International Economics

First Problem Set - Solutions Guide

Spring 2024

1. Being X_t a macromagnitude value in time t, we apply the following formula to compute the indices base 100=2022Q4:

   $$I_{t,2022Q4} = \left(\frac{X_t}{X_{2022Q4}}\right) \times 100 \quad \text{e.g.:} \quad I^{GDP}_{2023Q4,2022Q4} = \left(\frac{386{,}155}{360{,}022}\right) \times 100 = 107.3$$

   The following table shows the computed indices base 100=2022Q4:

	2022Q4	2023Q1	2023Q2	2023Q3	2023Q4
GDP_{mp}	100.0	97.2	101.8	99.9	107.3
GVA^{Agr}_{bp}	100.0	66.3	66.4	52.8	99.5
GVA^{Ind}_{bp}	100.0	98.2	88.4	87.2	100.8
GVA^{Con}_{bp}	100.0	89.5	109.3	92.9	107.1
GVA^{Ser}_{bp}	100.0	92.3	101.3	100.5	107.3
$(t-s)$	100.0	177.1	160.2	163.1	130.3

2. Being X_t a macromagnitude value in time t, we apply the following formula to compute the change rates:

   $$\Delta X_{t,t-1} = \left(\frac{X_t}{X_{t-1}} - 1\right) \times 100 \quad \text{e.g.:} \quad \Delta^{GDP}_{2023Q4,2023Q3} = \left(\frac{386{,}155}{359{,}688} - 1\right) \times 100 = 7.4\%$$

   The following table shows the computed changes between 2023Q4 and 2023Q3:

	GDP_{mp}	GVA^{Agr}_{bp}	GVA^{Ind}_{bp}	GVA^{Con}_{bp}	GVA^{Ser}_{bp}	$(t-s)$
$\Delta_{2023Q4,2023Q3}$	7.4%	88.5%	15.7%	15.4%	6.7%	-20.1%

3. The computed variations are based on values in current terms, not adjusted for seasonality nor calendar effects. This poses two problems when analyzing the variations between 2023Q4 and 2023Q3. The first problem is that it does not adjust for price variation. The computed variations include changes in both quantities and their prices. This makes it difficult to identify the actual change in economic activity. The second problem is that a quarterly variation is calculated in values not adjusted

for seasonality and calendar effects. Consequently, the effect of the economic cycle on the variations is not isolated. This makes it difficult to identify long-term trends in economic activity.

4. Being $I_{t,s}$ the indices base s=100 of a macromagnitude in time t, we apply the following formula to compute the change rate:

   $$\Delta_{t,t-1} = \left(\frac{I_{t,s}}{I_{t-1,s}} - 1\right) \times 100 \quad \text{e.g.: } \Delta^{GDP}_{2023Q4,2023Q3} = \left(\frac{114.3}{113.6} - 1\right) \times 100 = 1.1\%$$

   The following table shows the computed changes between 2023Q4 and 2023Q3:

	GDP_{mp}	C	G	GCF	X	M
$\Delta_{2023Q4,2023Q3}$	0.6%	0.3%	1.3%	0.2%	2.9%	2.6%

5. The GDP increased by 0.6% in the fourth quarter of 2023. This consolidates an entire year of growth for the Spanish economy. Internally, the largest growth was in Public Consumption (G), which grew by 1.3% and has been pushing the economy since 2023Q2. Private Consumtpion (C) expanded by 0.3%, and finished the year with growth in all quarters. Gross Capital Formation (GCF) slightly recovered (0.2%), but failed to regain previous quarter's loss and finished the year below end-2022. Both Exports (X) and Imports (M) expanded more than the economy (2.9% and 2.6%, respectively). The growths follow two quarters of contraction, and despite ending 2023 above 2022 closure, still fail to recover to 2023Q1 levels.

6. The GDP increased by 0.6% in the fourth quarter of 2023. All demand components expanded in the quarter. To correctly calculate which components contributed the most to overall growth, we need to apply the following formula:

   $\Delta M = \Delta m_1 \left(\frac{m_1}{M}\right) + \Delta m_2 \left(\frac{m_2}{M}\right) + \ldots \Delta m_z \left(\frac{m_z}{M}\right)$, with m_z being the subcomponent z of M, Δm_z being the CR of m_z.

   We have the change rate of the demand components (Δm_z), but we do not know the weight attached to each change ($\frac{m_1}{M}$). To compute the weights, we need the values for each component (we already have the total GDP value: M).