# Constant Prices

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| ***Expressing values in constant prices involves adjusting prices to correct for inflation so that they are expressing purchasing power, or value, on a ‘constant’ or comparable basis between years. This enables an assessment to be made of the true benefits of an intervention.***  |

**Why is it important?**

When prices paid for things in the past are remembered, or past company turnovers looked at, these are expressed in values relating to that particular year, that is **current prices**. To compare these values with today’s there is a need to adjust for price inflation or deflation, which will have altered prices in the intervening years. This enables comparisons to be made on a like-for-like basis.

It is important to adjust for such inflationary effects in price data in order to ensure that values are being compared on a consistent, comparable basis. Most past data will be quoted without such an adjustment: for example consider company turnovers of £100m, £101m and £102m over three years. These suggest that turnover rose slowly over the period (by around 1% a year). However, if inflation had been 2% per year, the real value of turnover has actually reduced, giving a different interpretation of performance.

In appraisals and evaluations, therefore, it is important to adjust prices between years for inflationary effects, so that real rather than nominal values are being compared.

Converting to constant prices must not be confused with **discounting** which is a separate process. This adjusts for the “rate of time preference” to produce calculations of present values. This reflects the fact that, all other things being equal, human beings place greater value on benefits delivered now rather than in the future. This also enables comparisons to be made between costs and benefits that are delivered over different time periods. Calculating constant prices, by contrast, is a procedure which focuses on “real” changes over time, controlling for the effect of price inflation. Generally both adjustments will be made to impacts. An example of this is shown below.

**Adjusting future prices**

The Green Book[[1]](#footnote-1) states that:-

*“5.43: If necessary, the effect of future inflation in the general price level should be removed by deflating future cash flows by forecast levels of the relevant deflator. Over a long time period, the Bank of England’s annual inflation target is the appropriate measure of prices to use as the general deflator.” (p.25).*

The operative words are “*if necessary*”. Experience within SE highlights the inconsistency with which future impacts are reported. For example, if impacts are forecast into the future from a base year, such as 2013, then more often than not these will be in constant, rather than current, prices. For example, impacts at 2017 will be given in 2013 prices rather than current prices derived by factoring in notional annual inflation rates. If these future impacts are then deflated, as the Green Book suggests could be done, then effectively they will be reduced. However, there is no justification for making such an adjustment as the values are already in constant prices.

Unless it is clear as to the price base being used for reporting future impacts then it should be assumed that these are expressed in today’s prices. Accordingly they should not be adjusted in appraisals or evaluations.

However, where it is clear that annual rates of inflation have been factored into forecast values then it is appropriate to deflate these to the appropriate price base.

**When do we need to convert to constant prices?**

All EIAs involving data from **past** years need values to be adjusted to constant prices. Future values are not adjusted as these will be given in constant prices with no inflation being factored in.

**How do we convert to constant prices?**

Monetary values expressed in current prices can be converted to constant prices using the formula:-

Vcox=Vcuri  \* (Px/Pi) *(1)*

Where:-

* Vcox is the value expressed in **constant prices** for the year for which constant prices are to be calculated (Year x), the base year;
* Vcuri is the value expressed in the **current prices** applying in Year i; and
* P refers to the price index applying in Years x and i, with x being the base year of 100.

For example, using the above formula *(1)* if:-

* Vcuri = £250,000;
* Px =100; and
* Pi = 102 (reflecting 2% inflation over the period x-i).

Then:-

Vcox = £250,000 X (100/102)

= £245,098

Thus the value to be used, expressed as constant prices at the base year x, is £245,098 rather than the current value of £250,000.

**Where do we get the data on past price levels?**

The Office for National Statistics publishes time-series data for GDP deflators[[2]](#footnote-2). These quote past prices in relation to a current base year of 100.0.

**Calculating Constant Prices**

Table 1 shows the current price estimates of GVA arising from the evaluation of one of SE’s interventions over a 5 year period. The price index for the base year is 100 and the relevant indices for the earlier years (reflecting inflation) are shown.

To calculate the value of the current price GVA impact of £500,000 in Year -4 in constant prices (at Year 0), these relevant values can be substituted into the formula:-

Vcox=Vcuri  \* (Px/Pi)

Where:-

Vcuri = £500,000

Px = 100

Pi = 90.982

Thus Vcox the constant price value (V) of the impacts at year -4 (i)) is:-

£500,000 x (100/90.982) = £550,164

With all GVA values adjusted in the same way, the cumulative GVA total becomes £3.388 million, rather than the £3.25 million when expressed in current prices. Thus the effect of calculating the impacts in constant prices, taking account of past deflation, is to increase the cumulative GVA impact of the intervention. This example demonstrates that, when there is price inflation, then:-

* Past current values increase when expressed in constant prices at a base year; and
* Were future current prices to be expressed in constant prices, then they would decrease.

**TABLE 1** **Current and Constant Price Impact of an Intervention**

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| --- | --- |
|  | **Year** |
| **-4** | **-3** | **-2** | **-1** | **0** | **Cumulative GVA** |
| **GVA (current prices (£000))** | 500 | 550 | 650 | 700 | 850 | 3,250 |
| **Price index** | 90.982 | 93.745 | 94.979 | 97.606 | 100.00 | - |
| **GVA (constant prices (year 0) (£000)**  | 550 | 587 | 684 | 717548 | 850 | 3.388 |

**Applying Constant Pricing and Discount Rates**

When impact values are discounted to a base year to account for social time preference, this is done after adjusting for constant prices.

**A Worked Example**

It is assumed that the example used above (Table 1) was based upon the evaluation of a company support programme which looked at impacts over a 5 year period. Table 2 models these in more detail. It can be seen that the programme started in year -5, spending £0.300 million, with a further £0.1 million being spent in years -4 and -3. As part of the evaluation the companies in the programme have been asked to estimate the impacts of the intervention over the next 5 years. This data will then be used in SE’s impact model.

Table 2 looks at the metrics and the calculations that have been undertaken in a number of stages:-

* The first stage is to rebase the GVA and cost data to constant prices in year 0 (now year 5 of the impact appraisal)[[3]](#footnote-3). Notice that all past prices have been adjusted but that future GVA estimates are not adjusted. The impact, as can be seen, is to increase both the past impacts and the costs; and
* These constant costs and GVA values have then been discounted back to year 0 of the appraisal period when the first project costs were incurred.

**TABLE 2 Constant Price and Discounting Calculations (£000)**



This shows how constant pricing and discounting adjustments would be performed in the same EIA. In the GVA assessment, the order of calculation would be:-

* Adjust gross GVA to constant prices;
* Apply gross to net effects, that is the additionality adjustments (this has not been done in the above example);
* Then apply the discount rate to get net PV GVA at constant prices; and
* This would then be divided by net PV cost at constant prices to give the net benefit:cost ratio. In this case (accepting that this is gross impact) this would give a ratio of 12:1 (£6.602 million GVA /£0.543 costs).

**Need more help?**

For further information contact:-

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1. <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf> [↑](#footnote-ref-1)
2. <http://www.hm-treasury.gov.uk/data_gdp_index.htm> [↑](#footnote-ref-2)
3. Thus if we consider the Year 2 GVA current price impact of £0.550 million (Column 5, row 3). This becomes a constant price (at the Year 5 base year) of £0.587 million (550 x (100/93.745)). [↑](#footnote-ref-3)