

Do Managers Matter? Management Practices in post-COVID Northern Ireland

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Abstract

Northern Ireland has a persistent productivity gap to the rest of the UK. Northern Ireland, as with the rest of the UK and Europe, also has a long tail of low productivity SMEs and micro businesses. An important contributor to a firm's productivity is its management. Managers make decisions regarding the allocation of labour and capital that affect whether a firm is at or below its production possibility frontier.

In this study, we focus on the managerial practices of businesses in Northern Ireland. We explore the correlates of good management practices and examine the consequences of good management practices for firm performance, innovation, exporting intensity, and working from home. Our study is the first to conduct a large-scale survey of management practices in Northern Ireland. To allow comparability, this survey was largely based on the Management and Expectations Survey run by the Office for National Statistics. We included additional questions to capture the extent of government support received, digitalisation within the firm, leadership training for managers, and trading links. We received 272 responses, and our sample was representative of the population in terms of firm size and business sector.

1 Executive Summary

- 1.1 Northern Ireland has a persistent productivity gap to the rest of the UK. Northern Ireland, as with the rest of the UK and Europe, also has a long tail of low productivity SMEs and micro businesses. An important contributor to a firm's productivity is its management. Managers make decisions regarding the allocation of labour and capital that affect whether a firm is at or below its production possibility frontier.
- 1.2 In this study, we focus on the managerial practices of businesses in Northern Ireland. We explore the correlates of good management practices and examine the consequences of good management practices for firm performance, innovation, exporting intensity, and working from home. Our study is the first to conduct a large-scale survey of management practices in Northern Ireland. To allow comparability, this survey was largely based on the Management and Expectations Survey run by the Office for National Statistics. We included additional questions to capture the extent of government support received, digitalisation within the firm, leadership training for managers, and trading links. We received 272 responses, and our sample was representative of the population in terms of firm size and business sector.
- 1.3 The average management practices score for Northern Ireland in 2022 is higher than the average score for Great Britain in both 2016 and 2020. The Northern Ireland distribution is negatively skewed, with a long tail of less well-managed firms, similar to the previous distributions for Great Britain.
- 1.4 In terms of the determinants of good management practices, there are several key findings. First, the proportion of managers having taken a leadership course, and the proportion of highly qualified managers, are important determinants of high management practices score. Second, management practices scores increase with the size of the firm. Third, firms that generate a higher proportion of their turnover within Northern Ireland have a lower management practices score. Fourth, second-generation family-managed firms have lower management practices scores. Fifth, receiving government support and multinational status are not associated with a firm's management practices score when other factors are controlled for.
- 1.5 Relative to the reference industry of Business services, no other industry had a higher management score. But after accounting for other firm-level characteristics, two industries had lower scores: Real estate and Manufacturing. There are differences in management practices scores across the 11 local government districts. However, these differences simply reflect differences in the characteristics of firms, rather than anything existing at local government level.
- 1.6 Our evidence suggests that management practices matter. Better managed firms perform better, are more likely to be exporters, and are more innovative as evidenced by their greater digitalisation. We also find tentative evidence that better managed firms are more likely to permit managers (but not non-managers) to work from home.

- 1.7 This report has several implications for both businesses and government. First, in the attempt to drive productivity, government policy increasingly focuses on innovation, and good management practices should be central to attempts to increase digitalisation and new technology adoption in businesses.
- 1.8 Second, the findings from this report reinforce the importance of a well-qualified workforce, specifically managers. Firms, government, and further and higher education institutes should be working together to identify the skills required to lead and manage in the twenty-first century economy. This will take time to bear fruit, but our findings also highlight the importance of leadership programmes to developing good management practices and more productive firms. Firms and government should therefore focus their attention on upskilling managers by putting them through appropriate leadership training.
- 1.9 Third, the findings in the report suggest where government should direct its resources to boost the management practices of firms. The characteristics of firms which are likely to have management practices further from best practice are small, second-generation family-managed, with less qualified managers, primarily selling to the domestic market. We find that two sectors have poorer management practices: real estate and manufacturing. Government policy should therefore target firms with these characteristics and in these sectors. Notably, our findings suggest that there is no local council area in Northern Ireland where management practices are worse, which suggests that instead of a place-based approach to management practices, policymakers should target policy interventions based on firm characteristics.

Box 1: Recommendations for government

1. Improving management practices is a key element in supporting new technology adoption and greater digitalisation.
2. Enhancing the human capital of managers – through qualifications and leadership training – is key to better management practices.
3. Government policy should target improving management practices in firms which are small, second-generation family-managed, and selling to the domestic market.

Box 2: Recommendations for business

1. The ability to adopt new technology and increase digitalisation is linked to a business's management practices.
2. Adopting best practice in management requires investment in the human capital of managers, particularly regular leadership training.
3. Businesses with characteristics associated with poorer management practices should proactively seek opportunities to improve their managers.

2 Introduction

- 2.1 The UK has experienced an unprecedented and major productivity slowdown since the global financial crisis, and its productivity lags that of other industrial nations.¹ Within the UK, Northern Ireland is the worst performing region, with a persistent productivity gap to the UK average.² Another set of stylized productivity facts are that the UK and Northern Ireland have a long tail of low productivity SMEs and micro businesses and that this tail has increased in length since the global financial crisis and associated credit crunch.³ This lagging productivity of SMEs and micro businesses is also a wider feature across the rest of Europe.⁴
- 2.2 An important contributor to a firm's productivity is its management. Managers make decisions regarding the allocation of labour and capital that affect whether a firm is at or below its production possibility frontier. Empirical work which has measured management practices has found that firms with better practices have higher productivity.⁵ But apart from a study by Forth and Bryson, most of this work has focussed on manufacturing and has ignored SMEs.⁶
- 2.3 Our study attempts to overcome these shortcomings by focusing on all industries and concentrating on a UK region – Northern Ireland – where SMEs and micro-enterprises dominate the business ecosystem. More importantly, this is, to the best of our knowledge, the first study to focus on the effect of management practices on firm innovation in the form of digitalisation. In addition, because the study is one of the first conducted in the post-Covid era, we can test for a relationship between good management practices and the extent to which employees work from home relative to the pre-pandemic era. Finally, as a laggard region which has suffered three decades of political violence, there has been extensive government support in Northern Ireland for SMEs and small businesses to develop their management and employee human capital. We therefore can analyse whether those firms in receipt of government support have better management practices. In other words, we can assess the effectiveness of the government support.
- 2.4 Focussing on management practices in Northern Ireland is of wider interest for at least two additional reasons. First, Northern Ireland's unique access to the EU single market means that its firms have more opportunities to trade outside the country. However, the potential to exploit these trading opportunities will only be possible if firms are well managed. Second, Northern Ireland's persistent economic underperformance has been anecdotally linked to an economy where there is a greater proportion of family firms than most other advanced economies. Family-owned firms may be holding back the country's

¹ Crafts and Mills, 2020; Chadha and Samiri, 2022; Fernald and Inkaar, 2022.

² Jordan and Turner, 2021.

³ Haldane, 2018; Douch et al., 2023.

⁴ Chen and Lee, 2023.

⁵ Bloom and van Reenen, 2007; Bloom et al., 2013; Broszeit et al., 2019; Forth and Bryson, 2019.

⁶ See Forth and Bryson, 2019.

productivity because the international evidence suggests that such firms are more likely to have poor management practices.⁷

- 2.5 Our study is the first to conduct a large-scale survey of management practices in Northern Ireland. The Office for National Statistics (ONS) has run three surveys of management practices in Great Britain, but firms in Northern Ireland have not been included in these surveys. Therefore, to assess management practices in Northern Ireland, we ran a survey in 2022 of all firms operating in Northern Ireland with more than five employees. To allow comparability, this survey was largely based on the management-related questions contained within the Management and Expectations Survey run by the ONS. We included additional questions to capture the extent of government support received, digitalisation within the firm, human capital and training of managers and employees, the change in the amount of working from home since 2019, and trading links. We received responses from 272 firms and, in terms of firm size and sector, it was representative of the population of firms.
- 2.6 In terms of the determinants of management practices, we find that larger firms, with better qualified managers, who have taken leadership training, and engage with more government programmes, score closer to best practice. Poorer management practices are associated with second-generation family-managed firms. We also find firms which generate high proportions of their turnover from within Northern Ireland operate further from best practice, which supports the role played by competition in driving good management practices.
- 2.7 When it comes to consequences of good management practices, we find that firms with better management practices have greater digitalisation of their different operational processes and export more than peers. We find some evidence to support the conjecture that better management practices are associated with productivity and firm performance. Finally, we find weak evidence of firms operating closer to best practice having higher rates of working from home (WFH) for managers, but notably there was no relationship prior to the Covid-19 pandemic.

⁷ Bloom and van Reenen, 2007.

3 The determinants and consequences of management practices

- 3.1 Practitioners and management scholars have long recognised that management matters for business performance.⁸ However, it is only recently that attempts have been made to measure managerial practices, assess the determinants of good management practices, and test whether they matter for firm behaviour and performance.⁹
- 3.2 What constitutes good management practice? Good management practices consist of four elements: (1) continuous improvement practices, which include the rationale for and use of modern manufacturing techniques and process improvements; (2) the use of key performance indicators (KPIs) in decision making; (3) the use of targets that are stretching, tracked and reviewed; and (4) employment practices which focus on managing, rewarding, attracting, and retaining talented people.¹⁰
- 3.3 Why might some firms have better management practices than others? One important factor is firm size: smaller firms and SMEs typically have inferior management practices scores.¹¹ There are a variety of reasons for this. For small firms, the cost of introducing cutting-edge management practices and high-performance work practices may outweigh the benefit in terms of productivity gains.¹² There are also frictions in terms of learning and adapting to new innovations in best practice. Finally, firm heterogeneity means that there is no one-size-fits-all definitive set of practices that a firm can simply imitate.
- 3.4 Another important factor that affects management practice is competition in the market for a firm's goods and services.¹³ Competition drives a business to do all it can to be on its production possibility frontier; otherwise, it will be outcompeted. Good management practices help take a firm closer to its frontier.
- 3.5 Relatedly, a third factor that may affect management practices is whether it is a multinational or an exporter.¹⁴ Such firms tend to operate in more competitive markets and there may be something of a selection effect at play in that good management practices will increase the likelihood that a firm becomes an exporter or a multinational. Multinationals also tend to import good management practices from their home country.
- 3.6 A fourth factor which may affect management practices is human capital.¹⁵ Managers with higher human capital are better able to implement and tailor complex management practices to their situation. In particular, if managers have received some sort of management training, then they will be better placed to do this.¹⁶ The human capital of workers may also matter for good management practices.¹⁷ The implementation of

⁸ Drucker, 1954.

⁹ Koch and McGrath, 1996; Bloom and van Reenen, 2007, 2010; Bloom et al., 2014; Scur et al., 2021.

¹⁰ Bloom and van Reenen, 2007.

¹¹ Broszeit et al., 2019; Forth and Bryson, 2019.

¹² See Wu et al., 2014.

¹³ Bloom and van Reenen, 2007, 2010; Bloom et al., 2019.

¹⁴ Bloom et al., 2021.

¹⁵ Feng and Valero, 2020.

¹⁶ Bloom et al., 2013; Georgiadis and Pitelis, 2016.

¹⁷ Georgiadis and Pitelis, 2016.

management practices may be easier if workers are better educated or have received formal training.

- 3.7 Another potential determinant of management practices is government support. The effect of such support could have a positive effect on management practices, because it typically offers some types of upskilling in terms of management and worker human capital and training. Alternatively, the effect and availability of such support may result in firms underinvesting in managerial upskilling, in the hope that the government will help cover some of the costs of this.
- 3.8 A final determinant is ownership. Family ownership may have a detrimental effect on management practices.¹⁸ One reason for this is that family firms, because they are more interested in survival, provide cheap capital and are less likely to take on debt. This means that it takes longer for competition to weed out poorly managed family firms. Another reason that family ownership may have a negative effect is that family firms typically use primogeniture to appoint their CEOs. In other words, CEOs may be in position merely because of genes rather than their managerial talent.
- 3.9 If a firm has good management practices, then it should result in better firm performance because inputs are being put to effective use to produce efficiently the firm's outputs and take the business towards its production possibility frontier.¹⁹ However, firm size may moderate the effect of management practices on firm performance, because some management practices may be inappropriate or overly costly for SMEs and micro-enterprises. Informal networks and relationships make monitoring business processes and incentivising employees relatively easy for firms with low employee numbers, which may mean that management practices are much less structured and codified and that this does not have a deleterious effect on firm performance.
- 3.10 As well as spurring better firm performance, good managerial practices may spur firm-level innovation.²⁰ Good managerial practices mean that firms have continuous improvement of their processes at their core, i.e., they are continually innovating their production. They also have good employment practices which tends to attract workers with higher skill levels, and which rewards innovative behaviour by workers. Finally, there are positive complementarities between innovations in management practices and technological innovations.²¹
- 3.11 One of the great challenges for managers since the arrival of Covid-19 has been the management of the working from home (WFH) revolution.²² There is some evidence that better managed firms were able to transition to home working during the pandemic.²³ Working from home became essential during the pandemic lockdowns, but worker preferences and the subsequent tightness of labour markets means that many firms have

¹⁸ Bloom and van Reenen, 2007.

¹⁹ Bloom and van Reenen, 2007; Bloom et al., 2013, Jibril et al., 2020.

²⁰ OECD, 2017; Custódio et al., 2019; Bloom et al., 2019; Owalla et al., 2022.

²¹ Hervas-Oliver et al., 2016; Giorcelli, 2019.

²² Askoy et al., 2022; Bloom et al., 2023.

²³ Office for National Statistics, 2021.

persisted with some form of WFH. Firms with better management practices may have more working from home for a couple of reasons. First, such firms care about attracting and retaining talent, so they have had to increase opportunities to WFH. Second, good management practices mean that firms are better able to facilitate WFH for their workers.

4 Method and Data

Survey Construction

- 4.1 To understand how management practices vary across firms in Northern Ireland, we construct a survey which closely follows the methodology of the ONS's Management and Expectations Survey (MES), which in turn is based on the work of Bloom and Van Reenen.²⁴ Our survey consists of 25 questions, answered by a member of management from any firm operating in Northern Ireland. Given the importance of SMEs to Northern Ireland's economy, we extend the eligibility to firms with five or more employees, in contrast to MES, where responding firms must have at least ten employees.
- 4.2 There are two groups of questions within our survey. The first group of questions are designed to allow the management practices of each firm to be scored against best practice. These questions evaluate firms across four key areas: Continuous improvement, Key performance indicators, Targets, and Employment practices. The continuous improvement section of our survey focuses on how firms deal with problems faced within their business, and whether they took further action by implementing continuous improvement processes to counter potential future problems. The key performance indicators section focuses on the ways and the frequency with which firms monitor their performance. The targets section focuses on how firms set targets for their employees; whether these targets are achievable within a given timeframe; and if these targets are clearly communicated, with a reward system in place for good performance. The employment practices section focuses on performance review processes in place, promotion criteria, hiring practices, and timeframes within which firms address underperformance, and whether firms provide skill development opportunities to employees.
- 4.3 Following the approach of MES, we calculate a management practices score across 19 questions. The answers to each question are multiple choice, ranging from an answer which is best practice (equal to 1), down to an answer which is worst practice (equal to 0). Answers between these two values are ranked and assigned a score which increases by $1/(n-1)$ increments, where n is the number of potential answers. To calculate the overall management score for a firm, we take the unweighted average of all answered questions.
- 4.4 The second group of questions we include in the survey looks at the potential determinants and outcomes of management practices. To understand how market competition may be associated with a firm's management practices, we collect

²⁴ See Bloom and Van Reenen, 2006, 2007.

information on what proportion of a firm's total revenue it generates in the different markets it sells to. To identify multinational firms, we collect information on whether the firm operates across business premises in other countries. To explore the role of family ownership and family-managed firms, we include two questions: the first asks whether the firm is family owned, and if so, what type (founder owned, relative owned, or unrelated family owned); and the second asks those family-owned firms whether the managing director (or equivalent) has any familial ties with the business owner(s).

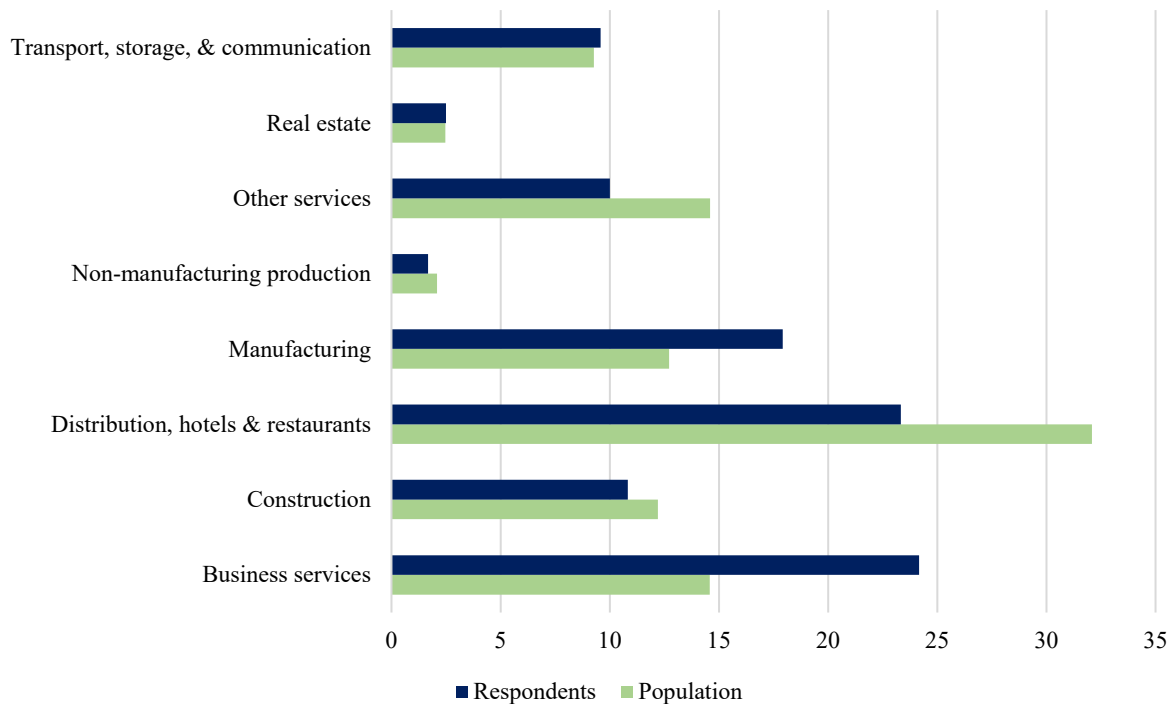
- 4.5 As human capital has been identified as a driver of firm management practices, we ask what proportion of employees have a Level 6 qualification or above. To examine human capital beyond formal qualifications, we ask what proportion of managers have taken a leadership development course in the past 12 months. To assess engagement with government programmes and support, we ask respondents to identify from a list any government-backed schemes or programmes they have participated in since January 2021.
- 4.6 To measure the extent that a firm's processes are digitalised, we ask respondents to choose the areas of their business which use software systems for their management, covering five areas: customer relationship management (CRM) system; enterprise resource planning (ERP) system; human resource (HR) system; digital accounting software; and project management software. Finally, we ask respondents about the proportion of both managers and non-managers who work from home for 2019 and 2022.
- 4.7 Finally, we collect publicly available data from Companies House, available through the FAME database, for each firm that responded to our survey. This allows us to measure additional firm characteristics, such as its age, number of subsidiaries, and financial performance.

Sampling strategy

- 4.8 We conducted the survey during 2022, across two waves. Surveyed firms were chosen using data from Companies House, covering all firms with a business address in Northern Ireland, at least five employees, and with a contact email recorded. The first wave, during March to July 2022, surveyed all firms with financial information recorded in the database. The second wave, during October to December 2022, surveyed all remaining firms. Each firm received an emailed invitation to take part in the survey, and a reminder four weeks later. Survey invitations were also sent to all individuals at each firm with roles listed as Managing Directors/Executives, Head of Finance, and/or Head of Human Resources, where their email addresses were provided. In total, we surveyed 8,257 firms. Following the completion of both waves, we received 272 responses, equating to a response rate of 3.3%.
- 4.9 Figure 1 shows the distribution of survey respondents by industry versus the population of firms in Northern Ireland. The distribution of respondents broadly reflects the population: three industries – Manufacturing, Distribution, hotels & restaurants, and Business services – account for 59.4 per cent of the NI economy and 65.4 per cent of the

respondents in our survey. Only two industries – Business services and Manufacturing – are over-represented in our respondents; while two industries – Distribution, hotels & restaurants and Other services – are under-represented.

Figure 1: Distribution of Survey respondents vs population by industry (%)

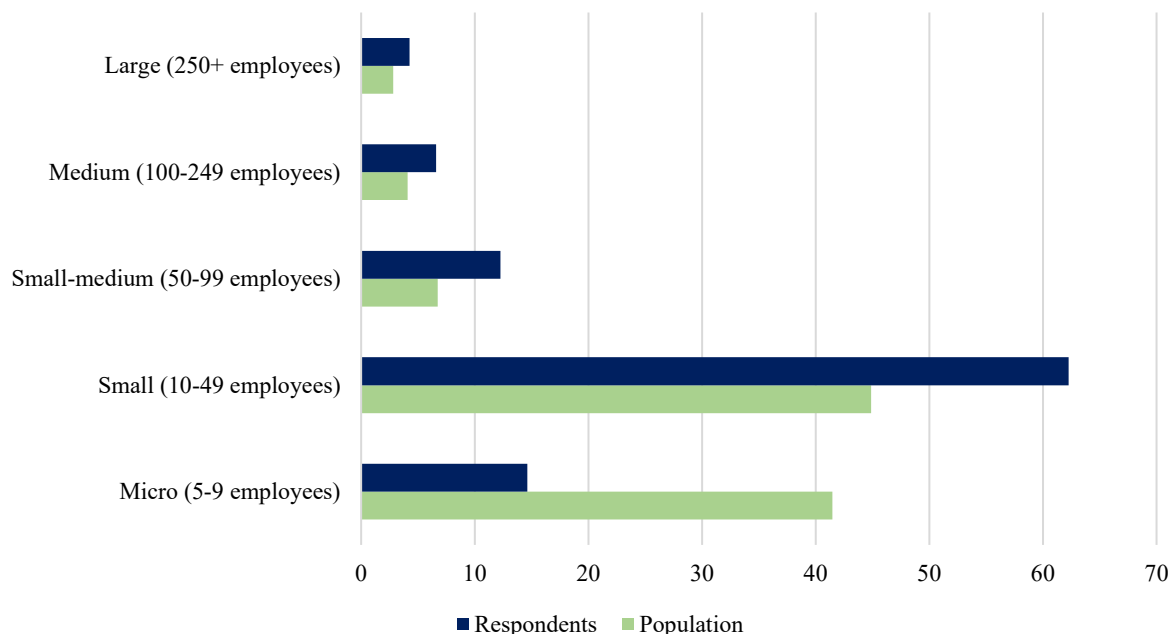


Notes: Industry classification based on SIC 2007. Non-manufacturing production includes Sections B, D and E. Distribution, hotels & restaurants includes Sections G and I. Transport, storage & communication includes Sections H and J. Business services includes sections M and N. Other services includes Sections P, Q, R and S. Sections A (Agriculture, Forestry and Fishing), K (Financial and insurance activities), O (Public administration and defence), T (Activities of households as employers), and U (Activities of extraterritorial organisations and bodies) are excluded from the analysis. Population includes all firms with a registered office or trading address in Northern Ireland

Sources: NI data from NI Management Survey; Population data from Companies House, FAME.

4.10 Figure 2 shows the distribution of respondents by firm size. Microbusinesses are 42.3 per cent of the firms operating in Northern Ireland, but only 15.0 per cent of our survey respondents. As a result, we have a slight over representation among our respondents for firms in the various other size bands, but the number of respondents in each of these is in proportion to the overall population when microbusinesses are excluded.

Figure 2: Distribution of survey respondents vs population by firm size (%)



Notes: Population includes all firms with a registered office or trading address in Northern Ireland

Sources: NI data from NI Management Survey; Population data from Companies House, FAME.

Empirical strategy

4.11 To examine how business characteristics affect management practices of a firm, we estimate the following regression model:

$$MPS_i = \beta_1 + \beta_2 Firm\ size_i + \beta_3 Age_i + \beta_4 AgeSquared_i + \beta_i X_i + v_i + \varepsilon_i \quad (1)$$

4.12 MPS_i is the management practices score for firm i ; β_1 is the constant; $Firm\ size_i$ is the firm's size; Age_i is the firm's age; $AgeSquared_i$ is the square of Age_i ; X_i is a vector of independent variables; v_i is a vector of industry fixed effects and local-government fixed effects; and ε_i is the error term.

4.13 To understand how management practices may affect firm performance, we estimate the following regression model:

$$y_i = \beta_1 + \beta_2 MPS_i + \beta_i X_i + v_i + \varepsilon_i \quad (2)$$

4.14 y_i measures our firm-level outcome, such as working from home, digitalisation, or financial performance; β_1 is the constant; MPS_i is a firm's management practices score; X_i is a vector of independent variables; v_i is a vector of industry fixed effects and local-

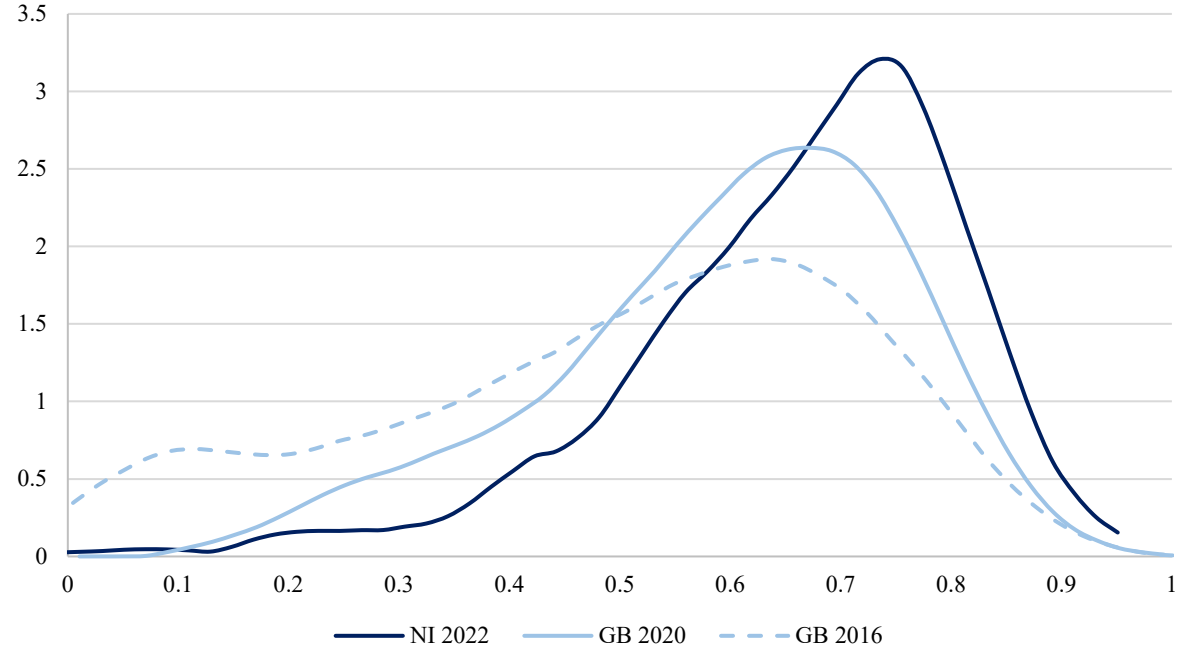
government fixed effects; and ε_i is the error term. Depending on how y_i is measured, we use either OLS or logistic regressions.

4.15 For our regression analysis, we use unweighted data, and include all firms with 5 or more employees. Appendix Table 1 shows all the variables we use in our analysis, including their summary statistics, definition, and source.

5 Management practice scores for Northern Ireland

5.1 Figure 3 shows the distribution of management practices scores for our Northern Ireland (NI) respondents with 10 or more employees, weighted by firm size and industry. This is plotted against the similarly weighted results for firms in Great Britain (GB) in 2016 and 2020. The average score for NI is 0.66, which is higher than the average GB score in both 2016 and 2020, which were 0.50 and 0.60 respectively. The NI distribution is negatively skewed, with a long tail of less well-managed firms, similar to the previous GB distributions. However, NI has fewer of these less well-managed firms, reflected in the higher median score for NI being 0.69, compared to 0.63 for GB in 2020.

Figure 3: Distribution of management score

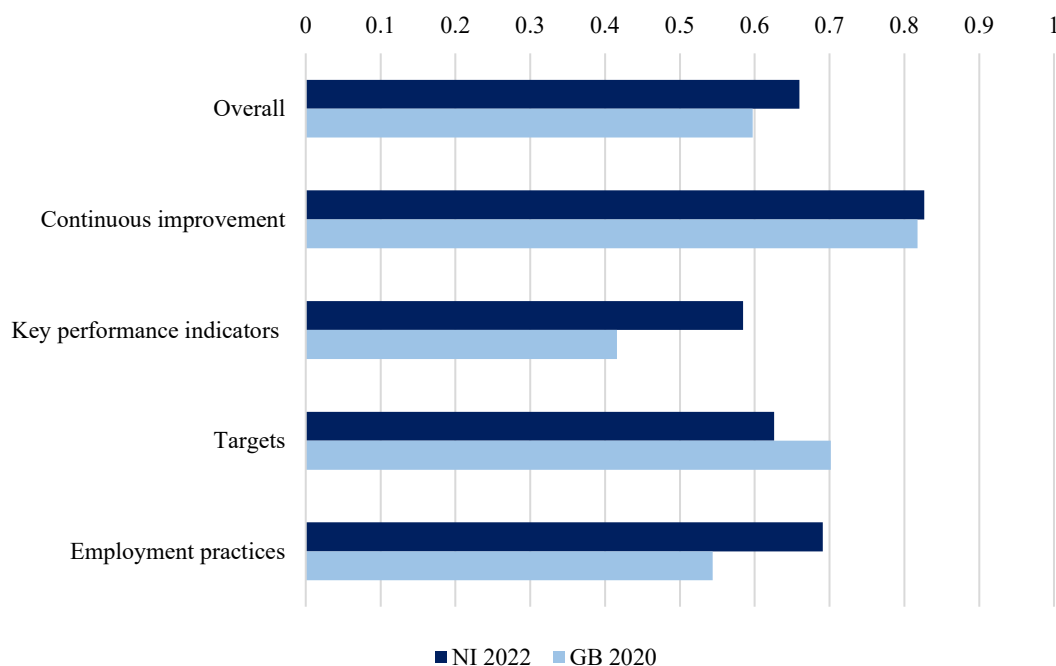


Notes: Kernel density plot. Scores shown for firms with 10 or more employees. NI scores are weighted by industry (8 broad industries; see Figure 1 Notes for definitions) and firm size band (small, 10-49; medium, 50-249; large, 250+). Weighting uses pseudo-inclusion probabilities estimated from a logistic regression. GB scores weighted by industry and firm size band.

Sources: NI data from NI Management Survey; GB data from ONS (2021).

- 5.2 While the NI distribution is similar in shape to the previous GB distributions, we should be cautious in interpreting this as firms in Northern Ireland having better management practices than those in Great Britain. First, our NI survey took place two years after the most recent GB survey, and after the Covid-19 pandemic, meaning the relative number of well managed firms may have changed during this time. Second, our survey had a lower response rate than the ONS survey, and a smaller sample size. Third, our sampling strategy and weighting of results relied on data from Companies House, while the ONS’s sampling strategy used respondents to the Annual Business Survey and previous Management and Expectations Surveys, and its weighting used the Inter-Departmental Business Register.
- 5.3 Figure 4 shows how firms in Northern Ireland score on each of the components of management practices. This is also compared against the scores for GB firms in 2020, with NI firms scoring better across three of the four components. NI firms score best in the area of continuous improvement, scoring almost identically to GB firms. Compared to GB firms, those in NI score substantially better for both key performance indicators and employment practices. However, they score more poorly than their GB counterparts for targets.

Figure 4: Management score by component

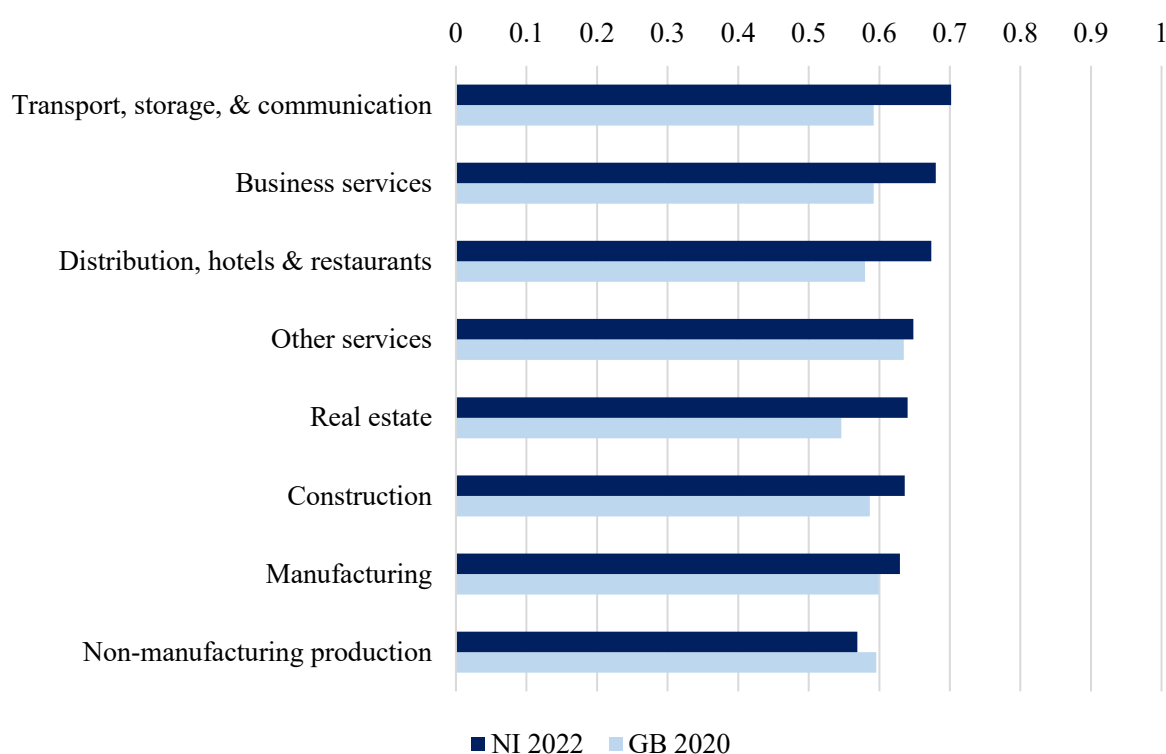


Notes: Scores shown for firms with 10 or more employees. NI scores are weighted by broad industry (see Figure 5) and firm size band (small, 10-49; medium, 50-249; large, 250+). Weighting uses pseudo-inclusion probabilities estimated from a logistic regression. GB scores weighted by industry and firm size band.

Sources: NI data from NI Management Survey; GB data from ONS (2021).

- 5.4 It is unclear why NI firms make better use of key performance indicators. For employment practices, a possible explanation for NI firms scoring better is the difference in employment law between Northern Ireland and the rest of the UK. In Northern Ireland, this covers areas such as the hiring and promotion of workers. It is therefore possible that NI firms score higher than their GB counterparts as a result of the requirements placed on them by NI employment law, as this relates to the aspects of employment practices we measure within our survey.
- 5.5 Figure 5 shows how the average management score varies by industry, for firms with 10 or more employees. Seven of the eight industries in NI outscore GB. NI's top three performing sectors – Transport, storage & communication; Business Services; and Distribution, hotels & restaurants – lead their GB counterparts by a substantial margin, as does Real estate. The poorest scoring sector in NI is Non-manufacturing production, which also scores more poorly than its GB counterpart.

Figure 5: Management score by industry



Notes: Scores shown for firms with 10 or more employees. Industry scores are weighted by firm size band (small, 10-49; medium, 50-249; large, 250+). Weighting uses pseudo-inclusion probabilities estimated from a logistic regression.

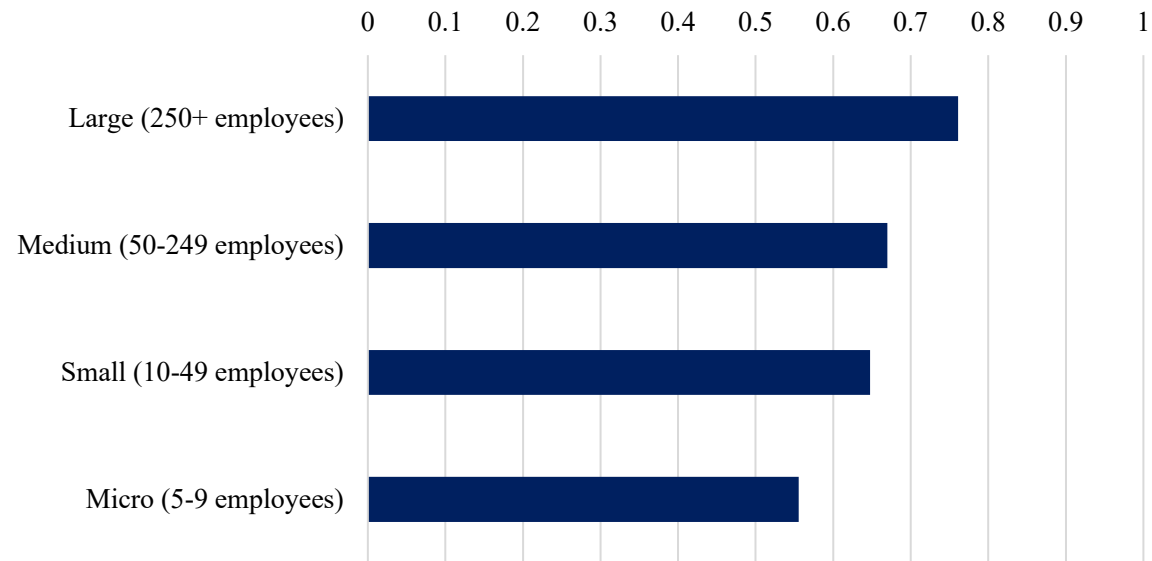
Sources: NI data from NI Management Survey; GB data from ONS (2021).

- 5.6 Figure 6 shows how the average management score varies by firm size. Large firms, with 250 or more employees, have the highest average score, at 0.76. Medium and small firms are next, with similar scores of 0.67 and 0.65 respectively. These results for firms with

10 or more employees are consistent with the results for GB firms in 2016 and 2020. In contrast to the analysis for GB, we extended our sample to include micro firms with 5 to 9 employees, with these firms scoring lowest, with an average of 0.56.

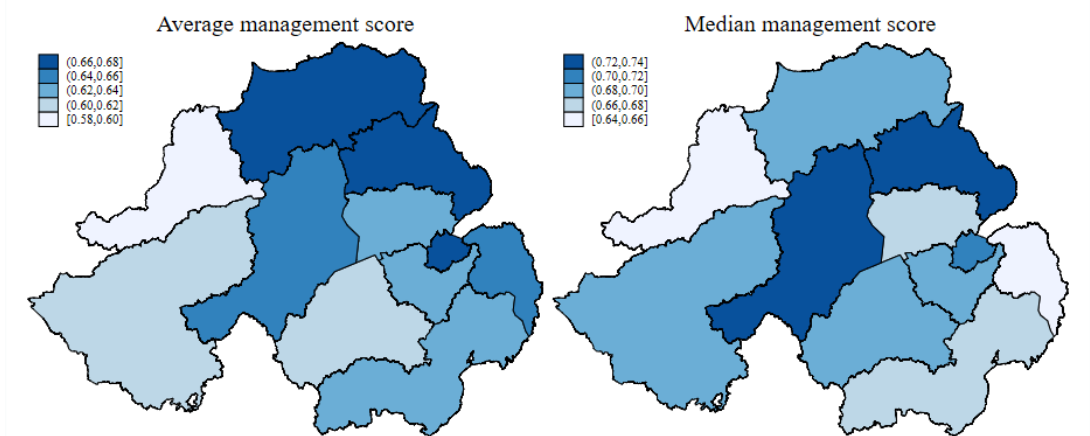
5.7 Figure 7 maps the regional variation in average and median management practices scores across local government districts in Northern Ireland. Average management scores are highest in the North and East of Northern Ireland, but there is no clear spatial pattern for median scores. Firms in Mid and East Antrim, Belfast, and Mid Ulster score well across both measures. In contrast, firms in Derry City & Strabane score poorly across both measures.

Figure 6: Management score by firm size



Notes: Scores weighted by industry. Weighting uses pseudo-inclusion probabilities estimated from a logistic regression.
Sources: NI data from NI Management Survey.

Figure 7: Management practices score by Local Government District



Notes: Scores are unweighted.
Sources: NI data from NI Management Survey.

6 Determinants of management practices score

- 6.1 In this section, we explore the covariates of good management practices. In column 1 of Table 1, we see that there is a small, positive effect of an increase in firm size on management practices: a 10 per cent increase in firm size results in the firms' management score increasing by 0.0057. We include firm size throughout our remaining regressions in Table 1, and the estimated coefficient is relatively stable and statistically significant throughout. This firm size effect is around half the size of that previously found for manufacturing firms in Great Britain in 2015,²⁵ suggesting firm size has less of an effect on management practices for our sample of firms.
- 6.2 We also examine the effect of a firm's age on management practices in column 1. We find age is positively correlated, where a 10 per cent increase in a firm's age results in a 0.0118 increase in its management practices score. This coefficient is approximately twice the size of the effect found for firm size. We also find the age squared term is negative, suggesting that management practices deteriorate for the oldest firms. As with firm size, we retain these two age variables throughout Table 1, and the size of the estimated coefficients remain relatively stable. Previous results for Great Britain did not suggest firm age was consistently related to management practices.²⁶
- 6.3 In column 2, we explore the role of family ownership and family management. Respondents to our survey indicated whether their firm was family owned, and if so, what form this family ownership took, and whether the firm was family-managed. We find that being a 'second-generation' family firm – a family firm, owned by someone other than the founder, and managed by a family member – is negatively correlated with its management practices score, with a 0.042 lower management practices score. We do not find any correlation between a firm's score and being either a family-owned firm or a family-managed firm in isolation: it is only for second-generation family-managed firms where a correlation exists (see Appendix Table 2). These results support Bloom and Van Reenen,²⁷ where it is family-owned firms not run by the founder which have poorer management practices.
- 6.4 In column 3, we explore a further type of ownership, by examining the role of multinationals. We find a positive effect of being a multinational on management practices: it is associated with an increase in the firm's management practices score of 0.040. This finding is consistent with the view that multinational firms adopt best practice, irrespective of local management practices.²⁸ To ensure it is not the number of sites that a firm operates from which is driving this finding, we include a measure of this in a separate regression reported in the Appendix, but it is not statistically significant (see Appendix Table 2).

²⁵ See ONS, 2017.

²⁶ See ONS, 2017, 2021.

²⁷ Bloom and Van Reenen, 2007.

²⁸ Bloom and Van Reenen, 2010.

Table 1: Covariates of firm-level management practices

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Firm size	0.057*** (0.010)	0.055*** (0.011)	0.054*** (0.009)	0.053*** (0.011)	0.054*** (0.010)	0.051*** (0.009)	0.058*** (0.009)	0.055*** (0.011)	0.043*** (0.007)
Firm age	0.118* (0.062)	0.113* (0.060)	0.130** (0.063)	0.108* (0.059)	0.121* (0.062)	0.090 (0.064)	0.096 (0.063)	0.122* (0.065)	0.085 (0.061)
Firm age ²	-0.022* (0.012)	-0.021* (0.012)	-0.025* (0.013)	-0.020* (0.012)	-0.023* (0.012)	-0.017 (0.013)	-0.020 (0.012)	-0.023* (0.013)	-0.017 (0.012)
Second-generation & family-managed		-0.042* (0.022)							-0.028 (0.021)
Multinational			0.040* (0.020)						0.025 (0.022)
NI turnover				-0.076** (0.031)					-0.060* (0.029)
Number of subsidiaries					0.015* (0.008)				0.015** (0.007)
Leadership training proportion						0.108*** (0.021)			0.076*** (0.017)
Manager qualifications							0.137*** (0.033)		0.125*** (0.033)
Government support								0.016** (0.008)	0.010 (0.008)
Industry dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
LGD dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.402*** (0.079)	0.413*** (0.076)	0.381*** (0.086)	0.471*** (0.088)	0.404*** (0.079)	0.429*** (0.079)	0.311*** (0.084)	0.392*** (0.084)	0.383*** (0.099)
Observations	208	208	206	208	208	208	208	208	206
R-squared	0.184	0.194	0.214	0.207	0.192	0.232	0.263	0.193	0.358
Adjusted-R2	0.0969	0.103	0.125	0.117	0.101	0.145	0.180	0.102	0.261

Robust standard errors in parentheses. Standard errors are clustered by industry and firm size.

*** p<0.01, ** p<0.05, * p<0.1

- 6.5 In column 4, we test whether the competitive environment faced by a firm is correlated with its management practices. Firms may be forced to adopt better management practices where they experience greater competition, and this may be most apparent where firms are exporting outside their immediate regional market, or across national boundaries. To examine this, we include a variable which measures the proportion of a firm's turnover generated within Northern Ireland. We find that firms generating a greater proportion of turnover locally have a lower management practices score: a firm exclusively generating its revenue from within Northern Ireland has a 0.076 lower management practices score.
- 6.6 In column 5, we look at whether more complex organisational structures have better management practices. It might be expected that adopting best practice is more crucial for firms which are more complex. We measure complexity as the number of subsidiaries a firm has, and find a higher number of subsidiaries is associated with a 0.015 higher management score.²⁹
- 6.7 In columns 6 and 7, we look at the effect of human capital on a firm's management practices. In column 6, we include a variable which measures the proportion of managers that have undertaken leadership training within the past twelve months. We find a higher proportion is associated with an increase in the firm's management practices score: if all managers have received leadership training, it increases the firm's score by 0.108. We also test whether having any proportion of managers taking leadership training is associated with better management practices, using a dummy variable, and find a similar result, with a slightly smaller increase of 0.098 in the firm's management practices score.³⁰ This means that for a firm with limited resources, ensuring that at least some of their managers have received leadership training is associated with better management practices, suggesting a spillover effect from those who have received training to the wider organisation. Finally, we test whether a higher proportion of managers taking a leadership course is associated with a higher score specifically for a firm's employment practices, with the estimated coefficient showing this increases a firm's employment practices score by 0.097, significant at the one per cent level.
- 6.8 In column 7, we examine the role of formal qualifications in relation to management practices. Our survey measures the proportion of both managers and non-managers with a level 6 qualification or above. We find that a higher proportion of managers reaching this qualification level is associated with a higher management practices score: if all managers have a level 6 qualification or above, the firm's management practices score is higher by 0.137. If we repeat this analysis and include the proportion of non-managers with a level 6 or above qualification, the result for manager qualifications remains, but there is no statistically significant coefficient for non-manager qualifications (see Appendix Table 2). We interpret these results as meaning it is the educational qualifications of managers which matter for a firm's management practices, rather than

²⁹ We also test whether simply being a parent company is associated with a higher management score, but it is not significant. See Appendix Table 2 column 4.

³⁰ See Appendix Table 2 column 5.

the qualification level of the firm's wider workforce. This result differs from the ONS's analysis for firms in Great Britain, which found that the qualification level of both managers and non-managers mattered when explaining a firm's management practices score.³¹

- 6.9 In column 8, we look at whether government support is associated with a higher management practices score. We find a positive relationship, where firms that have interacted with a larger number of government bodies or agencies have a higher management practices score: an increase of one additional government agency or body is associated with an increase in the firm's management practices score of 0.016. To test whether it is simply being involved with a government scheme or programme that matters, rather than the number, we run an alternative specification, using a dummy variable where a firm has been involved in at least one scheme or programme: the coefficient is positive and significant (see Appendix Table 2). We also check whether any individual government body or agency is driving this effect, but do not find any statistically significant effect associated with a specific government or non-governmental body. These results suggest that firms which interact with a higher number of government programmes or schemes have better management practices, but no single programme or scheme is solely responsible for this.
- 6.10 Our results in Table 1 show there are a number of different characteristics associated with a firm's management practices score. In column 9, we present our final regression specification, which includes all the variables considered in the previous columns. We also compare the relative contribution of each regressor, or group of regressors, to a firm's overall management score, by performing a Shapley-Shorrocks decomposition (see Appendix Table 3).
- 6.11 We find that our measures of manager human capital – the proportion of managers having taken a leadership course, and the proportion of highly qualified managers – remain significant, and together account for the largest proportion of the explained variation in the management score, at 35 per cent. They are followed by firm size, which accounts for 15 per cent of the explained variation. Generating a higher proportion of turnover from Northern Ireland is still associated with a lower management practices score, and accounts for 5 per cent. Ownership is next, with second-generation family-management accounting for 4 per cent of the variation in management scores: although relative-owned and family-managed falls short of the 10 per cent level of significance. A higher number of subsidiaries remains associated with a higher management practices score, and accounts for 3 per cent. A firm's age is no longer significant, for both age and age-squared terms, which together only account for 2 per cent of variation. Receiving government support is no longer significant, and accounts for 2 per cent. Multinational status is also no longer associated with a firm's management score, and accounts for just 1 per cent of variation in the management score.

³¹ See ONS, 2018.

6.12 Finally, we examine the dummy variables used to control for differences across industries and local government districts. Relative to the reference industry of Business services, no other industry had a higher management score. But after accounting for other firm-level characteristics, two industries had lower scores: Real estate and Manufacturing. We included similar control dummies for local government district (LGD), but after controlling for firm characteristics and industries, none of the LGDs had a higher or lower score relative to the reference LGD of Belfast. This result means that differences in management practices at the local government district level, seen in Figure 7, reflect differences in the characteristics of firms, rather than anything existing at local government level.

7 Management practices and firm-level outcomes

7.1 In this section, we examine the association between a firm's management practices score and firm-level outcomes.

7.2 In columns 1 to 6 of Table 2, we examine whether both levels and changes in working from home can be explained by a firm's management practices. We might expect firms with better management practices to have a higher proportion of their workforce who work from home, and these firms may have been able to more easily implement working from home across their workforce as a result of the Covid-19 pandemic.

7.3 In columns 1 to 3, we focus on rates of working from home amongst managers. In column 1, firms with higher management practices score had a higher proportion of managers working from home in 2022: a one-tenth (0.1) increase in a firm's management practices score is associated with a 2.21 percentage point higher proportion of managers who work from home, but this result falls just short of statistical significance. Similarly, the qualification level of managers is positively associated with the proportion of managers working from home, but this result again falls just short of statistical significance. We also find that both larger firms and firms that are family-managed have lower proportions of managers working from home. In contrast, multinational firms see higher proportions of managers working from home. The qualification level of non-managers, and a firm's age, have no statistically significant effect on the rate of working from home amongst a firm's managers.

Table 2: Economics outcomes and management practices

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Manager WFH 2022	Manager WFH 2019	Manager change in WFH	Non- Manager WFH 2022	Non- Manager WFH 2019	Non- Manager change in WFH	Digitalisation	Productivity	Profit Margin	Exporter
Management score	22.079 (13.916)	4.948 (5.919)	11.140 (14.066)	12.370 (13.354)	-3.158 (8.934)	11.789 (12.881)	0.516*** (0.104)	0.498 (0.747)	1.810* (0.947)	7.995*** (6.458)
Firm size	-4.736** (1.786)	-5.130*** (1.788)	0.808 (1.180)	-3.936** (1.816)	-2.805** (1.357)	-1.070 (1.210)	0.066*** (0.018)	-0.459** (0.193)	-0.225 (0.163)	1.309 (0.213)
Family-managed	-6.856* (3.635)	-4.453 (2.869)	-2.613 (3.937)	-6.714 (4.376)	-3.673 (2.981)	-3.353 (2.867)				
Multinational	12.348** (5.726)	8.026 (5.740)	3.592 (2.567)	12.518** (5.699)	9.273** (4.222)	3.581 (3.014)				
Manager qualifications	9.910 (5.959)	3.076 (6.260)	9.465 (7.210)	15.023** (6.517)	10.406* (5.373)	6.867 (5.064)				
Non-Manager qualifications	9.479 (8.700)	-10.001 (6.794)	21.102** (8.231)	8.636 (8.870)	-9.942 (7.471)	19.489** (8.239)				
Firm age										0.605** (0.135)
Industry dummy	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES
LGD dummy	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES
Constant	8.889 (7.657)	28.386*** (8.498)	-15.826* (7.793)	4.846 (8.381)	14.016 (9.543)	-7.695 (7.926)	-0.038 (0.084)	5.616*** (0.898)	2.563** (1.125)	0.174** (0.134)
Observations	193	192	189	193	192	190	209	42	43	183
R-squared	0.261	0.185	0.265	0.234	0.176	0.258	0.321	0.235	0.223	-
Adjusted-R2	0.161	0.0735	0.163	0.129	0.0629	0.155	0.253	0.196	0.0397	-
Pseudo-R2	-	-	-	-	-	-	-	-	-	0.1957

Robust standard errors in parentheses. Standard errors are clustered by industry and firm size.

*** p<0.01, ** p<0.05, * p<0.1

- 7.4 Comparing these results with those for managers in 2019 in column 2, we find that a firm's management score is not associated with higher rates of working from home. Firm size remains negative and statistically significant, but being either a multinational or family-managed firm is no longer associated with the proportion of managers working from home. These results suggest that management practices did not determine the extent of working from home amongst a firm's managers prior to the pandemic, and are at best only weakly associated post-pandemic. Column 3 tests whether the magnitude of the change in working from home can be explained by management practices, but finds no statistically significant result. Only a better-qualified non-manager workforce is associated with greater working from home for managers.
- 7.5 In columns 4 to 6, we repeat this analysis for non-managers. The management practices score of a firm is not found to be associated with rates of working from home for non-managers in 2022, with this also the case for 2019. Firms with a higher proportion of managers with a level 6 qualification or above also have higher rates of working from home, with this result stronger post-pandemic. This suggests that there is a link between the skill level of managers and a firm's ability to adopt greater working from home for non-managers. In column 6, we find that only the qualification level of non-managers has any association with the change in working from home, suggesting those with higher qualifications, or in jobs requiring higher qualifications, saw greater movement to working from home.
- 7.6 In column 7 of Table 2, we look at the extent of digitalisation within the firm. We find that management practices have a positive and statistically significant relationship with the extent of digitalisation. An increase in a firm's management practices score by 0.1 is associated with an increase in the extent of digitalisation by 0.0516. Firm size is also found to be associated with digitalisation, with larger firms seeing greater digitalisation of their business processes.
- 7.7 In columns 8 to 10, we examine alternative measures of firm performance. Previous studies have found that better management practices are associated with a firm having higher productivity and higher profitability.³² Due to data constraints, our regressions have low numbers of observations, limiting our potential to find statistically significant results. Due to these constraints, we do not include controls for local government districts.
- 7.8 In column 8, we examine whether better management practices are associated with higher levels of productivity. Unsurprisingly, given the low number of observations, we do not find any statistically significant relationship between management practices and productivity. The coefficient for management practices is positive, which is consistent with better management practices being associated with higher productivity. We also find that larger firms have lower productivity, suggesting they are not as effective at turning additional employment into higher value output relative to smaller firms in our sample.

³² See Bloom and Van Reenen, 2007, 2010.

- 7.9 In column 9, we examine a firm's profit margin. We find that better management practices are associated with a higher profit margin. This means that if a firm's management practices score increases by one-tenth (0.1), its profit margin will increase by approximately 18 per cent.
- 7.10 In column 10, we test whether a better management score makes a firm more likely to be an exporter. We run a logistic regression, and find that a higher management score results in the higher likelihood of a firm being an exporter, which is consistent with previous findings.³³

8 Conclusion and policy implications

- 8.1 Our evidence suggests that management practices matter. Better managed firms perform better, are more likely to be exporters, and are more innovative as evidenced by their greater digitalisation. Although we are unable to identify the direction of causation, the correlations we observe are nevertheless apposite. We also find tentative evidence that better managed firms are more likely to permit managers (but not non-managers) to work from home. This finding perhaps suggests more about the nature of the tight post-pandemic managerial labour market than about good management practices per se.
- 8.2 What drives good management performance? Our findings largely support what has been found in prior studies. Larger firms have better management practices, whereas poor management practices are typically found in firms which face a lack of competition and in second-generation family firms. However, we have one novel finding. We find that management practices are healthier in firms with better qualified managers and in firms where managers have taken leadership training. These two human capital measures explain a substantial proportion of the variation in management practices.
- 8.3 What do our findings mean for firms and government policy? First, as government policy, in the attempt to drive productivity, increasingly focuses on innovation, our results suggest that good management practices should be central to attempts to increase digitalisation and new technology adoption in businesses.
- 8.4 Second, our findings reinforce the importance of a well-qualified workforce, specifically managers. Firms, government, and further and higher education institutes should be working together to identify the skills required to lead and manage in the twenty-first century economy. This will take time to bear fruit, but our findings also highlight the importance of leadership programmes to developing good management practices and more productive firms. Firms and government should therefore focus their attention on upskilling managers by putting them through appropriate leadership training.
- 8.5 Third, our findings also suggest where government should direct its resources to boost the management practices of firms. The characteristics of firms which are likely to have management practices further from best practice are small, second-generation family-managed, with less qualified managers, primarily selling to the domestic market. We find

³³ See Bloom et al. (2021).

that two sectors have poorer management practices: real estate and manufacturing. Government policy should therefore target firms with these characteristics and in these sectors. Notably, our findings suggest that there is no local council area in Northern Ireland where management practices are worse, which suggests that instead of a place-based approach to management practices, policymakers should target policy interventions based on firm characteristics.

9 References

- Aksoy, C.G., Barrero, J.M., Bloom, N., Davis, S.J., Dolls, M. and Zarate, P., 2022. *Working from home around the world* (No. w30446). National Bureau of Economic Research.
- Bloom, N. and Van Reenen, J., 2007. Measuring and explaining management practices across firms and countries. *The Quarterly Journal of Economics*, 122(4), pp.1351-1408.
- Bloom, N. and Van Reenen, J., 2010. Why do management practices differ across firms and countries? *Journal of Economic Perspectives*, 24(1), pp.203-224.
- Bloom, N., Eifert, B., Mahajan, A., McKenzie, D. and Roberts, J., 2013. Does management matter? Evidence from India. *The Quarterly Journal of Economics*, 128(1), pp.1-51.
- Bloom, N., Lemos, R., Sadun, R., Scur, D. and Van Reenen, J., 2014. The new empirical economics of management. *Journal of the European Economic Association*, 12(4), pp.835-876.
- Bloom, N., Brynjolfsson, E., Foster, L., Jarmin, R., Patnaik, M., Saporta-Eksten, I. and Van Reenen, J., 2019. What drives differences in management practices?. *American Economic Review*, 109(5), pp.1648-1683.
- Bloom, N., Manova, K., Van Reenen, J., Sun, S.T. and Yu, Z., 2021. Trade and management. *The Review of Economics and Statistics*, 103(3), pp.443-460.
- Bloom, N., Han, R. and Liang, J., 2023. *How hybrid working from home works out* (No. w30292). National Bureau of Economic Research.
- Broszeit, S., Laible, M.C., Fritsch, U. and Görg, H., 2019. Management practices and productivity in Germany. *German Economic Review*, 20(4), pp.e657-e705.
- Chadha, J.S. and Samiri, I., (2022) Macroeconomic Perspectives on Productivity, Working Paper No. 030, The Productivity Institute.
- Chen, S. and Lee, D., 2023. Small and vulnerable: SME productivity in the great productivity slowdown. *Journal of Financial Economics*, 147(1), pp.49-74.
- Crafts, N. and Mills, T.C., 2020. Is the UK productivity slowdown unprecedented?. *National Institute Economic Review*, 251, pp.R47-R53.
- Custódio, C., Ferreira, M.A. and Matos, P., 2019. Do general managerial skills spur innovation?. *Management Science*, 65(2), pp.459-476.
- Drucker, P. (1954) *The Practice of Management*. New York: Harper and Brothers.
- Douch, M., Edwards, H. and Mallick, S., 2023. Productivity debacle in the UK: do post-crisis firm cohorts explain the performance puzzle? *British Journal of Management*, 34, pp.1459-87
- Feng, A. and Valero, A., 2020. Skill-biased management: evidence from manufacturing firms. *The Economic Journal*, 130(628), pp.1057-1080.
- J. Fernald and R. Inkaar (2022) The UK productivity “puzzle” in an international comparative perspective. Working Paper No. 020, The Productivity Institute.
- Forth, J. and Bryson, A., 2019. Management practices and SME performance. *Scottish Journal of Political Economy*, 66(4), pp.527-558.

- Georgiadis, A. and Pitelis, C.N., 2016. The impact of employees' and managers' training on the performance of small-and medium-sized enterprises: Evidence from a randomized natural experiment in the UK service sector. *British Journal of Industrial Relations*, 54(2), pp.409-421.
- Giorcelli, M., 2019. The long-term effects of management and technology transfers. *American Economic Review*, 109(1), pp.121-52.
- Haldane, A., 2018. The UK's productivity problem: Hub no spokes. *Academy of Social Sciences Annual Lecture*, 28.
- Hervas-Oliver, J.L., Ripoll-Sempere, F. and Moll, C.B., 2016. Does management innovation pay-off in SMEs? Empirical evidence for Spanish SMEs. *Small Business Economics*, 47, pp.507-533.
- Jibril, H., Stanfield, C. and Roper, S., 2020. What drives productivity growth behind the frontier? A mixed-methods investigation into UK SMEs. *ERC Research Paper* No, 89.
- Jordan, D. and Turner, J., 2021. Northern Ireland's productivity challenge: exploring the issues. *Productivity Insights Paper*, (004).
- Koch, M.J. and McGrath, R.G., 1996. Improving labor productivity: Human resource management policies do matter. *Strategic Management Journal*, 17(5), pp.335-354.
- Office for National Statistics (ONS), 2017. *Management practices and productivity among manufacturing businesses in Great Britain: Experimental estimates for 2015*. London: ONS.
- Office for National Statistics (ONS), 2018. *Management practices and productivity in British production and services industries – initial results from the Management and Expectations Survey: 2016*. London: ONS.
- Office for National Statistics (ONS), 2021. *Management practices in Great Britain: 2016-2020*. London: ONS.
- Office for National Statistics (ONS), 2021. *Management practices, homeworking and productivity during the coronavirus (COVID-19) pandemic*. London: ONS.
- Organisation for Economic Co-operation and Development (OECD) Staff, 2017. *OECD skills outlook 2017: Skills and global value chains*. Paris: OECD.
- Owalla, B., Gherhes, C., Vorley, T. and Brooks, C., 2022. Mapping SME productivity research: A systematic review of empirical evidence and future research agenda. *Small Business Economics*, 58(3), pp.1285-1307.
- Scur, D., Sadun, R., Van Reenen, J., Lemos, R. and Bloom, N., 2021. The World Management Survey at 18: lessons and the way forward. *Oxford Review of Economic Policy*, 37(2), pp.231-258.
- Wu, N., Bacon, N. and Hoque, K., 2014. The adoption of high performance work practices in small businesses: the influence of markets, business characteristics and HR expertise. *The International Journal of Human Resource Management*, 25(8), pp.1149-1169.

10 Appendix

Appendix Table 1: Variable summary statistics, definitions, and sources

	Obs.	Mean	Standard deviation	Min	Max	Definition	Source
Management practices							
Management practices score	240	0.65	0.16	0.04	0.91	Equally weighted average of all scored questions across continuous improvement, key performance indicators, targets and employment practices.	NI Management Survey
Continuous improvement	240	0.81	0.18	0.33	1.00	Equally weighted average of answers to the following questions:	NI Management Survey
Key performance indicators	240	0.56	0.22	0.00	1.00	Equally weighted average of answers to the following questions:	NI Management Survey
Targets	240	0.62	0.22	0.00	1.00	Equally weighted average of answers to the following questions:	NI Management Survey
Employment practices	239	0.68	0.19	0.00	1.00	Equally weighted average of answers to the following questions:	NI Management Survey
Covariates							
Firm size	212	3.29	1.01	1.79	6.71	Log of number of employees	Companies House, FAME
Firm age	228	2.78	0.78	1.10	4.80	Log of years since incorporation	Companies House, FAME
Firm age ²	228	8.31	4.27	1.21	23.08	Square of Firm age	Companies House, FAME
Family-owned	238	0.81	0.40	0.00	1.00	Equal to one if firm is owned by a family	NI Management Survey
Family-managed	242	0.54	0.50	0.00	1.00	Equal to one if the Managing Director or equivalent has any form of family connection or relationship with the firm's owners	NI Management Survey
Second-generation & family-managed	242	0.18	0.38	0.00	1.00	Equal to one if both family-owned (either related to founder or unrelated family) and family-managed	NI Management Survey
Multinational	236	0.33	0.47	0.00	1.00	Equal to one if firm has sites outside the UK	NI Management Survey
NI turnover dummy	236	0.19	0.39	0.00	1.00	Equal to one if 100% of turnover generated in NI	NI Management Survey
NI turnover proportion	242	0.62	0.36	0.00	1.00	Proportion of turnover generated in NI	NI Management Survey
Exports turnover proportion	242	0.21	0.25	0.00	1.00	Proportion of turnover generated from exports	NI Management Survey
Number of sites	237	2.49	6.93	1.00	100.00	Number of sites firm operates from	NI Management Survey
Number of subsidiaries	215	3.10	1.83	1.00	12.00	Firm's number of subsidiaries	Companies House, FAME
Leadership course dummy	239	0.45	0.50	0.00	1.00	Equal to one if any managers taken leadership course in past 12 months	NI Management Survey
Leadership course proportion	239	0.22	0.31	0.00	1.00	Proportion of managers taking leadership course in past 12 months	NI Management Survey
Manager qualifications	239	0.59	0.36	0.00	1.00	Proportion of managers who have Level 6 qualification or above	NI Management Survey
Non-manager qualifications	228	0.36	0.30	0.00	1.00	Proportion of Non-managers who have a Level 6 qualification or above	NI Management Survey

Government support number	240	0.84	0.93	0.00	4.00	Number of government backed programmes or schemes the firm has accessed since January 2021	NI Management Survey
Government support dummy	240	0.56	0.50	0.00	1.00	Equal to one if firm has accessed any government backed programme of scheme since January 2021	NI Management Survey
Outcome variables							
Manager WFH 2022	235	14.84	28.54	0.00	100.00	Proportion of managers working from home in 2022	NI Management Survey
Non-manager WFH 2022	234	14.01	28.81	0.00	100.00	Proportion of non-managers working from home in 2022	NI Management Survey
Manager WFH 2019	231	6.87	20.22	0.00	100.00	Proportion of managers working from home in 2019	NI Management Survey
Non-manager WFH 2019	230	6.28	20.78	0.00	100.00	Proportion of non-managers working from home in 2019	NI Management Survey
Manager change in WFH	228	8.33	26.07	-100.00	100.00	Percentage point change in managers working from home, 2019-2020	NI Management Survey
Non-manager change in WFH	228	8.04	24.37	-90.00	100.00	Percentage point change in non-managers working from home, 2019-2020	NI Management Survey
Digitalisation	240	0.50	0.26	0.00	1.00	Proportion of business processes digitalised across five key areas: customer relationship management, enterprise resource planning, human resource systems, digital accounting software, and project management software.	NI Management Survey
Productivity	43	3.86	0.85	0.58	5.46	Log of productivity per employee, last available accounts. Productivity equals Turnover minus Cost of sales, divided by total number of employees.	Companies House, FAME
Profit margin	44	1.88	1.02	-1.23	4.08	Log of profit margin, last available accounts. Profit margin equals Profit (Loss) before tax divided by turnover.	Companies House, FAME
Exporter	242	0.34	0.48	0.00	1.00	Equal to one if firm exports internationally	NI Management Survey

Appendix Table 2: Additional regression specifications for the covariates of firm-level management practices

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Firm size	0.056*** (0.010)	0.056*** (0.011)	0.055*** (0.011)	0.055*** (0.010)	0.043*** (0.010)	0.058*** (0.009)	0.055*** (0.011)
Firm age	0.104 (0.062)	0.120* (0.064)	0.113 (0.067)	0.118* (0.062)	0.091 (0.069)	0.071 (0.061)	0.123* (0.063)
Firm age ²	-0.019 (0.013)	-0.023* (0.012)	-0.021 (0.013)	-0.023* (0.012)	-0.018 (0.014)	-0.016 (0.012)	-0.023* (0.013)
Family owned	0.021 (0.029)						
Family-managed		-0.014 (0.027)					
Number of sites			0.008 (0.005)				
Parent company				0.020 (0.028)			
Leadership course dummy					0.098*** (0.016)		
Manager qualifications						0.129*** (0.044)	
Non-manager qualifications						0.031 (0.046)	
Government support dummy							0.022 (0.015)
Constant	0.399*** (0.080)	0.410*** (0.082)	0.402*** (0.088)	0.404*** (0.077)	0.436*** (0.085)	0.330*** (0.085)	0.390*** (0.080)
Observations	207	208	199	208	208	198	208
R-squared	0.188	0.186	0.181	0.186	0.266	0.274	0.188
Adjusted-R2	0.0959	0.0942	0.0841	0.0939	0.184	0.182	0.0967

Robust standard errors in parentheses. Standard errors are clustered by industry and firm size.

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 3: Shapley-Shorrocks decomposition of covariates of management practices

Factor	Shapley value (estimate)	Per cent (estimate)
Firm size	0.055	15.4
Firm age	0.009	2.4
Second-generation family	0.016	4.4
Multinational	0.004	1.2
NI turnover	0.018	5.1
Subsidiaries	0.011	3.1
Manager human capital	0.124	34.5
Government support	0.006	1.7
Industry	0.076	21.3
Local Government District	0.039	10.9
TOTAL	0.358	100