ADR NORTHERN IRELAND

Data Insight

Firm-level analysis of NI trade: A focus on 10X priority clusters

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Date: May 2023

This Data Insight report explores the factors influencing the performance of Northern Ireland (NI) businesses over the period 2014–2020. The focus is on 10X classified businesses and the impact of the EU exit decision and COVID-19.

What we did

The dataset was cleaned and adjusted to remove the effect of inflation, so that real patterns in trade could be observed.

Firm-level analysis was used to examine the performance of ten sectors, including four sectors classified according to their use of advanced technologies (10X priority clusters). Performance was proxied by two ratios: sales per employment and gross value added (GVA) per employment. These indicators were analysed by sector over time.

Regression analysis was used to investigate the relative performance of the different sectors. A second layer of investigation considered these sectors using an 'EU exit decision' dummy variable. This was used to examine whether trading performance altered in the period after the UK's decision to exit the European Union (EU) (2016), relative to the period before the EU exit decision.

Background

This project responds to an Economic and Social Research Council funding call to expand the use of the "Business Data for Research" (NI) database by researchers. The vision for Northern Ireland set out in the "10X Economy" is innovation-led growth underpinned by trade and investment[1]. Growing external sales is critical to the development of a strong Northern Irish economy and this is best achieved by businesses that innovate[2]– underscoring the importance of research in this area.

As part of the testing of the database, our study uses the de-identified Northern Ireland Annual Business Inquiry dataset, including the Broad Economy Sales and Exports Statistics dataset which includes data on trade sources and destinations. This provides illumination on the trading ecosystem that prevails for Northern Irish businesses, with a particular focus on 10X priority type trading activity.

What we found

Our results are based on the returns of over 5,000 Northern Irish businesses each year (as shown in Table 1). The sample is skewed towards larger businesses as reflected in the high overall average employment figure. The size distribution characteristics of the sample have changed over the period, and this needs to be considered when analysing the descriptive statistics and controlled for when using regression analysis.

Sales per employment increased steadily over the period 2014–2018. As the underlying data has been adjusted for inflation, this increase may be attributed to increased productivity (or changes in the characteristics of the underlying sample). Sales per employment increased in the post-EU exit decision period, relative to the pre-EU exit period. However, sales per employment fell in 2019 by 3.24% and then fell by 8.49% in 2020 as a result of COVID-19. GVA per employment also increased in the period 2014–2017, before stabilising at around £56,000 per employment.

Table 1: Sales and GVA per employment, real terms, 2014–2020

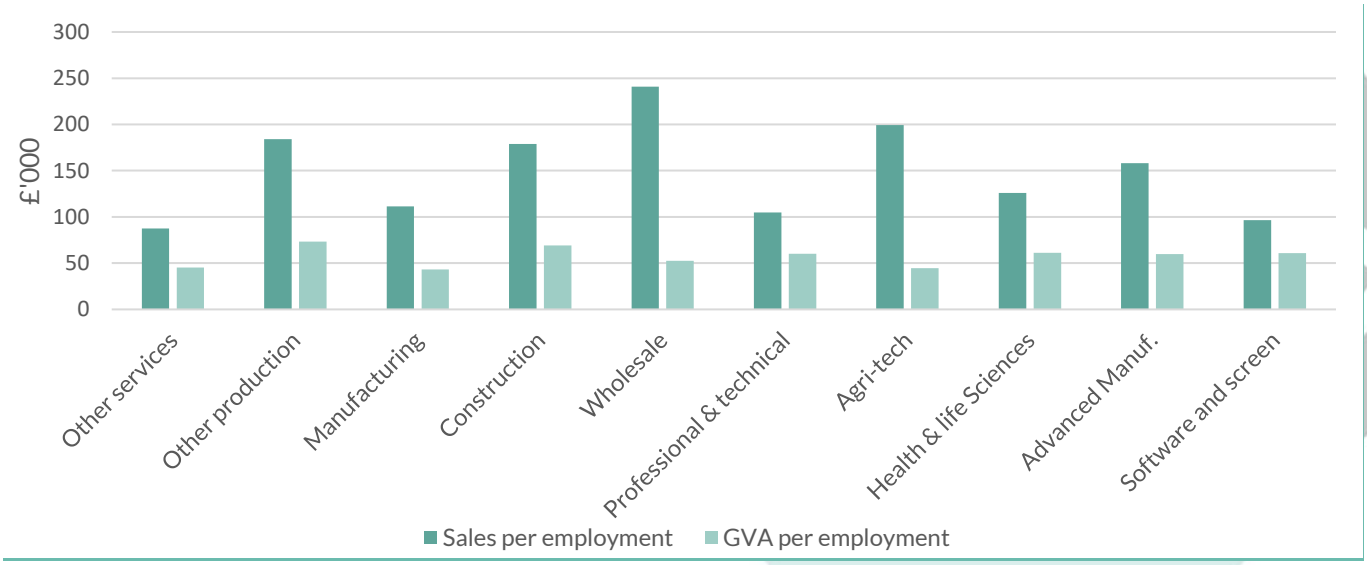
	2014	2015	2016	2017	2018	2019	2020	Total
Number of businesses	6,532	6,220	5,356	5,072	5,763	5,215	5,510	39,668
Average employment (size)	50.60	52.62	62.16	64.94	65.55	70.70	66.15	61.29[1]
Sales per employment (£'000)	143.78	138.08	139.72	153.66	156.29	151.23	138.39	145.65[1]
	Pre-EU exit decision			***Post-EU exit decision***			***COVID-19***	
	140.62			153.82			138.38	
GVA per employment (£'000)	48.57	49.70	50.80	56.72	56.28	55.72	54.17	52.93[1]
	Pre-EU exit decision			***Post-EU exit decision***			***COVID-19***	
	49.62			56.24			54.17	

Note: Underlying data is indexed to 2019 prices (ONS, 2022)

[1]*Average across the seven years.*

As shown in Figure 1, differences in sales per employment and GVA per employment are sector-specific. Companies that use advanced technologies typically have lower purchases and as a result health and life sciences, advanced manufacturing and software and screen have high GVA per employment relative to sales per employment.

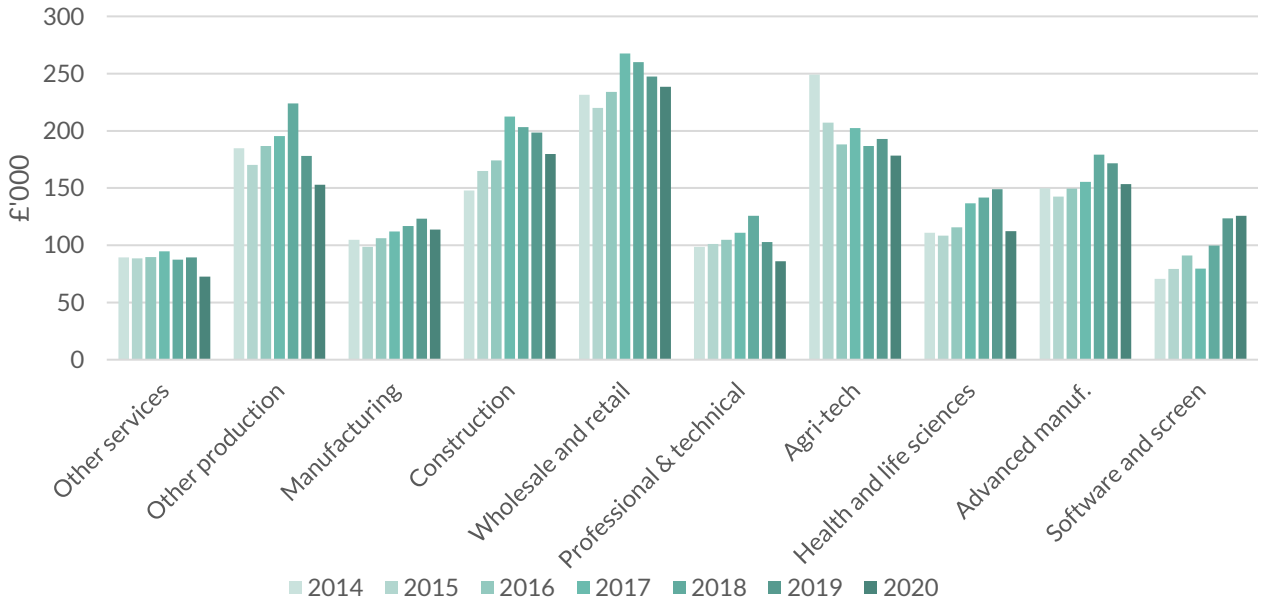
Figure 1: Sales and GVA per employment: real terms, 2014–2020



Note: Underlying data is indexed to 2019 prices (ONS, 2022)

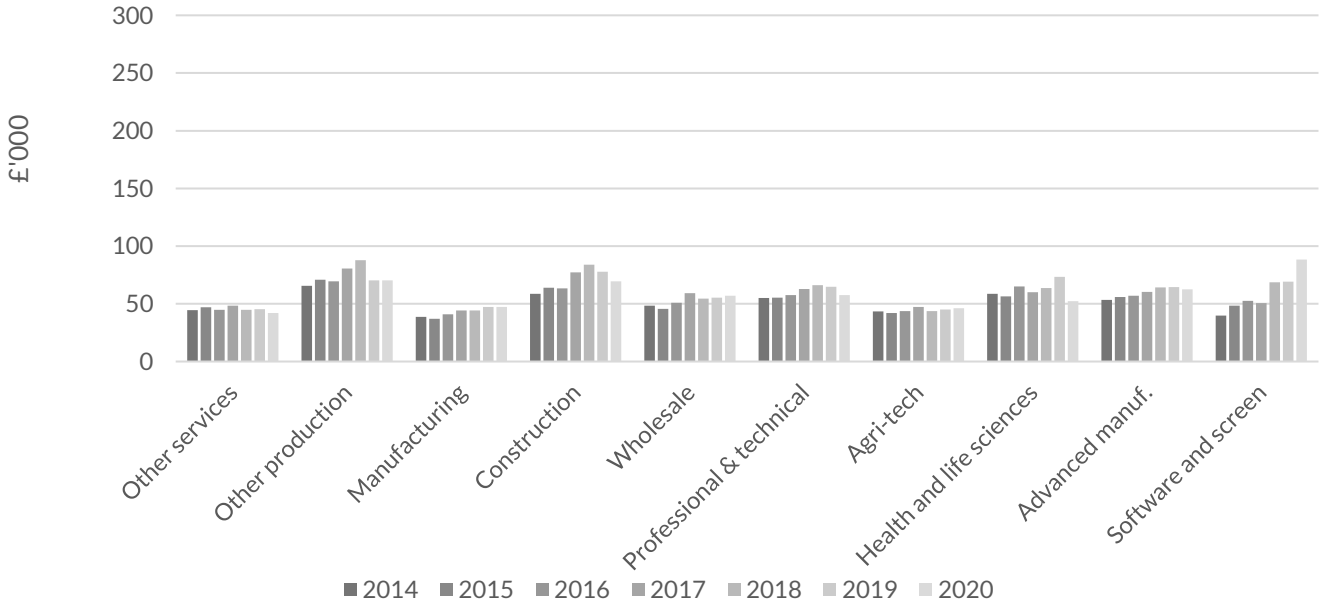
As shown in Figure 2, increases in sales per employment from 2014–2019 are observed in all sectors, except for agri-tech (which fluctuated between £186,600 and £249,200) and other services (which remained relatively static at about £90,000). The greatest growth observed is in the software and screen sector (from £70,500 in 2014 to £123,500 in 2019). COVID-19 had a negative impact on sales per employment in most sectors, except software and screen, which increased its sales per employment from £123,500 in 2019 to £125,700 in 2020.

Figure 2: Sales per employment by sector 2014-2020



Note: Underlying data is indexed to 2019 prices (ONS, 2022).

Figure 3: GVA per employment by sector 2014-2020



Note: Underlying data is indexed to 2019 prices (ONS, 2022).

Consistent with the patterns observed in Figure 2, Figure 3 shows that in all instances GVA per employment in 2019 was higher than in 2014. The largest increase is observed in the software and screen sector (from £39,700 in 2014 to £69,200 in 2020). In 2019, GVA per employment is highest in the construction (£77,900), health and life sciences (£73,400) and other production (£70,300) sectors; and lowest in the agri-tech (£45,200), other services (£45,500) and manufacturing (£47,200) sectors.

Though sales per employment typically declined in 2020, this pattern was not observed for GVA per employment due to reductions in purchasing, provision of subsidies, and reductions in employment. GVA per employment increased in the software and screen and wholesale and retail sectors; and decreased in the construction, professional and scientific, and health and life sciences sectors. Other sectors reported similar GVA per employment to 2019.

Other determinants of performance and EU exit decision

We used random effects regressions – a way of estimating the effect of individual-specific characteristics that cannot be measured - to identify the determinants of performance and test whether the EU exit decision had a significant impact on performance in the period 2017-2019 (see Table 2). After treatment for outliers, and controlling for location, legal status, trade characteristics, subsidies, size, and year effects, we find a pattern of results consistent with those reported in Figures 2 and 3.

In most instances, sales and GVA per employment increased in the post-EU exit decision period (models 1b and 2b). For example, pre EU exit software and screen has a coefficient of -0.30 (model 1b), indicating that its sales per employment are lower than the base case 'other services'. In the post EU exit period this moves to +0.07 (-0.30 + 0.05 + 0.28), indicating that software and screen are generating more sales per employment in the post-EU exit period than other services (pre-EU exit) and software and screen (pre-EU exit).

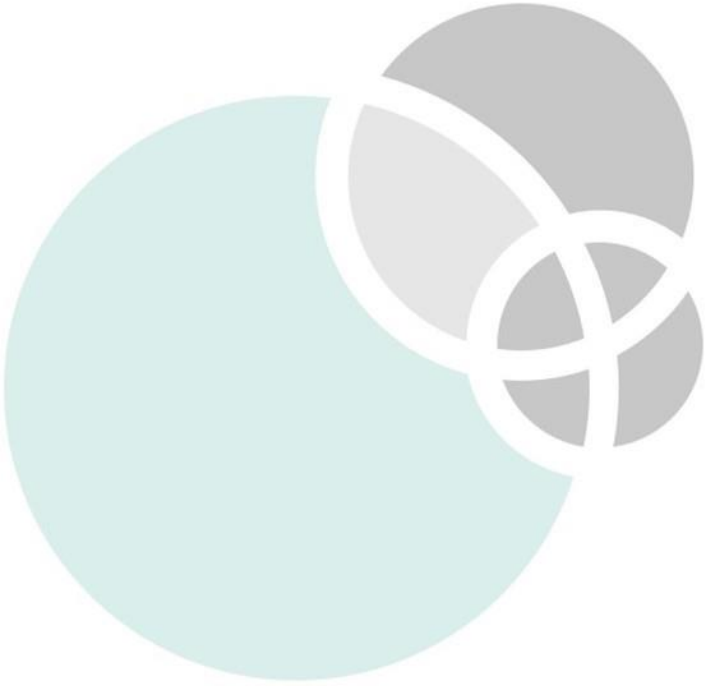


Table 2: Insights into the determinants of performance: 2014–2020

	Sales per employment[a]		GVA per employment[b]	
	Model 1a	**Model 1b**	**Model 2a**	**Model 2b**
Observations	39,652	34,143	39,652	34,143
Number of businesses	14,159	13,216	14,159	13,216
Sector (Base – Other services) ‡				
Non-10X	**Full period**	**Pre-EU exit**	**Full period**	**Pre-EU exit**
Other production	0.34***	0.30***	0.19***	0.12*
Manufacturing	0.42***	0.37***	0.14***	0.06
Construction	0.58***	0.65***	0.36***	0.36***
Wholesale and retail	0.86***	0.96***	0.16***	0.10**
Professional and technical	0.14***	0.17***	0.32***	0.33***
10X				
Agri-tech	0.67***	0.73***	0.08	0.07
Health and life sciences	0.29***	0.07	-0.01	-0.04
Advanced manufacturing	0.52***	0.60***	0.27***	0.33***
Software and screen	-0.03	-0.30***	-0.05	-0.27***
Non-10X		**Post-EU exit**		**Post-EU exit**
Other services	N/A	0.05***	N/A	0.06***
Other production	N/A	0.05***	N/A	0.18***
Manufacturing	N/A	0.08***	N/A	0.10**
Construction	N/A	-0.01	N/A	0.05
Wholesale and retail	N/A	-0.03*	N/A	0.04
Professional and technical	N/A	-0.02	N/A	0.07**
10X				
Agri-tech	N/A	0.02	N/A	-0.00
Health and life sciences	N/A	0.19***	N/A	0.05
Advanced manufacturing	N/A	0.08***	N/A	-0.04
Software and screen	N/A	0.28***	N/A	0.27**
Control variables				
Location (Base – Belfast) ‡				
Antrim and Newtownabbey	-0.01	-0.07*	-0.05	-0.07
All other locations	Negative***	Negative***	Negative***	Negative***
Legal status (Base – Companies)				
Sole proprietor	0.44***	0.55***	0.34***	0.38***
Partnership / limited partnership	-0.35***	-0.36***	-0.27***	-0.25***
Central and local government	0.76***	0.88***	-0.14	-0.29
Non-profit	-0.30***	-0.25***	-0.76***	-0.77***
Other control variables				
Goods	0.14***	0.13***	-0.06***	-0.07***
Exporting	0.19***	0.18***	0.22***	0.22***
Subsidies	-0.02***	0.01	0.02***	0.04***
Size[c]	-0.35***	-0.38***	-0.13***	-0.12***
Size squared	0.03***	0.03***	0.01**	0.01**
Year effects	Yes	N/A	Yes	N/A
Constant	5.00***	5.04***	3.98***	4.02***

**** p<0.01, ** p<0.05, * p<0.1.*
a Sine (inverse hyperbolic) of sales divided by employment.
b Sine (inverse hyperbolic) of GVA at basic prices divided by employment.
c Sine (inverse hyperbolic) transformation of total employment.
‡ This variable has a number of 'unknown' – results not reported in this table. The 2020 data are not included in Models 1b and 2b.

Why it matters

Our results suggest that, in real terms, the economic performance of Northern Irish businesses is improving. However, regression analysis suggests a slowing of performance in the post-EU exit decision period (2017–2019) relative to the pre-EU exit decision period (2014–2016). There are sectoral exceptions, with increased sales in the health and life sciences and software and screen sectors. There is also increased GVA in the software and screen sector in the post-EU exit period relative to the pre-EU exit period.

A concern is the wholesale and retail sector, which reported significantly lower sales in the post-EU exit decision period.

The results suggest that resilience and accommodation to change triggered by the EU exit and COVID-19 is unevenly felt across industries. This underscores the importance of carefully targeted policy interventions.

Our analyses also demonstrate the possibility of distinguishing 10X businesses from non-10X. Such an approach is likely to be of interest to policymakers in evaluating the achievement of the 10X economic vision.

What next?

We suggest several possible future avenues:

(1) Due to the absence of a 10X classification scheme, we had to design our own. If a 10X classification were introduced into the official data, researchers could more easily examine relevant 10X policy-related questions. It would also be helpful if researchers were using a consistent 10X classification system to enable comparability across their analyses.

(2) Our work here highlights the potential to use econometric analysis to examine performance-related issues using the NI Annual Business Inquiry data. This should be considered in future publications alongside basic descriptive statistics since the latter tend to be overly simplistic in nature.

(3) In considering issues around productivity, the granular depth of firm-level data is likely to result in more bespoke insights than highly aggregated geographies and sectors. This richness is an attractive avenue for future research.

References

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Acknowledgements

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This work was produced using statistical data from Office for National Statistics (ONS). The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce ONS aggregates.

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ADR UK is made up of four national partnerships (ADR England, ADR Northern Ireland, ADR Scotland and ADR Wales), and the Office for National Statistics (ONS), which ensures data provided by UK Government bodies is accessed by researchers in a safe and secure form with minimal risk to data holders or the public.

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