

Data and method: Good examples 3/2013

Counterfactual analyses

What is it?

A counterfactual analysis describes what effects would have occurred if, for example, a tax never would have been introduced. This is difficult to estimate. In this example a kind of counterfactual analysis has been done to analyse what the level of energy use would have been without participating in the Swedish voluntary programme for energy efficiency in energy intensive industries (PFE).

When?

- the audit focuses on policy *effectiveness*, i.e. the outcome of a certain policy
- the effects of a policy instrument is difficult to separate from other causes, i.e. high prices

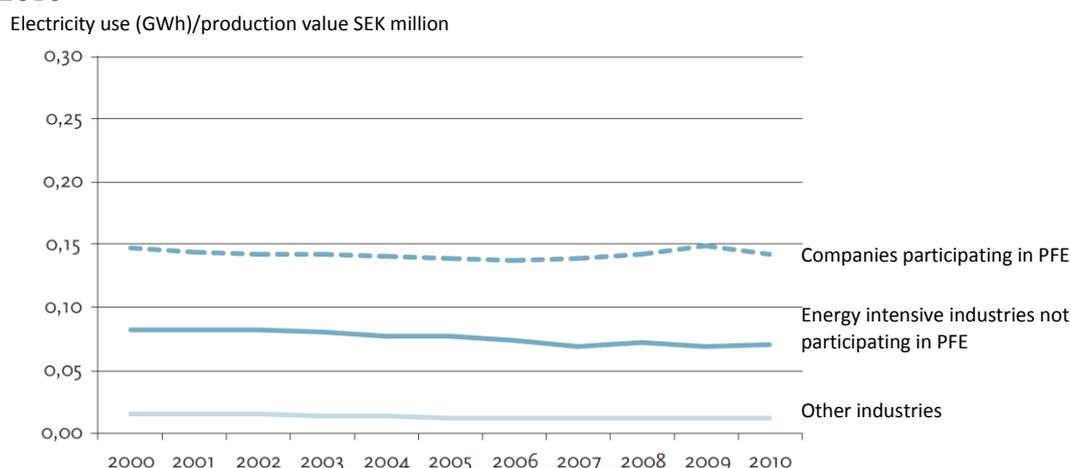
How? Audit example

Example Energy efficiency in industries – Effects of the Central Government's actions RiR 2013:8, the Swedish National Audit Office

The voluntary programme for energy efficiency in energy intensive industries (PFE) was introduced in Sweden in 2005. According to the the Swedish Energy Agency's and the Government's reporting, the results from the first five-year period of the programme has been a major success. However, the results presented did not exclude effects of other causes than participation in the programme. In other words, the result covers not only so-called additional effects. Other reasons for enhancing energy efficiency could, for example, be raised energy prices. What the energy use would have been without the programme has therefore not been considered sufficiently.

The Swedish National Audit Office commissioned Statistics Sweden to calculate energy use and production values in industries, divided into three different groups. The first group comprises the companies participating in the programme. The second group comprises energy-intensive sectors not participating in the programme. The third group comprises all other companies in the industry sector. The data referred to the companies' workplaces and covered the period from 2000 until 2010. As the first period of the programme lasted between 2005 until 2009, the effects of that period were covered (see figure). The conclusion of the audit was that there are only small changes in electricity use by production value both in the PFE-companies as well as in the two other groups of companies during the years 2000–2010.

Figure 1. Electricity use by production value in fixed prices 2005 within the industry 2000–2010



Source: The Swedish National Audit Offices' calculations of data from Statistics Sweden's survey of energy use in industries

Another practical tip of presenting data that could be regarded as business secrets is to normalize micro data by percentiles. In this case, the workplaces energy use by production value is normalized by its share in relation to the group's total energy use per production value. The groups are here; the companies participating in PFE, energy intensive industries not participating in PFE and other industries. Thereafter, the percentiles form a line. Each line corresponds to the energy use per production value per percentile group a specific year, see figure 2 and 3.

Figure 2. Companies participating in PFE ranked by energy use in relation to production value year 2004 and 2010

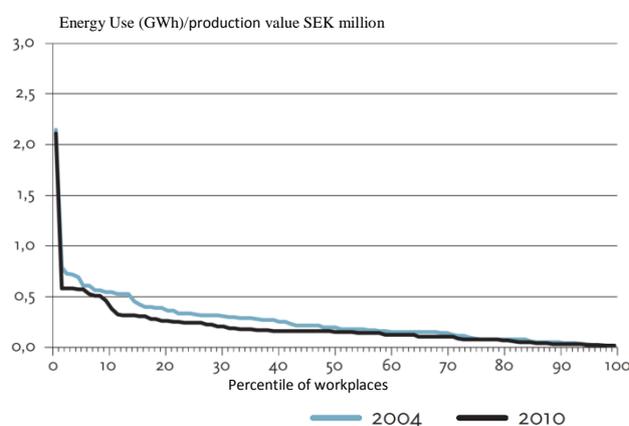
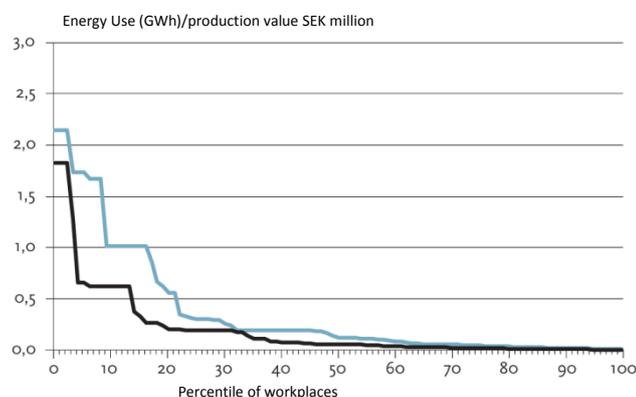


Figure 3. Energy intensive industries not participating in PFE ranked by energy use in relation to production value year 2004 and 2010



Source: Calculations of data from the survey of energy use in manufacturing industries by Statistics Sweden commissioned by the Swedish NAO

The value of the horizontal axis (x-axis) from 0 to 100 shall be interpreted as the whole group. The workplaces with the highest share of energy use per production value are found at the left in the figure, close to 0. The space between the two lines (2004 and 2010) illustrates whether if the energy use per production value has decreased or increased. In this case, the space is larger for the energy intensive industries besides the PFE-companies than of PFE-companies.

One conclusion of the audit was therefore that the energy use in companies participating in the PFE has not decreased to a larger extent than for other energy intensive companies.

General advice

- Be specific with different definitions of categories when performing counterfactual analyses. Strive for using the same definitions, for example regarding energy-intensity, for the different groups compared in the analyses.
- Counterfactual analyses are quite complicated to carry out. Remember that they should be supplemented by other analyses (for example regarding emission reductions).
- Calculate more time, when new methods are used, adjustments will probably be needed.

Sources

Swedish National Audit Office (2013) Energy efficiency in industries – Effects of the Central Government's actions. RiR 2013:8 (only available in Swedish)