

DEVELOPMENTS IN THE INFORMATION AND COMMUNICATION SECTOR^{1,2}

Joanna Borg Caruana and Michaela Ghigo

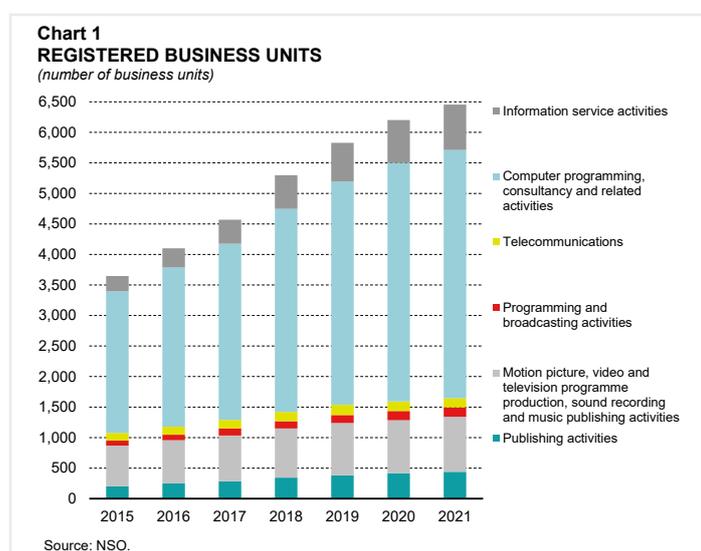
This article is part of a series of studies focusing on different sectors of the economy. This study focuses on the information and communication sector (NACE sector J).³ It assesses key trends and developments in this sector and its main sub-sectors, using different sources of data, including the statistical business register, activity indicators as well as input-output tables.

The information and communication sector is split into six sub-sectors. The first sub-sector covers publishing activities (NACE 58), which include the acquisition of copyrights for content and making this content available to the general public by means of reproduction and distribution. It also includes the publishing of books, directories and mailing lists, leaflets, maps, newspapers, journals, as well as software publishing. NACE 59 covers motion picture, video and television programme production, which includes production of theatrical and non-theatrical pictures on all kinds of media. It also includes sound recording and music publishing activities. The programming and broadcasting sub-sector (NACE 60) includes the creation of content and the acquisition of the right to distribute and broadcast this content, typically on radio and television. The telecommunications category (NACE 61) comprises the transmission of voice, data, text, sound and video. NACE 62 covers computer programming which includes writing and testing software as well as any support needed by the customer. It also includes computer consultancy activities. NACE 63 covers information services activities. These include activities that supply information such as web search portals, data progressing and hosting activities.

Business structure

According to data published by the NSO, the number of business units registered within the information and communication sector stood at 6,454 in 2021, comprising 4.8% of total registered business units in Malta that year (see Chart 1).⁴

During 2021, almost two-thirds of these business units were classified under the sub-sector of computer programming, consultancy and related activities (J62), and a further 14% formed part of the sub-sector comprising



¹ Prepared by Joanna Borg Caruana and Michaela Ghigo, who are Senior Economists at the Economic Analysis Department within the Central Bank of Malta. Helpful comments by Dr Aaron G. Grech and Ms Rita Schembri are gratefully acknowledged. The views expressed in this article are those of the authors and do not necessarily reflect those of the Central Bank of Malta. Any errors are the authors' own.

² The cut-off date for the GVA data is 30 June 2022.

³ The definition of information and communication sector used in this article are based on Eurostat's NACE Rev 2. Statistical classification of economic activities. Further information is available at <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>.

⁴ Registered business data for sector J at NACE division level is available as from 2015 onwards.

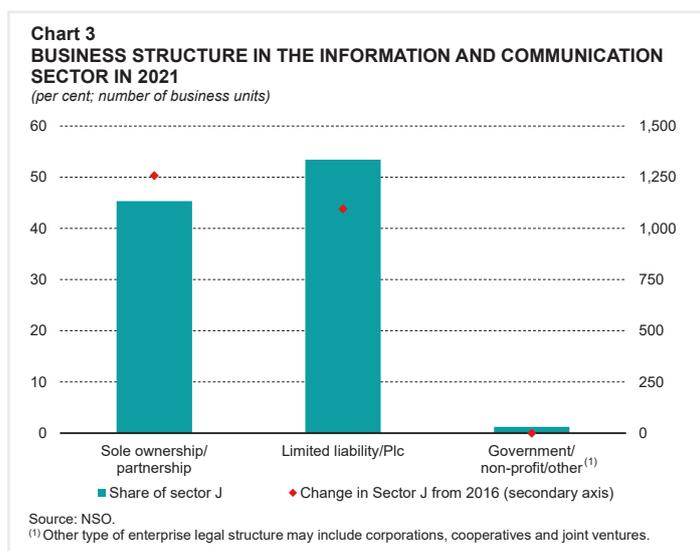
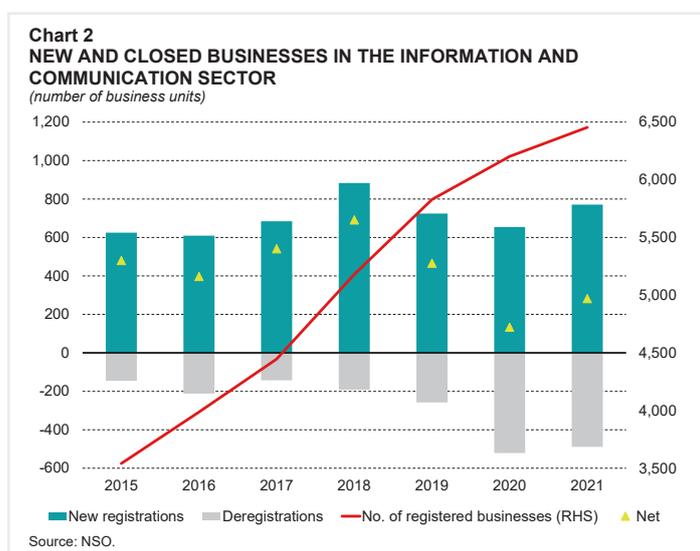
motion picture, video and television programme production, sound recording and music publishing activities (J59). Slightly over 11% of total registered units in sector J were included in the sub-sector comprising information service activities (J63), and almost 7% formed part of the publishing activities sub-sector (J58). The two sub-sectors comprising programming and broadcasting activities, and telecommunications, jointly made up around 5% of total business units in sector J.

Between 2015 and 2021, NACE division J recorded an increase of 77.0% in the number of registered business units, compared with a 39.5% increase for the whole economy. Almost two thirds of the increase in NACE division J reflects growth in the sub-sector comprising computer programming, consultancy and related activities. As a result, this sub-sector continued to increase its dominance throughout the years. Growth in the number of registered business units was also recorded in other sub-sectors, though to a smaller extent, notably in information service activities, publishing activities, and the sub-sector comprising motion picture, video and television programme production.

Additional data for this period show that the share of business units operating in motion picture, video and television programme production, sound recording and music publishing activities, and in the information service activities and publishing activities, retained around 25% of all registered business units between 2015 and 2021. However, the composition of these sub-sectors changed in favour of a greater share of businesses operating in information service activities and publishing activities. The composition of the other sub-sectors changed marginally.

In absolute terms, net registrations in recent years were strongest in 2017 and 2018, as the number of newly registered businesses significantly exceeded the number of deregistered entities (see Chart 2). Net registrations fell significantly during the first year of the COVID-19 pandemic, but began to recover in 2021, although remaining below the average recorded before the pandemic.

In 2021, 53.4% of total registered units were in the form of limited liability companies or public limited companies (see Chart 3). Entities operating as sole proprietors or partnerships

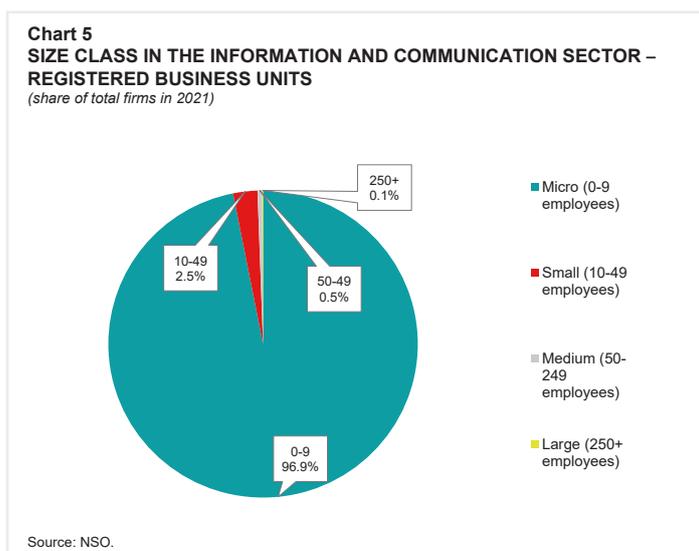
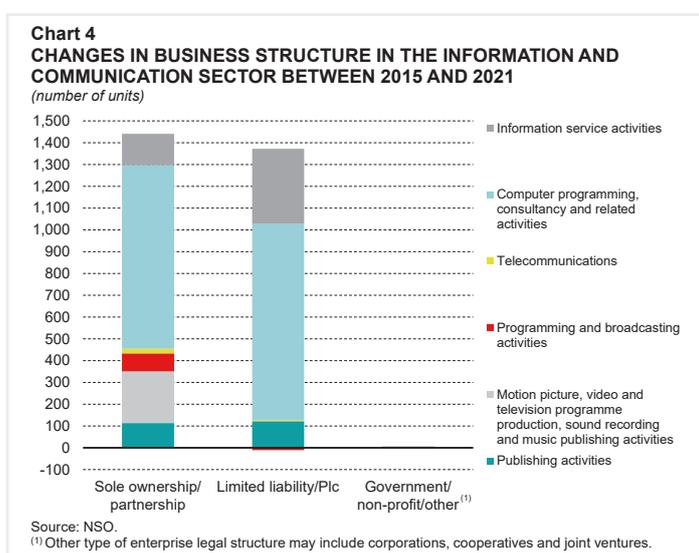


made up 45.3% of total units. The remaining 1.2% operated under a different legal structure, such as corporation, cooperative or joint venture. These figures differ slightly from those recorded in 2015, when over 57% of registered businesses were limited liability companies or public limited companies, while those operating as sole ownerships or partnerships stood slightly above 40%. Thus, sole ownerships and partnerships have gained some importance relative to other legal structures since 2015.

Over this period, the largest increase in registered business units was recorded in the sub-sector comprising computer programming, consultancy and related activities, with the increase broadly evenly spread across limited liability companies or sole ownerships and partnerships (see Chart 4). These were followed by limited liability companies within information service activities and publishing activities and sole ownership/partnerships in the sub-sector comprising motion picture and related activities.

A great majority of around 97% of enterprises within the information and communication sector were classified as microenterprises, employing less than ten employees in 2021 (see Chart 5).⁵ An additional 2.5% were classified as small enterprises, with just 0.5% being classified as medium or large enterprises. The large share of micro enterprises is not only a feature of sector J overall but is also a characteristic of all its sub-sectors.

Data for 2021 suggest that, although microenterprises prevail, they only generated 26.7% of employment in the information and communication sector, representing an increase of 2.9 percentage points from 2015 (see Chart 6). Small business entities accounted for another 26% of jobs, slightly above the 25% registered in 2015. Meanwhile, the share of medium enterprises declined by 8.3 percentage points over the period 2015 to 2021, standing at just over a fifth during 2021, while



⁵ According to the NSO News Release 081/2021 on registered business units, microenterprises are ones which employ up to nine employees. Small enterprises employ between ten and 49 employees, while medium enterprises engage between 50 and 249 employees. Units employing 250 or more employees are considered as large businesses.

that of large enterprises edged up slightly to 26.4%.

Activity indicators

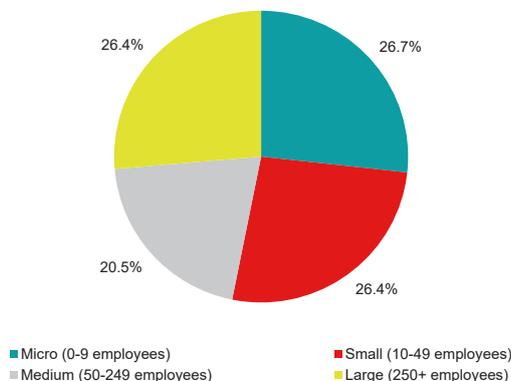
National accounts data show that the volume of GVA in the information and communication sector stood at €1,398.3 million in 2021, making up almost 12.0% of real GVA generated by the whole economy (see Chart 7).

In 2021, sector J's share of total GVA ranked fourth compared to other sectors within the economy. It was superseded only by the sector comprising public administration, education and human health, the wholesale and retail trade, transport, accommodation and food activities sector, as well as the sector comprising professional, scientific and technical activities, and administrative and support service activities.

Following the outbreak of COVID-19 in 2020, sector J's share in the economy's GVA edged up to 11.8% from just below 10% in 2019. Indeed, in 2021, the level of GVA in sector J exceeded its pre-pandemic level by over a fifth. The sector was among those that succeeded to grow despite the pandemic, possibly reflecting the drive towards teleworking and digitalisation during this period.

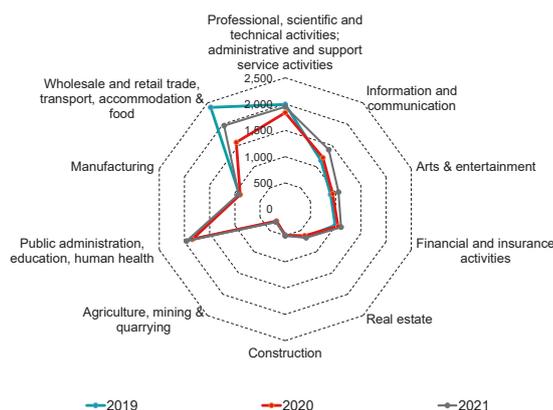
A longer-term assessment of the twenty years prior the pandemic reveals that sector J registered the second largest gain when compared to the other sectors in the economy. Its share more than tripled over this period, reaching 9.9% in 2019 (see Chart 8). Growth in

Chart 6
EMPLOYMENT BY FIRM SIZE IN THE INFORMATION AND COMMUNICATION SECTOR – REGISTERED BUSINESS UNITS
(share of total employment in 2021)



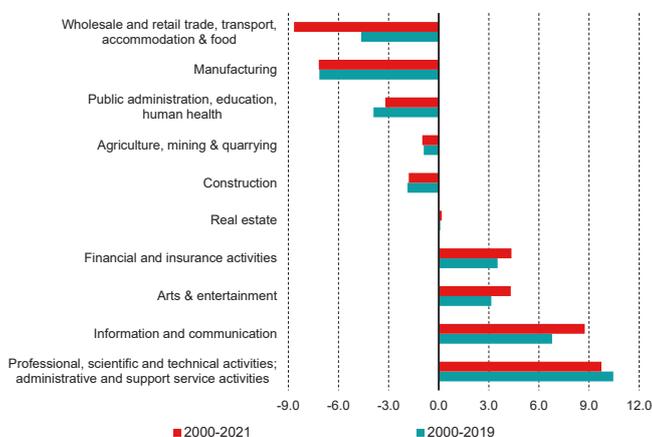
Source: NSO.

Chart 7
SHARE OF REAL GVA BY SECTOR
(EUR millions)



Source: NSO.

Chart 8
CHANGES IN REAL GVA OVER TIME
(as a % total economy)



Source: NSO.

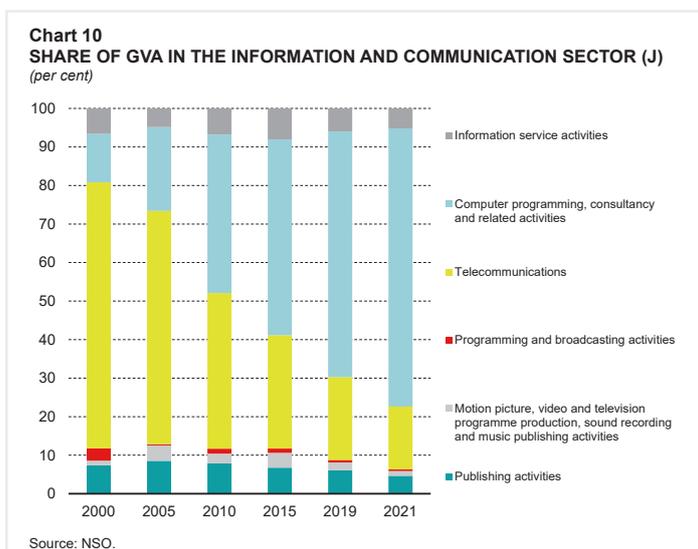
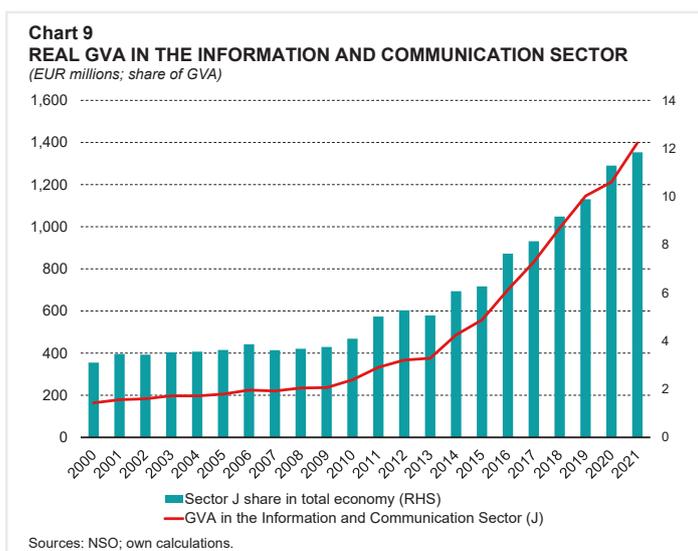
real GVA was particularly significant in 2011, 2014 and 2016, exceeding 20% per annum in each year (see Chart 9). The sector continued to register double-digit growth rates after this period, barring 2020 when the sector's GVA grew by 5.8%.

An assessment of nominal GVA by sub-sector shows that, activity in the sector is now mainly driven by computer programming, consultancy, and related activities (J62).⁶ The latter generated almost three quarters of the sector J's GVA in 2021 (see Chart 10). This is equivalent to 7.4% of total economy GVA.

The share of this sub-sector increased significantly since 2000, when it constituted only around 13% of value added in sector J. By 2015, it already accounted for more than half of sector J's GVA. During this period, Malta experienced increased digitization, improved internet connectivity and a higher number of graduates in ICT.⁷

The telecommunications sub-sector (J61) was the second largest in 2021. However, its share declined considerably over time, from 69.0% in 2000 to 16.3% in 2021. The largest decline was observed in the years between 2015 and 2021. This may reflect the presence of a new competitor and the deregulation of the market, as well as EU directives introduced in recent years, aimed at lower roaming mobile service fees.

The sub-sectors comprising publishing activities and information service activities made up 4.7% and 5.2% of the GVA of sector J, respectively, in 2021. Both sub-sectors have registered declining shares since 2000. The former registered a faster decline in GVA out of the two.



⁶ Chain-linked data at 2-digit NACE are not available in real terms. While chain-linked data are used to assess sector J as a whole, the analysis at sub-sector level is based on nominal data. Therefore, this section does not account for certain factors such as the impact of price changes.

⁷ See the European Commission's Digital Economy and Society Index for Malta: <https://digital-strategy.ec.europa.eu/en/policies/desi-malta>

Table 1
CONTRIBUTION OF SECTORAL GVA TO REAL GDP GROWTH

Percentage points

	2005	2010	2015	2019	2021
GVA	2.2	5.2	9.6	6.1	9.0
Agriculture, forestry and fishing	0.6	0.0	0.0	-0.2	0.0
Mining and quarrying; utilities	-0.4	-0.4	0.8	0.3	0.2
Manufacturing	0.0	1.3	-0.1	0.5	0.2
Construction	-0.2	0.7	0.4	0.5	0.1
Services					
<i>of which:</i>					
Wholesale and retail trade; repair of motor vehicles; transportation; accommodation and related activities	-0.8	0.7	2.8	1.2	3.2
Information and communication	0.2	0.7	0.8	1.1	1.4
Financial and insurance activities	1.1	0.9	0.8	0.3	0.5
Real estate activities	-0.2	0.3	0.6	0.1	0.5
Professional, scientific, administrative and related activities	0.4	1.2	2.4	1.3	1.0
Public administration and defence; education; health and related activities	0.3	0.2	0.6	1.0	1.0
Arts, entertainment; household repair and related services	1.1	-0.4	0.5	0.0	1.0
Annual real GDP growth (%)	3.4	5.5	9.6	5.9	10.3

Source: NSO.

The remaining sub-components (i.e. the sub-sector comprising motion picture, video and television programme production, and programming and broadcasting activities) are relatively small, jointly accounting for 1.7% of GVA in the information and communication sector in 2021. This share has also declined since 2000, reflecting their slower growth relative to other sub-sectors.

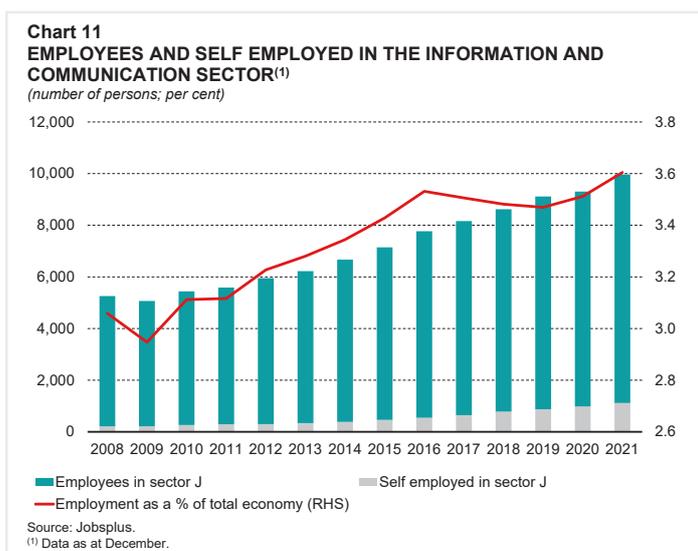
Compared with 2019 levels, the sub-sector comprising computer programming, consultancy and related activities registered an increase of 45.5%. Information service activities also exceed pre-pandemic levels, although by a smaller magnitude (11.4%). By contrast, the GVA in other sub-sectors had still not recovered to pre-pandemic levels, as business activity continued to be adversely impacted by travel restrictions and other containment measures during the year. GVA in the sub-sector comprising motion picture, video, and television programme production, sound recording, and music publishing activities stood over a fifth below its 2019 levels. This was followed by programming and broadcasting activities, where value added stood around 8% below pre-pandemic levels. Similarly, the sub-sectors comprising publishing activities and telecommunications stood at 1.2% and 2.7% less than 2019 levels.

The information and communication sector was the second largest contributor to real economic growth in 2021, exceeded solely by the wholesale and retail trade sector (see Table 1). Sector J's contribution to growth has increased constantly over the past two decades. Overall, in the last 10 years, this sector contributed just over a tenth of annual real GDP growth.

Labour market developments

According to administrative data, after a decline between 2008 and 2009, employment in the information and communication sector started to recover, and even accelerated from 2012 onwards, before slowing down in 2020, with the start of the COVID-19 pandemic (see Chart

11). Employment in the sector stood at around 9,967 workers in 2021, accounting for 3.6% of total employment in Malta. The majority of the workers in the industry are employees, although the share of self-employed workers almost tripled in the period under review. In 2021, the number of employees stood at around 8,852, equivalent to 89% of the job holders in sector J, compared to 96% in 2008, while self-employed workers made up 11% of total employment in the industry. This is in line with that of the other services sectors.



In terms of full-time employment, slightly more than half (53%) of such jobs in the sector in 2021 were generated by the sub-sector of computer programming, consultancy and related services, with 4,789 workers (see Table 2). This was followed by the telecommunications sub-sector with slightly more than 1,494 persons, or 16% of full-time employment. On the other hand, the smallest number of workers working full-time was registered in the programming and broadcasting services sub-sector, with less than 300 employees.

A similar picture emerges from data on the number of persons in part-time employment as a primary job, although in this case, dispersion across sub-sectors is limited, with the number of such jobs being small in all sub-sectors.

On the other hand, the structure of part-time employment as a secondary job is slightly different. While the computer programming and consultancy sub-sector accounts for over a half of such jobs, the second most important sub-sector is that comprising motion pictures, video and television program sub-sector, while the least important sector is the telecommunications sector.

When compared to the other sectors of the economy, the share of part time workers as a primary job in total employment for sector J stood at 8.0% in 2021. This is slightly below the average of 10.0% for the whole economy. By comparison, the sectors for agriculture, accommodation and food services as well as wholesale and retail trade recorded ratios of 15.0% or higher. With regards to the share of part time employment as a secondary job, sector J stood in line with the average for the whole economy.

The number of full-time jobs almost doubled over the past eleven years, with almost three-fourths of the rise generated by the computer programming, consultancy and related services. Other strong increases were observed in the information services as well as the publishing services sub-sectors. On the other hand, the programming and broadcasting services registered a decline of 119 full-time jobs.

Table 2**FULL-TIME AND PART-TIME GAINFULLY OCCUPIED POPULATION⁽¹⁾***Number of persons*

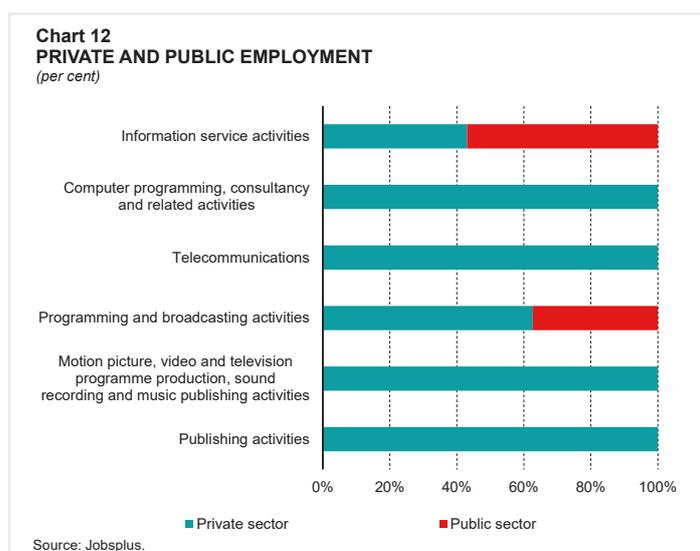
	2010	2015	2019	2020	2021	2021 change from 2010	2021 change from 2019
FULL-TIME EMPLOYMENT							
TOTAL	4,780	6,470	8,275	8,280	9,063	4,283	788
Publishing services	497	499	893	922	1,051	554	158
Motion pictures, video and television programme production services, sound recording and music publishing	300	278	479	451	381	81	-98
Programming and broadcasting services	384	240	269	253	265	-119	-4
Telecommunications services	1,467	1,688	1,650	1,576	1,494	27	-156
Computer programming, consultancy and related services	1,713	3,079	4,019	4,171	4,789	3,076	770
Information services	419	686	965	1,073	1,083	664	118
PART-TIME EMPLOYMENT	1,420	1,290	1,874	2,023	2,243	823	369
Part-time as a Primary Job							
TOTAL	669	673	841	857	904	235	63
Publishing services	68	96	111	109	119	51	8
Motion pictures, video and television programme production services, sound recording and music publishing	147	105	114	102	122	-25	8
Programming and broadcasting services	172	76	63	75	73	-99	10
Telecommunications services	115	151	150	150	125	10	-25
Computer programming, consultancy and related services	157	223	344	349	357	200	13
Information services	10	22	59	72	108	98	49
Part-time as a Secondary Job							
TOTAL	751	617	1,033	1,166	1,339	588	306
Publishing services	58	49	128	138	151	93	23
Motion pictures, video and television programme production services, sound recording and music publishing	206	135	183	180	210	4	27
Programming and broadcasting services	266	125	118	136	133	-133	15
Telecommunications services	28	31	50	57	51	23	1
Computer programming, consultancy and related services	180	261	494	574	691	511	197
Information services	13	16	60	81	103	90	43

Source: Jobsplus.

A similar pattern can be observed in part-time employment, both that as a primary and secondary job. The computer programming and consultancy sub-sector seems to have contributed to more than 85% of the increase in such jobs. Other increases were registered in information services as well as in publishing. On the other hand, programming and broadcasting services recorded declines, while motion pictures, video and television programmes saw a fall in the number of persons with a part-time job as their main source of employment.

Overall, full-time and part-time jobs in this sector explain around 4.5% of the change in employment for the total Maltese economy since 2010.

Table 2 shows that the developments during the COVID-19 pandemic were heterogeneous across sectors. One half of the sub-sectors registered an increase in full-time employment between 2019 and 2020, the first year of the pandemic. This could reflect the differences in the take up of remote working and, to a limited extent, Government support through the Wage Supplement Scheme. Moreover, by 2021, employment exceeded 2019 levels in almost all sub-sectors.



The labour market in sector J is composed of predominantly male workers. Males account for 71% of full-time employment in the sector, a much higher rate than that of 61% for the whole economy. This share ranges from 28% in the education sector to 94% in the construction sector.

Sub-sector data for 2021 show that men outweigh women in almost all sub-categories, except for part-time employment as a primary job in the publishing activities and telecommunications, where more than 60% of workers are females. Nevertheless, the latest indicator for female ICT specialists, presented in the Digital Economy and Society Index (DESI) for Malta, rose higher than the EU average in 2021.⁸ In fact, in Malta women accounted for more than one fourth of its ICT specialists, compared to the EU's average of one fifth.

Less than one-tenth of the workers in the information and communication sector during 2021 were employed with the public sector, with the majority of these working in the information services sub-sectors or engaged in programming and broadcasting activities (see Chart 12). Overall, 93% of the increase in employment since 2008 was driven by new jobs in the private sector.

Foreign workers

The information and communication sector has witnessed a rise in the number of foreign workers, in line with the rest of the economy. By 2021, the number of foreigners employed in the sector stood at 3,241 persons – around ten times the number of foreigners employed in this sector in 2010. Furthermore, foreign workers accounted for almost 30% of total employment in the sector, slightly higher than the 25% rate registered for the whole economy (see Chart 13). Sectors with the largest shares include the art and entertainment, construction as well as accommodation and food services. In these sectors, the share of foreigners to total workers is almost double that of the whole economy.

Almost two-thirds of foreign workers employed in the information and communication sector during 2021 were EU nationals, much less than the share registered in 2010 (86%). Non-EU workers

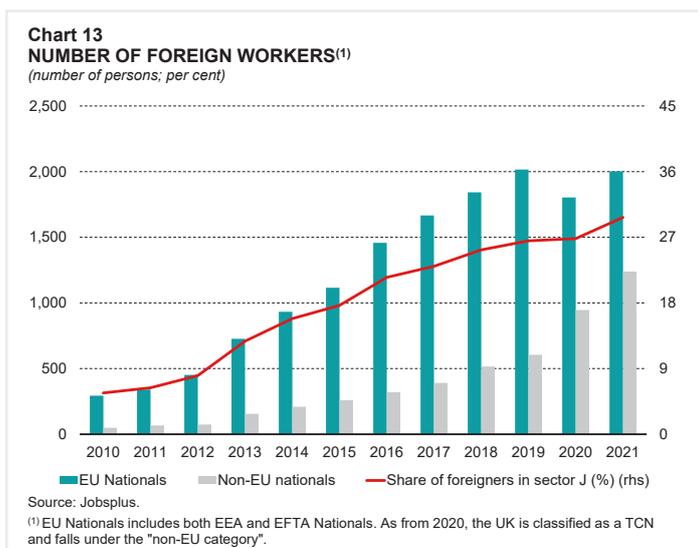
⁸ The DESI is a scoreboard of the European Commission that presents indicators on the digital performance of Member States. The indicator for female ICT specialists is based on data from the LFS. The index can be accessed from [DESI — Digital Scoreboard - Data & Indicators \(digital-agenda-data.eu\)](https://ec.europa.eu/digital-agenda/en/desi-digital-scoreboard-data-indicators)

have been on the increase over the period under review, with an acceleration in the last two years, which partly reflects the re-classification of British foreign workers from EU to non-EU workers after Brexit in 2020.

Overall, foreigners in the information and communication sector account for 4.2% of all foreign workers in Malta.

According to a Central Bank of Malta study on the length of stay of foreign workers in Malta, the information and communication sector had one of the

lowest exit rates at 18.4%, with only the wholesale and retail sector having an even lower exit rate at 17.5%.⁹ This pattern could also be seen in higher length of stays, which could reflect the fact that this industry requires a high degree of expertise.



SPECIAL FOCUS: LINKS WITH THE ARTS, ENTERTAINMENT AND RECREATION SECTOR¹⁰

Growth in activity within the information and communication sector (NACE sector J) coincides with higher activity within the arts, entertainment and recreation sector (NACE sector R). Between 2010 and 2021, GVA in nominal terms in sector R more than doubled, while that in sector J rose by almost four times as much.¹¹ This is mainly due to activity within the computer programming, consultancy and related activities sub-sector within sector J, and the gambling and betting activities sub-sector within sector R.

Both subsectors experienced significant increases in employment. The computer programming and consultancy subsector saw the number of full-time jobs almost triple since 2010, to stand at 4,789 in 2021. The number of part-time jobs also rose strongly. Similarly, in the gambling and betting activities subsector, the number of full-time jobs rose by more than four times the level in 2010, while part-time jobs almost doubled. The share of foreigners in both subsectors grew strongly, much faster than that for the whole economy. In 2021, it reached 41.3% of total employees in the computer programming and consultancy subsector, and 71.3% in the gambling and betting activities subsector.

⁹ Borg, I. (2019), "The length of stay of foreign workers in Malta", *Policy Note* January 2019, Central Bank of Malta.

¹⁰ Prepared by Noel Rapa, Manager Modelling Office in the Research Department, Joanna Borg Caruana and Michaela Ghigo, who are Senior Economists at the Economic Analysis Department within the Central Bank of Malta.

¹¹ Over the period 2010 and 2021, real GVA in sector R rose by more than a third, while that in sector J increased by around five times as much. However, chain-linked NACE data at 2-digit level is unavailable.

Similarities between these two subsectors suggest a growing link between the information and communication, and the arts, entertainment and recreation sectors. To analyse this, we look at the sectoral decomposition of primary and intermediate inputs of the arts, entertainment and recreation sector as well as the composition of output of sector J, decomposed into final demand and intermediate supply. To better gauge the extent of shifts in the linkages between these two sectors, we compare the results derived from the symmetric input-output tables (SIOT) of 2010 with those of 2015.

Starting from the composition of inputs, Table 3 shows that the arts, entertainment and recreation sector has had a consistently high import intensity fixed at just under 60%. The intra-sectoral intermediate output (output produced and used within the same sector) is very low when compared to other industries, suggesting that there are limited links across firms registered within the same sector. This is not common across the rest of the economy. More importantly, when rescaling these proportions as a percentage of intermediate inputs only, one can see that the dependency of sector R on intermediate outputs supplied by the information and communication sector has more than doubled between 2010 and 2015, rising from 25% of total intermediate inputs used by the arts and entertainment and recreation sector to 66%.

Similar trends can be seen when looking at the composition of output of the information and communication sector. First, the proportion of sector J's output directly devoted to final demand has fallen considerably, from 66% to 40% in the five years under consideration (see Table 4). This indicates that the information and communication sector has over time become more important as a supporting sector to other sectors. Moreover, the importance

Table 3
COMPOSITION OF TOTAL AND INTERMEDIATE INPUTS OF SECTOR R: ARTS, ENTERTAINMENT AND RECREATION

Percentage

	2010	2015
% of total inputs		
Primary inputs		
Imports	58.3	57.4
Taxes	2.2	0.3
Compensation of employees	5.5	4.3
Operating surplus	24.8	20.3
Intermediate Inputs		
Sector J	2.3	11.8
Sector R	0.5	0.7
Other intermediate	6.4	5.3
% of intermediate inputs (<i>rescaled</i>)		
Sector J	25.2	66.3
Sector R	5.6	3.9
Other intermediate	69.2	29.8

Source: Authors' calculations.

Table 4
COMPOSITION OF TOTAL AND INTERMEDIATE INPUTS OF SECTOR J:
INFORMATION AND COMMUNICATION

Percentage

	2010	2015
% of total inputs		
Final demand	66.7	39.4
Sector J	10.3	14.2
Sector R	5.0	33.9
Other intermediate	18.0	12.4
% of intermediate inputs (rescaled)		
Sector J	30.9	23.5
Sector R	15.0	56.1
Other intermediate	54.0	20.4

Source: Authors' calculations.

of sector R within the intermediate input chain of sector J has increased drastically from 15% to 56%, again suggesting a very close link between the two sectors.

Labour Costs

Eurostat's Labour Cost Survey shows that labour costs in the information and communication sector stood at €22.20 per hour in 2021. Costs in the domestic market remained below most of the euro area countries and stood at half the rate for the euro area (see Chart 14).

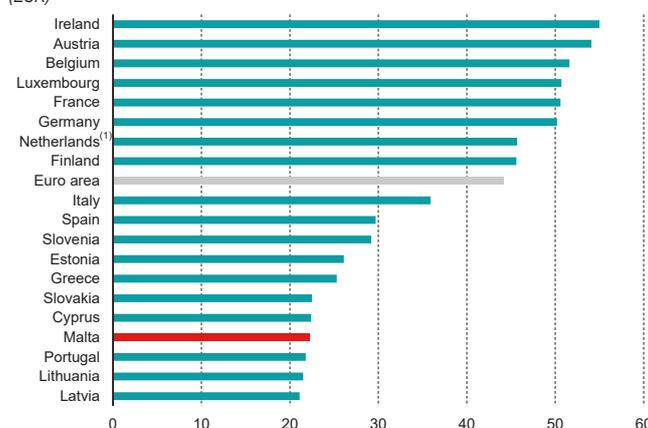
Nevertheless, when comparing with other services sectors in Malta, the cost of labour per hour in the information and communication sector in 2021 is the fourth highest (see Chart

15). It was exceeded by the arts, entertainment and recreation sector (€26.30), the financial and insurance sector (€26.20) as well as the professional, scientific and technical sector (€23). On the other hand, other services sectors with lower labour costs include education (€21.50), transportation and storage (€16.10) as well as administrative and support services (€12). Most non-services sectors also registered lower labour costs than the information and communication sector.

A similar pattern can be drawn on the basis of compensation per employee data.¹² During 2021, the average compensation per employee in the information and communication sector ranked

¹² Data on Compensation per employee is based on data from National Accounts. These workings include sectors which are not included in the Labour Cost Survey, primarily Agriculture and Fisheries sector as well as Public Administration. Moreover, the Labour Cost Survey covers only units with more than 10 employees.

Chart 14
AVERAGE LABOUR COST PER HOUR ACROSS COUNTRIES DURING 2021
(EUR)



Source: Eurostat.

⁽¹⁾ Data for the Netherlands is based on 2020 as 2021 data were not available.

in third highest at €35,300 (see Chart 16). This was one fourth higher than the whole economy average of €28,300. The only sectors that registered a higher compensation per employee during 2021 were the financial and insurance sector as well as the arts, entertainment and recreation sector, at €44,600 and €42,800, respectively.

Additional data by sub-sector shows heterogeneity in compensation within the information and communication sector (see Chart 17). By 2021, the publishing industry and the computer programming and consultancy sub-sector offered the highest compensation per employee in this sector. This could reflect their reliance on highly-skilled workers within these industries. On the other hand, the categories that include programming and broadcasting activities as well as those in motion pictures, videos and television programme offer lower than average compensation per employee. This however partly reflects the high degree of employees working in part-time employment, who generate less income due to lower hours worked. However, compensation per employee data exclude data on self-employed, which make up more than one fourth of workers in these two sub-sectors.

Between 2010 and 2021, compensation per employee generated in the sub-sector that include motion picture, video etc. as well as that which

Chart 15
LABOUR COST PER HOUR ACROSS THE SERVICES SECTORS
DURING 2021
(EUR)

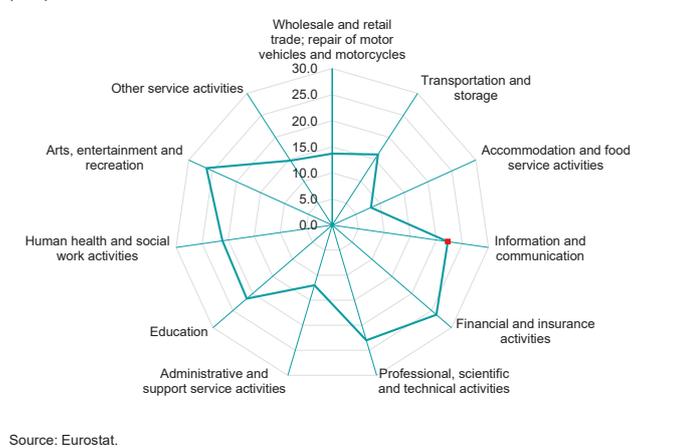


Chart 16
COMPENSATION PER EMPLOYEE BY SECTOR DURING 2021
(EUR thousands)

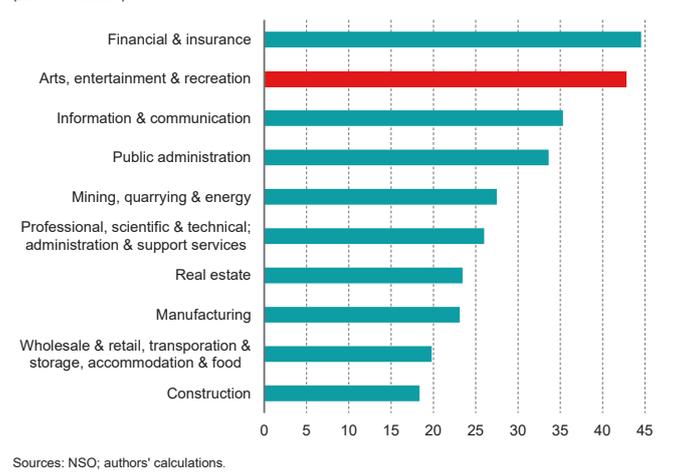
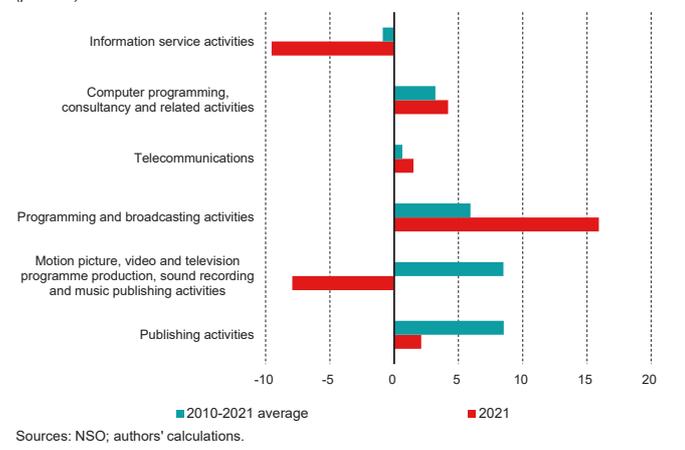


Chart 17
GROWTH RATES OF COMPENSATION PER EMPLOYEE BY SUB-SECTOR
(per cent)



includes publishing activities grew by an annual average rate of 8.5%. This was followed by the programming and broadcasting activities which saw an increase of 5.9%. These rates of growth in compensation were much higher than the increase of 3.8% registered for the whole economy over the same period. The computer programming and consultancy activities recorded a slightly smaller increase than that of the whole economy, while telecommunications saw a marginal increase of 0.6%. On the other hand, the information services sub-sector on average registered a decline of almost 1%.

In the last year under review, compensation per employee grew strongly in the programming and broadcasting activities, rising by almost 16.0%, while computer programming and consultancy rose by 4.2%. Publishing activities and telecommunications saw a smaller increase in compensation.

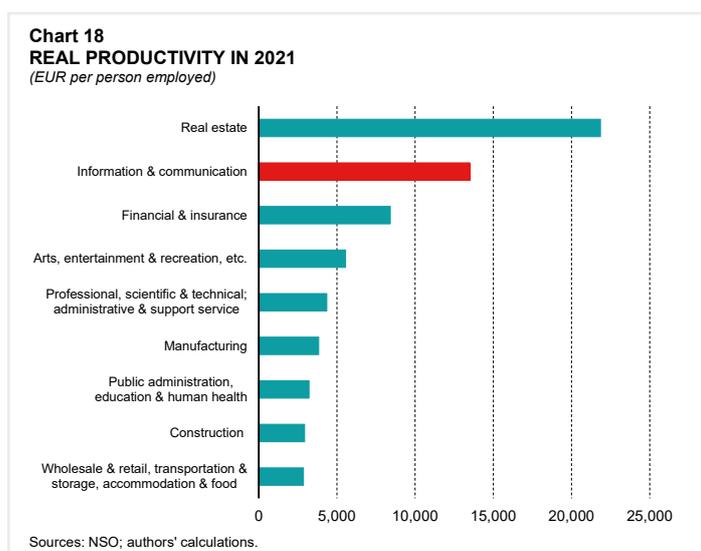
In 2021, information services and the sector that includes motion pictures, video and television programmes registered a decline of 9.5% and 7.9%, respectively. These sharp declines may reflect the loss of economic activity brought about by restrictions imposed in the outbreak of COVID-19, leading to lower wages per employee.

In terms of productivity per worker, which is being approximated by real GVA per person employed, the information and communication sector shows very strong results when compared to the rest of the economy. Between 2010 and 2021, productivity in sector J recorded the largest increase by far. This was followed by the financial and insurance activities sector.

By 2021 the information and communication sector had one of the highest productivity levels, which was more than three times that for the whole economy (see Chart 18). Only the real estate sector generated a higher productivity than sector J.

Sub-sector data, which are available in current prices, show that the highest productivity in the information and communication sector during 2021 was generated by the industry of computer programming and consultancy, closely followed by telecommunications and publishing activities. Low productivity sectors include those within the programming and broadcasting, those producing picture, video and television programmes as well as information services activities.

The publishing activities sector has seen strong growth in its nominal productivity over time, registering an average of almost 15% increase over the last eleven years, and registering an even higher productivity

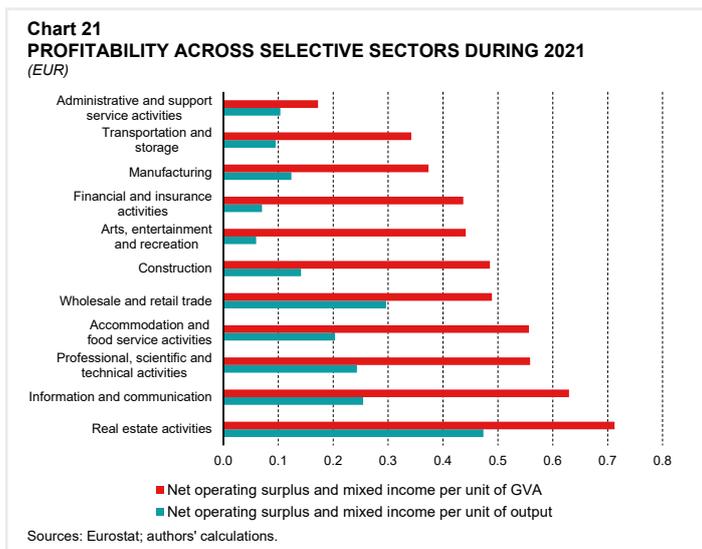
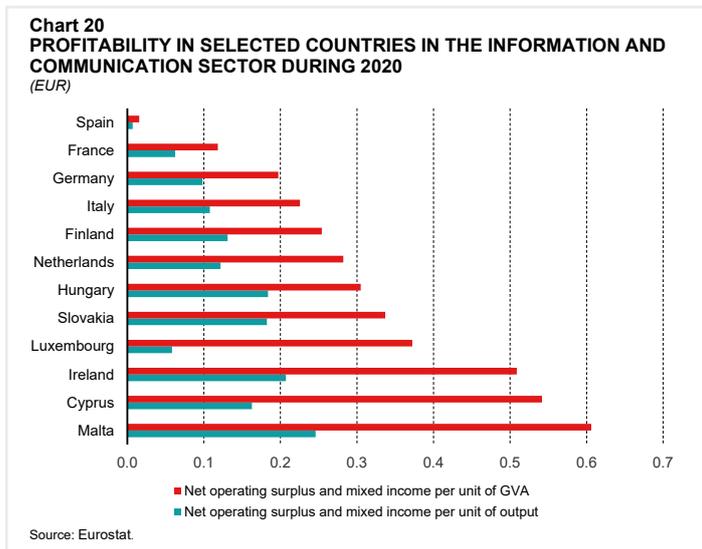
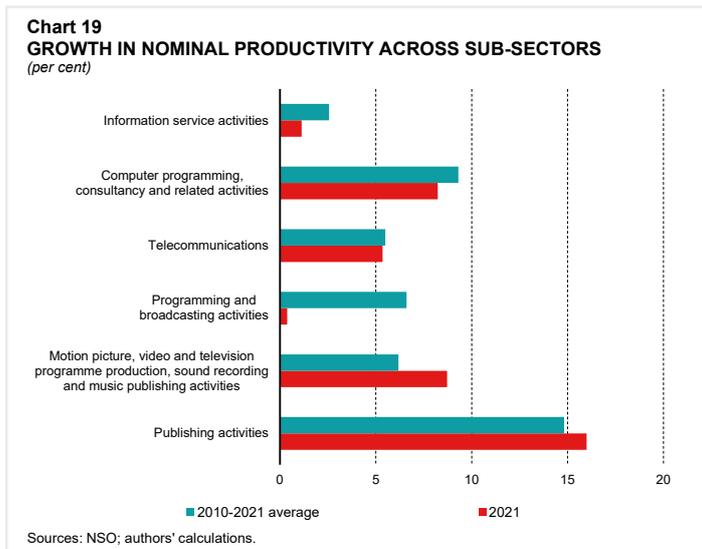


growth in 2021 (see Chart 19). Robust growth in productivity was also recorded in the sector of computer programming, consultancy and related activities, which saw an increase of more than 9% over the period under review, and a slightly lower rate for 2021.

After recording three consecutive negative rates in productivity, the motion pictures industry saw a positive turn in 2021, which was even higher than its average since 2010. On the other hand, the last year under review saw a mild increase in productivity in the programming and broadcasting activities as well in information and services activities.

The information and communication sector as a whole also exhibits a relatively high degree of profitability. National accounts data from Eurostat show that the net operating surplus and mixed income of this sector in Malta was high compared to that of other selected euro area countries during 2020 (the last actual year available) – both in terms of per unit of output and per unit of GVA (see Chart 20). It was followed by Cyprus, Ireland, Luxembourg, Slovakia and Hungary.

It was also among the highest compared to other large sectors of the domestic economy (see Chart 21). In terms of profitability per unit of GVA, the information and communication sector was exceeded by real estate activities. On the other hand,



in terms of profitability per unit of output, sector J was also exceeded by the wholesale and retail trade sector.

The high productivity of employees, despite the relatively higher labour costs, undoubtedly contributes towards the high level of profitability.

By 2021, the most profitable sub-sector is the motion picture, video and television programme production together with sound recording and music publishing activities (see Chart 22). This is however partly due to the fact that the high proportion of self-employed working in this sector boosts the profit element, as the remuneration of self-employed is recorded in the profit component rather than as part of compensation of employees.

Meanwhile, the programming and broadcasting sector generated the lowest profitability out of the sub-sectors under review.

Developments in profitability between 2010 and 2021 were heterogeneous across sub-sectors. Profitability increased strongly among firms that produce motion pictures, video and television programmes. This reflects the strong increase in the share of self-employed in total employment within the sub-sector. This increased by around a third, compared with an average of around 6% in the other sub-sectors, and by just 1% in the whole economy.

Net operating surplus and mixed income in publishing activities, telecommunications as well as computer programming and consultancy also increased in this period, but by less than the abovementioned sub-sector. On the other hand, the category of programming and broadcasting activities registered a lower profit per unit when compared to 2010, while the information services activities saw a decline in the profit per output, whilst the profit per GVA rose slightly over the same period of time.

Linkages with the rest of the economy

In recent years, the information and communication sector has increased its importance over time, becoming a relatively strong pillar of the economy. Indeed, the industry's share in real GVA in recent years was higher than that registered in the arts and entertainment sector, the sector comprising financial and insurance activities, as well as the manufacturing sector.

Industry J also shares linkages with other sectors of the economy. Looking at the latest input-output tables based on 2015 data, to generate an output worth of €1,494 million, the information and communication sector utilised around €395 million, or 26% of its intermediate consumption in domestic production (see Table 5).¹³ Mainly these were related to services (around

¹³ The latest Supply, Use and Input-Output (SUIO) tables can be accessed from <https://nso.gov.mt/en/nso/Media/Salient-Points-of-Publications/Pages/Supply-Use-and-Input-Output-Tables.aspx>

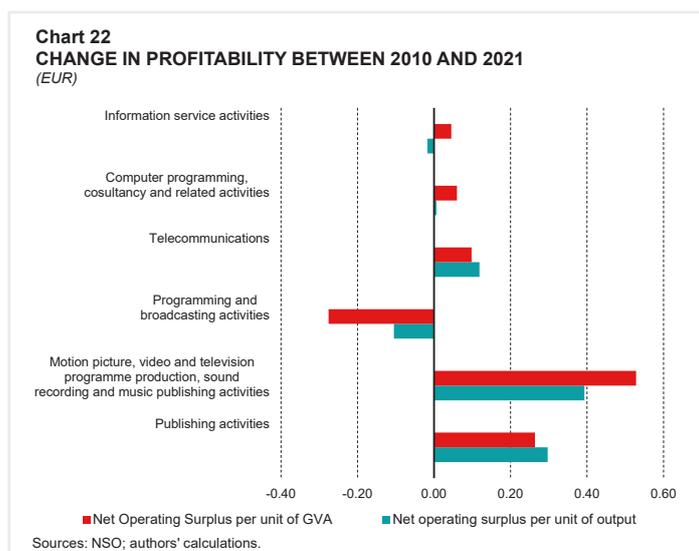


Table 5
DISTRIBUTION OF INTERMEDIATE CONSUMPTION FOR SECTOR J, 2015

EUR millions

Output at basic prices	1,494.4
Total intermediate consumption	936.9
<i>of which:</i>	
Domestic production	394.5
Agriculture, forestry and fishing	0.0
Mining and quarrying; utilities	8.3
Manufacturing	22.7
Construction	6.3
Services	357.2
<i>of which:</i>	
Professional, scientific & technical activities	58.6
Financial & insurance	33.2
Administrative & support services	8.7
Information & communication	212.7
Transport	6.4
Hotels & restaurants	3.7
Real estate	8.0
Distribution	7.8
Arts, entertainment & recreation	7.4
Imported products	539.2
Taxes less subsidies on products	3.1
GVA at basic prices	557.5

Source: NSO.

90%), particularly those generated from the sector to itself (54% of domestic production) as well as those from the sector comprising professional, scientific and technical activities (14.8% of domestic production). The import content of sector J is relatively high, standing at almost 58% of intermediate consumption.

Looking at the distribution of output for industry J in 2015, almost two thirds of its output (€905 million or 61%) was generated in intermediate demand, primarily from firms within the arts, entertainment and recreation sector, as well as by those within the same sector (see Table 6). The

Table 6
DISTRIBUTION OF OUTPUT OF SECTOR J IN THE ECONOMY, 2015

EUR millions

Intermediate demand	905
Final demand	589
<i>of which:</i>	
Final consumption	158
Gross capital formation	228
Exports	203
Output at basic prices	1,494

Source: NSO.

remaining share of output (€589 million) was distributed as final demand, primarily as investment (39%) and exports (35%). Another 27% was generated in final consumption.

A study published by the Central Bank of Malta presents modelling and accounting multipliers for various industry sectors in the Maltese economy, using the 2015 input-output framework.^{14,15}

Modelling multipliers show the marginal direct and indirect effects (Type I or simple multipliers) and also the induced effects (Type II or total multipliers) resulting from an increase in the final demand to a given sector (see Table 7). The information and communication sector has multipliers that fall slightly below the bottom half of the distribution, although those for employment are even lower when compared to other sectors of the economy. Nevertheless, sector J generated higher multipliers than those of the arts and entertainment sector – which has been a key driver of economic growth in Malta in recent years.

The modelling multipliers shown in Table 7 do not account for the relative size of the respective industries or the magnitude of the final demand for their goods and services. These factors are covered by accounting multipliers which show each industry's (direct and indirect) contribution to total output, income, value added, and employment in the economy, when accounting for each sector's final demand.

The information and communication sector (J) still has relatively low accounting multipliers compared to the other economic sectors, ranking somewhat among the lowest five sectors (see Table 8). The value-added multiplier for industry J was double that recorded for the agriculture sector (A) and the sectors comprising electricity and water supply (D + E), and only marginally lower than the multiplier recorded for the mining, quarrying and construction sectors (B + F). It also ranked above the education sector for the output multipliers.

Table 7									
MODELLING MULTIPLIERS FOR SPECIFIC SECTORS OF THE ECONOMY									
<i>Per cent of total</i>									
	Output	Income	Value added	Employment	Output	Income	Value added	Employment	
	Type I				Type II				
Selected industries:									
Manufacturing (C)	1.4	0.2	0.4	10.8	1.9	0.3	0.6	15.1	
Wholesale and retail (G)	1.4	0.3	0.8	17.1	2.1	0.4	1.1	22.9	
Accommodation and food services (I)	1.7	0.3	0.6	17.0	2.2	0.4	0.9	22.3	
Information and communication services (J)	1.4	0.2	0.5	6.9	1.8	0.3	0.7	10.6	
Financial service activities, except insurance and pension funding (K64)	1.0	0.1	0.1	1.5	1.1	0.1	0.2	2.6	
Professional, scientific and technical activities (M)	1.4	0.3	0.6	10.2	2.0	0.4	0.9	15.2	
Administration and support services activities (N)	1.4	0.4	0.7	19.6	2.2	0.5	1.1	27.0	
Arts, entertainment and recreation (R)	1.2	0.1	0.3	2.7	1.4	0.1	0.4	4.3	
Human health and social work activities (Q)	1.3	0.6	0.8	21.2	2.5	0.8	1.3	31.8	

Sources: Debono and Cassar (2021); Central Bank of Malta estimates.

¹⁴ Refer to Debono and Cassar (2021), "Estimates of industry specific multipliers for the Maltese economy on the basis of the SIOT for 2015", *Quarterly Review* 2021(2), Central Bank of Malta.

¹⁵ The study derives the industry-specific multipliers on the basis of the demand driven input-output framework, updating previous work conducted by the Central Bank of Malta using input-output data for 2010.

Table 8
ACCOUNTING MULTIPLIERS FOR SPECIFIC SECTORS OF THE ECONOMY

Per cent of total

	Accounting multipliers			
	Output	Income	Value added	Employment
Selected industries:				
Manufacturing (C)	9.6	10.3	9.0	11.4
Wholesale and retail (G)	5.7	8.2	9.3	10.5
Accommodation and food services (I)	6.5	7.2	7.4	10.2
Information and communication services (J)	3.0	2.9	3.4	2.4
Financial service activities, except insurance and pension funding (K64)	19.8	6.9	6.2	4.5
Professional, scientific and technical activities (M)	4.0	4.7	5.3	4.3
Administration and support services activities (N)	2.3	4.1	3.6	4.9
Arts, entertainment and recreation (R)	20.2	8.8	16.6	6.8
Human health and social work activities (Q)	3.9	10.8	6.9	9.5

Source: Debono and Cassar (2021).

Meanwhile, the income and employment multipliers for sector J also exceeded those generated by the sub-sectors comprising insurance, reinsurance and pension funds and activities auxiliary to financial and insurance activities.

Conclusion

The information and communication sector is one of the best performing sectors in the Maltese economy when assessed on the basis of value added and profitability. While labour costs are among the highest in Malta, productivity per worker in this sector is the second highest. At the same time, when compared with euro area countries, labour costs are relatively low, and profitability is relatively high, which could also explain why the sector has been able to grow strongly in recent years.

Sector J is characterised by micro and small enterprises, which together employ more than half of the workforce. Sub-sectors within this industry evolved over time, reflecting new technology and shifts in the regulatory environment and behavioural patterns. Over the last twenty years GVA by firms providing computer programming, consultation, and related activities, captured a larger share of the industry GVA at the expense of other sub-sectors, notably the telecommunications sector.

In recent years, the information and communication sector's share in total economy GVA exceeded that of other fast-growing sectors, including the art and entertainment sector. Over a fourth of the sector's output reflects intermediate consumption in domestic production, notably services from the sector to itself and to the sector comprising professional, scientific and technical activities, and is primarily driven by imports.

Profitability was heterogenous across categories. Although the telecommunications industry and the computer programming and consultancy sub-sector are the largest contributors to GVA in sector J, the increase in their profitability since 2010 was relatively small. On the other hand, firms within the motion pictures, video and TV programme production registered the highest increase in profitability since 2010, in part due to the high concentration of self-employed within this sub-sector.

Data for modelling multipliers shows that industry J lies within the bottom half of the distribution as regards multipliers for employment, and below-average multipliers for output, income and value added. Moreover, when looking at data for accounting multipliers, the sector ranks among the lowest five sectors within the economy.

Overall, the growth in the information and communication sector over time attests to the importance of increased use of digital technology and improved network connectivity. It also reflects the availability of ICT graduates, which is above the EU average. However, the sector may not have exhausted its potential to grow, given the limited role still being played by women within the sector compared to other sectors of the economy.