How to Calculate Contributions to Percent Change in real GDP

The contribution of the ith component to percent change in real GDP is calculated as follows:

$p_{i,t}$: the deflator of the ith component for year t

$q_{i,t}^{(k)}$: the volume of the ith component for the kth quarter of year t

T : fiscal year T, which starts at the 2nd quarter of year t and ends at the 1st quarter of year $t+1$

(a) Year-on-year contributions on a calendar year basis

$$\%\Delta_{i,(t-1)\to t} = 100 \cdot \frac{p_{i,t-1}q_{i,t-1}}{\sum_i p_{i,t-1}q_{i,t-1}} \cdot \left(\frac{q_{i,t}}{q_{i,t-1}} - 1\right)$$

(b) Quarter-on-previous-quarter contributions

$$\%\Delta_{i,(k-1)\to k} = 100 \cdot \frac{p_{i,t-1}q_i^{k-1}}{\sum_i p_{i,t-1}q_i^{k-1}} \cdot \left(\frac{q_i^k}{q_i^{k-1}} - 1\right)$$

* The discrepancy between the growth of the aggregate—benchmarked using the proportional Denton technique—and the sum of the initial estimates of all the component contributions is distributed proportionally over each component.
* The annualized contribution of any component is preliminarily calculated by multiplying its quarterly contribution by 4, and then the discrepancy between the sum of them and the annualized growth rate of the aggregate is distributed proportionally over each component.

(c) Contributions to changes on one year ago: quarter on corresponding quarter of previous year

$$\%\Delta_{i,(t-1,k)\to(t,k)} \fallingdotseq 100 \cdot \frac{p_{i,t-1}q_{i,t-1}^k}{\sum_i p_{i,t-1}q_{i,t-1}^k} \cdot \left(\frac{q_{i,t}^k}{q_{i,t-1}^k} - 1\right) \quad \text{(Approximation)}$$

* The discrepancy between the growth of the aggregate and the sum of the initial estimates of all the component contributions is distributed proportionally over each component.

(d) Year-on-year contributions on a fiscal year basis

$$\%\Delta_{i,(T-1)\to T} \fallingdotseq 100 \cdot \frac{p_{i,T-1}q_{i,T-1}}{\sum_i p_{i,T-1}q_{i,T-1}} \cdot \left(\frac{q_{i,T}}{q_{i,T-1}} - 1\right) \quad \text{(Approximation)}$$

where $\displaystyle p_{i,T-1} = \frac{p_{i,t-1}\sum_{k=2}^{4}Q_{i,t}^k + \dfrac{\sum_i p_{i,t-1}q_{i,t}^4}{\sum_i p_{i,t}q_{i,t}^4} \cdot p_{i,t}Q_{i,t+1}^1}{\sum_{k=2}^{4}Q_{i,t}^k + \dfrac{\sum_i p_{i,t-1}q_{i,t}^4}{\sum_i p_{i,t}q_{i,t}^4} \cdot Q_{i,t+1}^1}$

(For change in inventories, Q is the real stock value of inventories.)

* The discrepancy between the growth of the aggregate and the sum of the initial estimates of all the component contributions is distributed proportionally over each component.

(Notes)

  (1) For net exports, the sign of the contribution may be reverse to that of the change in values, since the real value of net exports is calculated as the real value of exports minus that of imports. In these cases, the contributions show correct signs.

  (2) The contributions of domestic demand, private demand, public demand, and gross fixed capital formation are not equal to the sum of their components' contributions.