PIN - Productivity Projects Fund

Small Project Report

Spatial Variations in SME Productivity

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About PIN

The Productivity Insights Network was established in January 2018 and is funded by the Economic and Social Research Council. As a multi-disciplinary network of social science researchers engaged with public, private, and third sector partners, our aim is to change the tone of the productivity debate in theory and practice. It is led by the University of Sheffield, with co-investigators at Cambridge Econometrics, Cardiff University, Durham University, University of Sunderland, SQW, University of Cambridge, University of Essex, University of Glasgow and the University of Leeds. The support of the funder is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders.

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Introduction

The Industrial Strategy identifies that the UK's productivity lags that of comparable countries, and seeks to realise improvements across all regions and types of localities, with a strong emphasis on small businesses and entrepreneurship (HM Government, 2017). Evidence suggests that productivity is significantly lower outside of London and the south-east (LSE) region, with the Northern Powerhouse (NP) and Midlands Engine (ME) initiatives seeking to address this productivity gap. Productivity in rural areas also lags urban areas, at the UK aggregate level. However, further understanding of the causes of spatial variations in productivity is required; as McCann (2018, p.15) notes 'it is this geographical aspect of the UK's productivity performance about which we probably know the least'. Specifically, initial evidence on spatial variations in productivity pose the question as to what extent are they the result of structural issues (e.g. too many firms in low productivity sectors in particular localities) or whether after controlling for sector, age and other profile variables, does the productivity of firms in the NP, ME and rural locations continue to lag. To address this we undertake three phases of research, analysing:

- Variations in small business productivity between NP, ME and LSE regions;
- Urban-rural variations in productivity;
- Determinants of variations in small business productivity.

Data and Methodology

Dataset

This study draws on the analysis of 13,200 Small and Medium Sized Enterprises (SMEs) in England from the Longitudinal Small Business Survey (LSBS) for 2015. The Department for Business, Energy and Industrial Strategy (BEIS) commissions the LSBS. We focus on three groups of enterprises (those in NP, ME, and LSE regions), which collectively account for 9,911 records. Regarding this sub-sample, approximately 29% are located in the NP region, of which 21% are classified as rural businesses, and around 27% are located in the ME region, of which approximately 31% are in rural areas. For the comparator region (LSE), 16% of firms are located in a rural area. Rural and urban locations in each region are classified using the ONS (2013) rural-urban classification by postcode.

We measure productivity in terms of turnover per full-time equivalent employees and consider other measures of business performance, namely turnover, generation of a profit, sales growth, employment growth, and exports. We treat turnover as a continuous variable by using information from two questions in the LSBS survey: actual turnover over the previous 12 months; and turnover bands for the same period where firms did not disclose a precise figure (using the mid-point of the band indicated by firms). Profitability, sales growth, employment growth, exports, and innovation are binary variables, where firms report whether or not they generated a profit during the last 12 months, whether they exported goods or services in the last year, whether they introduced new or significantly improved goods or services in the last three years, and whether they plan to increase employees in the next year or grow their sales. As the LSBS over-represents larger SMEs and under-represents micro-businesses, we apply weightings to correct for the imbalance (BIS, 2016). As sampled business numbers are low in Wales, Northern Ireland and Scotland, we concentrate on England.

Analytical Strategy

To identify and understand regional variations in SME performance, we first consider differences in business performance between firms located in the NP, ME and LSE regions. We apply

treatment effects analysis (Inverse Propensity Weighting), to control for differences in size, location, sector, business age, legal status and other business profile characteristics that can influence variations in performance. This allows for a more accurate assessment of regional effects on business performance. Specifically, the analysis helps distinguish whether any poorer performance of firms in the NP and ME regions stems from possessing adverse profile characteristics (e.g. sector, age) or related to region specific factors that are independent of the differences in industrial composition and which could relate to drivers associated with firm-level resources or wider institutional factors. We also consider the distribution of productivity across the three sub-samples and explore the challenges and opportunities faced by small businesses in the NP and ME regions.

In the second stage of the analysis, we undertake exact matched-pair comparisons of rural and urban enterprises located in the NP and ME regions. For this, we employ Propensity Score Matching (PSM) techniques (Rosenbaum and Rubin, 1983). Here we consider performance in terms of turnover, profitability, productivity, sales growth, employment growth, exports, and innovation. This informs discussions as to whether a policy focus on cities as the generators of productivity improvements within the NP and ME is justified.

In stage three, we consider determinants of SME productivity in greater depth, examining the relationship between productivity and innovation as well as other key determinants such as business networks, support, technology used, and other profile variables. Innovation is often critical to enhancing productivity (Crowley and McCann, 2018; Gkypali *et al.*, 2018), yet untangling causal effects is tricky as firms with high productivity are also more likely to be innovative[1] (Hall *et al.*, 2009; Hall, 2011; Baumann and Kritikos, 2016). Since LSBS data allow for studying the impact of different types of innovation on productivity, we divide innovation into five categories: process innovation combined with product innovation new to the market, process innovation combined with product innovation new to the business, only process innovation, only product innovation new to the market, and only product innovation new to the business. Additionally, firms reported whether they have a strong business capability for developing and introducing new products or services and process and operational improvement. These capabilities can influence innovation and in turn aid firms to improve their productivity. Thus, applying the notion of instrumental variables, we use the capability variables as a set of instrumental variables for innovation. To deal with a continuous outcome and endogenous binary covariate and explore the causal link between innovation and productivity, we use the extended linear regression model (Roodman, 2011).

Key Findings

In the first stage, based on the application of treatment effect analysis, the results show that enterprises located in the NP and ME regions are more likely to have lower average levels of annual turnover, but are more likely to report being profitable than firms in the LSE region. Firms located in the NP and ME regions are less likely to have exported their goods or services than those in the LSE region. Purely sectoral effects and theories of industrial organisation cannot thus explain fully differences in SME regional performance. Firms in the NP and ME regions are also less likely to be planning to increase sales than counterparts in the LSE, albeit there are no significant differences in plans to increase employment or in the level of goods and service innovation in the last 3 years. Of particular note, however, are the results for productivity. Enterprises in both the NP and ME are less productive than their counterparts in the LSE region. It is therefore not possible to attribute differences in productivity across regions solely to spatial

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[1] Using Conditional mixed-process models (CMP) the results do not show the simultaneous link between the delayed effect of innovation and labour productivity, which is what we would expect.

variations in profile characteristics, like sector, size and age. Firms of a similar size, sector and age in the NP and ME are less productive overall than comparable enterprises in the LSE region.

For the matched analysis of urban-rural enterprise performance within the NP and ME regions, the analysis indicates that there are no significant differences for any of the business performance measures (productivity, turnover, profitability, employment growth, sales growth, exporting and innovation) between rural and urban firms in the NP region. The results are not sensitive to the nature of the matching technique employed (e.g. PSM, nearest neighbour, caliper). The results are very similar in the case of the ME region where there are no significant differences between the matched urban and rural firms in terms of their turnover, profitability, sales and employment objectives, exporting, and productivity. Again, the results are not sensitive to the matching technique employed. One significant difference in the case of the ME region is that rural firms are more likely than urban firms to innovate in the production of goods. Overall, the analysis indicates that rural firms in both NP and ME regions do not underperform their urban counterparts.

In the third stage, the results indicate that process innovation combined with product innovation new to the market, process innovation combined with product innovation new to the business, only product innovation new to the market, and only product innovation new to the business are negatively associated with productivity. In fact, only process innovation is positively associated with improving productivity. The differences between process and product innovation are logical. Most new products fail to meet desired sales, so it is risky and uncertain process especially for SMEs (Morris *et al.*, 2015). When products are new to the business, there will be a learning curve and firms are unlikely to be efficient at first, this will come over time as they learn by doing and identify ways of reducing costs and further adding value (Luh and Stefanou, 1993). The direct relationship between new product development and productivity is likely therefore to be weak. In contrast, process innovation is about streamlining operations, so it should directly contribute to improved productivity (Huergo and Jaumandreu, 2004).

We also find that higher productivity is positively associated with the SME being over 20 years old, while enterprises aged less than five years tend to have lower productivity. This supports theories regarding the uncertainties of start-up and the role of learning by doing for achieving productivity gains. After controlling for other factors, women-led businesses record significantly lower productivity. The reasons for this are likely to be complex and warrant further investigation.

Consistent with the stage one analysis, SMEs located in London and South East have a positive relationship with productivity. In contrast, businesses located in deprived areas are negatively associated with productivity.

Regarding digital competences, SMEs that have their own websites are significantly more productive; however, reliance on third party websites to promote or sell products or service is negatively associated with productivity. Considering business networks, both use of social media business networks and membership of a Chamber of Commerce are positively associated with improved productivity.

Conclusions

Regional variations in productivity are persistent, and the NP and ME initiatives represent the latest attempts to spatially rebalance England's economy. Given this context, this study comparatively analyses the performance of SMEs located in the NP and ME regions, against those in England's core region of LSE using the UK Government's LSBS dataset. Based on the novel application of treatment effect analysis, findings indicate that firms in the NP and ME regions underperform in terms of productivity and exporting compared to comparable

businesses in the LSE region. In fact, the only performance indicator on which firms in the NP and ME regions outperform counterparts in the LSE regions is whether the enterprise recorded a profit in the previous 12 months. While this outcome is positive for the existing stock of businesses in the NP and ME, it may indicate that a relatively high proportion of SMEs in these regions lack a spur to improve productivity, sales and enter international markets.

The UK's Industrial Strategy seeks to realise growth and improvements in productivity across the whole of the UK (HM Government, 2017). However, the NP and ME initiatives regard urban areas as drivers of improvements in productivity, innovation and growth. Based on the analysis, the emphasis on urban-focused growth policies in the NP and ME initiatives appears misplaced. Rural firms in the NP region are just as likely to register similar levels of productivity, turnover, profit, sales growth, employment growth, exporting, potential to export and goods and service innovation to urban firms in this region. These results are similar to those for the ME region, but rural firms in the ME are more likely to innovate in goods than urban counterparts. Consequently, policies for enhancing regional performance should recognise and support the contribution of rural small businesses.

The third stage results suggest that greater focus should be given to process innovation, as this is where significant improvements in productivity can be realized. Digital capabilities and private sector business network membership can also boost SME productivity.

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