEAR	3.82	2.75	2.97	3.45	3.95	3.84	3.51
HOUSING	24.41	29.30	26.51	24.96	23.99	22.61	24.82
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	10.10	9.27	9.51	9.82	9.74	10.84	10.02
HEALTH	5.84	6.23	6.97	5.50	5.67	5.78	5.96
TRANSPORT	11.11	10.39	10.31	12.00	12.61	13.13	12.06
COMMUNICATION	2.88	3.76	3.49	3.27	3.07	2.48	3.08
RECREATION AND CULTURE	13.68	10.09	11.67	13.19	14.38	16.88	14.07
EDUCATION	4.59	2.75	3.28	3.15	2.73	4.35	3.42
INSURANCE AND FINANCIAL SERVICES	6.25	6.15	7.10	6.70	6.36	4.91	5.86
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

We then reproduce table 3—the inflation experience by income quintile—without alcohol and tobacco. These new inflation results are presented in Table 7.

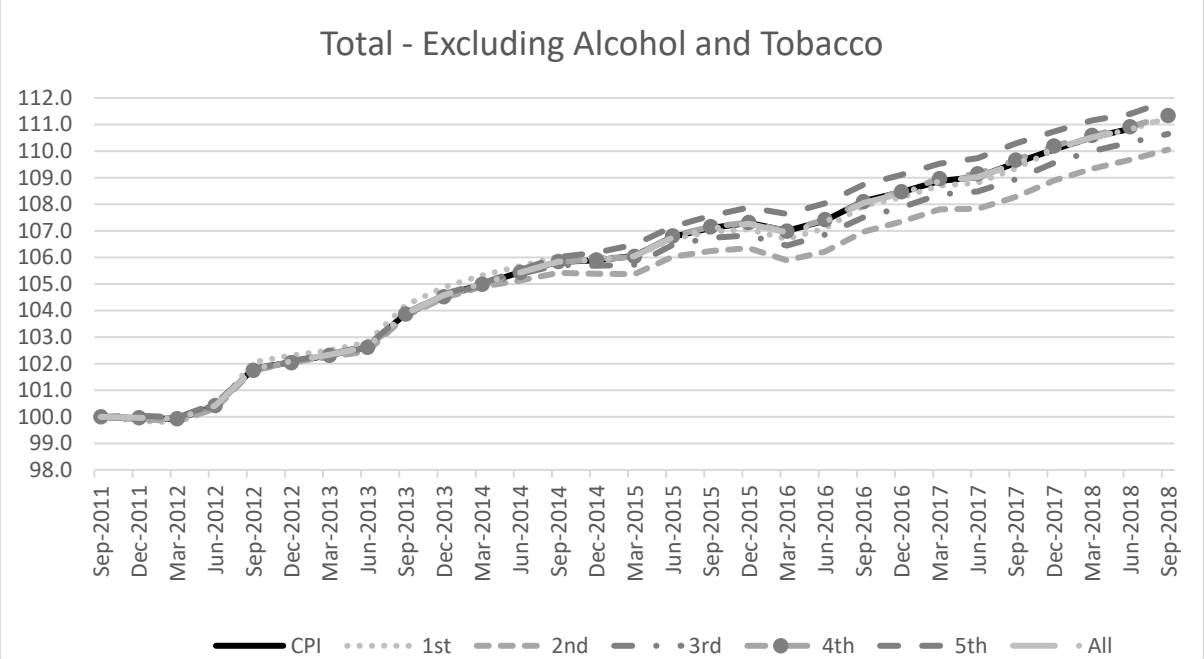
Table 7 (Compare to Table 3) – percentage change, September quarter 2011 to September quarter 2018 (excluding Alcohol and Tobacco)

Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	4.5	2.5	3.1	4.1	4.5	5.2	4.2
ALCOHOL AND TOBACCO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CLOTHING AND FOOTWEAR	-6.5	-6.6	-6.2	-6.5	-6.4	-6.6	-6.5
HOUSING	22.3	23.3	22.7	21.8	22.5	22.8	22.6
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	2.9	0.4	0.3	1.0	3.9	5.3	3.2
HEALTH	36.4	33.8	31.0	28.8	36.8	37.9	34.5
TRANSPORT	7.2	10.5	8.5	7.3	7.1	7.4	7.9
COMMUNICATION	-16.3	-16.1	-16.1	-16.6	-16.8	-16.3	-16.4
RECREATION AND CULTURE	4.8	4.9	4.2	5.5	5.6	7.7	6.2
EDUCATION	36.3	35.1	36.7	36.8	36.7	37.4	37.0
INSURANCE AND FINANCIAL SERVICES	15.4	14.8	14.5	14.6	14.6	14.9	14.8
ALL GROUPS	**11.2**	**11.3**	**10.1**	**10.6**	**11.3**	**11.9**	**11.2**

The impact of removing Alcohol and Tobacco on the results is striking and our previous results are completely overturned. It is now the highest income household group which experiences the highest inflation rate (+11.9 per cent) primarily due to price increases for products in the *Health, Food and non-alcoholic beverages* and *Recreation and culture* expenditure groups. Inflation for low income households is almost identical to that as calculated by the ABS CPI.

We present the results graphically in Figure 6.

<u>Figure 6 (Compare to Figure 3) -</u> Household income groups, price indexes, September quarter 2011 to September quarter 2018 (excluding Alcohol and Tobacco)



Comparison to other studies

The results of our study provide an interesting comparison to similar international studies. The study presented in this paper shows that low income household groups experience the highest inflation rates. This is in contrast to Chiru (2005) who found periods when higher-income households experienced higher rates of inflation, while in other periods lower-income households experienced higher rates of inflation; Hobijn & Lagakos (2005) who found lower income households generally experienced higher rates of inflation but this experience did not necessarily persist from year to year; Broda & Romalis (2009) who found lower income households experienced lower inflation relative to higher income households; and Mehrhoff and Breuer (2010) who found some variation between income groups, however the general inflation trend to be almost the same, irrespective of the household's net income.

More recent studies by Kaplan & Schulhofer-Wohl (2017) of US households and Weichenrieder & Gurer (2018) of European households both found lower-income households experience higher inflation than other households during the period of study.

It is acknowledged that the periods of study are not consistent across the literature which is likely to have some impact on the comparability of the results. However, we suggest that what can be inferred from this comparison of international studies is that country-specific empirical work is needed to determine the variability of inflation across household income groups in national contexts.

5. POLICY IMPLICATIONS

Taken at face value, the results of Table 3 suggest that inflation has been higher for the lowest income households. In real terms, inequality has thus increased more than would be apparent if we were to consider incomes deflated by CPI for all households, as is usually done in most inequality studies. Table 3 also suggests that indexing payments to the lowest income households by CPI would under-compensate them for their actual inflation experience.

However, in Table 7, we see that these differences are driven by alcohol and tobacco. The inflation in these items is mostly driven by tax regimes that attempt to discourage the use and abuse of these items. Once we exclude those items, the inflation experience of the bottom quintile is nearly identical to the CPI.

Should lower income households be compensated for their relatively larger preference for alcohol and tobacco? This is not necessarily inconsistent with using prices to affect people's behaviours around alcohol and tobacco. Compensation, through indexation of government support at levels above CPI, could keep growth in household well-being commensurate with wealthier households while prices are still used to alter consumption patterns.

Alternatively, society can take a view that some preferences are better than others and that it does not want to compensate lower income households for having the 'wrong' preferences.

Taxation policy with respect to tobacco, in particular, has been an important tool in Australia's remarkable success in reducing tobacco usage and the harm from tobacco products (Wilkinson, et al., 2019). The public health benefits of these policies have been well-documented.

Increasing indexation to households in the bottom quintile to compensate for higher inflation (equivalent to compensating those households for their alcohol and tobacco preferences) would lead to increased alcohol and tobacco consumption. Estimates of income elasticities for tobacco are around 0.4 (Selvanathan, 2006 and Clements, Lan & Zhao, 2010). Income elasticities for alcohol are around unity (Selvanathan & Selvanathan, 2005; Selvanathan, 2006 and Clements, Lan & Zhao, 2010).

This raises a couple of interesting policy questions which are not often highlighted. First, to what degree does society want to achieve public health benefits by suppressing incomes as opposed to altering relative prices in a way that does not affect overall well-being? Second, to what degree should indexation reflect societal preferences for some types of consumption as opposed to others? Different people will have different answers to these questions, but it is important to recognise that different proposals implicitly take different positions on these issues.

6. CONCLUSION AND FUTURE RESEARCH

This study has adopted ABS CPI concepts and methods, along with ABS household expenditure data, to calculate measures of inflation by equivalised household income quintiles. This study shows inflation varies across households grouped by income. A comparison of international studies found country-specific empirical work is needed to determine the variability of inflation across household income groups in specific national contexts.

Over the period September quarter 2011 to September quarter 2018, the 1st (lowest) income household group experienced the largest inflation rate (+14.8 per cent), while the other income quintiles experienced inflation similar to the ABS CPI (+13.7 per cent). The highest income quintile recorded the lowest inflation rate (+13.3 per cent). Differences in expenditure patterns across household groups and their interaction with price change of the products in the ABS CPI basket generate these outcomes.

The larger inflation rate for the lowest income household group was due to larger price increases for goods on which these households spend a larger fraction of income, namely *Alcohol and tobacco, Housing* and *Transport*. These increases were partly offset by falls in the price of staples, i.e. bread, milk and cheese.

For the highest income households, price increases were most significant for c*hild care services* and *recreation and culture*, categories on which wealthier households spend a larger fraction of income.

If we re-do the analysis excluding *Alcohol and Tobacco*, we find very little difference in the inflation experiences of the households in the five different income quintiles. This raises some caveat to whether or not lower income households should be compensated for their higher inflation experiences.

This research has focused exclusively on the variation in expenditure patterns of households grouped by income to produce household inflation measures; and assumed that all household income groups purchase the same products and pay the same average price for each broadly defined category of goods and services as the ABS CPI. Future research examining whether the product mix is different for households in different income quintiles would complement the results that we present here.

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Appendix

Table A1: Recalculated Table 1 ***Alcohol and Tobacco unadjusted*** *(ABS CPI Al & Tobacco is adjusted) – expenditure shares for household groups utilising 2009-10 household expenditure data*

2009-10 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	16.84	18.54	18.60	17.17	16.86	15.69	16.90
ALCOHOL AND TOBACCO	7.06	3.61	4.18	4.23	3.90	3.48	3.83
CLOTHING AND FOOTWEAR	3.98	2.74	3.50	3.49	3.70	4.58	3.85
HOUSING	22.30	25.05	23.84	24.42	23.65	20.31	22.80
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	9.10	9.54	9.61	8.72	9.64	10.69	9.82
HEALTH	5.29	6.90	4.86	5.96	5.07	5.26	5.44
TRANSPORT	11.55	10.54	12.14	12.67	12.76	13.94	12.87
COMMUNICATION	3.05	4.10	3.80	3.57	3.24	2.87	3.33
RECREATION AND CULTURE	12.56	10.94	11.55	11.67	13.15	14.75	13.01
EDUCATION	3.18	1.15	1.62	2.48	2.62	3.83	2.74
INSURANCE AND FINANCIAL SERVICES	5.08	6.88	6.30	5.61	5.41	4.59	5.42
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table A2: Recalculated Table 2 ***Alcohol and Tobacco unadjusted*** *(ABS CPI Al & Tobacco is adjusted) – expenditure shares for household groups utilising 2015-16 household expenditure data*

2015-16 Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	16.09	18.67	17.57	17.27	16.89	14.70	16.62
ALCOHOL AND TOBACCO	7.09	3.32	3.48	3.77	3.40	3.05	3.37
CLOTHING AND FOOTWEAR	3.55	2.66	2.87	3.32	3.82	3.72	3.40
HOUSING	22.68	28.33	25.59	24.02	23.18	21.92	23.98
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	9.39	8.96	9.18	9.45	9.41	10.51	9.69
HEALTH	5.43	6.02	6.73	5.29	5.48	5.61	5.75
TRANSPORT	10.32	10.05	9.95	11.55	12.18	12.73	11.66
COMMUNICATION	2.68	3.63	3.37	3.15	2.97	2.41	2.98
RECREATION AND CULTURE	12.71	9.76	11.26	12.69	13.90	16.37	13.59
EDUCATION	4.27	2.66	3.16	3.03	2.64	4.22	3.30
INSURANCE AND FINANCIAL SERVICES	5.80	5.95	6.85	6.45	6.14	4.76	5.66
ALL GROUPS	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table A3: Recalculated Table 3 ***Alcohol and Tobacco unadjusted*** *(ABS CPI Al & Tobacco is adjusted) – percentage change, September quarter 2011 to September quarter 2018.*

Expenditure group	CPI (%)	1st (lowest) Income quintile (%)	2nd Income quintile (%)	3rd Income quintile (%)	4th Income quintile (%)	5th (highest) Income quintile (%)	All households (%)
FOOD AND NON-ALCOHOLIC BEVERAGES	4.5	2.5	3.1	4.1	4.5	5.2	4.2
ALCOHOL AND TOBACCO	47.7	63.0	57.8	52.0	46.9	33.3	46.8
CLOTHING AND FOOTWEAR	-6.5	-6.6	-6.2	-6.5	-6.4	-6.6	-6.5
HOUSING	22.3	23.3	22.7	21.8	22.5	22.8	22.6
FURNISHINGS, HOUSEHOLD EQUIPMENT AND SERVICES	2.9	0.4	0.3	1.0	3.9	5.3	3.2
HEALTH	36.4	33.8	31.0	28.8	36.8	37.9	34.5
TRANSPORT	7.2	10.5	8.5	7.3	7.1	7.4	7.9
COMMUNICATION	-16.3	-16.1	-16.1	-16.6	-16.8	-16.3	-16.4
RECREATION AND CULTURE	4.8	4.9	4.2	5.5	5.6	7.7	6.2
EDUCATION	36.3	35.1	36.7	36.8	36.7	37.4	37.0
INSURANCE AND FINANCIAL SERVICES	15.4	14.8	14.5	14.6	14.6	14.9	14.7
ALL GROUPS	**13.7**	**13.0**	**11.9**	**12.3**	**12.6**	**12.6**	**12.5**