Decomposing Inflation

From the late 1960s through the early 1980s, inflation rose by at least two to three times in many countries due to preceding high growth, tight labor markets, and two oil shocks in the 1970s. The ensuing interest rate hikes, deceleration in economic growth, and the substantial decline in workers' bargaining power not only made high inflation disappear but also sometimes caused inflation to stay below the target inflation pursued by the central banks. In less than one year into the COVID-19 pandemic, the unusually high inflation made a comeback leading to a cost-of-living crisis for millions of people which in turn led to the fall of a series of incumbent governments.

Economists point mainly to four factors for high inflation during the pandemic: supply-chain bottlenecks, fiscal stimuli, concentration in product markets, and the Russia-Ukraine war with the debate on the role of each factor continuing.

This project gathers data and makes publicly available the results of a decomposition analysis that empirical studies have used to link inflation to wages/salaries and profits.

Decomposition Equation

Gross Domestic Product (GDP) can be measured in three different ways relying on either expenditure, output, or income approach. According to the income approach, GDP is measured as the sum of the following three income components:

1. compensation of employees (wages and salaries paid to employees and their employers' social contributions) (simply labor costs),
2. gross operating surplus (business profits) and gross mixed income (profits of the self-employed) (simply profits),
3. taxes on production and imports minus subsidies (i.e., net taxes).

Let W, S, and T denote these (nominal) income components respectively. Let also Y and Y_r denote nominal and real GDP respectively. The income approach leads to the following identity:

$$Y = W + S + T$$

Dividing both sides by real GDP gives us

$$\frac{Y}{Y_r} = \frac{W}{Y_r} + \frac{S}{Y_r} + \frac{T}{Y_r}$$

or

$$P = w + s + t.$$

P on the left-hand side of the equation is simply the GDP deflator. w, the total labor costs divided by real GDP, measures the labor costs per product and is called unit labor costs. Similarly, s and t denote unit profits and unit net taxes respectively. The change in the GDP deflator can then be written as

$$\Delta P = \Delta w + \Delta s + \Delta t$$

dividing both sides of which by P yields

$$\frac{\Delta P}{P} = \frac{\Delta w}{P} + \frac{\Delta s}{P} + \frac{\Delta t}{P}$$

which can be further written as

$$\frac{\Delta P}{P} = \frac{\Delta w}{w}\frac{w}{P} + \frac{\Delta s}{s}\frac{s}{P} + \frac{\Delta t}{t}\frac{t}{P}$$

or

$$\frac{\Delta P}{P} = \frac{\Delta w}{w}\frac{W}{Y} + \frac{\Delta s}{s}\frac{S}{Y} + \frac{\Delta t}{t}\frac{T}{Y}.$$

Finally, we can write

$$\%\Delta P = \%\Delta w\frac{W}{Y} + \%\Delta s\frac{S}{Y} + \%\Delta t\frac{T}{Y}$$

where W/Y, S/Y, and T/Y denote labor share, profit share, and tax share of income respectively.

In words, then, the percentage change in the GDP deflator, i.e., domestic inflation, is the weighted sum of the percentage changes in unit labor costs, unit profits, and unit net taxes where the weights are the corresponding shares of income. Each additive term in the equation represents the contribution of a distinct income component per product to domestic inflation decomposing the latter into three measurable parts. Empirically, all one needs to do is divide each nominal income component by real GDP to find the unit income component, compute the percentage change in it, and then multiply it by the respective income share for each period.

Dashboard

The dashboard, https://bguven.shinyapps.io/inflation-decomposed, makes available the results of the decomposition analysis which is outlined above. You can select a country on the sidebar and view the quarterly contribution of unit labor costs, unit profits, and unit net taxes to domestic inflation for the whole period for which data are available for the selected country. You can also focus on the pandemic patterns and view the decadal averages of the contributions of unit components. The underlying data behind visuals can be downloaded on the *Tables* tab of the dashboard.

Data Source

The decomposition analysis relies heavily on quarterly national accounts data provided by OECD's data warehouse *OECD Data Explorer*. I obtained the quarterly *nominal* GDP and components series from here, real GDP and deflator series from here, and finally Consumer Price Index series from here.

R scripts that extract the series used in the decomposition analysis from OECD data are all available on the project repository.