

## Royal Statistical Society response to the National Statistician's consultation on change to Retail Prices Index

21 November 2012

This response has been prepared by a special RSS technical group<sup>1</sup>. It has been reviewed by the National Statistics Working Party which is responsible for RSS policy on official statistics.

### Changing the RPI Formula – Summary

The RSS considers that the ongoing investigation into the formula effect being carried out by the ONS is (or will be) an excellent and comprehensive piece of work. While individual parts of it may appear to throw limited light on the issue, collectively they are starting to build a good picture of the reasons for the formula effect and ways to minimise it. The research is also providing indications of the impact of potential changes, not just on the formula effect, but on the actual inflation rates shown by the indices.

The RSS has argued for some time that the formula effect should be eliminated or reduced to a minimal level and we welcome the efforts that the ONS has been making towards this end. But the ultimate aim is to measure inflation, according to the definition adopted, as **accurately** as possible. The changes being tested by the ONS are likely to improve the accuracy of both indices as well as reducing the formula effect. Further, the impact of any formula depends also on the sampling scheme, price collection methods, choice of base month etc., precisely the factors being tested by the ONS research. Ideally therefore all these items should be considered together. It was recognised right from the early days after the introduction of the Harmonised Index of Consumer Prices (now called the CPI in the UK) that the size of the formula effect was dependent on these factors as a 1999 paper by David Fenwick showed<sup>2</sup>.

The formula effect is particularly marked in clothing, an area where large price swings in individual items make assessing inflation particularly difficult, and ONS research has therefore rightly been largely focused in this area. Not only is the formula effect in clothing large but past experience has shown that its size is dependent on sampling and price collection design. It widened substantially after the changes introduced in 2010 and the Fenwick paper, cited above, also reports a similar occurrence in the 1990s. So again this points to the need to consider these factors alongside choice of formula.

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<sup>1</sup> Michael Baxter, Mark Courtney and Philip Turnbull with the response coordinated by Jill Leyland.

<sup>2</sup> D. Fenwick, "The impact of choice of base month and other factors on the relative performance of different formulae used for aggregation of Consumer Price Index data at an elementary aggregate level," ONS, 1999, in *proceedings: Ottawa Group fifth meeting*, (Available from [www.statice.is/ottawa/fenwick.pdf](http://www.statice.is/ottawa/fenwick.pdf))

We would like to see the ONS bring together the collective results of its work and its assessment of the average long-term changes they might make to the series. Pending this, a very tentative assessment has been made and is attached as an appendix. This is subject to many qualifications and much of the work is inevitably based on very limited information and therefore should be considered only indicative evidence but it does start to give a picture of changes which would narrow the gap with CPI inflation overall moving up and RPI inflation moving down (the downward movement in RPI inflation being greater than the net upward movement in CPI inflation). A formula effect would remain but it would be considerably reduced, making it easier to manage or eliminate, and making both series a better measure of the unknown "true" rate of inflation.

In summary we feel that statistically and presentationally it would be desirable to wait a further year (to March 2014) before making any substantial changes. As well as completing the current research we also think it is necessary to test the impact of much greater tightening and sub-division of clothing and perhaps some other categories than currently tested. Making all the changes to both the RPI and the CPI implied by the research programme as well as changing the formulae would be a more measured and statistically satisfactory way to deal with this complex issue.

Once all the research, including the need for more homogenous elementary aggregates has been completed, the remaining formula gap is likely to be considerably smaller. The choice of formula then is by definition less contentious. If changes to the formula are made in isolation then there is a risk that subsequent changes might alter the inflation rate in the opposite direction engendering a yoyo effect. This would not increase confidence in the index among users and would be unnecessarily disruptive for holders of index-linked gilts. A large adverse change one year, followed by a favourable change the following year would, in our view, cause more reputational damage than a single, well-founded set of changes.

### **Detail of RSS Technical Group views**

Attached as an Appendix is a draft paper covering the clothing sub-category of the RPI and CPI (the category which contributes most to the formula effect) which attempts to bring together results of the ONS work to date. This work is tentative, but it is the best that we could do with the limited resources and time available to us. We are sure that ONS staff could come up with a better and more definitive version. Nevertheless the work done so far suggests that the potential changes would alter the results shown by both price indices as well as reducing the formula effect gap. ONS needs to complete and extend its work programme in this area, notably: continuing its analysis of the effect of changing the base month; completing the pilot data collection; and examining the impact of much more tightly defined categories. However, it is clear to us from the work carried out so far that the accuracy of both CPI and the RPI could be improved by implementing the results of the research programme and that changing the RPI now to bring it on a par with the CPI in terms of aggregation formula would be premature. We would add that we continue to believe that insufficient attention is being paid to the need for more homogeneous elementary aggregates.

The ONS has tested the impact of increasing outlet stratification, some limited tightening in the definition of clothing items, changing price collection guidelines and the introduction of seasonal items. The average formula effect gap for clothing from February to July 2012, the period over which many of these tests were run, was 6.0 percentage points. The tests suggest that the introduction of each these changes would reduce the formula effect, although since some of them were only tested on one or two items assessing the overall size of their impact is difficult. In addition, the impact of these changes may not be strictly additive – i.e. if they were all introduced the collective impact may be less than the sum of individual impacts. Nevertheless taking them all together they could point to a reduction of between 2 and 3 percentage points out of the 6.0 points.

Two additional potential changes – first, making more substantial tightening and sub-division of clothing categories, and second, the possible change in base month within the year from January to December, as recommended by the EU – could potentially account for a further substantial reduction. The tightening in the definition of clothing items tested was very limited – for example splitting women’s dresses into casual and formal. It is almost certain that further tightening coupled with more item sub-divisions and stratification, where prices in individual categories remain highly diverse, would reduce the formula effect, probably substantially. We feel this should be tested and subsequently implemented as a matter of urgency, not just in clothing but in all relevant categories, as it would also, in our view, increase the accuracy of the index. It would be necessary to devise a weighting scheme in some cases (e.g. for price stratification or items not separately identified in the source data) and the weights might need to be best estimates, but we do not feel this is a major problem particularly given the wealth of market research in this area.

We also wish to draw attention to the limited work done in the ONS on changing the base month for each yearly chain from January to December in line with EU recommendations<sup>3</sup>. While results that have been published are only available for a very short period following the change in price collection methods introduced in 2010, they suggest that this could result in a substantial narrowing of the formula effect that is brought about by raising the CPI inflation rate while little change would be made to the RPI inflation rate. More work needs to be done but if these preliminary results are borne out it would suggest that any downward change to the RPI inflation rate through changing the formulae to those in the CPI could be partly reversed if and when the change to base month (which for technical reasons cannot be introduced for the moment) is implemented.

## **Fashion items**

Clothing contributes most to the formula effect because it is a particularly difficult category for which to measure inflation due to the existence of “fashion” items. Fashion items, which in the case of clothing are often seasonal, typically enter the market when new at full price

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<sup>3</sup> See Papers for the 22<sup>nd</sup> Meeting of the GSS Methodology Advisory Committee, May 2012 <http://www.ons.gov.uk/ons/guide-method/method-quality/advisory-committee/2008-2012/22nd-meeting/gss-mac-22-meeting-papers.pdf> Pages 41-43

and, if they do not sell out fully, are subsequently reduced in price, often very substantially. They are “replaced” by other new items selling initially at full price<sup>4</sup>. This therefore means that sampled items are subject to wild swings in prices and it is often difficult to match new and old items; further, old items are often still selling at heavily discounted prices after new items are introduced. This makes it difficult to design sampling and price collection schemes and makes the results of different aggregation formulae very dependent on these factors. Indeed the difficulty of dealing with these items is illustrated by the fact that Erwin Diewert, the leading index number specialist consulted by the ONS, recommended that such items could be dropped from the index altogether or that radically different techniques, such as treating them as seasonal items, should be used to measure them<sup>5</sup>. This is an area for further research; other questions for consideration being whether extreme price movements should be treated as outliers and removed or whether items on sale are conceptually different to full price items and should be considered as different products.

### **The economic approach**

ONS investigations have shown that the economic approach, under which consumers are assumed to substitute towards items with price falls or lower price rises, was a major reason why a number of countries – most famously but not only the US following the Boskin Report – switched to using the Jevons formula as algebraically it can be said to mimic consumer behaviour when such substitution is high. Similarly, in the UK, the first of three reasons given for the switch to the CPI as monetary target in 2003 was that it “may be considered a more realistic depiction of consumer behaviour,”<sup>6</sup> while this was also the main reason that the government gave for switching the indexation of many benefits and pensions to the CPI in 2011.<sup>7</sup> Courtney, however, showed that while Jevons could theoretically be appropriate when price changes were supply driven, when they were demand driven, as is arguably the case in clothing, both the Carli and the Jevons formulae theoretically underestimate price rises but the Jevons underestimates more<sup>8</sup>. Further, even while consumers may substitute towards goods with lower price rises, their motivation for doing so is not always clear. If they substitute because the good with the price fall or lower price rise meets their needs as well as or better than that previously bought, then this is inflation reducing; if they substitute because they are income constrained and the new good is less satisfactory, this is not. Meanwhile, Erwin Diewert states in his report that the economic approach at the elementary

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<sup>4</sup> Other examples of “fashion” items are cars and a number of electronic goods.

<sup>5</sup> <http://www.ons.gov.uk/ons/guide-method/user-guidance/prices/cpi-and-rpi/erwin-diewert-report-on-consumer-price-statistics-in-the-uk.pdf>

<sup>6</sup> Statement by HM Treasury, December 2003, available at [www.bankofengland.co.uk/monetarypolicy/pdf/annex031210.pdf](http://www.bankofengland.co.uk/monetarypolicy/pdf/annex031210.pdf)

<sup>7</sup> Speech by Lord Freud, The Parliamentary Under-Secretary of State, Department for Work and Pensions, moving the Social Security Benefits Up-rating Order 2011, *Hansard* 14 March 2011, columns 75 – 78.

<sup>8</sup> Mark Courtney, *CPI and RPI differences: The Formula Effect and the Identification Problem* [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1816262](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1816262)

level is misguided for unweighted formulae and arose from a misinterpretation of the ILO 2004 consumer prices manual.

ONS research into this issue has given inconclusive results suggesting that consumer behaviour is too complex to be modelled by simplistic economic theory<sup>9</sup>. We accept this and conclude from this and from the other points above that the economic approach should not be considered a definitive guide to choice of formulae. Nevertheless we do not feel it can be entirely dismissed and it could be a supplementary means of choosing a formula. Where price relatives are dispersed, the choice of formula can have a marked effect on the estimated rate of inflation and the economic approach may still help to indicate where there is a particular danger of over- or under-estimation.

### **RPI and CPI formulae**

We feel that it is unbalanced to consider changes to RPI formulae without considering whether changes need to be made to CPI formulae (as well as other issues). We would like to know why when the HICP was introduced the number of items using Dutot instead of being around 29%, as in the RPI, were substantially reduced to around 5% (see table below). Each elementary aggregate, including new elementary aggregates created by our recommendation to sub-divide many items should be re-examined case by case and a standard decision taken on which of the two formulae to use – this would normally be the same for both the RPI and the CPI. The only remaining differences in the percentages in a future version of this table would then be the result of different item coverage.

### **Current formulae used in the RPI and CPI, 2012 (Table 1 from ONS consultation document)**

	RPI	CPI
Carli	27%	0%
Dutot	29%	5%
Jevons	0%	63%
Other/weighted formula	43%	33%

### **Price bounce**

Finally, we note that while the problem of price bounce in the Carli has been highly publicised, no assessment has been made of its impact. The example in the consultation paper is misleading, as it involves price switching between outlets within a year. The more important and realistic example of price bounce would be over time and cutting across the January chaining month. Our belief is that while it is definitely a factor, and undesirable, it may be less important than some commentary suggests.

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<sup>9</sup> See *The Formula Effect Gap between the Retail Prices Index and the Consumer Prices Index*, CPAC (12)24, September 2012, available from <http://www.ons.gov.uk/ons/guide-method/development-programmes/other-development-work/consumer-prices-advisory-committee/cpac-papers/cpac-papers---september-2012-meeting.zip>

### **New private rental series**

We agree that the proposed change will lead to a better quality sub-series for private sector rents, and that this change should happen as soon as possible (March 2013). We would however point out the dangers of relying on administrative data such as those from the valuation service. The reason these data have improved in recent years is because of their recent and current policy use in setting housing benefit levels. This is fine so long as this incentive to high quality data remains in place. If in future the benefits system changes so as not to need these data, then there is an equal danger that the quality of this administrative series will deteriorate once again. Service level agreements with the agencies concerned may help to prevent this happening but ONS need to pledge that it will maintain a sub-series for private sector rents using whatever source or sources are necessary to assure the necessary levels of quality. If existing administrative or other sources do not meet the quality standard required ONS must find or establish alternative sources to fill the gap.

## Appendix: Explaining the Formula Effect for Clothing<sup>10</sup>

The ONS is more than half way through a thorough programme of research into the formula effect in the UK, in which it is looking particularly at the formula effect in clothing. Although clothing makes up only about 5% of consumer purchases, it is currently responsible for slightly more than 50% of the overall formula effect. The ONS has published a number of papers – mainly for the Consumer Prices Advisory Committee and the GSS Methodology Advisory Committee – with progress reports on the various strands of this research, but there is no summary table of how far it has got in explaining the formula effect gap between the RPI and CPI in clothing.

This note is an attempt to fill that gap, drawing together all the published ONS clothing research. It is, therefore, incomplete as a summary of where the ONS research has got to so far, since not all the ONS research has been published. In one case data have had to be read off a chart. However, the general impression should be correct as far as the partial information available goes.

The ONS research on clothing covers various time periods. The most detailed work – with the price collection pilot – is for February to July 2012, and therefore, in line with the ONS methodology in CPAC(12)20 we look at the average formula effect gap over this period. Where the ONS research covered earlier periods, we take the results for the year October 2010 to September 2011, when the revised price collection guidelines introduced in 2010 were in effect.

In aggregating the effects of the various changes investigated by the ONS, we are making the assumption that they would be cumulative and additive. This is unlikely to be strictly true, although it is usually not obvious how any differences would manifest themselves. For example, it is probable that changing the base month from January to December would affect the strength of any seasonal effects, but it is not clear *a priori* whether it would increase or decrease them. On the other hand, we would expect that if the definition of clothing items has been tightened up, then the effect of the revised price collection guidelines would be less than if they were introduced with unchanged item definitions. And we would expect that a reduction in seasonal effects would reduce the amount of price bounce caused when chain-linking the Carli index.

We are also making the implicit assumption that the results for the February to July period would hold true for the rest of the year.

Bearing these limitations in mind, Table 1 below shows how the various effects identified by the ONS fit together; as indicated above we recognise that by adding them we are calculating an upper bound. Overall, they provide a comprehensive but still preliminary explanation of the formula effect gap: the main requirement now is to put the tentative estimates currently available onto a firmer basis.

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<sup>10</sup> This appendix has been produced by the RSS technical group but the group wishes to acknowledge that the inspiration for it came from Mark Courtney who also carried out most of the work.

Contributions to eliminating the formula effect						
	Dates test results refer to*	Mean % reduction in formula effect for items tested	Implied overall reduction in average clothing formula effect of 6.0 pp	Impact on CPI inflation	Impact on RPI inflation	Comments
Tightening of definitions	Feb to Jul 2012	13.6	0.8	Lower	Lower	13.6% reduction applied to overall effect
Introduction of seasonal items	Feb to Jul 2012	31.9	0.6	Variable	Variable	We assume one third of clothing items may be seasonal so have applied one third of 31.9% to the overall effect
Change in price collection guidelines	Feb to Jul 2012	8.0	0.5	Lower	Lower	Since tests done on 48 items apply % reduction to overall effect
Outlet stratification	Oct 10 to Sept 11		1.0	Higher	Slightly lower	Test covered total category
<b>Total above if additivity assumed</b>			<b>2.9</b>			
Change of base month	Oct 10 to Sept 11		2	Higher	Little change	Test covered total category. Results read off chart.
<b>Total inc. base month</b>			<b>4.9</b>			
<b>Remaining if total additivity assumed</b>			<b>1.1</b>			
of which inferred price bounce			<b>0.5</b>			
Some ONS tests also covered the period before 2010 when revised guidelines were introduced for clothing but we have used results only for the most comparable last twelve months.						

Before discussing in detail how the numbers are derived, let us interpret the table. The overall formula effect gap between the RPI and CPI for clothing from February to July 2012 averaged 6.0 percentage points according to CPAC(12)24. The table shows that, using ONS research we can decompose this gap into various components. Thus:

The ONS tested the effect of defining clothing items more tightly. If this were carried out for all clothing, with no other changes, the formula effect gap would be reduced by an estimated 0.8 percentage points. The ONS research suggested that both RPI and CPI currently produce higher values of inflation than an index with tighter definitions. The indications are, therefore, that the gap would be closed by a fall in RPI inflation (suggested at around 1.5 percentage points on average from the test) and a smaller (0.7 percentage points) fall in CPI inflation.

0.6 percentage points are attributed to the lack of seasonal items. Thus if seasonal items as tested by the ONS were introduced wherever appropriate in the clothing indices, and everything else were left unchanged, we could expect to reduce the average formula effect gap by 0.6 percentage points. It is unclear from the limited results to date, whether introducing a seasonal distinction has an upward or downward effect on measured inflation levels.

The pilot price collection exercise tested the effect of introducing revised price collection instructions. If these were applied to all garments, the estimated reduction in the formula effect gap is 0.5 percentage points. The revised price collection guidelines have a bigger effect on the level of inflation than on the formula effect gap, producing lower inflation with

both the RPI (about 1.9 percentage points) and CPI (about 1.4 percentage points) aggregation formulae.

The ONS tested the effect of introducing outlet stratification in the price collection process, according to the type of outlet. This led to a reduction in the formula effect difference by an average of 1.0 percentage points over the period when the new price collection guidelines were in force. With outlet stratification the average level of RPI inflation was slightly lower (by 0.3 percentage points) with a rise (0.7 percentage points) in measured CPI inflation.

The ONS also tested the effect of using December rather than January as the base month, and found that – over the period October 2010 to September 2011 when the new price collection guidelines were in force – there was a reduction in the gap between the RPI and CPI clothing inflation averaging about 2.0 percentage points. The size of this gap should not be surprising, since it was recognised as soon as the CPI was introduced in 1997 that using January as the base month was one of the reasons why the formula effect in the UK was so high.<sup>11</sup> The ONS figures show that over the period when the new price collection procedures were in force there was a small increase, on average, in RPI inflation (0.5 percentage points) with the reduction in the formula effect gap being mainly accounted for by an increase in the average level of the CPI (2.5 percentage points).

0.5 percentage points of the formula effect gap are attributed to the upward bias to the RPI arising from “price bounce” (see details below of how this has been inferred).

Finally, there is an unexplained residual of 0.6 percentage points. We would expect this: once we have reduced the variance of prices by introducing tighter item definitions, better treatment of seasonality and a more typical base month, and once we have used one of the available techniques to eliminate price bounce in the RPI (while still using the Carli aggregation formula) an irreducible dispersion of price relatives will remain, so that the different aggregation formulas will give different results. For a group like clothing, it is likely that this residual will actually be larger than 0.6 percentage points, because, as we pointed out earlier, the effects of the various adjustments to price collection and estimation may not be strictly additive. On the other hand, we feel there is scope for further tightening of product definitions and stratifying which would be expected to reduce the gap noticeably.

If we had detailed simulation results for clothing such as the ONS methodology papers<sup>12</sup> report for some alcohol groups, we might be able to decide whether we were justified in closing this remaining gap by changing the RPI aggregation formula to the Jevons or by changing the CPI aggregation formula to the Carli. But these results are not yet available

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<sup>11</sup> D. Fenwick, “The impact of choice of base month and other factors on the relative performance of different formulae used for aggregation of Consumer Price Index data at an elementary aggregate level,” ONS, 1999, in *proc. Ottawa Group fifth meeting*, (Available from [www.statice.is/ottawa/fenwick.pdf](http://www.statice.is/ottawa/fenwick.pdf))

<sup>12</sup> Duncan Elliott, Robert O’Neill, Jeff Ralph and Ria Sanderson, *Stochastic and Sampling Approaches to the Choice of Elementary Aggregate Formula*, ONS Discussion Paper, 5 October 2012; Joseph Winton, Robert O’Neill and Duncan Elliott, *Elementary Aggregate Indices and Lower Level Substitution Bias*, CPAC(12)15 Annex A.

and might well not yield a decisive result. We therefore have to use the indications we have from theory and from the discussions that the ONS has had with clothing retailers: clothing is likely to have a high proportion of fashion goods, where demand changes are a prominent cause of observed price movements. It is most probable, therefore – once all other adjustments have been made – that using the Carli in the RPI would, if anything, leave a residual underestimate of inflation while using Jevons would make a larger underestimate. We therefore make the conservative assumption that retaining the Carli would leave no residual bias, upwards or downwards.

The ONS research thus provides a comprehensive – although admittedly preliminary – explanation of the clothing formula effect gap. It also allows us to estimate the effects that making the various adjustments would have on the levels of the RPI and CPI clothing indices. In this case the results are even more tentative, since for adjustments such as seasonality and tighter definitions we are extrapolating from only a couple of products. And whereas we can be reasonably sure that, for example, tighter product definitions will reduce the formula effect gap, with only the amount of the reduction in question, there is no similarly obvious theoretical reason why tighter product definitions should lead to lower measured levels of both CPI and RPI inflation. It is possible that this might change once full-year results are available. The research so far can therefore be viewed as being indicative of the sort of results that a more comprehensive investigation would produce.

If we assume that all the adjustments investigated by the ONS are justified, then we can see how making various adjustments would affect the average measured inflation level of the clothing CPI and RPI:

Making all the adjustments identified by the ONS would raise CPI clothing inflation by 1.2 percentage points; and it would lower RPI clothing inflation by 3.6 percentage points.

Making all the adjustments identified by the ONS except for eliminating price bounce, would raise CPI clothing inflation by 1.2 percentage points; and it would lower RPI clothing inflation by 3.1 percentage points.

If no adjustments were made except for switching the clothing RPI to using the Jevons formula for elementary aggregation, CPI clothing inflation would be unchanged; and RPI clothing inflation would be lowered by 6.0 percentage points (it would then, on the basis of the ONS results, be underestimating inflation by 1.8 percentage points).

It should be stressed that all these numbers are very tentative and might change considerably once the full programme of ONS research is completed. Nevertheless, they represent our current best guess at the effects of the various possible adjustments.

## Sources of the Estimates

### (i) Item Definition

The clothing price collection project is looking at the effect of tighter item definitions for five garments – women’s formal jacket, women’s work/formal skirt, women’s casual skirt, women’s formal dress, women’s casual dress. Interim results for two of these garments are given in CPAC(12)20 and CPAC(12)24. They show, as expected, that the tighter definitions reduce the average formula effect gap. It is assumed that a similar reduction can be made if tighter item definitions are applied to all garments (allowing for the fact that the average formula effect gap is wider for these goods than for garments as a whole). This may be a generous assumption, since not all garments may have characteristics that need a tighter definition: on the other hand, experience in other countries (and in the UK prior to the 1996 loosening of item definitions) shows that there is considerable scope for tightening item definitions and sub-dividing some existing items.

The interim results also show that in most cases, the tighter definitions reduce the level of the index for both the RPI and CPI and it is not clear why this is so: a full year’s results for more garments may give a better idea of whether this downwards adjustment is general and what is its cause.

### (ii) Introducing seasonal items

The source for the effect of introducing seasonal items are the two ONS papers CPAC(12)20 *Managing the Formula Effect Project Update* and CPAC(12)24 *The Formula Effect Gap between the Retail Prices Index and the Consumer Prices Index*. These contain interim reports on a project in which the ONS has introduced new seasonal distinctions for four garments: men’s casual outer jacket, girl’s jacket, women’s casual outer jacket and women’s vest/strappy top. They are running a pilot price collection in which seasonal adjustment is applied to these garments along with the normal price collection in which no seasonal distinction was made. Interim results for the first six months are reported in chart form for only two of these garments: men’s casual outer jacket and girl’s jacket. The men’s jacket shows the expected seasonal effect but the results for the girl’s jacket are not so clear and the ONS speculates that it might be a less appropriate candidate for seasonal adjustment. Nevertheless, these are the only results we have, and their average effect is taken as being indicative of what would happen if seasonal adjustment applied were more widely (adjusting for the fact that the size of the formula effect gap is wider for these goods than for garments as a whole). In this case, we assume that this sort of seasonal adjustment can be applied to one third of the clothing index (by expenditure). Since women’s outerwear accounts for nearly half the clothing index, this may be a conservative assumption.

In the case of the men’s casual outer jacket, the seasonal adjustment causes a decline in the level of both the RPI and CPI index, whereas for the girl’s jacket there is, on average, an increase. A full year’s data may yield a clearer result. For the moment, we assume no changes in RPI or CPI inflation levels from introducing seasonal items.

### (iii) Price Collection Guidelines

The third strand in the clothing price collection project is looking at the effect of introducing revised price collection guidelines for all garments (other than those with tighter definitions or a new seasonal treatment) which are aimed at encouraging price collectors to select more

strictly comparable products, rather than simply relying on the item 'top-line' descriptions. In this respect they are, to some extent, reversing the effect of the 2010 changes, which loosened the comparability requirements. As expected, paying closer attention to comparability reduced the dispersion of price relatives and led to a modest 0.4 percentage point fall in the formula effect gap. (The price collection project also looked at the effect of re-introducing the T – temporarily unavailable – code, so as not to force the selection of a replacement item if the original item was expected to re-appear subsequently – e.g. after a sale was over. On average, this had no effect once the revised price collection guidelines were in force, and therefore is not included as an additional explanation).

The revised price collection guidelines have a marked effect in reducing the level of both the RPI and CPI clothing indices. Since the revised guidelines are being applied to 48 items, we can be reasonably confident that this is a genuine effect (whereas for seasonal adjustment or tighter item definitions the observed index level effects are only indicative at this stage). It is also not an unexpected effect. The 2010 relaxation of the price collection guidelines was introduced in order to remove what was seen as a strong downwards bias in the clothing index arising because the existing guidelines were picking up the price falls in sale periods but were not picking up price rises when new season goods were introduced thereafter.<sup>13</sup> The revised price collection guidelines, which tighten up the comparability criteria again, were meant to avoid the pre-2010 under-estimation, but it is not surprising that there is a downward adjustment to the price level. Whatever other changes the ONS make to the RPI and CPI they will need to consider what are the most appropriate price-collection guidelines for clothing and whether any downward bias to measured prices can be reduced e.g. by switching to a December base month (discussed below).

#### (iv) Outlet Stratification

As a separate exercise, the ONS looked at the effect of stratifying the clothing item indices by type of outlet. The results are reported in CPAC(12)06 *Managing the Formula Effect, Stratification of Outlets*. Currently the clothing item indices are stratified only into two types, independent or multiple. This exercise recalculated both RPI and CPI clothing indices from 2006 to 2011 with price quotes stratified into six outlet types: supermarkets, high street stores, department stores, discount retailers, independent retailers and mail order companies. The results show that the more stratified indices decreased the formula effect gap by an average of around 0.6 percentage points over January 2006 to September 2011. If only the period from October 2010 to September 2011 is considered, when inflation was being measured under the revised price collection guidelines, the reduction in the formula effect gap is 1.0 percentage points. This would represent a useful contribution to reducing the formula effect, particularly as this sort of stratification could be expected to alleviate the downwards bias inherent in pricing fashion goods. CPAC(12)06 proposed re-visiting the grouping of the retail outlets into lower level strata, constructing elementary aggregate indices at individual retailer level. This would be applied to as many of the retailers in the price sample as possible and the results used to refine the way in which the outlets are grouped into strata.

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<sup>13</sup> Bank of England, Inflation Report, February 2011, page 39.

The ONS paper reports that for both the RPI and CPI the outlet stratified indices were higher than the equivalent published indices for much of the period analysed. This is true for the CPI almost throughout and is what would be expected if stratification was reducing the downwards bias from pricing fashion goods, but over the last two years the stratified index was actually slightly lower for the RPI.

#### (v) Base Year Effects

Paper one in GSSMAC22 *Managing the Formula Effect Gap between the CPI and RPI*<sup>14</sup> reports on an exercise conducted by the ONS in which both the CPI and RPI indices were re-calculated using December rather than January as the base month. The paper notes that December is the preferred month (for the CPI/HICP) under European legislation. For the period 1997 to 2009, when the old price collection guidelines were in force, moving to a December base results in a considerable upward shift in the levels of inflation of both CPI and RPI, by an average of 5.6% in the CPI and 8% in the RPI. This is consistent with the results reported in Fenwick *op cit* for the period 1989 to 1998. It is also consistent with the Bank of England's observation that inappropriate price recording, especially for January sales, was biasing the January base indices downwards. The ONS paper observes that over 1997-2009 switching to a December base raised the RPI index more than the CPI index, in other words it increased the formula effect gap. This is the opposite to the result reported by Fenwick.

The ONS paper notes a change in behaviour from the middle of 2010, coinciding with the introduction of improved price collection guidelines during 2010. In this period, moving to a December base leads to a small increase, on average, on the clothing RPI (0.5 percentage points). It still leads to an increase in the clothing CPI, by an average of about 2.5 percentage points, thus reducing the average formula effect gap by 2.0 percentage points.

This is a powerful result. It suggests that by moving to a December base, combined with the revised, slightly tighter price collection guidelines as in the price collection pilot, it would be possible almost to halve the formula effect gap for clothing, while avoiding any downward bias to the indices from tighter collection guidelines.

#### (vi) Price Bounce

That a chain-linked average of relatives (Carli) index can give rise to price bounce when prices rise and then fall over the linking period has been known ever since the RPI was constructed: the latest, 2010 edition of the ONS Consumer Price Indices Technical Manual says that it will introduce a "small" upward bias. The current – otherwise comprehensive – ONS research programme into the formula effect unfortunately does not include any research into the size of the price bounce effect. This omission is important, because the a major statistical justification given for the option for switching some or all of the RPI's elementary aggregation from the Carli to the Jevons formula is to eliminate price bounce.

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<sup>14</sup> *Managing the Formula Effect Gap between the CPI and RPI*, Paper 1 for the 22<sup>nd</sup> meeting of the GSS Methodology Advisory Committee, available at <http://www.ons.gov.uk/ons/guide-method/method-quality/advisory-committee/2008-2012/22nd-meeting/index.html>

Since there is no direct estimate of the size of the price bounce effect, we have to turn to indirect methods to get at least an indication of its order of magnitude. One approach is to look at the residual. Once we have accounted for all the other identified influences on the clothing formula effect gap – in terms of seasonal adjustment, item definition, price collection, stratification and base month effects – we are left with an unexplained residual of 1.1 percentage points. This is composed of two elements: one is the formula effect difference when an arithmetic and geometric mean applied to dispersed price relatives, once we have eliminated all unwarranted sources of price variance; the second is the price bounce effect in the RPI caused by some price relatives falling and then rising over January. It is implausible that this second effect is higher than the first, and therefore to set it at 0.5 percentage points would be to put it at its upper limit.<sup>15</sup> Of course, taking the residual as 1.1 assumes that all the effects are additive which we know is unlikely to be strictly true; however as we have argued, further tightening of definitions and stratification would reduce the formula effect gap beyond the results obtained in the tests so a residual of 1.1 may not be unrealistic.

As a second approach, we can observe that seasonality also deals with cases where the price of goods falls and rises as the retail cycle proceeds from the new season's offerings to end-of-season sales. This is likely to be a more prevalent and more important effect than price bouncing in January, so the effect of seasonality on the formula effect gap can be taken as an upper limit on the price bounce effect. This gives us 0.6 percentage points as an upper limit.

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<sup>15</sup> This estimate applies only to clothing inflation where the formula effect gap, seasonality and the dispersion of price relatives is particularly large.