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The introduction of new methods for price observations in the Consumer Price Index (CPI) New methods for airline tickets and package holidays

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**THE INTRODUCTION OF NEW METHODS FOR PRICE
OBSERVATIONS IN THE CONSUMER PRICE INDEX (CPI)
NEW METHODS FOR AIRLINE TICKETS AND PACKAGE HOLIDAYS**

Summary:

This report deals with the introduction of new methods for price observation in the Consumer Price Index (CPI).

First in chapter 2 changes are described that were introduced in the measurement of prices for airline tickets and package holidays as of January 2012.

In chapter 3 it is described how new observation methods can be introduced in the CPI production. In many cases there are no noticeable consequences for the users of the results and direct linking is possible.

However, if there are important changes, particularly if the seasonal pattern of the observed prices changes, the consequences may have implications for users. In that case an adjusted method of calculation and publication is desirable. This is the case with the new methods for package holidays and airline tickets.

A roof tile publication and a level correction are introduced as adjusted methods. The roof tile publication leads to a slightly different method for the calculation of official inflation figures.

In the fourth chapter of the report the method for calculating the official inflation figures is presented. Also users are advised on how to use the CPI for indexation purposes.

Keywords: Consumer Price Index, CPI, indexation

1. Introduction

As of January 2012 Statistics Netherlands (CBS) introduced in the Consumer Price Index (CPI) new methods for the observation of prices for airline tickets and for package holidays. In both product groups the seasonal patterns of published results change. In some months these changes have significant impacts on the indices. Therefore CBS recalculated CPI-results for the year 2011. This ensures that published inflation results remain correct.

The recalculations have some consequences for users. In section 4.2 advices will be given on the correct use of the CPI index numbers before and after recalculation for indexation purposes. These advices have been implemented in the rents adjustment module that CBS offers on its website (Indexerinsmodule huuraanpassing; only in Dutch). Analysts may face changes in the patterns of some index series. The impacts of the changes are fully described in section 2.4.

In chapter 2 the changes in the observation methods and their consequences for the results from 2012 are explained. Chapter 3 describes the general strategy for implementing new observation methods. In chapter 4 the calculation of the official inflation figures is explained and advices are given on the use of the results for indexation purposes.

2. New observation methods in 2012

2.1 New method for airline tickets

From 2012 onwards observed prices for airline tickets are entered in the CPI for the month in which the flight will take place. Until 2011 the observed prices were entered in the CPI for the month in which the ticket was purchased.

Airline tickets are often purchased by consumers one or several months before the flight will actually take place. The price of the ticket may vary according to the date and time of the flight and the number of days the ticket is purchased in advance. In order to have a representative sample of prices paid by consumers CBS measures the prices of airline tickets in several months preceding the flights selected for the CPI.

For example, the method change implies that the price a consumer pays in October for a flight departing in December, which was previously included in the October CPI, will be included in the December CPI figure from 2012. The method now introduced is in line with a regulation for the HICP. According to this regulation

observed prices for all services must be entered into the HICP in the month in which the consumption of the service can commence.

2.2 New method for package holidays

As of 2012 CBS will follow short term price fluctuations of package holidays in the CPI.

When measuring prices for package holidays CBS for many years made the distinction between package holidays from the summer season and package holidays from the winter season. The price for a package holiday was until now used for the calculation of the CPI in the season where the tour departs. A sample of prices for tours offered by tour operators in their summer programmes or in their winter programmes was compared with a corresponding sample from the previous year's programmes. In this way it was determined how the price level in the summer or winter programmes had developed in comparison to the previous year. This change was used for the CPI in all months of the summer or winter season. Price differences between the individual months within the seasons were not measured.

For some time now CBS has received detailed data of tours sold by a number of large tour operators. It is now possible to measure short term price developments accurately. The price of package holidays is now entered in the calculation of the CPI in the month where the tour departs. Price differences between the individual months and the seasonal pattern of the price have now become visible in the CPI for package holidays.

2.3 Implementation of the new methods

Already in 2011 CBS had at its disposal data on the basis of the new observation methods. If these new data had already then been introduced into the calculation of the CPI, it would have had a noticeable impact on the inflation figures, but the precise size of the impact would have been unknown. That was not desirable. Therefore during 2011 CBS calculated and published the price index for airline tickets and for package holidays in the same way as in 2010.

Index numbers published in 2011 are therefore fully comparable with the results of earlier years. Also the inflation figures in 2011 were published correctly.

In order to make good comparisons with upcoming results for 2012 the results for 2011 have now been recalculated, using the new methods described above. CBS published these "index numbers after recalculation" next to the "index numbers before recalculation" that were published in 2011.

<p>The 2011 index numbers "after recalculation" are solely meant to compare with results that will be published from 2012 onwards. The index numbers "before recalculation" are meant for comparison with results that were published in other months of 2011 or in earlier years.</p>
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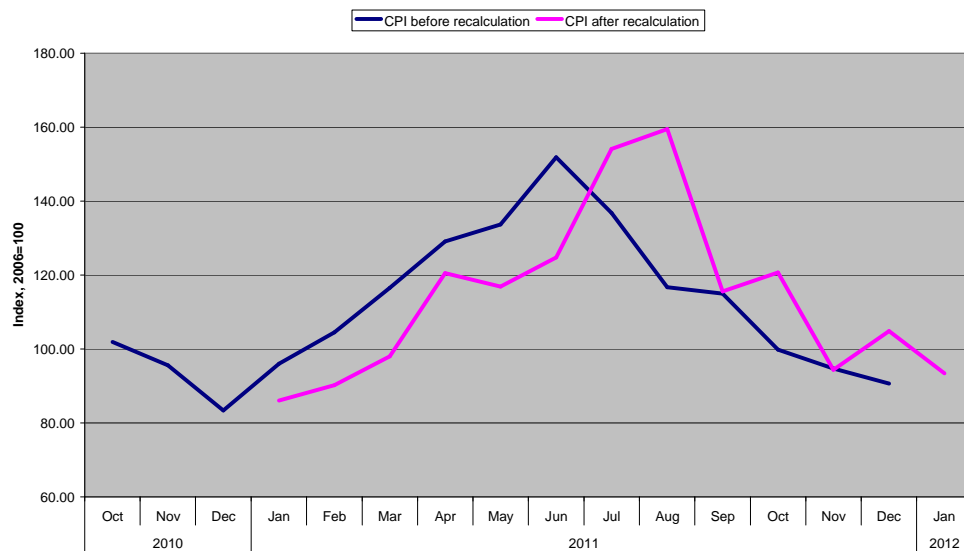
The recalculation was performed in such a way as to ensure that the average indexes for the year 2011 before and after recalculation are equal. A full description of the recalculation method will be given in chapter 3 of this report.

2.4 Index results before and after the recalculation

Table 1 gives index results before and after recalculation for 2011 and comparable results for 2010 and January 2012.

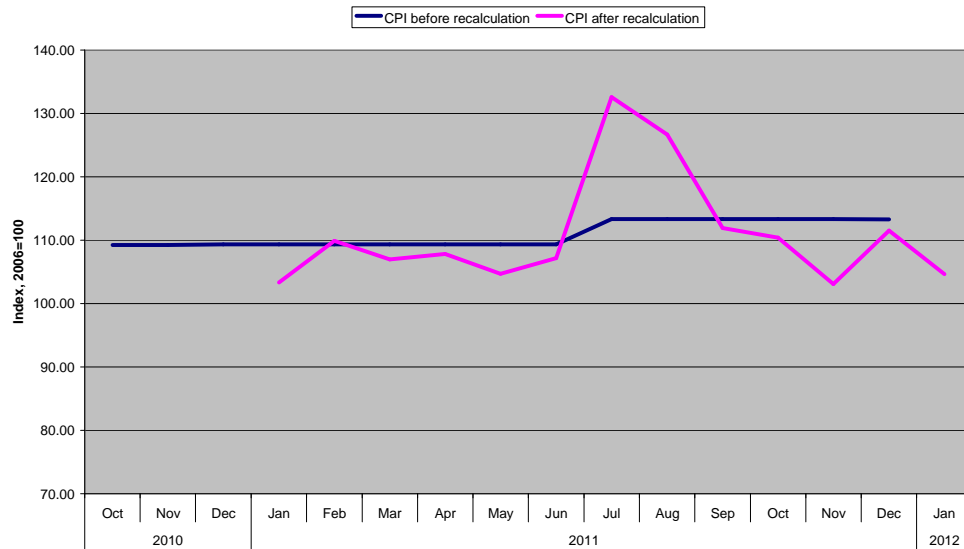
The recalculated price indices for airline tickets show that in 2011 consumers paid the highest fares for flights that departed in July and August. With the index numbers before recalculation this was not the case. They showed decreasing average prices for purchases in July and August. In many case this concerned flights that were to depart only in September or October (see figure 1).

Figure 1: CPI airline tickets before and after recalculation



In the new calculation for package holidays it is shown that highest prices were also paid for tours departing in July and August. Price differences between high season and pre-season were not shown previously in the CPI (see figure 2).

Figure 2: CPI Package holidays before and after recalculation



2.5 The introduction of new methods in the HICP

Following international agreements method changes are always implemented in the Harmonised Index of Consumer Price (HICP) using direct linking. If the new methods have significant impacts on the results of inflation or on the price developments of the product groups concerned, these impacts (the differences between the original and recalculated results) are made available next to the published results.

The Netherlands introduces the new methods retrospectively from 2011. The average HICP results for 2011 do not change, but the 2011 monthly index numbers of 2011 are revised. The new results and the impacts of the new methods on the results are summarized in table 2.

The recalculated index numbers result into new HICP inflation figures for 2011. The adjustments range from -0.2 to +0.4 percentage points.

Table 1. Index numbers and annual rates for the national CPI. Recalculation of prices for airline tickets and package holidays

	0000 TOTAL		0733 Passenger transport by air				0962 Package holidays abroad					
	Index		Annual rate		Index		Annual rate		Index		Annual rate	
	Before recalculation	After recalculation	Calculated from figures before recalculation	Calculated from figures after recalculation	Before recalculation	After recalculation	Calculated from figures before recalculation	Calculated from figures after recalculation	Before recalculation	After recalculation	Calculated from figures before recalculation	Calculated from figures after recalculation
2010 Jan	104.93				96.59				111.30			
Feb	105.68				110.75				111.30			
Mar	106.93				111.49				111.30			
Apr	107.29				136.71				111.30			
May	107.25				125.20				111.30			
Jun	106.74				126.85				111.30			
Jul	106.44				113.13				109.26			
Aug	106.60				106.75				109.26			
Sep	107.26				103.47				109.26			
Oct	107.35				101.86				109.26			
Nov	107.22				95.55				109.26			
Dec	106.99				83.30				109.34			
2011 Jan	107.00	106.87	2.0		96.04	86.10	-0.6		109.34	103.33	-1.8	
Feb	107.74	107.68	1.9		104.52	90.24	-5.6		109.34	109.91	-1.8	
Mar	109.02	108.90	2.0		116.56	98.06	4.5		109.34	106.96	-1.8	
Apr	109.54	109.48	2.1		129.12	120.56	-5.6		109.34	107.82	-1.8	
May	109.71	109.57	2.3		133.73	116.90	6.8		109.34	104.67	-1.8	
Jun	109.18	109.03	2.3		151.87	124.79	19.7		109.34	107.18	-1.8	
Jul	109.23	109.58	2.6		136.78	154.08	20.9		113.34	132.55	3.7	
Aug	109.38	109.76	2.6		116.74	159.48	9.4		113.34	126.68	3.7	
Sep	110.17	110.15	2.7		114.95	115.55	11.1		113.34	111.93	3.7	
Oct	110.15	110.20	2.6		99.84	120.67	-2.0		113.34	110.39	3.7	
Nov	110.01	109.86	2.6		94.75	94.32	-0.8		113.34	103.08	3.7	
Dec	109.54	109.58	2.4		90.67	104.82	8.8		113.27	111.48	3.6	
2012 Jan		109.55		2.5		93.40		8.5		104.63		1.3

Source: Statistics Netherlands

Table 2. Harmonised index HICP. Recalculation of prices for airline tickets and package holidays and impacts on annual rates

	0000 TOTAL					0733 Passenger transport by air					0960 Package holidays				
	Index		Annual rate			Index		Annual rate			Index		Annual rate		
	Original	After recalculation	Original	After recalculation	Impact	Original	After recalculation	Original	After recalculation	Impact	Original	After recalculation	Original	After recalculation	Impact
2010 Jan	105.52					99.27					115.22				
Feb	106.51					113.87					115.22				
Mar	108.08					114.67					115.22				
Apr	108.45					140.51					115.22				
May	108.35					128.74					115.22				
Jun	107.64					130.36					115.22				
Jul	107.01					116.27					113.11				
Aug	107.16					109.74					113.11				
Sep	107.96					106.38					113.11				
Oct	108.22					104.86					113.11				
Nov	108.06					98.30					113.11				
Dec	107.77					85.71					113.19				
2011 Jan	107.68	107.52	2.0	1.9	-0.2	98.93	88.61	-0.3	-10.7	-10.4	113.19	106.97	-1.8	-7.2	-5.4
Feb	108.67	108.60	2.0	2.0	-0.1	107.64	92.92	-5.5	-18.4	-12.9	113.19	113.78	-1.8	-1.2	0.5
Mar	110.21	110.08	2.0	1.9	-0.1	120.00	100.95	4.6	-12.0	-16.6	113.19	110.72	-1.8	-3.9	-2.1
Apr	110.82	110.74	2.2	2.1	-0.1	133.04	124.14	-5.3	-11.7	-6.3	113.19	111.62	-1.8	-3.1	-1.4
May	110.99	110.82	2.4	2.3	-0.2	137.93	120.37	7.1	-6.5	-13.6	113.19	108.36	-1.8	-6.0	-4.2
Jun	110.30	110.12	2.5	2.3	-0.2	156.61	128.67	20.1	-1.3	-21.4	113.19	110.96	-1.8	-3.7	-1.9
Jul	110.06	110.48	2.9	3.2	0.4	140.88	158.88	21.2	36.6	15.5	117.33	137.22	3.7	21.3	17.6
Aug	110.16	110.61	2.8	3.2	0.4	120.38	164.40	9.7	49.8	40.1	117.33	131.14	3.7	15.9	12.2
Sep	111.17	111.15	3.0	3.0	0.0	118.48	119.15	11.4	12.0	0.6	117.33	115.88	3.7	2.4	-1.3
Oct	111.21	111.27	2.8	2.8	0.1	102.81	124.40	-2.0	18.6	20.6	117.33	114.27	3.7	1.0	-2.7
Nov	111.01	110.83	2.7	2.6	-0.2	97.47	97.09	-0.8	-1.2	-0.4	117.33	106.71	3.7	-5.7	-9.4
Dec	110.43	110.48	2.5	2.5	0.0	93.30	107.90	8.9	25.9	17.0	117.26	115.41	3.6	2.0	-1.6
2012 Jan	110.41		2.7			96.13		8.5			108.32		1.3		

Source: Statistics Netherlands

3. General methodology for the introduction of new observation methods in the CPI

3.1 Introduction

The consumer price index (CPI) measures the price development of an extensive basket of goods and services, purchased by consumers. The price observation methods may differ by product and may change in the course of time.

In the past new index series started about every five years, introducing not only a new weighting scheme but also new methods. After the introduction of the yearly base revision in the 2006=100 series there is one continuous series of index results.

In this chapter it is described how changes in methods can be introduced in this continuous CPI series. This can be done by direct linking or by using a roof tile publication with a level correction. The choice between the two methods depends on the nature and impact of the change.

3.2 Direct linking

The consumer price index (CPI) measures the price development goods and services purchased by consumers. The CPI is compiled by measuring the price developments of a representative sample of products and weighing together the results per product or per product group. Inflation is defined as the change of the CPI over a 12 months period. Also monthly rates of change and rates of change over a period of several months or years are of importance to users and analysts.

The method to measure price developments may differ per product. It may depend on characteristics of the product, of the companies selling the products and on the price development characteristics.

The CPI is constantly developing. Each year new products appear in the observed basket and other articles for which the importance for consumers has reduced, disappear. Also there are changes in observation and calculation methods for certain products or in certain enterprises.

Most of the changes in the production process do not lead to significant changes of the measured time series for the products concerned. In that case the new method can simply be introduced without any potential bias in the results. This is called *direct linking*. This linking usually takes place by December. Index numbers for the products concerned are calculated using the old method up to and including the month of December. The monthly change between December and January, and subsequent changes are calculated using the new method.

Changes in the composition of the basket of goods and services and changes in the weights are also usually introduced in December by direct linking to existing results.

3.3 Changes with impact on the measured seasonal pattern

Some changes in method result in a significant change of the measured time series of the product concerned. First of all this concerns changes whereby the seasonal pattern of the product price is measured in a different way. This needs not involve a long term change in the price development. It may also concern other important changes in the CPI calculation.

A seasonal pattern means that observed prices each year in certain months are higher or lower than in other months of that year. Examples of products showing a seasonal pattern are:

- Seasonal products, products that are not available the full year,
- Articles having regular sales periods, e.g. clothing,
- Package holidays and airline tickets.

If a change in the observation method leads to a significant change in the seasonal pattern of the observed prices of a product (group), direct linking may lead to biased inflation results:

- The first problem is that the annual rate in a certain month does not only represent the price trend, but also the difference between the measured seasonal effects in the old and new methods. This may be considered a bias of the annual inflation rate in that month.
- The second problem is that the index series may have a structural shift if the seasonal effects are significantly different for the two methods in the linking month.

3.4 Solutions for changes in the measured seasonal patterns

Both problems can be solved but ask for a different approach. The first problem may be solved using a so-called roof tile publication, the second by an index level correction. Usually both methods will be applied simultaneously.

3.4.1 The roof tile publication

The aim of the roof tile publication is to avoid a bias in the published annual inflation rates after the methods change. In the roof tile method two series on monthly index numbers are calculated:

- During the transition year monthly index numbers for that year are published using the old method. These are fully comparable with results of the preceding year.
- At the end of the transition year next to the published index numbers new index numbers are published for the same year, which are calculated using the new method. These are fully comparable with results that will be published in the subsequent year.

3.4.2 The level correction

The aim of the level correction is to avoid a possible bias in the average inflation figure in the year following the transition to the new method.

Real prices may by seasonal effects in December be extra high (or extra low) compared to average prices in the year. Some methods do not include all seasonal effects in the calculation. If such a method is replaced in December by a new method that does include these extra high (or extra low) prices in the calculation, the average index in the first year after the transition will become too low (or too high).

Then the annual inflation rate may be biased on average in that year. That is undesirable. This is solved by correcting the index during the first year after the introduction of the new method with the average value of that bias.

This bias is not exactly known beforehand. However, if results are calculated using the old and new methods during a year the bias can be determined as the difference between the average indices using the two methods. The new series can then be corrected using this measured bias. The result is that the average indices in the conversion year using the old and new methods are equal.

3.4.3 Combination of roof tile publication and level correction

The roof tile publication requires during a year the calculation of indices using two methods. Also the level correction can only be established exactly after a year of double calculations. Therefore the two methods will often be combined. Results for a year will first be published using the old method. After that year index numbers will be recalculated using the new method. The level correction can then be applied to these new index numbers. These newly calculated index numbers are published next to the original ones.

Note that because of the level correction a roof tile publication for the annual averages is not necessary, as the average indices using the old and new methods were made equal.

4. The compilation of inflation and the use of the index numbers after a recalculation

In this chapter is described which results are published by CBS in the case of a changed method and recalculation. It concerns index numbers, annual inflation rates and monthly rates.

In section 4.2 an advice is given on the use of the CPI for indexation purposes. The “rents adjustment module” which is published on the CBS website, calculates the price changes between any couple of periods in line with these recommendations.

4.1 Published index numbers and published inflation figures

The roof tile publication is first applied by CBS for the year 2011. Scheme 1 below gives an overview of published and still to be published index numbers using the old and new methods for the 36 months of the years 2010, 2011 and 2012.

- Index numbers for the conversion year and earlier years were compiled using the old methods. In the scheme it is months 1 to 12 for the year 2010 and months 13a to 24a for the year 2011.
- Recalculated index numbers for the conversion year and index numbers for following years are compiled using the new methods. In the scheme it is months 13b to 24b for the year 2011 and months 25 to 36 for the year 2012.
- Annual inflation rates in the year 2011 were compiled and published by comparing the original monthly index numbers 13a to 24a with index numbers 1 to 12 for the year 2010 published earlier.
- Annual inflation rates in the year 2012 are compiled and published by comparing the monthly index numbers 25 to 36 for the year 2012 with the recalculated monthly index numbers 13b to 24b for the year 2011.
- Monthly rates in the year 2011 are compiled from the original index numbers 13a to 24a. From January 2012 monthly rates will be compiled using the new method. The first time it will be applied when comparing index number 25 for January 2012 with index number 24b for December 2011.
- The annual average index for the year 2011 as compiled from 13a to 24a equals the average compiled from 13b to 24b.

Scheme 1 Index numbers and inflation figures in a roof tile publication for 2011

Index number	Inflation figure	
	Annual rate	Monthly rate
1 Jan-10		
2 Feb-10		
3 Mar-10		
4 Apr-10		
5 May-10		
6 Jun-10		
7 Jul-10		
8 Aug-10		
9 Sep-10		
10 Oct-10		
11 Nov-10		
12 Dec-10		
Year 2010 = Avg (1:12)		
13a Jan-11 before recalculation	13a / 1	13a / 12
13b Jan-11 after recalculation		
14a Feb-11 before recalculation	14a / 2	14a / 13a
14b Feb-11 after recalculation		
15a Mar-11 before recalculation	15a / 3	15a / 14a
15b Mar-11 after recalculation		
16a Apr-11 before recalculation	16a / 4	16a / 15a
16b Apr-11 after recalculation		
17a May-11 before recalculation	17a / 5	17a / 16a
17b May-11 after recalculation		
18a Jun-11 before recalculation	18a / 6	18a / 17a
18b Jun-11 after recalculation		
19a Jul-11 before recalculation	19a / 7	19a / 18a
19b Jul-11 after recalculation		
20a Aug-11 before recalculation	20a / 8	20a / 19a
20b Aug-11 after recalculation		
21a Sep-11 before recalculation	21a / 9	21a / 20a
21b Sep-11 after recalculation		
22a Oct-11 before recalculation	22a / 10	22a / 21a
22b Oct-11 after recalculation		
23a Nov-11 before recalculation	23a / 11	23a / 22a
23b Nov-11 after recalculation		
24a Dec-11 before recalculation	24a / 12	24a / 23a
24b Dec-11 after recalculation		
Year 2011 = Avg (13a:24a) = Avg (13b:24b)		
25 Jan-12	25 / 13b	25 / 24b
26 Feb-12	26 / 14b	26 / 25
27 Mar-12	27 / 15b	27 / 26
28 Apr-12	28 / 16b	28 / 27
29 May-12	29 / 17b	29 / 28
30 Jun-12	30 / 18b	30 / 29
31 Jul-12	31 / 19b	31 / 30
32 Aug-12	32 / 20b	32 / 31
33 Sep-12	33 / 21b	33 / 32
34 Oct-12	34 / 22b	34 / 33
35 Nov-12	35 / 23b	35 / 34
36 Dec-12	36 / 24b	36 / 35
Year 2012 = Avg (25:36)		

4.2 Advice on the use of index numbers before and after recalculation

With the roof tile publication CBS gives full transparency on the consequences of the changes in methods for the index numbers. The following inflation figures can be considered the official inflation rates as compiled by CBS:

- For the year 2011 annual inflation rates have been compiled monthly using original index numbers from the year 2011 and comparing them with index numbers from the year 2010. The already published inflation rates will not be revised.
- In the year 2012 annual inflation rates will be compiled monthly using index numbers from 2012 and comparing them with recalculated index numbers from the year 2011. These will be the first published inflation figures.
- In the year 2011 monthly rates have been compiled using the original index numbers. These first published figures will remain the official rates of change.
- The annual average index will not be revised so the annual average inflation rate can be compiled using the annual average index numbers.

Direct comparisons between the “new” and “old” index numbers may be biased because of the different patterns of the two series. Such comparisons should therefore be avoided if possible. A direct comparison between the recalculated index number of January 2011 and the result for December 2010 may also be biased by the applied level correction.

For the calculation of the price development over a period that is not one month or one year long, the following rules apply:

- If the end of the period is in December 2011 or earlier the original index numbers should be used.
- If the end of the period is in January 2012 or later and the beginning of the period is in 2011 recalculated index numbers for 2011 should be used.
- If the end of the period is in January 2012 or later and the beginning of the period is in December 2010 or earlier the index numbers are directly compared.