



ESRI Research Note

The Distributional Impact of Inflation: 2003-2014

Brian Colgan and Tim Callan

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*Brian Colgan and Tim Callan¹

1. Introduction

Research has shown that, depending on the period under consideration, high and low income groups can experience different rates of inflation (Crawford and Smith 2002). Over the course of the Great Recession, there is growing evidence from the UK (Levell and Oldfield, 2011; Adams et al., 2014; Flowers and Wales, 2014) that low-income households have experienced higher rates of inflation than high-income households. Have similar differentials emerged during the Irish experience of the Great Recession? This is the central question addressed by this note, which examines the distributional impact of inflation over the years 2003 to 2014. We use detailed micro-data from the Household Budget Survey (HBS) and Consumer Price Indices (CPIs) produced by the CSO, to examine the distributional impact of inflation over the years 2003-2014. We find somewhat different effects depending on whether the focus is on the full period, the 'boom' years or the 'austerity' years.

2. Existing Evidence for Ireland and the UK

Irish evidence on the distributional impact of inflation is quite limited. An early study by Kennedy and Bruton (1975) found that for the period 1968-1975 several different types of household faced broadly similar rates of inflation. More recently Somerville (2004) examined the distributional impact of inflation in Ireland over the years 1987 to 2001. Using the 1987 HBS and Madden's (1993) parameter estimates for an Almost Ideal Demand System, true cost-of-living indices for each decile were constructed.² Somerville (2004) found that by December 2001 the bottom decile's index was 3.8 per cent above the overall mean while the top decile's index was 2.3 per cent below the mean.

The topic has been examined in greater depth in the UK. Levell and Oldfield (2011) examined the period 2000-2010 and focussed on the inflation experience of low-income households. This paper found that over the ten-year period, lower-

¹ Thanks to Barra Casey (CSO) and to Alan Barrett for comments on a previous draft and to participants at an ESRI internal seminar for their comments. Any remaining errors are the responsibility of the authors.

² The difference between a true cost-of-living index and a consumer price index is discussed in Section 2.1.

income households had experienced higher average annual inflation rates. For the entire period the bottom decile experienced 3.3 per cent average annual inflation while the top decile experienced 2.9 per cent. The authors attributed at least part of this difference in inflation rates to increases in the price of fuel, which had quite different weights in the baskets of high and low income households.

Adams et al. (2014) used quintile specific inflation rates to examine changes in real income for the period 2008-2009 to 2013-2014. They found that the inflation rate for low-income households was, on average, one percentage point higher per year than that for high-income households. When purchasing power is measured by deflating all incomes by an average inflation rate, results suggest that low-income households have fared much better over the recession than high-income households. However, if incomes are deflated by decile-specific inflation rates it was found that low-income households fared only slightly better than high-income households.

Flowers and Wales (2014) examine a similar period to this note (2003-2014). They focus in particular on the 2nd and the 9th deciles, as they argue it is potentially more representative of low and high incomes than the extreme circumstances of top and bottom deciles. They found little difference between the inflation experienced by the 2nd income decile and that experienced by the 9th income decile. However, they found significant differences in the inflation experienced by different *expenditure* deciles: the 2nd expenditure decile experienced 3.5 per cent average annual inflation, one percentage point higher than the annual average for the 9th decile.

While evidence from the UK highlights the potential for low income households to experience higher average annual inflation, it is important to note that the inflation experiences of the UK and Ireland have differed significantly over the 2003-2014 period. Table 1 below uses the internationally comparable Harmonised Indices of Consumer Prices (HICP) to illustrate this point. Particularly during the austerity years there was a clear distinction between the inflation experiences of Ireland and the UK.

TABLE 1 Comparing Average Annual Inflation in the UK and Ireland excl. Housing Costs

	2003-2008	2009-2014	2003-2014
Ireland	2.9	0.1	1.5
UK	2.2	2.8	2.5
Cumulative Inflation			
Ireland	18	1	19
UK	14	18	34

Source: Authors analysis using HICPs available at <http://ec.europa.eu/eurostat/data/database>.

Note: The inflation rates reported do not take into account mortgage interest payments and may further differ from nationally reported figures due to methodological differences.

3. Constructing an Index

3.1 What is the CPI?

The Consumer Price Index records changes in the price of an average basket of goods over time. What comprises an average basket of goods, and the importance or weight each item should be given, is determined using micro-data from the HBS. Expenditure is recorded over a two-week period. However for some items such as durables, expenditure for the entire year is recorded and converted to a weekly value (CSO, 2012). The expenditure weights for certain items, such as alcohol and tourism, are supplemented with external data.

Until recently the CPI has been a purely fixed weight index,³ with weights being updated every five years in line with the latest HBS results.⁴ It should be noted that there are two main shortcomings to this approach:

- Fixed expenditure weights assume away any potential substitution. For example the price of rice could triple and yet under this approach households would still purchase the same quantity of rice.
- This approach also assumes that high- and low-income households face the same price for the same category of good. For example it may be that high-income households consume more expensive types of bread which are subject to a different rate of inflation (Levell and Oldfield 2011).

In order to overcome these shortcomings a true cost of living index would need to be constructed. As Somerville (2004) highlights there is much debate over the choice between the use of a cost of living index and fixed weight price indices. True cost of living indices allow for substitution to take place based on estimates of demand elasticities but this comes at the cost of much greater complexity (CSO, 2012). The current approach in Ireland and the UK is to use fixed weight price indices which are then often referenced in the decision to increase social

³ Council Regulation (EC) No 2494/95 (1995) makes it a legal requirement that the HICP be produced using a Laspeyres index (a fixed weight index). <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31995R2494&from=EN>.

⁴ Recent changes to the construction of the HICP, and thus the CPI, have introduced annual updating of weights with reference to the National Accounts (CSO, 2015).

welfare payments. In the interest of comparability and as the aim of this paper is to examine the distributional impact of inflation, we focus on identifying CPI-type differences rather than constructing a true cost of living index.

The CPI is, as the CSO (2015) says, ‘the official measure of inflation in Ireland’ and ‘the most widely used measure of consumer inflation’. The CPI includes mortgage interest as a housing cost. It should be noted, however, that the EU’s preferred measure of inflation is the Harmonised Index of Consumer Prices (HICP), which excludes mortgage interest. In this note we consider the distributional aspects of the CPI and of a CPI-type index which excludes housing costs, in order to examine the sensitivity of results to the inclusion or exclusion of mortgage interest.

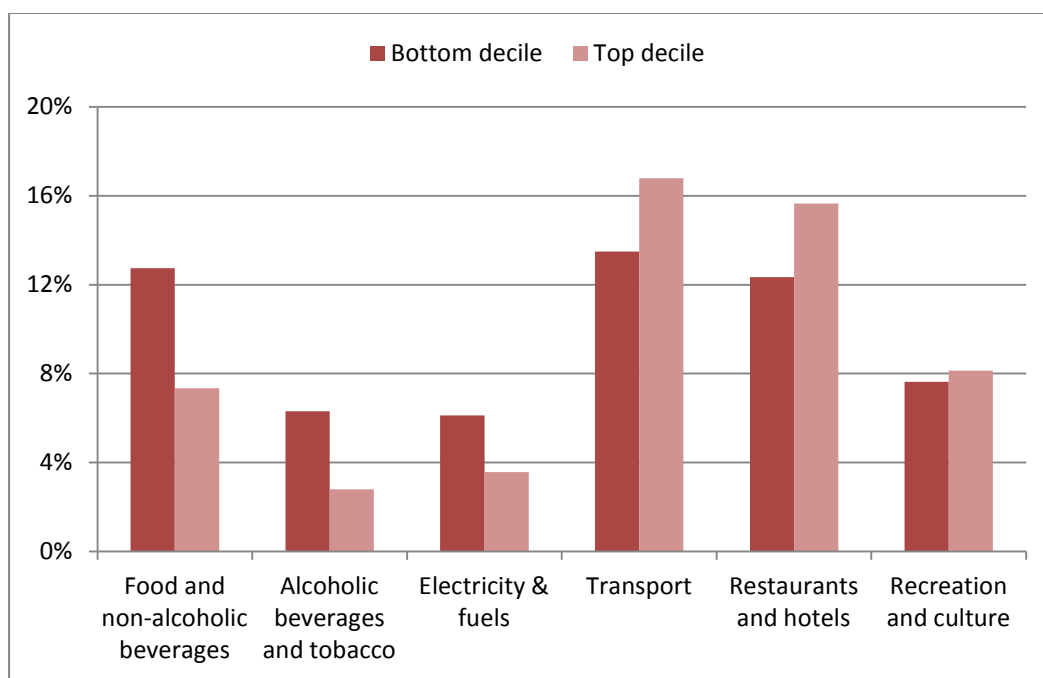
3.2 Why might Households Experience Different Rates of Inflation?

As Adams et al. (2014) remark, differences in inflation rates depend upon two factors:

1. Differences in spending patterns between low- and high-income households;
2. Differences in price changes for goods consumed disproportionately by low- or high-income households.

Figure 1 addresses the first of these factors and shows that for a number of categories of goods there are large differences in spending patterns for the top and bottom deciles. The bottom decile devotes a larger share of spending to items such as food and non-alcoholic beverages, alcoholic beverages and tobacco products, and electricity and fuels while the top decile devotes a larger share to transport, restaurants and hotels, and recreation and culture.

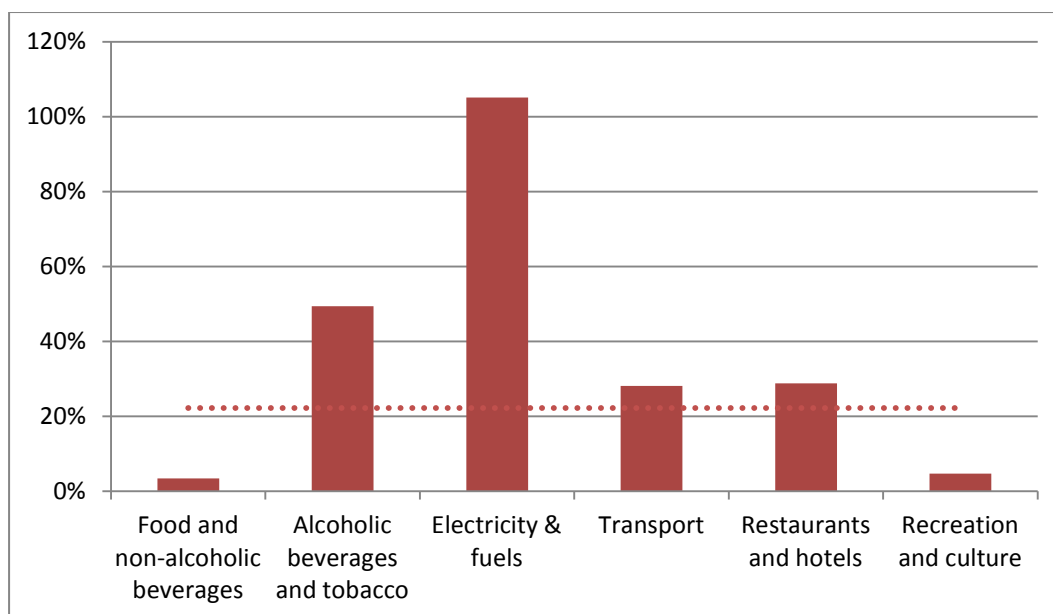
FIGURE 1 Comparing Expenditure Weights for Top and Bottom Deciles



Source: Authors analysis of HBS 2009-2010.
Note: The weights above have been through the reconciliation process discussed in Section 3.3.2

Figure 2 shows the cumulative inflation for the same broad categories of goods. The dotted line represents the state average cumulative inflation. Clearly different categories have experienced very different price changes, both compared to the average and to other categories, with some items, such as electricity and fuels, reporting high inflation while others, such as food and non-alcoholic beverages, reporting very small price increases.

FIGURE 2 Cumulative Price Changes for Certain Items 2003-2014



Source: Authors analysis of CPIs available from the CSO's StatBank.

3.3 Constructing Decile Specific Inflation Rates

3.3.1 Level of Analysis

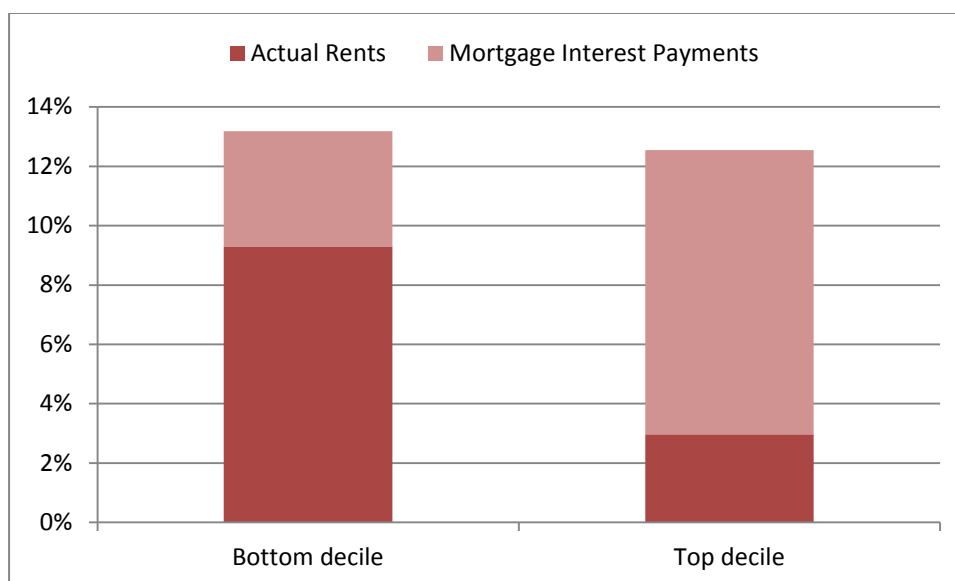
The CSO produces monthly CPIs for the total basket of goods as well as for a number of sub-categories or COICOPs (Classification of Individual Consumption According to Purpose). The construction of a decile-specific inflation rate requires the decomposition of household expenditure into these sub-categories in order to identify different spending patterns between deciles.

At its most detailed, spending can be separated into over 160 different categories. Greater disaggregation allows for greater differences in expenditure patterns to emerge. However, disaggregation also raises concerns over the sample size. Expenditure patterns may relate to a very small number of households. The more aggregate COICOP groups do not suffer from this limitation and therefore expenditure weights at the most aggregate COICOP level, COICOP 1, may have a lower margin of error (Kennedy and Bruton 1975).

COICOP 1 divides spending into 12 broad categories. This greater aggregation overcomes problems of sample size/margin of error but it comes at the cost of a loss of detail. A large number of items, each of which experiences different price changes and are of differing importance for different deciles, are often bundled together.

Figure 3 highlights a particularly important expenditure distinction; housing costs (mortgage interest payments and rents). At an aggregate level, both the bottom and top deciles dedicate a similar proportion of their expenditure to housing costs, however this conceals large differences in the nature of the expense. The bottom decile's expenditure on housing is predominantly comprised of rents whereas the top decile's is largely made up of mortgage interest payments. Whether a household pays rent or mortgage interest payments may have a dramatic impact on the household rate of inflation. This difference would not be effectively captured at a high level of aggregation as both items would fall under the heading of housing and would ultimately be subject to the same weighted average rate of inflation.

FIGURE 3 Expenditure Shares for Housing Costs



Source: Authors analysis of HBS 2009-2010.
Notes: The weights above are based on HBS 2009-2010 and have been reconciled to match CSO weights.

In order to overcome sample size concerns while maintaining the necessary level of disaggregation, analysis is conducted at the COICOP 3 level. This is the level of analysis used in the recent Flowers and Wales (2014) paper and divides spending into 96 categories. As the period under consideration spans 12 years, expenditure weights are taken from three occurrences of the HBS (1999-2000, 2004-2005, and 2009-2010), corresponding to the weights used in CPI construction.

HBS 1999-2000 is used for the period 2003-2006, 2004-2005 for 2007-2011, and 2009-2010 is used for 2012-2014. One consequence of these time intervals is that expenditure weights for some austerity years are based upon spending patterns from a boom year. This may overstate spending on items which are highly income elastic, such as restaurants and hotels. However, the main differences in expenditure patterns between the bottom and top income deciles change little between different releases of the HBS. The bottom decile consistently spends more on essentials such as food and electricity and fuels while the top decile spends more on transport and restaurants and hotels. Our analysis can be seen as trying to explain differential impacts on the CPI across income groups, rather than assessing how accurately a fixed weight CPI - necessarily with weights which lag consumption by some time - represent current prices.

3.3.2 Reconciling Expenditure Weights

The expenditure weights used in the construction of the CPI are primarily based on the HBS but do also incorporate other external data. For example it is assumed that households under-report their spending on items such as alcohol and tourism. In order to compensate for this the CSO makes use of the national

accounts to update spending on alcohol, and the Household Travel Survey to update spending on domestic tourism. The CSO also updates expenditure weights for certain items, such as accommodation, to take account of spending by foreign tourists (CSO, 2012).

Adopting the approach used by Flowers and Wales (2014) we reconcile the weights generated directly from the HBS with those used in the construction of the CPI so that our aggregate expenditure weights are almost identical to those used by the CSO. Since the weights used in the construction of the CPI include spending by foreign tourists we reduce the weight for accommodation in proportion to the amount of nights spent in accommodation by Irish residents compared to nights spent by foreign nationals.⁵ The adjustment is then shared across all other items in accordance to their weight.

Reconciliation is done in such a way that any pre-existing differences in spending patterns between households are maintained; it is assumed that all households under- or over-report their expenditure by the same proportion.

Once expenditure has been reconciled, households are divided into deciles of equivalised income⁶ and using the detailed item-level CPIs available from StatBank, decile-specific rates of inflation are constructed.⁷

Despite the reconciliation process, the state average inflation rate produced differs very slightly from the CSO reported rate of inflation, due to rounding, and to the adjustment for spending by foreign tourists detailed in footnote 5.

4. Results

4.1 Income Deciles

Table 2 reports the average annual inflation rates for all income deciles. Results have been separated into three time periods: 2003-2008 (boom years), 2009-2014 (austerity years) and 2003-2014.

⁵ Other items are affected by foreign tourist spending but comparing HBS generated weights with those used by the CSO, the differences appear to be quite small and so no adjustment is made for these items. The adjustment to accommodation reflects the share of total nights spent in accommodation which can be attributed to Irish tourists. This adjustment factor was generated from the CSO's Tourism and Travel Annual Series available in the CSO's StatBank www.cso.ie/px/pxeirestat/Database/eirestat/Tourism%20and%20Travel%20Annual%20Series/Tourism%20and%20Travel%20Annual%20Series_statbank.asp?SP=Tourism and Travel Annual Series&Planguage=0.

⁶ The equivalence scale is the same as that used by CSO in its estimates of risk of poverty and consistent poverty, i.e., 1 for the first adult in a household, 0.66 for other adults and 0.33 for children aged under 14.

⁷ CPIs are taken from the 'Consumer Price Index by Month, Detailed Sub-Indices and Statistic' table which can be found in the CSO's StatBank www.cso.ie/px/pxeirestat/statire/SelectTable/Omrade0.asp?Planguage=0.

There is a clear distinction in the distributional pattern of average annual inflation rates between the boom years and the austerity years. In the 2003-2008 period households in the lower half of the income distribution experienced lower average annual inflation rates than those in the top half of the income distribution. For the 2009-2014 period this trend was reversed, with households in the bottom half of the income distribution experiencing higher average annual inflation.

Housing costs play an important role in explaining these differing experiences. In the boom years, when house prices were rising rapidly, inflation for mortgage interest was higher than inflation for rents. Since the proportion of homeowners rises as we advance along the income distribution, the inflation experience of wealthier households were more influenced by the high rates of inflation for mortgage interest.

TABLE 2 Average Annual Inflation 2003-2014

Decile	2003-2008	2009-2014	2003-2014
Bottom	3.0	0.3	1.7
2	3.0	0.1	1.6
3	3.0	0.0	1.5
4	3.1	0.0	1.6
5	3.2	0.0	1.6
6	3.3	-0.2	1.5
7	3.4	-0.1	1.6
8	3.4	-0.1	1.6
9	3.4	-0.3	1.5
Top	3.5	-0.3	1.6
State	3.3	-0.1	1.6

Source: Authors analysis using CSO data (HBS and CPIs).

Notes: The state average reflects the distribution of expenditure across deciles and may therefore differ from the arithmetic average of the decile specific rates.

Table 3 examines the inflation experiences of the top and bottom deciles in comparison to the state average and each other. In the 2003-2008 period the bottom decile experienced average annual inflation 0.3 percentage points lower than the state average while the top decile experienced above average, average annual inflation. This trend was reversed in the 2009-2014 period when the bottom decile experienced average annual inflation 0.5 percentage points higher than the state average and 0.7 percentage points higher than the top decile. For the entire period 2003-2014, the bottom decile experienced slightly higher average annual inflation than both the state average and the top decile.

While a difference of 0.7 percentage points may seem small in magnitude, over the six-year austerity period it results in the bottom decile's basket increasing in

price by 2.1 percentage points while the top decile's basket decreased in price by two percentage points. Thus, the bottom decile experienced 4.1 percentage points higher cumulative inflation over this six-year period.

When examining cumulative inflation it is important to bear in mind that a household will only have experienced the bottom decile's cumulative inflation if consistently placed in the bottom decile through time (Flowers and Wales 2014).

TABLE 3 Average Annual Distance from Mean Inflation 2003-2014

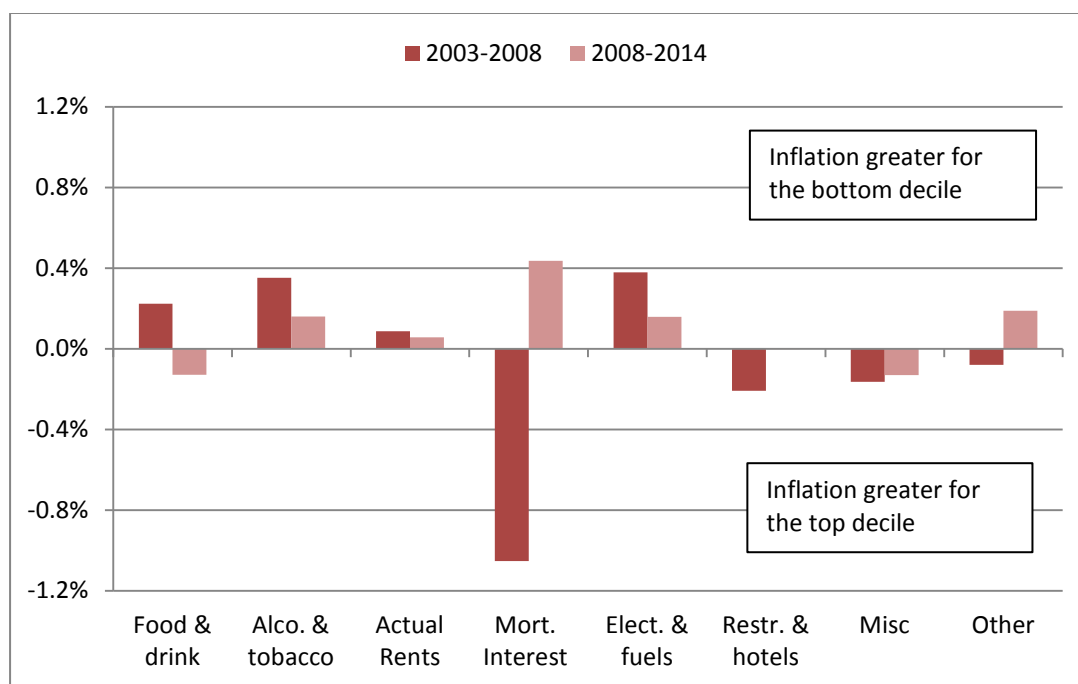
	2003-2008	2009-2014	2003-2014
Bottom – mean	-0.3	0.5	0.1
Top – mean	0.2	-0.2	0.0
Difference: Bottom-Top	-0.5	0.7	0.1
Cumulative Inflation			
Bottom – mean	-1.8	2.8	1.5
Top – mean	1.6	-1.3	-0.1
Difference: Bottom-Top	-3.4	4.1	1.6

Source: Authors analysis using CSO data (HBS and CPIs).

Notes: The difference between the bottom and top deciles may differ slightly from what Table 2 would suggest due to rounding.

Figure 4 identifies the contribution different items made to the differences in average annual inflation rates between the bottom and top deciles. A positive (negative) bar indicates that an item raises (lowers) the average annual inflation rate for the bottom decile relative to the top.

FIGURE 4 Contributions to the Difference in Average Annual Inflation Rates: Bottom Decile Less Top Decile



Source: Authors analysis using CSO data (HBS and CPIs).
Notes: Other is a catch all heading for all other categories not shown. It includes furniture, health, education, communication, recreation, and transport.

For the 2003-2008 period, we can see that food and drink, alcohol and tobacco, electricity and fuels, and actual rents all increased the bottom decile’s rate of inflation relative to the top. However, these items are largely counteracted by the impact of mortgage interest payments which lowered the average annual inflation rate for the bottom decile relative to the top by over one percentage point. This large differential combined with negative contributions for restaurants and hotels, miscellaneous, and the ‘other’ category resulted in the top decile experiencing higher average annual inflation than the bottom decile in the 2003-2008 period.

In the 2009-2014 period, the bottom decile experienced higher average annual inflation than the top. The largest contributor to this finding was mortgage interest payments. This item alone accounted for the bottom decile experiencing 0.4 percentage points higher average annual inflation relative to the top. During the austerity years mortgage interest payments reduced the average annual inflation rate of the top decile by 0.6 percentage points. However, since there are fewer homeowners in the bottom decile, mortgage interest only reduced the average annual inflation rate of the bottom decile by 0.2 percentage points.

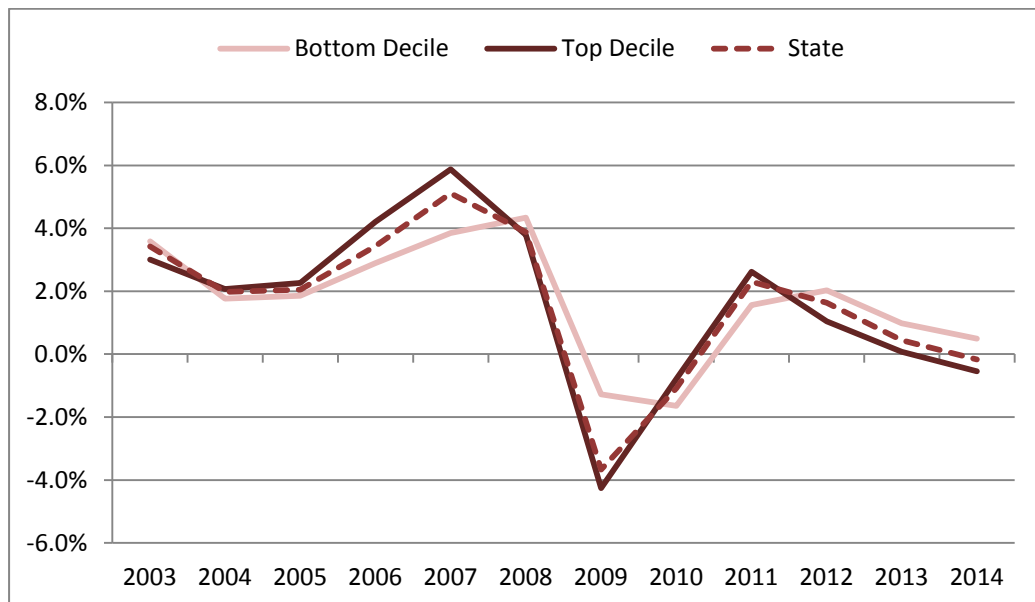
From Tables 2 and 3 we can see that while there tends to be little difference in average annual inflation rates over the full period, differences do exist in sub-periods. Differences become even larger and more volatile if we examine

inflation rates on an annual basis. Figure 5 compares the annual inflation rates of the state and the top and bottom deciles.

In certain years the difference in inflation rate experienced can be quite large. For example in 2009 inflation for the top decile was strongly negative (-4 per cent), but was less negative (-2 per cent) for the bottom decile. Falling mortgage interest payments played an important role, reducing the inflation rate of the bottom decile by only 0.5 percentage points whereas the corresponding figure for the top decile was 3.7 percentage points.

While there is a good deal of variation from year to year, no decile has consistently experienced higher or lower inflation.

FIGURE 5 Annual Inflation 2003-2014



Source: Authors analysis using CSO data (HBS and CPIs).

Notes: State refers to the mean generated from the authors' calculations and differs slightly from the CSO reported inflation rate.

4.2 Deciles of Expenditure

When examining distribution on the basis of deciles of income there is the potential for the bottom decile to be made up of temporary low-income households who are income poor but asset rich (Flowers and Wales 2014). One method to overcome this potential problem is to look at deciles of expenditure. The Permanent Income Hypothesis (Friedman, 1957) suggests that individuals will smooth consumption over their lifetime, using savings to supplement periods of low income. The results below are based on deciles of expenditure with the bottom decile containing the households which spend the least.

Table 4 below compares the average annual inflation of the top and bottom expenditure deciles with each other and with the state average. The pattern of inflation rates is similar to that found when using deciles of income.

During the period 2003-2008 the bottom decile experienced lower average annual inflation than the top expenditure decile. The reverse was then true for the austerity years with the bottom decile experiencing average annual inflation 0.6 percentage points higher than the state average and 0.8 percentage points higher than the top decile. During this period the package of goods consumed by the bottom expenditure decile increased in price by 3.3 per cent while the top decile's package actually decreased in price by 1.6 per cent. For the entire period the bottom expenditure decile experienced 0.3 per cent higher average annual inflation than the top decile.

TABLE 4 Average Annual Distance from Mean CPI Inflation (by Deciles of Expenditure 2003-2014)

	2003-2008	2009-2014	2003-2014
Bottom – mean	-0.3	0.6	0.2
Top – mean	-0.1	-0.2	-0.1
Difference: Bottom-Top	-0.2	0.8	0.3
<i>Cumulative Inflation</i>			
Bottom – mean	-1.9	3.9	2.8
Top – mean	-0.6	-0.9	-1.7
Difference: Bottom-Top	-1.3	4.8	4.5

Source: Authors analysis using CSO data (HBS and CPIs).

4.3 Retired and Non-Retired Households

Table 5 compares the inflation experience of retired⁸ and non-retired households. Retired households experienced lower average annual inflation in the 2003-2008 period and higher inflation in the 2009-2014 period. This reflects the fact that mortgage interest payments carry a much smaller weight in the expenditure basket of retired households and as such the impact of inflation/deflation for mortgage interest payments is lessened.

⁸ For the purposes of this analysis a retired household is defined as any household in receipt of a retirement pension.

TABLE 5 Average Annual Distance from Mean Inflation by Retired Households 2003-2014

	2003-2008	2009-2014	2003-2014
Non-retired Households	0.1	-0.1	0.0
Retired Households	-0.5	0.5	0.0
Difference: Non retired-Retired	0.5	-0.6	0.0
Cumulative Inflation			
Non-retired Households	0.4	-0.4	-0.1
Retired Households	-3.3	3.1	0.3
Difference: Non retired-Retired	3.8	-3.5	-0.4

Source: Authors analysis using CSO data (HBS and CPIs).

4.4 Children

Table 6 examines the annual average inflation experience of households with and without children. Households with children experienced slightly lower average annual inflation than the state average and than households without children for the entire period. Differences between periods are driven by the higher rate of home ownership among households with children and the resulting impact of mortgage interest payments.

TABLE 6 Average Annual Distance from Mean Inflation for Households with and without Children 2003-2014

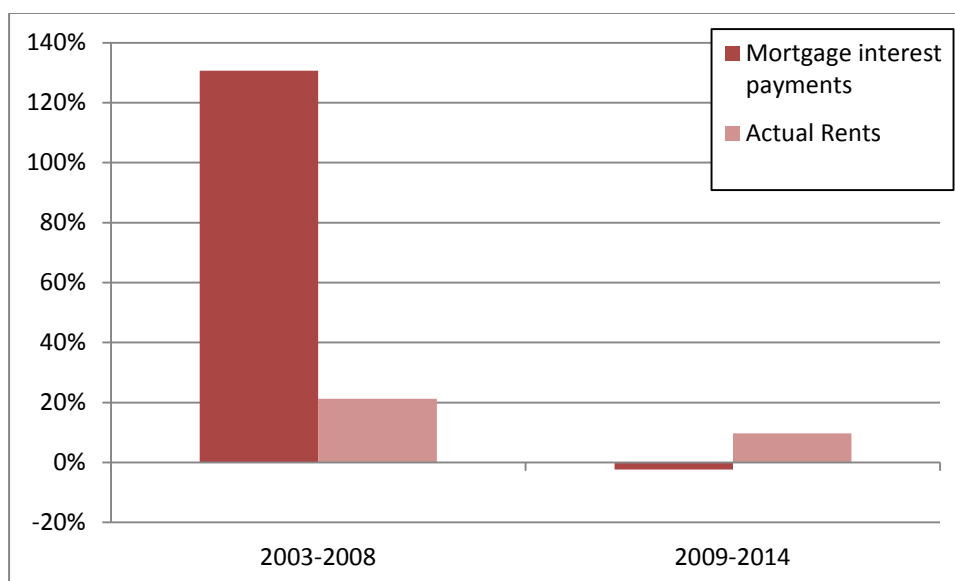
	2003-2008	2009-2014	2003-2014
Without Children	-0.1	0.2	0.0
With Children	0.2	-0.4	-0.1
Difference: Without Children-With Children	-0.4	0.6	0.1
Cumulative Inflation			
Without Children	-1.0	1.3	0.6
With Children	1.5	-2.3	-1.3
Difference: Without Children-With Children	-2.5	3.6	1.9

Source: Authors analysis using CSO data (HBS and CPIs).

4.5 Inflation Excluding Housing Costs

Mortgage interest payments and rent payments are an important component of the CPI. Figure 6 compares the cumulative inflation for mortgage interest payments to that for rent over the two periods considered. Over the period 2003-2008, mortgage interest payments experienced cumulative inflation of over 120 per cent; by comparison actual rents increased in by price by only 20 per cent. Such a large difference in the inflation experience of these items means that whether a household pays rent or mortgage interest can have a large impact on their rate of inflation.

FIGURE 6 Cumulative Inflation for Housing Costs 2003-2014



Source: Authors analysis using CSO data (CPIs).

The large difference in the inflation experiences of these items can be in part explained by the calculation of the CPI for mortgage interest payments.

Mortgage interest is a special item in the CPI. Inflation for mortgage interest is the product of:

'the index of current interest rates; and

the index of mortgage debt outstanding for the fixed age pattern of mortgages.' (CSO, 2012)

The index of mortgage debt outstanding reflects changes in the size of mortgages which in turn is influenced by changes in the price of property.⁹ This means that an increase in the price of property will increase measured inflation for all households with a mortgage.

Table 7 compares the inflation experience of households including and excluding housing costs.

⁹ *'The indicator of mortgage debt outstanding is estimated as the change in the weighted average of prices level in successive monthly periods, where the relative weights decline with age of mortgage reflecting the reduction in interest payable over time.'* (CSO, 2012).

TABLE 7 Impact of Removing Housing Cost from Calculation of Average Annual Inflation 2003-2014

	2003-2008		2009-2014	
	Incl. Housing Costs	Excl. Housing Costs	Incl. Housing Costs	Excl. Housing Costs
Difference: Bottom – Top income decile	-0.5	0.5	0.7	0.2
Difference: Bottom – Top expenditure decile	-0.2	0.6	0.8	0.3
Difference: non-retired – Retired	0.5	-0.4	-0.4	-0.3
Difference: Without children – With children	-0.4	0.3	0.6	0.4

Source: Authors analysis using CSO data (HBS and CPIs).

Without the high inflation for mortgage interest payments in the 2003-2008 period the bottom decile would have experienced higher average annual inflation than the top. This is due to the impact of food and drink, alcohol and tobacco, and electricity and fuels. In the 2009-2014 period the difference between the top and bottom decile would have been reduced from 0.7 to 0.2 percentage points. This reflects the greater deflationary impact mortgage interest payments had for the top decile over this period. Housing costs clearly played a key role in determining the distributional impact of inflation.

Examining deciles of expenditure we again found that housing costs played a key role in the inflation experiences of the different households. When housing costs are included, inflation for lower expenditure households was somewhat lower than that for higher expenditure households in the 2003-2008 period. But this finding is reversed when housing costs are excluded, with lower expenditure households experiencing somewhat faster inflation than higher expenditure households. Furthermore, without the deflationary impact of mortgage interest payments in the 2009-2014 period, the difference between the average annual inflation experienced by the bottom and top deciles would have been reduced, although the bottom decile would still have experienced higher average annual inflation.

Housing costs also play a significant role for comparisons between retired and non-retired households, and households with and without children. As illustrated in Table 7, differences based on the CPI including housing costs are reversed in the 2003-2008 period when housing costs are excluded. For the 2009-2014 period, the exclusion of housing costs means that differentials across these dimensions are reduced, but not reversed.

4.6 Plutocratic versus Democratic Approach

The expenditure weights used in the preceding analysis are generated from average spending per item at the decile level. This is the plutocratic approach to

constructing an inflation rate and matches the approach used in the construction of the CPI. An alternative approach, the democratic approach, generates household level inflation rates and then looks at the average rate per decile. Using the democratic approach we found that while inflation rates were slightly higher the distributional impact of inflation did not change.

4.7 Comparing the Distributional Impact of Inflation in the UK and Ireland

Table 8 compares the annual average difference in inflation rates between low and high income households in the UK with Irish figures for similar periods. Inflation rates for the UK are drawn from a number of different studies and it should be noted that there may be methodological differences between different studies, and between UK and Irish figures.

In all studies examining inflation in the UK during the 2000-2014 period, it was found that low income households experienced higher average annual inflation than high income households. In Ireland differences tend to be of a smaller magnitude and it was not always the case that the bottom decile experienced higher average annual inflation.

In the 2009-2014 period the lowest income quintile in the UK experienced one percentage point higher average annual inflation (Adams et al., 2014). In Ireland the difference was much lower, with the lowest income quintile experiencing 0.5 percentage points higher inflation.

The most striking difference between the Irish and UK results is for the 2003-2013 period. Examining the difference between the 2nd and 9th expenditure deciles, inclusive of housing costs, Flowers and Wales (2014) found that the 2nd expenditure decile experienced one percentage point higher average annual inflation than the 9th expenditure decile. In Ireland there was no difference in the inflation experiences of these two deciles.

TABLE 8 Comparing Differences in Annual Average Inflation Rates between Low and High Income Households in the UK and Ireland

	UK	Ireland	
Levell and Oldfield 2000 to 2010†	0.4	-0.1	2003-2010
Adams et al., 2008-2009 to 2013-2014‡	1	0.5	2009-2013
Flowers and Wales Income Excl. Housing Costs 2003-2013*	0.2	0.2	2003-2013
Flowers and Wales Expenditure Incl. Housing Costs 2003-2013*	1	0.0	2003-2013

Source: Authors analysis using CSO data (HBS and CPIs).

Notes: †The average annual inflation examined by Levell and Oldfield (2011) is based on the RPI which has a different methodology to the Irish CPI. Furthermore Levell and Oldfield (2011) use the democratic approach to generating inflation rates and as such the Irish figures are also generated using the democratic approach..

‡The Adams et al. (2014) findings are based on the democratic approach and examine quintiles of income. The Irish figures are therefore also based on the democratic approach and examine quintiles.

*Flowers and Wales (2014) examine the difference between the 2nd and 9th income/expenditure deciles. The Irish figures reported also examine the difference between the 2nd and 9th deciles.

5. Conclusion

This note analyses the distributional impact of inflation during the period 2003-2014. We find that over the entire period there is little difference in the inflation rates experienced by different deciles. However, for the two sub-periods of six years each, we find that differences did occur. Most significantly during the austerity years we found that the bottom income decile experienced higher average annual inflation than both the state average and the top decile. More generally, during this period, households in the lower half of the income distribution experienced higher average annual inflation than those in the top half. The state average annual rate of inflation for the austerity years reports that the basket of goods for the average household has decreased in price; however the bottom decile's basket has actually increased in price. This pattern was even more pronounced when deciles of expenditure were examined.

Housing costs in the form of mortgage interest payments and actual rents played an important role in the inflation experience of households. In the 2003-2008 period, mortgage interest payments contributed over one percentage point to the higher average annual inflation experienced by the top decile. Furthermore, without the deflationary impact of mortgage interest payments in the 2009-2014 period, the differential between the average annual inflation experienced by the bottom and top deciles would have been reduced, although the bottom decile would still have experienced higher average annual inflation.

We also examined the inflation experience of two sub-groups; retired households and households with children. During the austerity years we found that retired households experienced higher average annual inflation than non-retired households while households with children experienced lower average annual inflation than households without children. Both results are driven by the impact of inflation for mortgage interest payments. Such payments are of less importance to retired households and so they did not benefit from deflation in

mortgage interest payments during the austerity years. The converse is true for households with children. For the entire period both sub-groups faced broadly similar average annual inflation rates as the state average.

Overall we find that differences in inflation facing low and high income groups have been more modest than in the UK. This does not guarantee that such differences will not emerge in future, and a more regular and systematic monitoring of this issue could be undertaken at relatively low cost.

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