

Adjusting costs for inflation in economic evaluations of healthcare

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Introduction

There are two main reasons such adjustment.

- (1) To compare the results of economic evaluations or costing studies undertaken at different time points. This is important since, as emphasised in the World Health Organization (WHO) guidelines, analysts should place their findings in broader context by comparing their findings to other economic evaluations that have been undertaken in the same or neighbouring countries after adjustment for inflation and purchasing power (WHO, 2003).
- (2) To estimate unit costs for specific resources, valued at the appropriate price year, to use as inputs to the economic analysis. Up-to-date unit costs are not always available in the country in the chosen analytical price-year, and hence values from earlier years are used instead, and updated for inflation. One can think of this task as a problem of missing data.

There are a great many price indices published annually covering a wide range of goods and services, and in the subsequent sections we review the construction of the Consumer Price Index, the Gross Domestic Product deflator, and related indices that are specific to healthcare. The choice of one index or another will obviously affect the estimates of costs of treatments (Turner et al., 2019).

No method for measuring costs can be described as objectively “correct” or “incorrect”. “Costs” are not physical units, but are analytically derived estimates of the opportunity cost of the resources that are not available for use elsewhere in society. Nevertheless, it is important to understand what items are included in a given index and how it is constructed, because this will inform any judgement about how accurately or precisely that index is likely to capture trends in the cost of a specific type of healthcare resource or service.

Table 1. Summary of Inflation Indexes.

	CPI	CPI Health component	GDP deflator	NHS Inflation Index
Method of construction	Laspeyres index	Laspeyres index	Paasche index	Paasche index
Types of goods and services included	Goods and services purchased by households	Health goods and services purchased by households	Goods and services produced domestically	Health goods and services produced domestically
Expenditure weights	Fixed basket	Fixed basket	Varying basket	Varying basket

Methods and Materials

Data: Monthly data of CPI, CPI Health component; Quarterly data of GDP Deflator; Annual data of NHS Inflation index.

Countries: France, Germany, Italy, Poland, Portugal, Slovenia, Spain, Sweden, United Kingdom.

Source: Eurostat and Office for National Statistics UK.

Methods:

(1) Graphical evidence of time series.

(2) Association between the Indexes:

$$GDP_{i,t} = \alpha_1 + \beta_1 CPI_{i,t} + \mu_t + c_i + \epsilon_{i,t}, \quad (1)$$

$$GDP_{i,t} = \alpha_2 + \beta_2 CPI\ Health_{i,t} + \mu_t + c_i + \epsilon_{i,t}. \quad (2)$$

$$GDP_t = \alpha_3 + \beta_3 NHS\ Inflation_t + \mu_t + \nu_t. \quad (3)$$

(3) Volatility Analysis of *differenced* time series

Figure 1. Time series of Inflation Indexes

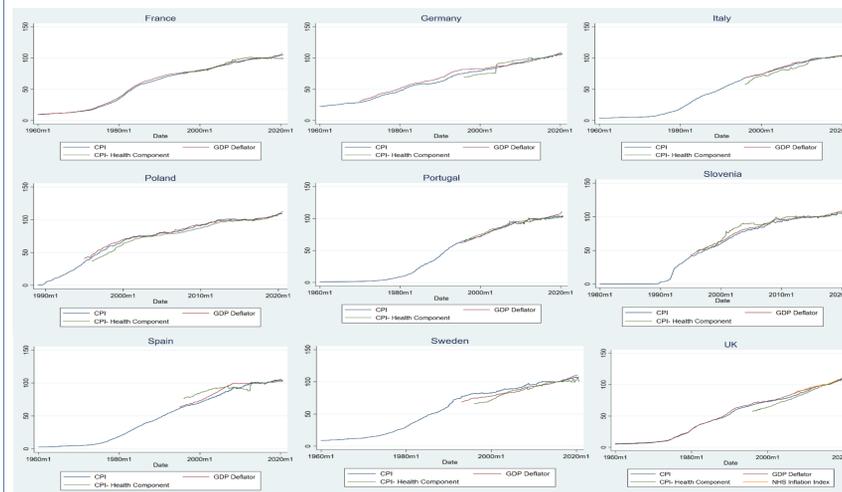


Table 2. Associative model between the Inflation indexes.

	(1)	(2)	(3)	(4)	(5)	(6)
	GDP Deflator	GDP Deflator	GDP Deflator	GDP Deflator	GDP Deflator	GDP Deflator
CPI	0.984*** (0.083)	0.966*** (0.073)				
CPI Health			0.444*** (0.127)	0.411** (0.160)		
NHS Inflation Index					0.268 (0.202)	0.427 (0.295)
Linear Time Trend	0.002 (0.014)	0.015 (0.009)	0.075*** (0.017)	0.148 (0.167)	0.105*** (0.026)	-0.057 (0.216)
Quadratic Time Trend		-0.000 (0.000)		-0.000 (0.000)		0.000 (0.000)
Observations	3915	3915	2664	2664	10	10

Table 3. Volatility Analysis of the Inflation Indexes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	CPI Deflator	GDP Deflator	p-value	CPI Component	CPI Health Component	p-value	GDP Deflator	CPI Health Component	p-value
France	0.211	0.286	0.000	0.211	0.406	0.000	0.286	0.406	0.000
Germany	0.235	0.262	0.006	0.235	0.795	0.000	0.262	0.795	0.000
Italy	0.156	0.281	0.000	0.156	0.416	0.000	0.281	0.416	0.000
Poland	0.376	0.644	0.000	0.376	0.431	0.012	0.644	0.431	0.000
Portugal	0.362	0.370	0.674	0.362	0.519	0.000	0.370	0.519	0.000
Spain	0.337	0.348	0.510	0.337	0.663	0.000	0.348	0.663	0.000
Slovenia	0.481	0.467	0.581	0.481	0.719	0.000	0.467	0.719	0.000
Sweden	0.325	0.331	0.684	0.325	0.629	0.000	0.331	0.629	0.000
UK	0.217	0.415	0.000	0.217	0.382	0.000	0.415	0.382	0.000

Results

- Graphical and empirical evidence (Table 2) confirm that the inflation indexes are highly correlated between each others.
- The volatility analysis (Table 3) provides compelling evidence that the

Recommendations in the Literature

In 2003, the WHO-CHOICE guide to cost-effectiveness analysis noted:

“The most appropriate inflationary measure for adjusting costs for CEA is the one which reflects most closely the general price level of the resources used to produce health interventions. This would probably be the health component of the GDP deflator, but this is available in only a few countries (UK only in the current study). Therefore, we recommend using the GDP deflator. If no GDP deflator is available for a country, the CPI can be used as the second best alternative.”

Kumaranayake (2000) is the main reference of the WHO recommendation. In the paper, he references the World Bank report (1999), which also suggest to use the GDP deflator, as opposed to the CPI that exclusively focuses on privately purchased consumption goods.

The GDP deflator is the broadest measure of inflation as accounts for private consumption, for government spending, and investment in private and public capital goods.

Discussion and Conclusion

The WHO guide to cost-effectiveness analysis (2003) recommendation to use the health component of the GDP deflator seems reasonable for updating the costs of composite healthcare services (such as hospital procedures) that are a combined use of healthcare staff, capital goods, consumables and so on. Such an index has two advantages: first, it reflects the costs of the same types of resources as are used to provide hospital procedures (including investment goods), and second, it is constructed as a Paasche index, which might be important in an innovative, capital intensive sector where technology is frequently updated.

The CPI is designed as an index of prices for goods and services consumed by households. Although it is not as generally appropriate for updating prices or costs of public-sector provided healthcare as the health component of the GDP deflator, there may exist certain categories of healthcare goods and services whose prices are likely to move in the same trend as goods and services consumed by households.

The CPI health sub-index may have limited usefulness for economic evaluation of interventions provided in the public healthcare system. An example where it might be useful is to estimate the change in the price of specific resources in markets where the NHS buys goods and services at approximately the same prices as private consumers. Examples might be specific categories of orthopaedic equipment or devices.