



BANK ĊENTRALI TA' MALTA  
EUROSISTEMA  
CENTRAL BANK OF MALTA

# SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY AND ULC GROWTH

Article published in the Annual Report 2023 pp. 72-76

### BOX 3: SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY AND ULC GROWTH<sup>1</sup>

This box looks at sectoral contributions to total labour productivity and real ULC growth during 2023, using national accounts data. To ensure the additivity of sectoral contributions, the analysis utilises the generalised exactly additive decomposition (GEAD) of productivity growth, first developed by Tang and Wang (2004).<sup>2</sup> This method was also applied in a separate analysis of labour productivity growth in Malta over the past two decades.<sup>3</sup>

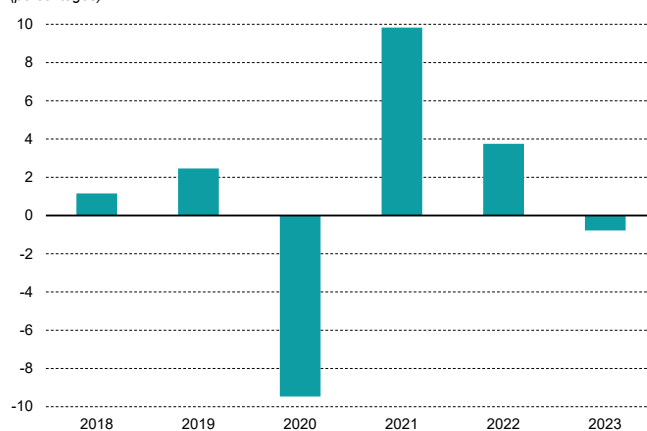
In the GEAD approach, aggregate labour productivity can be decomposed into three effects. The first is the *pure productivity effect*, which is the sector's contribution to aggregate productivity growth that is solely due to changes in its labour productivity, weighted by its share in nominal aggregate output.

There is also a *reallocation effect*, which measures a sector's contribution to aggregate productivity growth due to changes in its relative size. This reallocation effect is split into a static (level) effect and a dynamic (growth) effect. The *static reallocation level effect* measures the impact of absolute changes in labour shares and relative prices, scaled by the ratio of the respective sector's labour productivity level to the economy-wide productivity level. The *dynamic reallocation growth effect* takes into account whether these changes are occurring within a growing or a declining productivity industry.

#### Sectoral contributions to aggregate labour productivity growth

Both economic activity and employment levels continued to grow robustly in 2023, though at a slower rate than in 2022. Nevertheless, labour productivity declined as employment outpaced output. Indeed, employment rose by 6.5% in 2023, while chain-linked GVA rose by 5.7%, according to national accounts data. As a result, labour productivity – measured as chain-linked GVA per person employed – fell by 0.8% during the year under review, following an increase of 3.7% in 2022 (see Chart 1).<sup>4,5</sup>

**Chart 1**  
**PRODUCTIVITY GROWTH**  
(percentages)



Source: NSO.

<sup>1</sup> Prepared by Martina Cassar, Economist within the Economic Projections and Conjunctural Analysis Office. The views expressed are those of the author and do not necessarily reflect the views of the Central Bank of Malta. Any errors are the author's own.

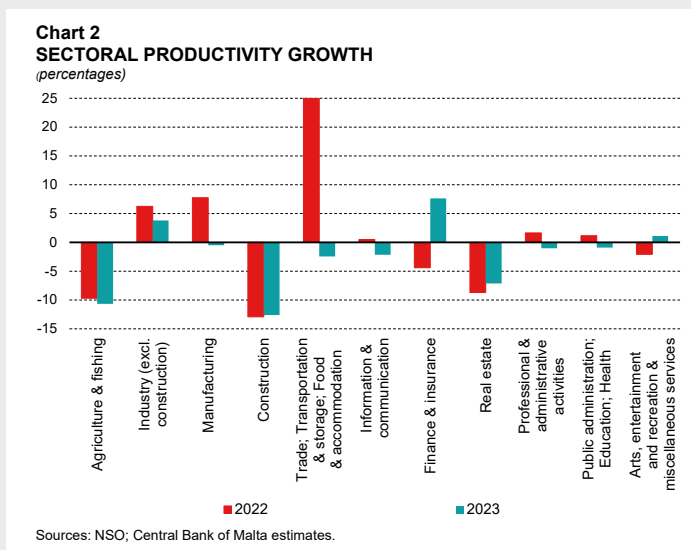
<sup>2</sup> Tang, J., & Wang, W. (2004). Sources of aggregate labour productivity growth in Canada and the United States, *Canadian Journal of Economics*, 37(2), pp. 421-444.

<sup>3</sup> Montebello R., & Darmanin J., (2021). Labour Productivity Growth in Malta: A sectoral decomposition analysis, *Working Paper* 04/2021, Central Bank of Malta.

<sup>4</sup> This analysis is based on GVA per person employed rather than GDP per person employed, as sectoral data are only available for GVA. Aggregate productivity and ULCs may thus deviate from those reported in the section of this Report on costs and competitiveness where aggregate productivity and ULCs are derived using GDP. Another difference stems from the treatment of CPE, which is in nominal terms in that section, but is deflated in this box. Employment figures are based on data from the NSO News Release 039/2024 and therefore do not take into account revisions to LFS employment data made in light of the 2021 Census and published in NSO News Release 044/2024.

<sup>5</sup> Productivity developments would have been better measured using output per hour rather than output per person, particularly during periods in which average hours worked change significantly. However, this analysis could not be made due to the unavailability of sectoral hours worked in the national accounts for Malta. Furthermore, both measures may be affected by limitations in the measurement of output of new sectors.

Sectoral productivity mostly declined in 2023 (see Chart 2). The largest drop in productivity occurred in the construction sector. This decrease amounted to 12.6%. Although this sector registered a drop in its output of 8.2%, employment grew by 5.1%. The agricultural sector also suffered a decline in output with higher employment levels compared to 2022. Meanwhile, productivity growth in the real estate sector declined significantly, but unlike the above-mentioned sectors, GVA growth in 2023 was positive (3.4%). However, this was less than the growth in employment (11.4%). Similar developments occurred in the trade, transportation, the accommodation and food services sector, the information sector, the manufacturing sector, the professional sector, and the sector comprising public sector administration and related activities.



By contrast, sectors comprising industry (excluding construction), finance and insurance, as well as the arts and recreation sector registered higher productivity. The strongest gain is estimated for the sector comprising finance and insurance and amounted to 7.6%. This reflects very strong growth in GVA (11.8%), which offset a 3.9% increase in employment. Productivity developments in the financial and insurance sector must, however, be interpreted with caution, as movements in output might be affected markedly by financial market developments due to the strong shift in monetary policy. Any reversal of the recent tightening in monetary policy could have a negative impact on the value added, and thus productivity of this sector.

Table 1 shows the sectoral contributions to aggregate labour productivity growth derived using the GEAD decomposition. Most sectors have contributed to the decline in productivity growth in 2023. The largest negative contribution (-0.7 percentage point) was brought about by the sector comprising public administration. This reflects the fact that it has a large labour share, and hence, a small drop in its productivity would have a significant impact on total productivity growth.

The sector comprising the trade, transportation, accommodation and food services – which has the highest labour market share, contributed significantly to the drop in overall productivity growth, as did the information and communication sector. Similarly, despite the fact that the construction sector is relatively small, it has contributed significantly to the drop in overall productivity growth on account of its sharp drop in sectoral productivity. Moreover, despite registering some positive growth in productivity, the arts and entertainment contributed negatively to productivity growth, due to a small decline in its labour share and its relative prices in relation to the whole economy deflator.

In line with its rise in productivity, the sector comprising of the finance and insurance services had the largest positive contribution to aggregate productivity growth in 2023, contributing 1.1 percentage points. In addition, the sectors comprising real estate activities and professional services, also contributed positively to overall growth, despite their decline in productivity. This reflects an increase

**Table 1**  
**SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY GROWTH**

*Percentage points; Chainlinked*

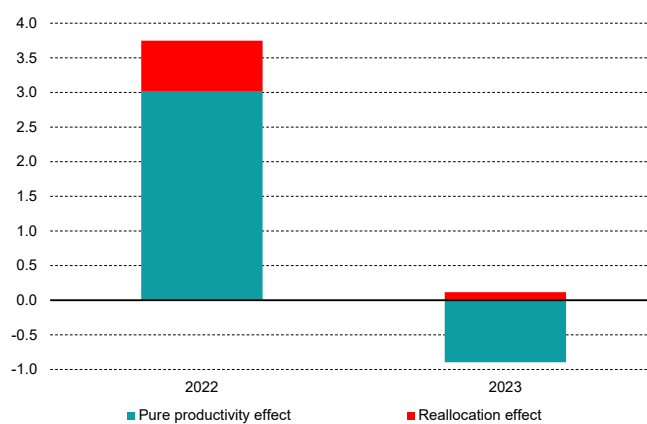
	2016	2017	2018	2019	2020	2021	2022	2023
Agriculture, forestry & fishing	0.0	-0.3	0.0	-0.2	0.2	0.2	-0.1	-0.1
Industry (excl. construction)	0.0	-0.7	0.1	-0.1	-0.4	0.3	0.3	0.0
of which: Manufacturing	-0.4	-0.2	0.0	0.0	-0.2	0.1	0.4	-0.3
Construction	-0.1	0.3	0.3	0.9	-0.1	0.0	-0.2	-0.4
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	-1.6	1.1	-0.4	-0.4	-7.5	3.6	4.4	-0.6
Information & communication	0.9	0.3	0.4	0.7	-0.5	1.3	0.5	-0.5
Finance & insurance activities	0.4	0.2	0.2	0.1	0.5	-0.3	-0.4	1.1
Real estate activities	0.4	0.2	-0.1	0.1	-0.3	0.1	-0.2	0.3
Professional, scientific and technical activities; administrative and support service activities	1.7	1.8	0.0	1.2	-1.9	1.8	0.5	0.5
Public administration and defence; education, health and social work activities	0.2	-0.6	0.3	0.5	-0.1	1.2	-0.8	-0.7
Arts, entertainment and recreation, repair of household goods and other services	-3.0	0.4	0.4	-0.4	0.6	1.4	-0.3	-0.4
<b>Aggregate labour productivity growth (%; GVA-based)</b>	<b>-1.2</b>	<b>2.7</b>	<b>1.2</b>	<b>2.5</b>	<b>-9.5</b>	<b>9.8</b>	<b>3.7</b>	<b>-0.8</b>

Sources: NSO; Central Bank of Malta estimates.

in the labour share of these sectors, and in the case of real estate activities, also an increase in its relative price.

Using the GEAD approach, Chart 3 decomposes overall productivity growth into the pure productivity effect and the reallocation effect. The pure productivity effect – which captures the change in productivity within sectors – was the dominant contributor to the decline in overall productivity in 2023. The contribution of the reallocation effect – which represents the reallocation of resources among sectors – was marginally positive, and its impact was smaller than that in 2022.

**Chart 3**  
**DECOMPOSITION OF PRODUCTIVITY GROWTH**  
*(percentage contributions)*



Source: Central Bank of Malta estimates.

Table 2 elaborates further, by decomposing the contribution of each sector into the pure productivity effect, the reallocation level effect, as well as the reallocation growth effect. The drop in the pure productivity effect was mainly driven by construction, the sector comprising trade, transportation, accommodation and food services, and the real estate sector. Conversely, the sector comprising finance and insurance activities registered the largest positive contribution to the pure productivity effect.

**Table 2**  
**SECTORAL CONTRIBUTIONS TO PRODUCTIVITY GROWTH DECOMPOSED**

Percentage points; Chainlinked

	2023					
	Total contribution	Pure productivity effect	Total reallocation effect	Reallocation effect		
				Reallocation level effect	Reallocation growth effect	
Agriculture, forestry & fishing	-0.1	-0.1	0.0	0.0	0.0	
Industry (excl. construction)	0.0	0.3	-0.4	-0.3	0.0	
of which: Manufacturing	-0.3	0.0	-0.2	-0.2	0.0	
Construction	-0.4	-0.5	0.2	0.2	0.0	
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	-0.6	-0.5	-0.1	-0.1	0.0	
Information & communication	-0.5	-0.2	-0.3	-0.3	0.0	
Finance & insurance activities	1.1	0.6	0.5	0.5	0.0	
Real estate activities	0.3	-0.4	0.7	0.7	-0.1	
Professional, scientific and technical activities; administrative and support service activities	0.5	-0.2	0.6	0.6	0.0	
Public administration and defence; education, health and social work activities	-0.7	-0.1	-0.6	-0.6	0.0	
Arts, entertainment and recreation, repair of household goods and other services	-0.4	0.1	-0.5	-0.5	0.0	
<b>Total economy</b>	<b>-0.8</b>	<b>-0.9</b>	<b>0.1</b>	<b>0.2</b>	<b>0.0</b>	

Sources: NSO; Central Bank of Malta estimates.

Meanwhile, the improvement in the reallocation effect, which reflects changes in labour shares and relative prices, was primarily driven by the real estate sector, the professional and administrative sector, as well as the financial and insurance sector. These outweighed drops registered in other sectors, particularly in the public and administration sector, as well as the arts and entertainment sector.

### Sectoral contributions to growth in real CPE and real ULCs<sup>6</sup>

Real CPE fell by 3.9% in 2023, following a decline of 2.2% in 2022 (see Table 3).<sup>7</sup> Almost all sectors contributed to the decline in real CPE, except the finance and insurance sector.

The largest contributor to the decrease was the sector comprising trade, transportation, accommodation and food services. This was followed by the sector comprising public administration and related activities. Both sectors recorded minimal growth in nominal average wages (less than 1%). As inflation was significantly higher, this resulted in negative contributions to real compensation per person.

Conversely, real wages in the finance and insurance sector rose.

Real ULCs declined by 3.2% in 2023, following a decline of 5.7% in the previous year (see Table 4). The drop in overall real ULCs was due to the decrease in real wages, which surpassed the fall in productivity.

The main driver behind the drop in ULCs was the sector comprising trade, transportation, accommodation and food services activities. This sector experienced a larger drop in real wages than the decline in productivity. Meanwhile, the finance and insurance activities, and the professional and administrative sectors also contributed negatively, as they experienced a drop in real wages and an improvement in productivity.

<sup>6</sup> Using the GEAD decomposition of productivity, it is possible to calculate approximate sectoral contributions to real ULC growth as the log difference of sectoral contributions to CPE growth and aggregate productivity growth.

<sup>7</sup> In this box, real CPE is calculated as total CPE divided by the private consumption deflator.

**Table 3**  
**SECTORAL CONTRIBUTIONS TO GROWTH IN REAL CPE<sup>(1)</sup>**

Percentage points

	2016	2017	2018	2019	2020	2021	2022	2023
Agriculture, forestry & fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry (excl. construction)	0.1	0.2	0.8	0.1	-0.3	0.3	-0.1	-0.3
of which: Manufacturing	0.1	0.2	0.8	0.1	-0.3	0.3	0.0	-0.3
Construction	0.2	-0.1	0.3	-0.3	-0.3	0.0	-0.4	-0.2
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	1.1	-0.9	0.4	-0.4	-1.8	0.5	0.2	-2.1
Information & communication	0.2	0.4	0.8	0.3	-0.2	0.0	-0.2	-0.1
Finance & insurance activities	0.5	-0.1	0.6	0.6	0.2	0.0	0.0	0.2
Real estate activities	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	-0.1
Professional, scientific and technical activities; administrative and support service activities	0.6	-0.5	1.5	-0.2	-0.7	0.3	-0.5	-0.4
Public administration and defence; education, health and social work activities	1.3	0.6	1.7	1.5	0.4	1.9	-0.9	-0.8
Arts, entertainment and recreation, repair of household goods and other services	0.3	1.7	0.8	0.2	-0.2	0.1	-0.3	-0.4
<b>Aggregate CPE growth (%)</b>	<b>4.2</b>	<b>1.3</b>	<b>6.5</b>	<b>1.6</b>	<b>-2.9</b>	<b>2.9</b>	<b>-2.2</b>	<b>-3.9</b>

Sources: NSO; Central Bank of Malta estimates.

<sup>(1)</sup> Sum of sectoral contributions may not exactly match aggregate CPE growth due to chainlinking.

**Table 4**  
**SECTORAL CONTRIBUTIONS TO GROWTH IN REAL ULCS<sup>(1)</sup>**

Percentage points

	2016	2017	2018	2019	2020	2021	2022	2023
Agriculture, forestry & fishing	0.0	0.3	0.0	0.2	-0.3	-0.3	0.0	0.1
Industry (excl. construction)	0.1	0.9	0.7	0.2	0.1	0.0	-0.4	-0.3
of which: Manufacturing	0.5	0.3	0.8	0.1	-0.1	0.2	-0.5	0.0
Construction	0.3	-0.4	0.0	-1.2	-0.1	-0.1	-0.1	0.1
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	2.7	-1.9	0.8	0.0	5.6	-3.1	-4.2	-1.5
Information & communication	-0.7	0.0	0.4	-0.4	0.4	-1.3	-0.6	0.3
Finance & insurance activities	0.1	-0.3	0.4	0.5	-0.3	0.3	0.4	-0.9
Real estate activities	-0.4	-0.2	0.2	-0.2	0.3	-0.2	0.1	-0.3
Professional, scientific and technical activities; administrative and support service activities	-1.0	-2.3	1.5	-1.4	1.1	-1.6	-1.1	-0.8
Public administration and defence; education, health and social work activities	1.2	1.2	1.3	1.1	0.6	0.7	-0.2	-0.1
Arts, entertainment and recreation, repair of household goods and other services	3.3	1.3	0.4	0.6	-0.8	-1.3	-0.1	0.0
<b>Annual ULC growth (%)</b>	<b>5.4</b>	<b>-1.4</b>	<b>5.3</b>	<b>-0.8</b>	<b>7.3</b>	<b>-6.3</b>	<b>-5.7</b>	<b>-3.2</b>

Sources: NSO; Central Bank of Malta estimates.

<sup>(1)</sup> Sum of sectoral contributions may not exactly match aggregate ULC growth due to chainlinking.