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SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY AND ULC GROWTH

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BOX 4: SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY AND ULC GROWTH

In August 2020, the NSO carried out benchmark revisions to national accounts data and published data on chain-linked GVA by sector.¹ This additional information allows for the analysis of sectoral developments in labour productivity and ULCs while accounting for the impact of price changes.

This box looks at sectoral contributions to total labour productivity and real ULC growth during 2021 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).² This method was also employed to analyse labour productivity growth in Malta over the past two decades.³

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.

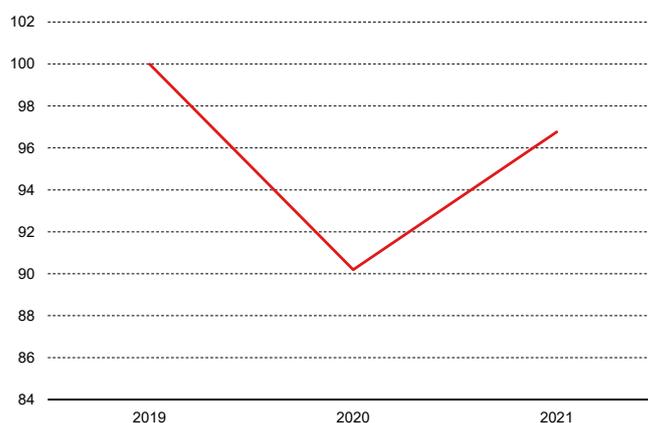
There is also a *reallocation effect* which measures a sector's contribution to aggregate productivity growth due to changes in its relative size. This reallocation effect is split into a static (level) effect and a dynamic (growth) effect. The *static reallocation level effect* measures the impact of absolute changes in labour shares and/or 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

As economic activity rebounded in 2021 – following the sharp contraction in 2020 – aggregate labour productivity levels also rose. Indeed, chain-linked GVA rose by 9.0% in 2021, which follows a contraction of 7.3% in 2020. Meanwhile, according to national accounts data, employment rose by a more modest 1.6% in 2021, after a 2.6% increase in 2020. As a result, labour productivity – measured as chain-linked GVA per person employed – rose by 7.3% in 2021 following a decline of 9.8% in 2020.⁴

Despite the sharp improvement in 2021, the labour productivity level for the whole economy remained below that of 2019 (see Chart 1). While output stood around

Chart 1
PRODUCTIVITY LEVELS
(2019=100)



Source: NSO.

¹ See "The 2020 National Accounts Benchmark Revision", *Quarterly Review* 2021:1.

² 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.

³ Montebello R., & Darmanin J., (2021). "Labour Productivity Growth in Malta: A sectoral decomposition analysis", WP/04/2021, Central Bank of Malta.

⁴ This analysis is based on GVA 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.

1% higher than the level prevailing in 2019, employment stood around 4% higher than its pre-pandemic level.

Almost all sectors registered higher productivity in 2021 except for the agricultural and fishing sector (see Chart 2).

Productivity gains were strongest in the group of sectors comprising trade, transportation, accommodation and food services. The latter were the sectors that experienced the largest decline in productivity in

2020 mainly due to the disproportionate negative impact of pandemic-related containment measures. As containment measures were eased in 2021, the group of sectors' output recovered sharply and outpaced employment growth. Nevertheless, both its output and productivity levels remained below those prevailing in 2019.

In 2021, productivity growth rose strongly also in the arts, entertainment, recreation, and miscellaneous sector, the information and communication sector, as well as in the manufacturing industry. The improvement in productivity in these sectors was also driven by stronger growth in their output relative to that in employment. In each of these sectors, moreover, productivity levels in 2021 were higher than those prevailing in 2019. On the other hand, while productivity growth was positive in the construction sector, the real estate sector as well as in professional and administration sector, productivity levels in these sectors remained below those in 2019.

Table 1 shows the sectoral contributions to aggregate labour productivity growth derived using the GEAD decomposition. In line with its sharp rise in productivity, the sector comprising trade, transportation,

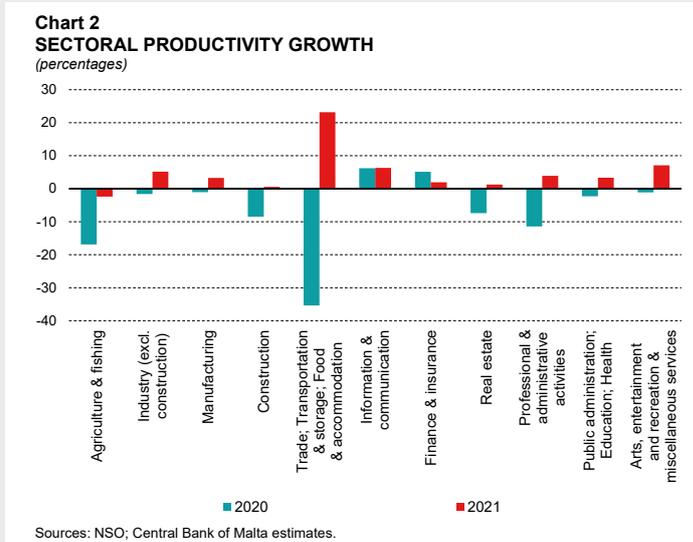


Table 1
SECTORAL CONTRIBUTIONS TO AGGREGATE LABOUR PRODUCTIVITY GROWTH

Percentage points; chain-linked

	2016	2017	2018	2019	2020	2021
Agriculture, forestry & fishing	0.0	-0.3	0.1	-0.2	-0.1	0.0
Industry (excl. construction)	0.0	-0.5	0.1	0.2	-0.6	0.4
of which: Manufacturing	-0.4	-0.1	0.2	0.0	-0.5	0.2
Construction	-0.1	0.3	0.2	0.3	0.0	0.2
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	-1.6	1.0	-0.2	-0.2	-7.5	2.8
Information & communication	0.9	0.4	0.6	0.5	0.4	1.1
Finance & insurance activities	0.4	0.2	0.1	-0.1	0.1	0.0
Real estate activities	0.4	0.1	0.0	0.0	-0.3	0.2
Professional, scientific and technical activities; administrative and support service activities	1.7	1.9	1.1	0.7	-1.8	0.3
Public administration and defence; education, health and social work activities	0.2	-0.3	0.0	0.4	-0.3	1.2
Arts, entertainment and recreation, repair of household goods and other services	-3.0	0.5	-2.1	-0.5	0.3	1.0
Aggregate labour productivity growth (%; GVA-based)	-1.2	3.2	-0.1	1.1	-9.8	7.3

Sources: NSO; Central Bank of Malta estimates.

accommodation and food services had the largest positive contribution to aggregate productivity growth in 2021, contributing 2.8 percentage points.

The public sector had the second largest contribution to aggregate labour productivity growth in 2021, mainly on account of the relatively high share in nominal GVA of this sector, which amplifies its contribution. Moreover, the information and communication sector, as well as the arts and entertainment sector also contributed markedly to the growth in overall labour productivity.

Together, these sectors contributed 3.3 percentage points to productivity growth in 2021.

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 decrease in overall productivity in 2020 but also emerged as the main driver behind the increase in productivity in 2021. However, in 2021, the reallocation effect – which represents the reallocation of resources among sectors – also contributed positively towards the growth in productivity.

The dominance of the pure productivity effect reflects the unique nature of the contraction in 2020 and the recovery in 2021. In 2020, large parts of the economy were forced to shut down or limit production simultaneously, while fiscal support curtailed the number of layoffs. As a result, it is likely that the economy mostly absorbed the COVID-19 shock through a temporary decline in productivity rather than a change in employment or prices. In 2021, most of the recovery in productivity occurred due to the rise in output amid the re-opening of most economic sectors. At the same time, given that many firms had kept headcount numbers generally stable in 2020 despite the decline in activity, employment growth in 2021 was relatively muted, limiting the scope for re-allocation of resources across sectors.

When compared to other recessions, the positive contribution from the reallocation effect during the first year of the recovery from the pandemic seems rather small. For example, following the recession in 2009, the contribution of the reallocation effect to overall productivity growth in 2010 is estimated to have stood at around 2.5%, which is much higher than the 0.7% contribution in 2021. This could reflect the extraordinary fiscal support which was intended to limit the impact of the pandemic on employment levels across all affected sectors. In turn this may have limited the extent of structural changes that typically occur in the recovery period following a recession.⁵

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. While the

⁵ See Montebello R., & Darmanin J., (2021). "Labour Productivity Growth in Malta: A sectoral decomposition analysis", WP/04/2021, Central Bank of Malta, for a decomposition of productivity growth in Malta during and after recessions.

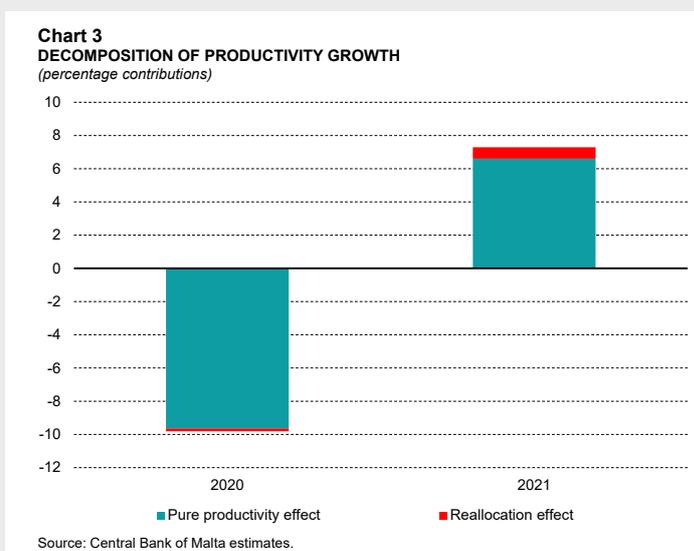


Table 2
SECTORAL CONTRIBUTIONS TO PRODUCTIVITY GROWTH DECOMPOSED

Percentage points; chain-linked

	2021				
	Total contribution	Pure productivity effect	Total reallocation effect	Reallocation effect	
				Reallocation level effect	Reallocation growth effect
Agriculture, forestry & fishing	0.0	0.0	0.0	0.0	0.0
Industry (excl. construction)	0.4	0.5	-0.1	-0.1	0.0
of which: Manufacturing	0.2	0.3	0.0	0.0	0.0
Construction	0.2	0.0	0.1	0.1	0.0
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	2.8	3.2	-0.4	-0.4	-0.1
Information & communication	1.1	0.6	0.5	0.5	0.0
Finance & insurance activities	0.0	0.2	-0.1	-0.1	0.0
Real estate activities	0.2	0.1	0.2	0.2	0.0
Professional, scientific and technical activities; administrative and support service activities	0.3	0.7	-0.4	-0.4	0.0
Public administration and defence; education, health and social work activities	1.2	0.6	0.6	0.6	0.0
Arts, entertainment and recreation, repair of household goods and other services	1.0	0.7	0.3	0.3	0.0
Total economy	7.3	6.6	0.7	0.7	0.0

Sources: NSO; Central Bank of Malta estimates.

group of trade, transportation, accommodation and food services sector was the main driver of the increase in overall productivity in 2021, this sector experienced a negative contribution from the reallocation level effect. This reflects the decline in its relative size in the economy, primarily due to a decline in the share of employment. The reallocation level effect was also negative in the professional and administrative sector and, to a lesser extent, in the financial and insurance activities sector.

Conversely, reallocation level effects were positive in most other sectors, particularly in the public and administration sector, the information and communication sector, as well as in the arts, entertainment, and recreation sectors. In each case, the relative size of these sectors rose in 2021 due to an increase in their employment share.

Sectoral contributions to growth in real compensation per employee and real unit labour costs⁶

Real CPE rose by 2.7% in 2021, following a decline of 2.5% in 2020 when a significant share of employees were receiving below normal wages in terms of the wage supplement scheme (see Table 3).⁷

The largest contributor to the latest increase was the sector comprising the professional and administrative services sector, which reversed some of the decline experienced in 2020. This was followed by higher wages in the public administration, education and health sector, which was partly driven by one-off increases in allowances in the health and defense sectors. The sectors comprising trade, transportation, accommodation and food services, financial and insurance activities, manufacturing, and information and communication also contributed positively to the growth in real wages in 2021. On the other hand, real wage levels in the construction sector fell marginally, while the remainder registered minor changes.

⁶ 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.

⁷ In this box, overall real CPE is calculated as total CPE divided by the overall GVA deflator.

Table 3
SECTORAL CONTRIBUTIONS TO GROWTH IN REAL COMPENSATION PER EMPLOYEE⁽¹⁾

Percentage points

	2016	2017	2018	2019	2020	2021
Agriculture, forestry & fishing	0.0	0.0	0.0	-0.1	0.0	0.0
Industry (excl. construction)	-0.2	0.2	0.0	0.2	-0.1	0.3
of which: Manufacturing	-0.3	0.1	0.0	0.1	-0.1	0.2
Construction	0.2	-0.1	0.0	-0.2	-0.3	-0.1
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	0.6	-1.1	-0.1	-0.8	-1.3	0.5
Information & communication	0.5	0.6	0.6	0.3	-0.3	0.1
Finance & insurance activities	0.5	0.1	0.2	0.7	0.2	0.4
Real estate activities	0.0	0.0	0.0	0.0	0.0	0.0
Professional, scientific and technical activities; administrative and support service activities	0.6	-0.6	0.2	0.0	-1.1	0.8
Public administration and defence; education, health and social work activities	0.7	-0.1	0.4	1.3	0.3	0.7
Arts, entertainment and recreation, repair of household goods and other services	0.5	1.4	0.4	0.3	0.1	0.0
Aggregate CPE growth (%)	3.1	0.3	1.6	1.5	-2.5	2.7

Sources: NSO; Central Bank of Malta estimates.

⁽¹⁾ Sum of sectoral contributions may not exactly match aggregate CPE growth due to chain-linking.

Despite the increase in real wages, aggregate ULCs declined by 4.3% during 2021. This follows an increase of 8.1% in the previous year (see Table 4). The drop in overall ULCs was mainly due to the aforementioned increase in aggregate productivity which offset the increase in real wages. The large decline in labour costs mirrors the sharp correction in output and subsequent rebound, concurrent with the smooth evolution of employment levels during the past two years which have created substantial movements in overall productivity growth. Despite the decline in overall ULCs, labour costs remain a significant concern for firms that participate in the Bank's *Business Dialogue*, especially in view of high labour shortages.

Table 4
SECTORAL CONTRIBUTIONS TO GROWTH IN REAL ULCs⁽¹⁾

Percentage points

	2016	2017	2018	2019	2020	2021
Agriculture, forestry & fishing	0.0	0.3	0.0	0.2	0.1	0.0
Industry (excl. construction)	-0.2	0.7	-0.1	0.0	0.4	-0.1
of which: Manufacturing	0.1	0.2	-0.2	0.1	0.3	0.0
Construction	0.2	-0.5	-0.2	-0.6	-0.3	-0.2
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities	2.2	-2.1	0.1	-0.6	6.2	-2.3
Information & communication	-0.4	0.2	-0.1	-0.2	-0.7	-1.0
Finance & insurance activities	0.1	-0.1	0.1	0.8	0.1	0.4
Real estate activities	-0.4	-0.1	0.0	0.0	0.3	-0.2
Professional, scientific and technical activities; administrative and support service activities	-1.1	-2.5	-0.9	-0.7	0.7	0.5
Public administration and defence; education, health and social work activities	0.6	0.2	0.4	0.9	0.6	-0.6
Arts, entertainment and recreation, repair of household goods and other services	3.4	1.0	2.5	0.7	-0.2	-1.0
Annual ULC growth (%)	4.3	-2.8	1.8	0.4	8.1	-4.3

Sources: NSO; Central Bank of Malta estimates.

⁽¹⁾ Sum of sectoral contributions may not exactly match aggregate ULC growth due to chain-linking.

Similar to the development in sectoral contributions to productivity growth, the main driver behind the drop in ULCs was the group of trade, transportation, accommodation and food services sectors. This was followed by the arts, entertainment and recreation, as well as the information and communication sector. These sectors experienced both an increase in productivity as well as very low growth in real wages. Moreover, the public sector also contributed negatively to overall ULC growth but to a lower extent, also on account of the sector's positive contribution to overall productivity.

Conversely, the professional and administration sector as well as the financial and insurance activities sector, both contributed positively to ULC growth in 2021. This was driven by the positive contribution in their wage levels which outpaced their modest contribution to productivity growth.

A number of observations can be drawn from the above results. Firstly, developments in productivity seem large and extraordinary mainly due to the unique nature of the economic contraction that occurred in 2020 and the concomitant government support to employment. Secondly, despite the strong economic recovery in 2021, the pandemic remained disruptive in some sectors. On the other hand, government support schemes – such as the wage supplement scheme – remained active for most part of the year and have been extended further into 2022. Hence, it is likely that the economy has not yet experienced to the full extent a sectoral reallocation of resources.

Finally, for the purposes of this box, productivity levels calculations are based on the number of persons employed rather than hours worked. The latter would have been a better indicator of changes to sectoral productivities, since hours worked responded much more to the decline in economic activity than employment levels in 2020. However, sectoral data for hours worked are not as yet available.