Box VIII-1

Base effects in the CPI

The most common measurement of price changes is consumer price indices. The consumer price index (CPI) is calculated by Statistics Iceland and based on a monthly survey of prices and regular surveys of households' consumption patterns. The total index weighs together prices of goods and services in proportion to their weightings in households' consumer spending. The twelve-month percentage change in the CPI is normally used as a measurement of inflation and the Central Bank's inflation target is defined in such terms.

By using the twelve-month increase in the index the effect of seasonal fluctuations on measured inflation can be largely avoided, for example due to seasonal sales. Nonetheless, the twelve-month increase in consumer prices is not without flaws as a measurement of inflation. The twelve-month change in the CPI does not distinguish between recent price changes and price changes a year before. When changes in the CPI in the base month have a considerable effect on twelve-month measured inflation, this is commonly referred to as a base effect. Base effects are therefore the contribution to changes in the annual rate of measured inflation from abnormal changes in the CPI in the base period. It can make a considerable difference whether changes in inflation are caused by price changes in the current month, or by extreme price changes passing out of the twelve-month comparison.

Calculation of measured inflation
The annual inflation rate (π_t) is calculated as the percentage difference between the CPI in a given month (P_t) and the index value twelve months earlier (P_{t-12}):

$$\pi_t = (P_t/P_{t-12}-1)\times100.$$

The difference between the annual inflation rates in two subsequent months is approximately equal to the difference between the month-on-month rate in the current month and the month-on-month rate twelve months earlier:

$$\pi_t - \pi_{t-1} = (P_t/P_{t-1} - P_{t-12}/P_{t-13})\times100.$$

The change in the annual inflation rate between two subsequent months equals the difference between price changes in the measuring month and changes twelve months earlier. If the index increases abnormally in the period from t-13 to t-12 this will reduce the change in annual inflation between t-1 and t. Base effects can be defined as the contribution of price changes a year ago, (P_{t-12}/P_{t-13}), to the current change in inflation (see ECB, 2005, 2007).

Considerable base effects due to price changes in housing and groceries
Base effects are often very important when price movements are unusually large. Housing price inflation in 2005 is a good example. Owner-equivalent (imputed) rent increased monthly by 3.2% on average during the first four months of 2005.[1] Imputed rent carries a weight of 17% in the CPI and the price increase added almost 2 percentage points to the CPI. During the first four months of 2006 imputed rent increased monthly by 1.4% on average, considerably less than the previous year. The twelve-month change in imputed rent was 24% in December 2005 but had declined to 15% in April

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1. Owner-equivalent rent is the owners' housing cost and is calculated from the market price of housing and mortgage interest cost.

2006 when the impact of the price increase during the same period a year before had passed out of the measurement and been replaced by a smaller price increase.

Changes were made to the housing component of the CPI in May 2005 when Statistics Iceland shortened the reference period for computing real interest costs of housing from five years to twelve months. The impact of this change lowered the CPI by 0.45 percentage points in May 2005, which then passed out of measured inflation in May 2006, resulting in an increase in twelve-month housing inflation.

Competition in the grocery market in spring 2005 was another source of base effects. Temporary fierce competition for market share brought down prices of food and beverages by 10% over a four-month period. The impact lowered the CPI by 1½ percentage point. The twelve-month decrease in food prices was 1% in January 2006, before the base effect of the price decrease a year earlier appeared. In May the twelve-month increase in food prices was over 10%. The difference is largely explained by base effects.

Base effects in 2007
Base effects will have a considerable impact on the development of measured inflation in 2007. During the period March to June 2006 the CPI increased monthly by 1-1.45%. Housing inflation and an increase in the prices of imported goods, mainly new cars and petrol, added the most to the CPI during this period, a total of 2.6 percentage points. In the coming months the impact of these price increases will pass out of the twelve-month inflation figures. Inflation will therefore decrease, other things being equal.

Fluctuations in petrol prices had a considerable impact on inflation developments in 2006. Petrol prices increased almost continuously during the first half of the year but started to decrease in the autumn. Price changes in petrol added only 0.25 percentage points in total to the CPI during last year. Therefore the total base effect does not weigh heavily for 2007 as a whole, but rather in monthly developments. On the other hand, given an unchanged petrol price during 2007, the base effect will reduce twelve-month inflation considerably, most markedly until autumn.

Cuts in indirect taxes in March 2007
The government's plan to cut indirect taxes and excise taxes on food and other goods went into effect in March and shaved 1.4 percentage points off measured inflation. It is likely that a further impact will be felt in the next couple of months. Measured inflation decreases temporarily, until the impact of the price decrease passes out of twelve-month inflation figures after one year. The base effect will lead to a considerable increase in measured inflation in spring 2008. Central banks normally do not consider the first-round effect of changes in consumption taxes on inflation since they do not entail changes in underlying inflation pressures. This can be done by calculating an index excluding these effects, or simply focusing on a longer horizon than one year, when the base effects have surfaced.

References

ECB. (2005). Base effects and their impact on HICP inflation in early 2005. *Monthly Bulletin* January: 31-33.

ECB. (2007). The role of base effects in driving recent and prospective developments in HICP inflation. *Monthly Bulletin* January: 33-35.

Chart 1

Contribution of base effects to inflation
January 2005 - December 2007

Base effects[1]

Month-on-month change in seasonally adjusted inflation
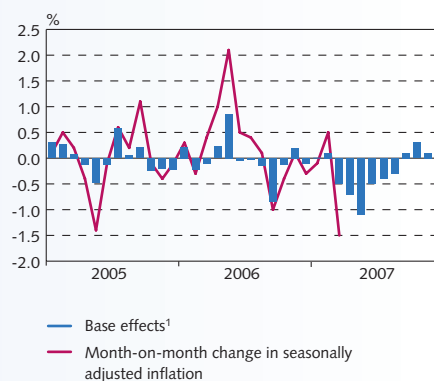
1. Contribution of base effects is the deviation of the month-on-month change 12 months earlier from a 5-year average.
Source: Central Bank of Iceland.